60459300



NOS VERSION 2 ANALYSIS HANDBOOK

CDC® COMPUTER SYSTEMS: CYBER 180 CYBER 170 CYBER 70 MODELS 71, 72, 73, 74 6000

.

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CDC[®] COMPUTER SYSTEMS: CYBER 180 CYBER 170 CYBER 70 MODELS 71, 72, 73, 74 6000

REVISION RECORD

REVISION	DESCRIPTION
A (04-26-82)	Manual released at NOS 2.0, PSR level 562. NOS Version 2 is the successor product to NOS Version 1. The file name table reorganization and support of models 825, 835, and 855 is documented. In addition, parameter changes and enhancements are included for the permanent file utilities, queue file utilities, mass storage subsystem utilities, data gathering utilities, memory dump directives, and system accounting information. The ASTIM, NSTIM, and VALNET commands have been deleted and a glossary has been added.
B (01-27-83)	Manual released at NOS 2.1, PSR level 580. New features include support of the Remote Host Facility, Remote Diagnostic Facility, Multi Host, and models 815, 865, and 875. Section 4 has been revised to include the NAMI and COLLECT utilities. Also the LFG and NDA utility descriptions have been revised and the Network Products Stimulator and NETUVSN utility have been deleted. New CMR dump directives have been added to section 10. The Controlware Loading utility described in section 14 has been expanded and rewritten. Section 16 has been added to describe the new RHF utilities. New diagnostic messages and glossary terms have also been added. Due to extensive changes, change bars and dots are not used, and all pages reflect the latest revision level. This edition obsoletes all previous editions.
C (10-11-83)	Manual released at NOS 2.2, PSR level 596. New features include support of project prologues and epilogues, enhanced system security, service class assignment by users, expanded equipment status table, reformatted TRACER output, network enhancements, and support of model 845. Also the K displays have been revised for permanent file utilities, queue file utilities, MODVAL, and PROFILE. Due to extensive changes, change bars and dots are not used, and all pages reflect the latest revision level. This edition obsoletes all previous editions.
D (10-05-84)	Manual released at NOS 2.3, PSR level 617. New features include support of the 721 console, CYBER 180 Computer Systems, 834 Disk Storage Subsystem, 639 Magnetic Tape Units, and Mass Storage Archival Subsystem.
	The NOS 2 Analysis Handbook, formerly the System Maintenance Reference Manual, no longer contains user validation and system accounting information (that information is now included in the NOS 2 Administration Handbook). All error messages have been moved to the NOS 2 Operations Handbook. New to this manual is the analysis information from part II of the Operator/Analyst Handbook, such as the DSD commands, DIS operations, K-display and L-display utilities, and network operations. Also incorporated in this manual are the deadstart decks (CMRDECKs, EQPDECKs, APRDECKs, IPRDECKs, and LIBDECKs), which were in the Installation Handbook. Due to extensive changes, change bars and dots are not used, and all pages reflect the latest revision level. This edition obsoletes all previous editions.
Publication No. 60459300	

REVISION LETTERS I, O, Q, S, X AND Z ARE NOT USED.

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or use Comment Sheet in the back of this manual.

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# PREFACE

This manual describes the CONTROL DATA® Network Operating System (NOS) Version 2. NOS 2 operates on these computer systems:

- CDC® CYBER 180 Computer Systems Models 810, 830, 835, 845, and 855
- CDC CYBER 170 Computer Systems Models 171, 172, 173, 174, 175, 176, 720, 730, 740, 750, 760, 815, 825, 835, 845, 855, 865, and 875
- CDC CYBER 70 Computer Systems Models 71, 72, 73, and 74
- CDC 6000 Computer Systems

# AUDIENCE

This manual assumes you are a site analyst. It assumes you are familiar with the hardware of your computer system(s) and that you understand the functions of the various components of NOS.

# ORGANIZATION

This manual includes information required for the day-to-day maintenance of the operating system and for troubleshooting. Topics discussed include the mass storage subsystems, network operations, the K and L utilities, backing up and reloading files, deadstart, and DIS operations.

Since the sections of the manual are self-contained in that they do not build on each other, the sections are ordered alphabetically by title. The appendixes include character set tables; a glossary; and descriptions of the SCOPE 2 Station Facility, the status/control register simulator, programmable format control for 580 printers, and disk pack reformatting for 881/883 units.

# CONVENTIONS

Models 815, 825, 835, 845, and 855 of the CYBER 170 Computer Systems share many of the functional and architectural attributes of the CYBER 180 Computer Systems. This manual uses the term CYBER 180-class machines when describing these similar models collectively.

Extended memory for model 176 is large central memory extended (LCME). Extended memory for models 865 and 875 and CYBER 180-class machines is unified extended memory (UEM). Extended memory for models 865 and 875 may also include either extended core storage (ECS) or extended semiconductor memory (ESM). Extended memory for all other NOS computer systems is either ECS or ESM. ECS and ESM are the only forms of extended memory that can be shared in a linked shared device multimainframe complex and can be accessed by a distributive data path (DDP).

In this manual, ECS refers to both ECS and ESM, and extended memory refers to all forms of extended memory unless otherwise noted. However, when referencing extended memory in the context of a linked shared device multimainframe complex or DDP access, UEM and LCME are excluded.

(Manuals dealing with the various form of extended memory are listed next, under Related Publications.)

# **RELATED PUBLICATIONS**

All of the manuals listed next are available through Control Data sales offices or through:

Control Data Corporation Literature Distribution Services 308 North Dale Street St. Paul, Minnesota 55103

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The following is a list of NOS operating system manuals.

The reader should be thoroughly familiar with the material in the following publications.

| Control Data Publication                                       | Publication Number |
|----------------------------------------------------------------|--------------------|
| NOS Version 2 Operations Handbook                              | 60459310           |
| NOS Version 2 Reference Set, Volume 2<br>Guide to System Usage | 60459670           |
| NOS Version 2 Reference Set, Volume 3<br>System Commands       | 60459680           |

The following publications provide additional information about NOS and its product set that may be useful to the reader.

| Control Data Publication                                      | Publication Number |
|---------------------------------------------------------------|--------------------|
| BML Message Formats                                           | 60459940           |
| COBOL Version 5 Reference Manual                              | 60497100           |
| Communications Control Program Version 3 Diagnostic Handbook  | 60471500           |
| COMPASS Version 3 Reference Manual                            | 60492600           |
| CYBER Cross System Version 1 Build Utilities Reference Manual | 60471200           |
| CYBER Initialization Package User's Handbook                  | 60457180           |
| CYBER Loader Version l Reference Manual                       | 60429800           |

| Control Data Publication                                                                                                                      | Publication Number |
|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| CYBER Supermini Operations Handbook                                                                                                           | 60459850           |
| CYBER Record Manager Advanced Access Methods Version 2<br>Reference Manual                                                                    | 60499300           |
| CYBER Record Manager Basic Access Methods Version 1.5<br>Reference Manual                                                                     | 60495700           |
| CYBER 70 Model 71 Computer System Hardware Reference Manual                                                                                   | 60453300           |
| CYBER 70 Model 72 Computer System Hardware Reference Manual                                                                                   | 60347000           |
| CYBER 70 Model 73 Computer System Hardware Reference Manual                                                                                   | 60347200           |
| CYBER 70 Model 74 Computer System Hardware Reference Manual                                                                                   | 60347400           |
| CYBER 170 Computer Systems Models 171 through 175 and 176<br>(Level A) Hardware Reference Manual                                              | 60420000           |
| CYBER 170 Computer Systems Models 720, 730, 750, 760, and 176 (Level B) Hardware Reference Manual                                             | 60456100           |
| CYBER 170 Computer Systems Model 825 Hardware Reference Manual                                                                                | 60469350           |
| CYBER 170/180 Computer Systems Models 835, 845, and 855<br>Hardware Operator's Guide                                                          | 60458390           |
| CYBER 170/180 Computer Systems Models 835, 845, 855, and 990<br>(CYBER 170 State) Hardware Reference Manual                                   | 60469290           |
| CYBER 170 Computer Systems Models 865 and 875<br>Hardware Reference Manual                                                                    | 60458920           |
| CYBER 180 Models 810 and 830 Hardware Operator's Guide                                                                                        | 60469440           |
| CYBER 180 Models 810 and 830 (CYBER 170 State)<br>Hardware Reference Manual                                                                   | 60469420           |
| FORTRAN Extended Version 4 Reference Manual                                                                                                   | 60497800           |
| FORTRAN Version 5 Reference Manual                                                                                                            | 60481300           |
| Message Control System Version 1 Reference Manual                                                                                             | 60480300           |
| Modify Version l Instant                                                                                                                      | 60450200           |
| Modify Version 1 Reference Manual                                                                                                             | 60450100           |
| MSSI Version 3 Reference Manual                                                                                                               | 60458820           |
| Network Products<br>Network Access Method Version l<br>Network Definition Language Reference Manual                                           | 60480000           |
| Network Products<br>Network Access Method Version 1/Communications Control Program<br>Version 3 Host Application Programming Reference Manual | 60499500           |

| Control Data Publication                                                                                                             | Publication Number |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Network Products<br>Network Access Method Version 1/Communications Control Program<br>Version 3 Terminal Interfaces Reference Manual | 60480600           |
| Network Products<br>Remote Batch Facility Version l Reference Manual                                                                 | 60499600           |
| Network Terminal User's Instant                                                                                                      | 60459380           |
| NOS Full Screen Editor User's Guide                                                                                                  | 60460420           |
| NOS Online Maintenance Software Reference Manual                                                                                     | 60454200           |
| NOS Screen Formatting Reference Manual                                                                                               | 60460430           |
| NOS Version 2 Administration Handbook                                                                                                | 60459840           |
| NOS Version 2 Applications Programmer's Instant                                                                                      | 60459360           |
| NOS Version 2 Diagnostic Index                                                                                                       | 60459390           |
| NOS Version 2 Installation Handbook                                                                                                  | 60459320           |
| NOS Version 2 Manual Abstracts <sup>†</sup>                                                                                          | 60485500           |
| NOS Version 2 Reference Set, Volume 1<br>Introduction to Interactive Usage                                                           | 60459660           |
| NOS Version 2 Reference Set, Volume 4<br>Program Interface                                                                           | 60459690           |
| NOS Version 2<br>Security Administrator´s Handbook                                                                                   | 60460410           |
| NOS Version 2 System Overview                                                                                                        | 60459270           |
| NOS Version 2 Systems Programmer's Instant                                                                                           | 60459370           |
| Remote Host Facility<br>Access Method Reference Manual                                                                               | 60459990           |
| Remote Host Facility Usage Manual                                                                                                    | 60460620           |
| SCOPE Version 2.1 Operator's Guide                                                                                                   | 60455090           |
| Software Publications Release History††                                                                                              | 60481000           |

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<sup>&</sup>lt;sup>†</sup>The NOS Manual Abstracts is a pocket-sized manual containing brief descriptions of the contents and intended audience of all NOS and NOS product manuals. The abstracts can be useful in determining which manuals are of greatest interest to a particular user.

<sup>&</sup>lt;sup>††</sup>The Software Publications Release History lists all of the software manuals and revision packets Control Data has issued. The history specifies the revision level of a particular manual that corresponds to the level of software installed at the site.

| Control Data Publication                        | Publication Number |
|-------------------------------------------------|--------------------|
| TAF Version 1 Reference Manual                  | 60459500           |
| TAF Version 1 User's Guide                      | 60459520           |
| TAF/CRM Data Manager Version 1 Reference Manual | 60459510           |
| Text Editor Reference Manual                    | 60436100           |
| Update 1 Reference Manual                       | 60449900           |

Programming information for the various forms of extended memory can be found in the COMPASS Reference Manual and in the appropriate computer system hardware reference manual. Hardware descriptions of the various forms of extended memory can be found in the following manuals.

| Control Data Publication                                                | Publication Number |
|-------------------------------------------------------------------------|--------------------|
| Extended Semiconductor Memory Hardware Reference Manual                 | 60455990           |
| Extended Core Storage Reference Manual                                  | 60347100           |
| Extended Core Storage II and Distributive Data Path Reference<br>Manual | 60430000           |

# DISCLAIMER

NOS and its product set are intended to be used only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features or parameters.

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By using the LOADBC command, you can download control module controlware, disk controlware, or network access device (NAD) controlware to the associated controller.

# CONTROL MODULE CONTROLWARE

You can use the LOADBC command to load controlware into a control module for the 834 Disk Storage Subsystem. The calling job must be of system origin or you must be validated for system origin privileges, and the system must be in engineering mode (refer to the DSD ENABLE command in section 5). LOADBC will issue appropriate messages to indicate the success or failure of the attempt to load controlware.

The format of the command is:

LOADBC,EQ=est,F=loadfile.

Parameter

Description

- EQ=est est is the EST ordinal of the control module in which to load the controlware.
- F=loadfile Name of the local file from which control module controlware is to be loaded. If F=loadfile is specified, local file loadfile must contain the control module controlware in binary format and an appropriate header (refer to the NOS 2 Installation Handbook). If F=loadfile is omitted, controlware is read from the system library SYSTEM.

## DISK CONTROLWARE

You initiate downloading of disk controlware only by entering a console command. Also, you can load the disk controlware from a channel only if it is either active or down and unassigned. The calling job must be of system origin or you must be validated for system origin privileges. The system must be in engineering mode (refer to the DSD ENABLE command in section 5). LOADBC will issue appropriate messages to indicate the success or failure of the disk controlware load attempt.

The format of the command is:

LOADBC,C=cc,F=loadfile,D=dumpfile.

Parameter

Description

C=cc

cc is a 2-digit octal number of the channel from which the disk controlware is to be loaded. The controlware can be loaded only if the channel status is UP, or if the channel status is DOWN and not assigned to a maintenance user.

1

# Parameter Description F=loadfile Name of the local file from which disk controlware is to be loaded. If F=loadfile is specified, local file loadfile must contain the disk controlware in binary format and an appropriate header (refer to the NOS 2 Installation Handbook). If F=loadfile is omitted, controlware is read from the system library SYSTEM. D=dumpfile Name of the local file to which 7155/7255 disk controlware is to be dumped before reloading. This parameter is ignored for other types of controllers and an informative message is issued. LOADBC performs a binary comparison between the old and new controlware and writes this data to a file that can be processed by DSDI by using the DMB parameter

# NETWORK ACCESS DEVICE (NAD) CONTROLWARE

The LOADBC command can be used to load NAD controlware into local NADs (380-170) and remote NADs (380-170, 380-200, 380-370, and 380-110). Since the NAD controlware is not automatically loaded at deadstart, LOADBC must be used before a local NAD can be used by the operating system. NAD controlware may be automatically loaded by the Remote Host Facility (RHF) when RHF is initiated. Refer to the RHF K display in section 8.

(refer to section 6 for information on DSDI).

LOADBC can be called from the console or a batch job. When loading 380-170 controlware into a local NAD, the EST entry associated with the NAD's channel number must be OFF or the controlware-not-loaded flag must be set.

When loading a remote NAD, a local NAD that is not reserved for maintenance must be defined in the EST. The EST entry must be ON. Controlware must be loaded and running in the local NAD before loading the remote NAD.

Remote NAD loading operations can occur concurrently with RHF use of the local NAD. However, extreme care should be exercised when performing a remote NAD load to ensure that the correct remote NAD is being loaded and that the remote NAD is not being used by the mainframe to which it is connected. LOADBC will issue appropriate messages to indicate the success or failure of the NAD controlware load attempt.

The format of the command is:

 $P_{i}$ 

Description

C=cc

The 2-digit octal number of the channel from which the NAD controlware is to be loaded. This parameter is required.

F=filename Name of the local file from which NAD controlware is to be loaded. If F=filename is specified, local file filename must contain the NAD controlware in binary format and an appropriate header (refer to the NOS 2 Installation Handbook). If F=filename is not specified, the NAD controlware type specified by the TY parameter is read from the system library SYSTEM. The following parameters apply only when loading remote NAD controlware.

| Parameter   | Description                                                                                                                                                                                           |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC=aaaa     | The 4-digit hexadecimal number specifying the remote NAD's access code (refer to the RHF K display in section 8). The default is AC=0000.                                                             |
| LT=t0t1t2t3 | The 4-digit binary bit pattern specifying the local trunk control units (TCUs) that are enabled. At least one TCU enable must be specified for remote NAD controlware loading. $t_n = 1$ enables TCU. |
|             | For example, LT=1010 indicates that local TCUs 0 and 2 are enabled.                                                                                                                                   |
| ND=nn       | The 2-digit hexadecimal number specifying the remote NAD's address (refer to the RHF K display in section 8). This parameter is required for remote NAD loads.                                        |
| TY=value    | Type of controlware to be loaded.                                                                                                                                                                     |
|             | value Description                                                                                                                                                                                     |
|             | 170 CYBER 170 controlware (380-170)                                                                                                                                                                   |
|             | 200 CYBER 200 controlware (380-200)                                                                                                                                                                   |
|             | IBM IBM controlware (380-370)                                                                                                                                                                         |

- MIN Minicomputer controlware (380-110)

The default value is TY=170.

Under certain conditions, a remote NAD loading operation will fail on the first attempt but a second loading attempt will succeed. This loading problem can be prevented by always preceding a remote NAD loading operation with a remote NAD dumping operation to ensure the remote NAD controlware is halted before loading is attempted.

For example, to load a remote NAD with NAD address 7F and access code FOFO connected to TCU 0 of the local NAD on channel 5, enter the following commands.

X.DMPNAD(CH=05,ND=7F,AC=F0F0,LT=1000) X.LOADBC(C=05,ND=7F,AC=F0F0,LT=1000)

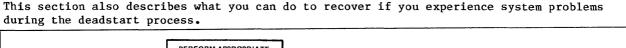
# DEADSTART

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# DEADSTART

Deadstart is the process that makes the system operational and ready to process jobs. After performing the appropriate deadstart procedures described in the CIP User's Handbook, you can continue the deadstart process as shown in figure 2-1 and described in detail following the figure.



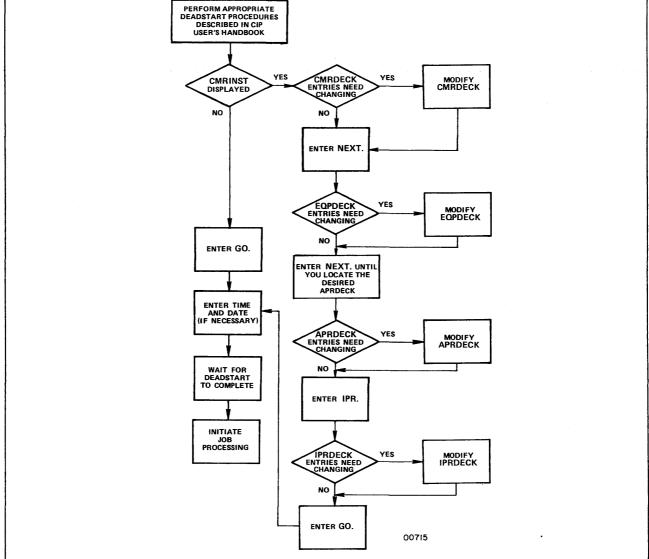


Figure 2-1. Deadstart Process

2

## NOTE

Modifying the deadstart decks (CMRDECK, EQPDECK, APRDECKs, and IPRDECK) does not apply to a level 3 recovery deadstart. Modifications made during the last level 0, 1, or 2 deadstart are recovered during a level 3 recovery deadstart.

# **MODIFYING THE CMRDECK**

If bit 6 of word 13 (word 12 for warmstart on a CYBER 70 or 6000 Computer System with an active PP) is set (ppp=001), or if you select the D=Y option on the \*P\* display, an instruction display entitled CMRINST appears on the console screen(s) after the CTI displays on a level 0, 1, or 2 deadstart. All valid CMRDECK entries are defined in this display. Several of the entries listed are assigned system default values. These values are assumed if the entries do not appear in the CMRDECK being used. To view the contents of the CMRDECK being used, toggle from the CMRINST display to the CMRDECK display. If either the CMRDECK or CMRINST overflows two screens, the display can be paged.

Modify the CMRDECK by entering the appropriate changes or additions from the console keyboard. These entries can be made while either CMRDECK or CMRINST is being displayed. Generally, each console entry supersedes the value currently specified in the CMRDECK (or default value in CMRINST).

Refer to section 3, Deadstart Decks, for complete information on all CMRDECK entries.

## NOTE

The modified CMRDECK remains in effect only until the next level 0 deadstart is performed. Changes to the CMRDECK are not recovered for the next deadstart unless a new deadstart file is created. If you want these changes to take place on the next level 0 deadstart, make the appropriate changes to the CMRDECK after NOS is up and running and use LIBEDIT to replace the record on the deadstart file.

After all CMRDECK modifications have been made and you want to modify an EQPDECK, APRDECK, or IPRDECK, enter:

NEXT.

Refer to Modifying the EQPDECK, Modifying the APRDECKs, or Modifying the IPRDECK in this section. Otherwise, to indicate that all modifications to the CMRDECK are complete and you want to begin loading the system, enter:

GO.

# **MODIFYING THE EQPDECK**

After completing all CMRDECK modifications, you can also modify the default EQPDECK, an APRDECK, or the IPRDECK being used. If no changes need to be made to any EQPDECK, but you do need to modify an APRDECK or the IPRDECK, refer to Modifying the APRDECKs or Modifying the IPRDECK later in this section.

To modify an EQPDECK, enter

NEXT.

while the CMRDECK or CMRINST is being displayed.

When processing the EQPDECK, four displays are available, which you can toggle through in a circular manner. You can make changes when the EQPDECK, EQPINST, or any one of the following four displays is being displayed at the console screen.

| Display               | Description                                                                                 |
|-----------------------|---------------------------------------------------------------------------------------------|
| Equipment Status      | Describes the hardware configurations (refer to figure $2-2$ ).                             |
| Mass Storage Status   | Describes how the system allocates files on a mass storage<br>device (refer to figure 2-3). |
| Mass Storage          | Describes initialization status of the devices (refer to figure                             |
| Initialization Status | 2-4).                                                                                       |
| Controlware Status    | Describes the status of the controlware loaded (refer to figure 2-5).                       |

Table 2-1 describes the entries that can be made only at the console keyboard at deadstart time and cannot be stored in the EQPDECK on the deadstart file. Refer to section 3, Deadstart Decks, for complete information concerning all EQPDECK entries.

After making the changes to EQPDECK you can toggle through the equipment display, mass storage display, mass storage initialization display, and controlware display to ensure all the changes are made.

### NOTE

The modified EQPDECK remains in effect only until the next level 0 deadstart is performed. Changes to the EQPDECK are not recovered for the next deadstart unless a new deadstart file is created. If you want these changes to take place on the next level 0 deadstart, make the appropriate changes to the EQPDECK after NOS is up and running and use LIBEDIT to replace the record on the deadstart file. After all EQPDECK modifications have been made and you want to modify an APRDECK or IPRDECK, enter:

NEXT.

Refer to Modifying the APRDECKs or Modifying the IPRDECK later in this section. Otherwise, to indicate that all modifications to the EQPDECK are complete and you want to begin loading the system, enter:

GO.

### EQUIPMENT STATUS DISPLAY

The equipment status display lists the status of all the devices.

Figure 2-2 illustrates the equipment status display.

|              |     | EQU  | IPMENT | STATU | IS  |       |     |   |
|--------------|-----|------|--------|-------|-----|-------|-----|---|
| (            | EST | TYPE | ST     | EQ    | UN  | CHANN | ELS |   |
|              | 0.  | RD   | ON     | 0.    | 00. | 00.   | •   |   |
|              | 1.  | DS   | ON     | 7.    | 00. | 10.   | -   |   |
|              | 2.  | NE   | ON     | 0.    | 00. | 00.   | -   |   |
| $\mathbf{X}$ | 3.  | TE   | ON     | Ο.    | 00. | 00.   | •   | / |
|              |     | ~    |        |       |     |       |     |   |

Figure 2-2. Equipment Status Display

Each entry in the display appears in this format:

| est    | type | st               | eq     | un       | channels                                             |
|--------|------|------------------|--------|----------|------------------------------------------------------|
| Header |      |                  |        |          | Description                                          |
| est    | EST  | ordina           | 1.     |          |                                                      |
| type   |      | ice typ<br>play. | e. The | e follow | wing device types can appear in the equipment status |
|        |      | CC               | Sate1  | lite Co  | oupler.                                              |
|        |      | CM               | Contr  | ol modu  | ule for an 834 Disk Storage Subsystem.               |
|        |      | СР               | 415 C  | ard Pur  | nch.                                                 |
|        |      | CR               | 405 C  | ard Rea  | ader.                                                |
|        |      | CS               | MSS C  | Cartridg | ge Storage Unit.                                     |
|        |      | CT               | MSS C  | artridg  | ge Transport.                                        |

# Header

# Description

| DB-i | 885-42 Disk Storage Subsystem (1 $\leq$ i $\leq$ 3; full track).      |
|------|-----------------------------------------------------------------------|
| DD-i | 834 Disk Storage Subsystem (1 $\leq$ i $\leq$ 8; full track).         |
| DE   | Extended memory.                                                      |
| DI-i | 844-21 Disk Storage Subsystem (1 $\leq$ i $\leq$ 8; half track).      |
| DJ-i | 844–41/44 Disk Storage Subsystem (1 $\leq$ i $\leq$ 8; half track).   |
| DK-i | 844-21 Disk Storage Subsystem (1 $\leq$ i $\leq$ 8; full track).      |
| DL-i | 844-41/44 Disk Storage Subsystem (1 $\leq$ i $\leq$ 8; full track).   |
| DM-i | 885-11/12 Disk Storage Subsystem (1 $\leq$ i $\leq$ 3; half track).   |
| DP   | Distributive data path to extended memory.                            |
| DQ-i | 885-11/12 Disk Storage Subsystem (1 $\leq$ i $\leq$ 3; full track).   |
| DV   | 819 Disk Storage Subsystem (single density).                          |
| DW   | 819 Disk Storage Subsystem (double density).                          |
| LP   | Any line printer.                                                     |
| LR   | 580-12 Line Printer.                                                  |
| LS   | 580-16 Line Printer.                                                  |
| LT   | 580-20 Line Printer.                                                  |
| MT   | Magnetic Tape Drive (7 track).                                        |
| NC   | 380-170 Network Access Device.                                        |
| NP   | 255X Network Processing Unit.                                         |
| NT   | Magnetic Tape Drive (9 track).                                        |
| RM   | Two-port multiplexer (models 865, 875, and CYBER 180-class machines). |
| SS   | MSAS Controller.                                                      |

TT Internal stimulation device.

### Description

The system creates the following device types at deadstart for internal use. Except for the display console, DS, physical hardware does not exist for these device types. The device types appear in the second column of the equipment status display along with the real device types.

- DS Display console (EST ordinal 18).
- NE Null equipment (EST ordinal 28).
- RD Used for online reconfiguration of mass storage (EST ordinal 0).
- TE Tape equipment (EST ordinal 38).
- TT Used for assignment of terminal files (EST ordinal 48).
- st Equipment status (ON, OFF, or DWN<sup>†</sup>).
- eq Equipment number that corresponds to switch settings on the controller that connects the equipment to the channel(s). The site engineer is responsible for setting these switches. Ask your customer engineer for the correct switch settings if you are unsure.
- un Unit number (serves as ID code for unit record devices). The identifier code (un parameter) provides a method of grouping peripheral devices when a site has several units. Output from a job read in through a card reader with identifier un can only be directed to a device with the same identifier. Changing the identifier code via the ROUTE command can direct program output to a special printer.

Most equipment has the unit number labeled on the equipment. Some equipment has the unit number as part of a switch or button. Ask your customer engineer for the correct unit numbers if you are unsure.

channels Channel(s) on which equipment is available. An asterisk (\*) instead of a
 period (.) following the channel number entry indicates that the channel is
 down.

# Header

<sup>†</sup> DWN is DOWN status. An equipment cannot be logically turned ON when in DWN status.

### MASS STORAGE STATUS DISPLAY

The mass storage status display provides detailed information about all mass storage devices. Figure 2-3 illustrates the mass storage status display.

| MASS | STORA GE | STATUS |        |  |
|------|----------|--------|--------|--|
| EST  | T YPE    | STATUS | FILES  |  |
| 5.   | DE       | A I    | S      |  |
| 6.   |          | SIB-   |        |  |
| 7.   | DB       | SI     | RT     |  |
| 10.  | DB       | SI     | RT     |  |
| 11.  | DB       | SI     | RT     |  |
| 14.  | DQ       |        |        |  |
| 15.  | DQ       |        |        |  |
| 16.  | DQ       |        |        |  |
| 17.  | DQ       | F      |        |  |
| 20.  | DQ       |        |        |  |
| 21.  | DQ       |        |        |  |
| 22.  | DL       | R      |        |  |
| 23.  | DL       | R      | ****** |  |
| 24.  | DL       | R      |        |  |
| 25.  | DL       | R      |        |  |

Figure 2-3. Mass Storage Status Display

Each entry in the display appears in this format: files est type status Description Header EST ordinal. est Device type: type 885-42 Disk Storage Subsystem (1  $\leq$  i  $\leq$  3; full track). DB-i 834 Disk Storage Subsystem (1  $\leq$  i  $\leq$  8; full track). DD-i DE Extended memory. 844-21 Disk Storage Subsystem (1  $\leq$  i  $\leq$  8; half track). DI-i 844-41/44 Disk Storage Subsystem (1  $\leq$  i  $\leq$  8; half track). DJ-i 844-21 Disk Storage Subsystem (1  $\leq$  i  $\leq$  8; full track). DK-i DL-i 844-41/44 Disk Storage Subsystem (1  $\leq$  i  $\leq$  8; full track).

### Description

- DM-i 885-11/12 Disk Storage Subsystem ( $1 \le i \le 3$ ; half track).
- DP Distributive data path to extended memory.
- DQ-i 885-11/12 Disk Storage Subsystem ( $1 \le i \le 3$ ; full track).
- DV 819 Disk Subsystem (single density).
- DW 819 Disk Subsystem (double density).

status Status conditions. Any combination of conditions can exist. The following codes are listed in the order in which they appear on the display.

- S A copy of the system resides on this device.
- M Device is shared by more than one mainframe. †
- R Device is removable.
- N Independent shared device.
- A Alternate system device.
- I Initialization requested or format is pending.
- P Preset of the device requested.
- D System dayfile on this device.
- C Account dayfile on this device.
- E Error log on this device.
- B Binary maintenance log on this device.
- F System default family on this device.
- G Checkpoint device. A copy of the checkpoint file resides on this device.

Header

<sup>†</sup> If a device is shared by two or more mainframes (status M), the mainframe identification is shown on the screen as the mainframe accesses the shared device.

### Description

- Types of files that are allowed on this device. Any combination of types files can exist. The following codes are listed in the order in which they appear on the display. Refer to the MSAL EQPDECK entry in section 3, Deadstart Decks. S Secondary rollout. LGO. B L Local. Ρ Primary. D Job dayfile. Rollout. R 0 Output.
  - I Input.
  - T Temporary.

### MASS STORAGE INITIALIZATION STATUS DISPLAY

The mass storage initialization status display shows the initialization status of mass storage devices on the system.

Figure 2-4 illustrates the mass storage initialization status display.

| MASS | STORAGE | INITIALIZATION | STATUS |      |      |         |     |      |
|------|---------|----------------|--------|------|------|---------|-----|------|
| EST  | ΤY      | OPTIONS        | т      | IAM  | DAM  | FM/PN   | DN  | NC   |
| 5.   | DE      | QSA            |        |      |      |         |     |      |
| 6.   | DB      | E-             |        |      |      |         |     |      |
| 7.   | DB      | PQ SAED        |        |      |      |         |     |      |
| 10.  | DB      | FT             |        |      |      |         |     |      |
| 11.  | DB      |                |        |      |      |         |     |      |
| 14.  | DQ      |                | F      | 377. | 377. | FEATURE | 40. | 000. |
| 15.  | DQ      |                | X      | 000. | 377. | R4IAE   |     | 000. |
| 16.  | DQ      |                |        |      |      |         |     |      |
| 17.  | DQ      |                |        |      |      |         |     |      |
| 20.  | DQ      |                |        |      |      |         |     |      |
| 21.  | DQ      |                |        |      |      |         |     |      |

Figure 2-4. Mass Storage Initialization Status Display

Header

| est     | type | option     | s t         | iam      | dam      | fm/pn                 | dn                   | nc            |
|---------|------|------------|-------------|----------|----------|-----------------------|----------------------|---------------|
| Header  |      |            |             |          | Des      | cription              |                      |               |
| est     | EST  | ordinal    | •           |          |          |                       |                      |               |
| type    | Dev  | lce type   | •           |          |          |                       |                      |               |
|         |      | DB-i       | 385-42 Dis  | k Storag | e Subsys | stem (1 <u>&lt;</u> 1 | i <u>&lt;</u> 3; f   | ull track).   |
|         |      | DD-1       | 334 Disk St | torage S | ubsystem | n (1 ≤ i ≤            | 8; full              | track).       |
|         |      | DE         | Extended me | emory.   |          |                       |                      |               |
|         |      | DI-1       | 344-21 Disl | k Storag | e Subsys | tem (1 <u>&lt;</u> 1  | L <u>&lt;</u> 8; h   | alf track).   |
|         |      | DJ-i       | 344-41/44 1 | Disk Sto | rage Sul | system (1             | <u>&lt; i &lt; 8</u> | ; half track) |
|         |      | DK-i       | 344-21 Disl | k Storag | e Subsys | tem (1 <u>&lt;</u> i  | L <u>&lt;</u> 8; f   | ull track).   |
|         |      | DL-1       | 344-41/44 1 | Disk Sto | rage Sul | system (1             | <u>&lt; i &lt; 8</u> | ; full track) |
|         |      | DM-i 8     | 885-11/12 1 | Disk Sto | rage Sub | system (1             | <u>&lt; i &lt; 3</u> | ; half track) |
|         |      | <b>DP</b>  | Distributiv | ve data  | path to  | extended m            | nemory.              |               |
|         |      | DQ-i 8     | 885-11/12 1 | Disk Sto | rage Sub | system (1             | <u>&lt; i &lt; 3</u> | ; full track) |
|         |      | DV         | 319 Disk St | torage S | ubsystem | (single d             | lensity)             | •             |
|         |      | DW 8       | 319 Disk St | corage S | ubsystem | (double d             | lensity)             | •             |
| options | Init | ialize o   | options. N  | laximum  | of eight | options a             | ire disp             | layed.        |
|         |      | FI         | 'ormat pack | ۲.       |          |                       |                      |               |
|         |      | T 7        | otal syste  | em.      |          |                       |                      |               |
|         |      | <b>P</b> 1 | Permanent f | Eiles.   |          |                       |                      |               |
|         |      | Q (        | ueue files  | 3.       |          |                       |                      |               |
|         |      | s :        | System day  | file.    |          |                       |                      |               |
|         |      | A A        | ccount day  | yfile.   |          |                       |                      |               |
|         |      | E I        | error log.  |          |          |                       |                      |               |
|         |      | B I        | Sinary main | ntenance | log,     |                       |                      |               |
| t       | Туре | e of unit  | device.     |          |          |                       |                      |               |
|         |      | F 1        | amily devi  | ice.     |          |                       |                      |               |
|         |      | X A        | uxiliary d  | levice.  |          |                       |                      |               |
|         |      |            |             |          |          |                       |                      |               |

Each line in the display appears in this format:

| Header | Description                                            |
|--------|--------------------------------------------------------|
| dam    | Direct access mask.                                    |
| fm/pn  | Family name/pack name.                                 |
|        | F Family name.                                         |
|        | X Pack name.                                           |
| dn     | Device number if the device unit is the family device. |
| nc     | Number of permanent file catalog tracks.               |

## **CONTROLWARE STATUS DISPLAY**

Controlware status display describes the status of the controlware loaded.

Figure 2-5 illustrates the controlware status display.

| (            | CONTROLWAR | RE STATUS   |   |
|--------------|------------|-------------|---|
| (            | CHANNEL    | CONTROLWARE |   |
|              | 00.        |             |   |
|              | 01 -       |             |   |
|              | 02.        |             |   |
|              | 03.        | NN          |   |
|              | 04 -       |             |   |
|              | 05 .       |             |   |
|              | 07.        | FM          |   |
|              | 10.        |             |   |
|              | 11.        | NN          |   |
|              | 12.        |             | / |
| $\mathbf{X}$ | 13.        |             |   |

Figure 2-5. Controlware Status Display

Each line in the display appears in this format:

 channel
 controlware

 Header
 Description

 channel
 Channel on which equipment is available.

 controlware
 Name of the controlware loaded. Refer to the LBC EQPDECK entry in section 3, Deadstart Decks, for a list of controlware types.

# Table 2-1. EQPDECK Entries (Sheet 1 of 3)

| Entry                                                                 | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AUTOLOAD.                                                             | Toggles the selection of buffer controller autoload-<br>ing for all 7054/7154/7152/7155/7255 control module<br>controllers. This entry is valid only when entered<br>from the console keyboard. That is, the AUTOLOAD<br>entry cannot be included as part of the EQPDECK on<br>the deadstart file. This entry, which affects all<br>7054/7154/7152/7155/7255 control module controllers<br>defined on the mainframe being deadstarted, is not<br>necessary for normal system operation but is<br>provided as an aid to hardware checkout.                                                                                                                                                                                                                      |
| GRENADE .                                                             | Toggles the selection of the grenade function. This<br>entry is valid only when entered from the console<br>keyboard. That is, the GRENADE entry cannot be<br>included as part of the EQPDECK on the deadstart<br>file. The grenade function is issued to all<br>7054/7154/7152/7155/7255 control module controllers,<br>once the controlware is loaded. This function<br>causes unit reservations to be cleared on all 834<br>and 844 units physically connected to each<br>controller. This entry is normally used when a unit<br>reservation from a downed mainframe exists on a<br>device. Use this entry with caution since it can<br>interrupt the operation of another machine that<br>could be accessing affected units through another<br>controller. |
| INITIALIZE,op,est <sub>1</sub> ,est <sub>2</sub> ,,est <sub>n</sub> . | Creates new labels for the specified mass storage<br>devices during a level 0 deadstart. This entry is<br>valid only when entered from the console keyboard.<br>That is, the INITIALIZE entry cannot be included as<br>part of the EQPDECK on the deadstart file. Before<br>any mass storage device defined in the EQPDECK (by an<br>EQ entry) can be used, it must have a label that can<br>be recognized by the system. Existing labels are<br>normally recovered automatically during all levels of<br>system deadstart. However, if the existing label is<br>destroyed (for example, during maintenance operations<br>on the device) or if a new mass storage device is<br>added to the system, you enter the INITIALIZE command<br>to create a new label. |
|                                                                       | op Level of initialization:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                       | AL Total initialization.<br>PF Permanent files.<br>QF Queued files.<br>DF System dayfile.<br>AF Account dayfile.<br>EF Error log.<br>FP Format pack (844).<br>MF Binary maintenance log.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Entry | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | est <sub>1</sub> The 1- to 3-digit number specified in<br>the EQ entry for the device (for<br>example, EQ005). This is also the<br>EST ordinal for the device. Any number<br>of devices can be initialized with the<br>same level of initialization, provided<br>the command is no more than 72<br>characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| · · · | Depending upon the levels of initialization<br>selected, all or part of the previously existing<br>information on the device is lost when the new label<br>is created. Total initialization of 844 format pack<br>(AL or FP options) destroys all information on a<br>device. The other options selectively purge<br>information. A separate INITIALIZE entry is<br>required for each option selected. Selecting FP<br>results in an automatic system selection of AL. The<br>system deletes all existing files, including a<br>system deadstart file, from a device initialized<br>with the AL option. CTI, MSL, and HIVS information<br>is not deleted when a device is initialized with the<br>AL option. You cannot initialize the device from<br>which you are deadstarting. You should initialize a<br>device if you just loaded CTI, HIVS, or MSL on it.                                                                                                                                                                                            |
|       | No options (except AL and FP) are processed until<br>deadstart is completed. At that time, the K display<br>is requested and you must enter the family name (FM)<br>and device number (DN) of the device to be<br>initialized. This is a final check to ensure that<br>the correct device is being initialized; the<br>selected options are then processed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|       | If permanent files are to reside on the device being<br>initialized, the EQPDECK should contain a PF entry<br>for that device. The PF entry corresponds to the<br>EST ordinal specified in the EQ entry and indicates<br>that permanent files can reside on the device. If<br>the EQPDECK displayed contains a PF entry for the<br>device being initialized, a new PF entry is not<br>required unless the existing entry is to be altered,<br>or the associated EQ entry is altered. Redefining<br>the existing EQ entry clears all associated<br>attributes. In addition, if PF entries do not exist<br>in the EQPDECK, initializing the device causes a<br>default family name and device number to be<br>assigned. Thus, it is necessary to reestablish the<br>PF entry via the console keyboard if the device is<br>to remain a permanent file device. For this reason,<br>it is recommended that the PF entry for all mass<br>storage devices used for permanent files reside in<br>the EQPDECK. Although this is recommended, it is<br>not required. |

## Table 2-1. EQPDECK Entries (Sheet 3 of 3)

| Entry                                                          | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | If the EQ entry in the EQPDECK displayed indicates<br>that the status of a particular mass storage device<br>is off when the INITIALIZE entry is made, initialize<br>status is maintained and occurs automatically when<br>the DSD command ON is entered for that device during<br>normal system operation.                                                                                                                                                                                         |
|                                                                | Note that initialization of mass storage devices can<br>also be accomplished during normal system operation<br>via the DSD command INITIALIZE.                                                                                                                                                                                                                                                                                                                                                      |
| PRESET,n.                                                      | Initializes tables (MST, TRT, MRT, and DAT) on the<br>link device that are required for the management of<br>shared multimainframe mass storage devices. The<br>entry is valid only for level 0 deadstarts by the<br>first mainframe in the multimainframe complex to<br>deadstart. This entry is valid only when entered<br>from the console keyboard. That is, the PRESET<br>entry cannot be included as part of the EQPDECK on<br>the deadstart file.                                            |
|                                                                | n Number of shared devices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                | If you do not specify n, the link device is preset,<br>and the amount of table space reserved for the<br>shared devices is determined by the number of shared<br>device entries in the EQPDECK.                                                                                                                                                                                                                                                                                                     |
| PRESET=est <sub>1</sub> ,est <sub>2</sub> ,,est <sub>n</sub> . | Presets independent shared devices in a<br>multimainframe complex. It is valid only on a<br>level 0 deadstart by the first mainframe in the<br>multimainframe complex. This entry is valid only<br>when entered from the console keyboard. That is,<br>the PRESET entry cannot be included as part of the<br>EQPDECK on the deadstart file.                                                                                                                                                         |
|                                                                | est <sub>i</sub> EST ordinal of independent shared device                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| RESET=estl,est2,,est <sub>n</sub> .                            | Rescinds all device-related attributes except those<br>specified on the EQ entry. It restores the values<br>specified with the last encountered EQest entry. If<br>the DOWN command was specified, EQest <sub>n</sub> will be up,<br>but off. Ranges of ordinals are not allowed; each<br>ordinal must be entered individually. This entry is<br>valid only when entered from the console keyboard.<br>That is, the RESET entry cannot be included as part<br>of the EQPDECK on the deadstart file. |

. . .

# **MODIFYING THE APRDECKs**

After completing all EQPDECK modifications, you can also modify the default APRDECK, the APRDECK for a specific equipment, or the IPRDECK being used. You can modify an APRDECK only when you are initializing the corresponding equipment. If no changes need to be made to any APRDECK, but you do need to modify the IPRDECK, refer to Modifying the IPRDECK later in this section.

The APRDECK contains entries identifying areas of mass storage that are not usable (flaws). The APRDECK used can vary from equipment to equipment. One of the parameters specified when an equipment is defined in the EQPDECK is the APRDECK number that applies to that equipment. The default (APRD00) is selected if this parameter is not specified.

To modify an APRDECK, enter

NEXT.

while the EQPDECK or EQPINST is being displayed. The APRINST display describes the valid entries. You can toggle between the APRDECK and APRINST. Enter the changes or additions to the APRDECK from the console keyboard (refer to section 3, Deadstart Decks, for a description of the entries).

If there are no changes to the APRDECK displayed, enter

NEXT.

to go to the next APRDECK. Repeat this process until the appropriate APRDECK is displayed or until you have changed all APRDECKs needing changes.

After all APRDECK modifications are complete, you can skip to the IPRDECK by entering:

IPR.

Refer to Modifying the IPRDECK, next, for more information. Otherwise, to indicate that all modifications to the APRDECKs are complete and you want to begin loading the system, enter:

GO.

## **MODIFYING THE IPRDECK**

The IPRDECK contains installation parameters that describe the mode of system operation. IPRDECK modification is seldom required during deadstart since nearly all IPRDECK commands are also valid DSD commands that make the same changes during normal system operation. Generally, installation parameters changed during normal operations (with DSD commands or by modifying the IPRDECK) are retained only across a level 3 recovery deadstart.

After entering

IPR.

when all the CMRDECK, EQPDECK, or APRDECK modifications are complete or after repeatedly entering

NEXT.

to step through all the APRDECKs, the instruction display entitled IPRINST appears on the console screen(s). This display defines all valid IPRDECK entries. Most of these entries are also valid DSD commands.

To view the contents of the IPRDECK being used, toggle from the IPRINST display to the IPRDECK display. If either the IPRDECK or IPRINST overflows two screens, you can page the display.

Enter the appropriate changes or additions from the console keyboard. These entries can be made while either IPRINST or IPRDECK is being displayed. A console entry supersedes the value currently specified in the IPRDECK.

## NOTE

The modified IPRDECK remains in effect only until the next level 0, 1, or 2 deadstart is performed. Changes to the IPRDECK are retained if a level 3 recovery deadstart is performed. If you want these changes to take place on the next level 0 deadstart, make the appropriate changes to the IPRDECK after NOS is up and running and use LIBEDIT to replace the record on the deadstart file.

For complete information concerning IPRDECK entries, refer to section 3, Deadstart Decks, and to section 5, DSD Commands.

To indicate that changes to the CMRDECK, EQPDECK, APRDECK, and/or IPRDECK are completed and you want to begin loading the system, enter:

GO.

# LOADING THE SYSTEM

If you are performing a level 0 or level 2 deadstart, the system library is automatically loaded from the deadstart file to each mass storage device specified in the EQPDECK as a system device. If no system device is specified, the system is loaded on the first nonremovable mass storage device in the equipment status table.

Mass storage labels are validated for all levels of deadstart. This ensures that the configuration matches the one specified in the EQPDECK. Normally, the device label validation display appears for only a few seconds. However, this display remains longer (from 30 to 120 seconds) if 834 disk units must first be automatically spun up in order to validate their labels.

If you specify a level 1 or level 3 recovery deadstart, the system library is not reloaded. In this case, the deadstart file is rewound and is not accessed again until another deadstart operation is performed. The system library is recovered from checkpoint information on mass storage. Central memory tables such as the system file name table (FNT), executing job table (EJT), queued file table (QFT), equipment status table (EST), and track reservation table (TRT) are either recovered from checkpoint information for level 1 or from central memory (and the link device, extended memory, if in multimainframe mode) for level 3.

If a deadstart error occurs, a message appears on the right console screen and, depending upon the nature of the error, deadstart processing may halt. Refer to Error Processing later in this section for complete information and corrective action. If the system is being loaded (level 0 or 2 only), the name of each system library program is also displayed on the right console screen as it is being loaded. This allows you to monitor deadstart progress.

The left console screen may display the message ENTER DATE YY/MM/DD. You can enter the date while the system is being loaded.

#### ENTERING THE DATE AND TIME

Each time a system deadstart function is performed, it is necessary to enter the current date and time. The system uses the date and time (updated every second) for dayfile messages and for permanent file catalogs and directories for files being accessed. This includes the creation, last modification, and last access date and time for each permanent file in the system. It is important to enter the correct date and time in order to accurately maintain these system records. If you are performing a level 3 recovery deadstart, it is possible to recover the date and time from the previous system deadstart. However, this is not recommended since the new date and time recorded for system records would no longer be accurate.

When the system loading (or recovery) phase of deadstart is about to begin, the system checks for the presence of a wall clock chip. If the clock is present, the date and time are automatically read from it. If the clock is not present, the following message appears on the left console screen requesting entry of the current date.

ENTER DATE YY/MM/DD.

Enter the current date, followed by CR, in this format:

yy/mm/dd.

- yy Year; 00 through 99.
- mm Month; 01 through 12.
- dd Day; 01 through nn (nn is the number of days in the month).

For deadstart levels 0, 1, and 2, pressing CR without first entering the date causes the system to assume the date that the deadstart file was created. For a level 3 recovery deadstart, pressing CR alone recovers both the previous date and time (time entered during the last deadstart plus time accumulated until this deadstart).

When the system accepts the date entry, it displays the following request for entry of the current time.

ENTER TIME HH.MM.SS.

Enter the current time in this format:

hh.mm.ss.

hh Hour; 00 through 23.

- mm Minute; 00 through 59.
- ss Second; 00 through 59.

For deadstart levels 0, 1, and 2, pressing CR without first entering the time causes the system to set the time to 00.00.00. If you enter CR alone following the date prompt on a level 3 recovery, this prompt to enter time does not appear (the previous time is assumed).

# **INITIATING JOB PROCESSING**

DSD commands specified in the IPRDECK automatically initiate normal job processing except on a level 3 recovery where you must enter AUTO. If a level 1 or level 3 recovery deadstart is being performed, the system recovers all jobs and active files and resumes normal operation immediately. However, if an initial deadstart (level 0) or level 2 recovery deadstart is being performed, job processing may not be initiated immediately. The time of initiation depends upon the time it takes to load the system from the deadstart file (you can monitor progress on the right console screen). If file loading is not completed when the time entry is made, the DSD commands specified in the IPRDECK are displayed on the left screen. Until file loading completes, you can clear one or more of the DSD commands.

Clearing a command prevents it from being executed when file loading completes. In this case, you must manually enter the commands necessary to initiate job processing from the console keyboard.

To initiate job processing, enter either:

AUTO.

or

MAINTENANCE.

Following entry of the AUTO or MAINTENANCE command during an initial (level 0) deadstart, the deadstart sequencing process begins. Deadstart sequencing causes job processing to be suspended until all system files in the default family are initiated. To initiate a family other than the default, enter the command:

X.ISF(FM=family)

Parameter

#### Description

family Alternate family of devices.

For additional information concerning the ISF command and deadstart sequencing, refer to section 20, System File Initialization.

Normal job processing begins after the deadstart sequencing job completes. If the AUTO command is entered, the subsystems enabled in the IPRDECK are automatically assigned to specified control points. Assuming that all standard subsystems are set to be enabled, the system calls them to specific control points as shown in the following example.

| Control Point Number | Job Sequence Name | Activity                                   |
|----------------------|-------------------|--------------------------------------------|
| 1                    | IAF               | Interactive Facility.                      |
| 2                    | NAM               | Network Access Method.                     |
| 3                    | RHF               | Remote Host Facility.                      |
| 4                    | SMF               | Screen Management Facility.                |
| 5                    | NEXT              | Available for automatic system assignment. |
|                      |                   |                                            |
| •                    | •                 |                                            |
| n-3                  | NEXT              |                                            |
| n-2                  | MAG               | Magnetic tape subsystem executive routine. |
| n-1                  | BIO               | Central site batch input/output.           |
| n                    | RBF               | Remote Batch Facility.                     |
| n+1                  | SYS               | System.                                    |

The MAINTENANCE command performs the same function as the AUTO command. Additionally, it assigns several maintenance routines, according to mainframe type, to available control points and runs them as normal jobs with minimum queue and CPU priorities. These are CPU or central memory test routines designed to detect hardware errors. The routines display error messages either at the control point on the B,O display or in the system error log. To display the error log, enter:

#### A,ERROR LOG.

You should monitor these routines from time to time. If a maintenance routine displays an error message indicating a hardware malfunction occurred, call a customer engineer. It is recommended that these programs be run at all times. The maintenance programs use little memory, are run at minimum CPU and queue priority, and are automatically rolled out if necessary; thus, system performance is not severely affected. Descriptions of the maintenance routines are in the NOS Online Maintenance Software Reference Manual.

in is the number of control points defined in the CMRDECK.

# PREPARING FOR RECOVERY DEADSTART

Sometimes during system operation an uncorrectable error occurs that prevents further system activity. Often the situation can be corrected by deadstarting the system and recovering prior activity. The success of such a recovery depends upon the severity of the problem and the extent to which system information is destroyed. There are three levels of recovery deadstart available (levels 1, 2, and 3). Table 2-2 lists each deadstart level, including level 0 (initial deadstart), and describes the extent of recovery possible.

If the MS VALIDATION installation option is enabled during a level 1 or 2 recovery, or if both the MS VALIDATION and PF VALIDATION options are enabled during a level 3 recovery, the system:

- Verifies selected mass storage files.
- Checks files identified in the queued file table (QFT) to ensure that all tracks in the chain are reserved and that no circular linkage exists.
- Depending on file type, checks the track reservation table (TRT) to ensure that the file is preserved.
- Checks all preserved files for proper length.

If the system encounters a verification failure, it clears the queued file table entry but does not release disk space assigned to the file. If a length error is detected, the system sets error idle status and terminates recovery operations on the device. To recover from an error idle condition, refer to Error Idle Recovery under Error Processing later in this section.

During level 0 deadstart, the system verifies the length of preserved files regardless of the setting of the MS VALIDATION option. If a length error is detected, the system reads the disk chain to determine the correct length of the file, issues a message to the B,O display, and stops recovery of the device. To alter the EOI for the file and proceed with recovery, enter:

GO,SYS.

To terminate recovery of the device, enter:

PAUSE, SYS.

## Table 2-2. Levels of System Deadstart

| Deadstart<br>Level | Jobs                                         | Queued Files                       | Permanent<br>Files | System                             | System<br>Dayfiles |  |
|--------------------|----------------------------------------------|------------------------------------|--------------------|------------------------------------|--------------------|--|
| 0                  | Input and output<br>queues recovered.†       | No •                               | Yes.               | No.                                | Yes.tt             |  |
| 1                  | Recovered from<br>last checkpoint.           | Recovered from<br>last checkpoint. | Yes.               | Recovered from<br>last checkpoint. | Yes.               |  |
| 2                  | Recovered from<br>last checkpoint.           | Recovered from<br>last checkpoint. | Yes.               | No .                               | Yes.               |  |
| 3                  | Recovered from<br>CM copy of EJT. <b>†††</b> | Recovered from<br>CM copy of QFT.  | Yes.               | Yes.                               | Yes.               |  |

files. Input files associated with jobs currently executing are returned to the input queues, unless the device they reside on is initialized. Permanent files are recovered unless the device is initialized.

The following topics provide general information concerning each level of system deadstart and recommended steps of preparation.

## CAUTION

Before attempting any level of recovery deadstart (including level 0), examine the current status codes listed for each mass storage device in the disk status display (E,M). Delay deadstart if status code C (checkpoint requested) appears for any device. When the system has processed the request, status code C is cleared (within 30 seconds). Refer to the NOS 2 Operations Handbook for complete information concerning the disk status display (E,M). Failure to observe this caution may result in the loss of permanent file information.

#### LEVEL 3 RECOVERY DEADSTART

Usually you perform a level 3 recovery deadstart following an equipment or system malfunction (for example, channel or PP hung), providing the system remains intact. Basically, the system FNT, QFT, EJT, TRT, EST, and control-point areas of central memory must be intact in order to successfully perform a level 3 recovery deadstart. However, unless you can determine that central memory is no longer intact, attempt a level 3 recovery deadstart before a level 0 deadstart. This is recommended because system activity, as it existed at the time of the malfunction, can best be recovered by performing a level 3 recovery deadstart. Only PP memory confidence testing occurs during a level 3 recovery deadstart; central memory is not affected.

Requests for device checkpoint are retained over a level 3 recovery. Therefore, if a system malfunction prevents a device checkpoint from being done, the checkpoint is processed after level 3 recovery is successfully completed. If a level 3 recovery fails, always do another level 3 recovery with the ABORT option selected before doing a level 0 deadstart. This ensures that all checkpoint processing is done correctly.

On a level 3 deadstart the CMRDECK, the EQPDECK, the APRDECKs, and the IPRDECK cannot be viewed or changed. The CMRDECK, the EQPDECK, the APRDECKs, and the IPRDECK specified during the last level 0 deadstart remain in effect. If you set the CMRDECK switch (bit 6 in word 13 of the deadstart panel) or select the D=Y option on the CTI \*P\* display; the system halts and displays level 3 deadstart options. The options and their default values are displayed on the left screen (figure 2-6) and instructions on the right screen (figure 2-7).

| LEVEL 3 OPTIONS |     |
|-----------------|-----|
| ABORT.          | NO  |
| ABORT, B.       | NO  |
| AUTOLOAD.       | YES |
| GRENADE.        | NO  |
| AUTO.           | YES |

Figure 2-6. Level 3 Deadstart Left Screen Display

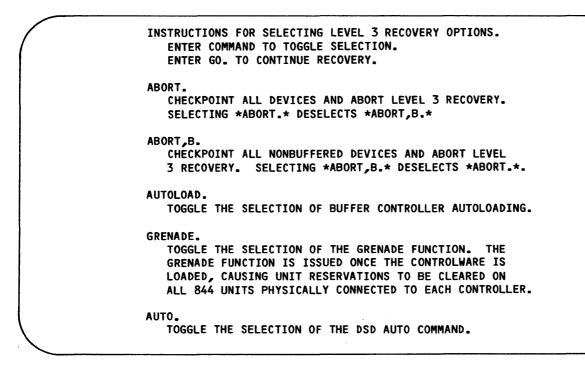


Figure 2-7. Level 3 Deadstart Right Screen Display

Entering a command will toggle the level 3 deadstart selections. The ABORT command checkpoints all the devices and aborts level 3 recovery. Selecting the ABORT command automatically deselects the ABORT,B command. The ABORT,B command checkpoints all the nonbuffered devices and aborts level 3 recovery. Selecting the ABORT,B command automatically deselects the ABORT command. The AUTOLOAD command toggles the selection of buffer controller autoloading. The GRENADE command toggles the selection of the grenade function. The AUTO command toggles the selection of the DSD AUTO command. Refer to table 2-1 for more information about the AUTOLOAD and GRENADE commands. When you are done making changes, enter

GO.

to continue the deadstart recovery. If you choose not to display the level 3 options, the default values are used.

A level 3 recovery deadstart is impossible after:

- An attempted checkpoint recovery (level 1).
- An aborted level 0 (initial) deadstart.
- The MREC utility (refer section 8, K-Display Utilities) has been run for the machine to be deadstarted while in multimainframe mode.

It is recommended that you stop system activity prior to beginning the system deadstart procedure. To accomplish this, enter the following DSD commands.

| Command             | Description                                                                                                                                                                                                                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E,M.                | Displays the disk status display (E,M).                                                                                                                                                                                                                                                                          |
| CHECK POINT SYSTEM. | Provides for termination of job processing and for writing the<br>contents of central memory tables to mass storage. For a<br>complete description of this process, refer to the CHECK POINT<br>SYSTEM command in section 5, DSD Commands.                                                                       |
| STEP.               | Prevents the system from processing PP requests. This stops<br>all central memory input/output (I/O) operations. You should<br>enter the STEP command after all device checkpoints are<br>completed. Determine checkpoint status from the disk status<br>display (E,M) (refer to the NOS 2 Operations Handbook). |

## NOTE

To recover interactive users after a level 3 recovery, sense switch 1 must be set in the IAF procedure. Sense switch 1 is set by default in the released IAF procedure.

#### LEVEL 1 RECOVERY DEADSTART

Usually you perform a level 1 recovery deadstart to resume normal processing following maintenance procedures. The system, all jobs, and all active files are recovered from checkpoint information on mass storage.

NOTE

A level 1 recovery deadstart is not intended to be a recovery process after a system/ equipment malfunction. You should never attempt it after a level 3 recovery deadstart fails.

Level 1 recovery is also useful in system test situations. If two systems are being alternated, separate mass storage devices and tapes<sup>†</sup> must be available for both systems. Tapes are not repositioned after a level 1 deadstart. Thus, if a job was previously assigned to the tape unit that has been used for deadstarting, the job cannot be recovered. The tape unit should be left unloaded after recovery until it is no longer assigned to the job (job aborted).

The following rules apply when performing a level 1 recovery deadstart.

- The DSD command CHECK POINT SYSTEM must have been successfully completed immediately before the end of the last NOS operating period.
- The contents of the extended memory must not be destroyed from the time of the CHECK POINT SYSTEM command.
- Memory dumps must be completed before level 1 recovery deadstart begins since memory confidence testing destroys the contents of both central memory (except on CYBER 180-class machines) and PPs.
- The mass storage equipment configuration must be the same as specified during the most recent level 0 deadstart; that is, the same EQPDECK must be used.
- The system devices (mass storage devices on which the system library resides) must be the same as or fewer than those specified during the most recent level 0 deadstart.

<sup>&</sup>lt;sup>†</sup>Separate tapes are necessary only if tape jobs are being checkpointed.

It is recommended that you stop system activity before beginning the system deadstart procedure. To accomplish this, enter the following DSD commands.

| Command             | Description                                                                                                       |
|---------------------|-------------------------------------------------------------------------------------------------------------------|
| CHECK POINT SYSTEM. | Provides for termination of job processing and for writing the contents of central memory tables to mass storage. |
| UNLOCK.             | Necessary only if console is currently locked.                                                                    |
| STEP.               | Prevents the system from processing PP requests. This stops all central memory I/O operations.                    |

#### LEVEL 2 RECOVERY DEADSTART

Usually you perform level 2 recovery deadstart in system test situations; it is not recommended for the normal production environment. If you select level 2 recovery, all jobs and active files are recovered from checkpoint information on mass storage as in level 1 recovery. However, no attempt is made to recover the system. Instead, the system is loaded from the deadstart file as in level 0 deadstart. In all other respects, level 2 recovery is identical to that described for level 1, and all level 1 rules apply.

## LEVEL O INITIAL DEADSTART

Use level 0 or initial deadstart in cases where a recovery deadstart is not possible. This is a complete or initial load from the deadstart file. Only preserved files, which include permanent files, queued files, and system dayfiles, are recovered (preserved files are recovered on all levels of system deadstart). Because memory confidence testing destroys the contents of central memory (except on CYBER 180-class machines) and PPs, all memory dumps must be completed before deadstart begins.

NOTE

If the machine is the first machine being deadstarted in a shared device multimainframe environment, you must enter a PRESET command (refer to section 13, Multimainframe Operations).

# **ERROR PROCESSING**

If no CTI display appears when you initiate a deadstart, perform the following steps as needed. After each step, reinitiate the deadstart to see if the problem has been eliminated.

Deadstart from tapet:

- 1. If the unit select switch on the deadstart tape unit is not on (tape does not move), check the channel, controller, and unit selections on the deadstart panel or display to ensure they are set correctly.
- 2. If the unit select switch is on, the correct unit was selected; however, check word ll of the deadstart panel or display to ensure it is set correctly.
- 3. Ensure that a 7-track tape is not mounted on a 9-track drive or vice versa. Also, ensure that a deadstart tape is not mounted on a tape unit that does not support the density of the deadstart tape.
- 4. Ensure that the deadstart tape is an I-format unlabeled tape.
- 5. Ensure that the card reader and tape unit (667 or 669 only) are not on the same channel and that the card reader is not on a channel with a PP. Also, ensure that two or more units do not have the same physical unit number.
- 6. If still no display appears after initiating the deadstart, there might be a parity error on one of the first records of the deadstart tape or the magnetic tape controller might have detected a channel parity error on a CYBER 170 Computer System.

<sup>&</sup>lt;sup>†</sup>When deadstarting a CYBER 180-class machine, the disk containing the CIP module must be used.

Deadstart from disk:

- la. For an 844 or 885 disk, ensure that the disk is spinning, the READY light is on, and the SELECT light is on.
- lb. For an 834 disk, ensure that the start button is pushed in and the power switch is on.
- 2. Ensure that the disk has the CIP module loaded.
- 3. Ensure that the deadstart panel or display is set correctly.
- 4. Select an alternate channel.
- 5. If still no display appears after initiating the deadstart, there might be a parity error on one of the first records of the deadstart file or the disk controller might have detected a channel parity error on a CYBER 170 Computer System.

For a proper understanding of the problems that can occur during deadstart, you should be familiar with several basic concepts. For example, because most errors that occur involve mass storage devices, you should be familiar with their use in the system. Each mass storage device has a label that contains descriptive information about its contents. For certain levels of recovery deadstart, this information must be consistent with corresponding information either contained in central memory or provided through deadstart procedures. Conflicts can result in the system issuing deadstart error messages. An attempt is made to recover all mass storage devices defined in the EST during all levels of system deadstart.

The specific recovery function performed depends upon the level of deadstart selected. Table 2-3 describes the recovery function performed for each deadstart level and the types of errors you can encounter. The system response to errors and the recommended action are also listed.

Refer to the NOS 2 Operations Handbook for information concerning all deadstart messages.

|                                                                                 |                       |                                                                                                                                  |                                                           |                                                                                                                                                                                                                                                               | ····                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recovery Function                                                               | Level of<br>Deadstart | Description of Error                                                                                                             | Type of Device                                            | System Response to Error                                                                                                                                                                                                                                      | Action                                                                                                                                                                                                                   |
| Read and verify the<br>label on each mass<br>storage device                     | 0                     | Device being recovered is<br>not ready and, therefore,<br>cannot be read.                                                        | Removable.                                                | Error code NR and status U set in<br>MST; device is left unavailable.                                                                                                                                                                                         | None.                                                                                                                                                                                                                    |
| against that<br>specified by the EQ<br>definition for the<br>device in EQPDECK. |                       | calliot be read.                                                                                                                 | Nonremovable.                                             | Wait and retry. Error message<br>appears on the right screen<br>display.                                                                                                                                                                                      | Check to ensure that all<br>nonremovable devices are<br>ready.                                                                                                                                                           |
| device in Bornbox.                                                              |                       | Read error occurred when<br>attempting to read label<br>(parity error, surface<br>error, and so on).                             | A11.                                                      | Advance to next track and try to<br>read. A predetermined number of<br>tracks are searched if error<br>persists. If this number is<br>exceeded, the device is treated<br>as if a bad label existed. Refer<br>to the description of bad label<br>error, below. | None.                                                                                                                                                                                                                    |
|                                                                                 |                       | Label verification error.<br>The label was read but<br>could not be verified.<br>For example, label<br>indicates device is first | Nonsystem device.                                         | Error code CE and status U set in<br>MST; device is left unavailable.                                                                                                                                                                                         | Examine E,M display after<br>deadstart is complete to<br>determine corrective<br>action.                                                                                                                                 |
|                                                                                 |                       | unit of a three-unit<br>multispindle pack (DK-3),<br>but not all elements of<br>the configuration are<br>present.                | System device<br>(nonremovable with<br>system residence). | <ul> <li>If permanent files do not<br/>reside on the device, it is<br/>initialized automatically<br/>using parameters in existing<br/>label.</li> </ul>                                                                                                       | None.                                                                                                                                                                                                                    |
|                                                                                 |                       |                                                                                                                                  |                                                           | <ul> <li>If permanent files reside on<br/>the device, the following<br/>message appears on the right<br/>console display and deadstart<br/>processing halts.</li> <li>CONTINUING DESTROYS PFS<br/>RECOVERY OF DEVICE<br/>IMPOSSIBLE.</li> </ul>               | Type GO. or PAUSE. to<br>proceed. If GO.<br>is entered, the device<br>is initialized using<br>parameters in existing<br>label (permanent files<br>will be lost), or<br>redeadstart without the<br>system on this device. |
|                                                                                 |                       | Bad label. Information<br>read was not recognized<br>as a label sector.                                                          | Nonsystem device.                                         | Error code LE and status U set in<br>MST; device is left unavailable.                                                                                                                                                                                         | Device must be initialized<br>after deadstart if it is<br>to be used (refer to DSD<br>command INITIALIZE in<br>section 5).                                                                                               |
|                                                                                 |                       |                                                                                                                                  | System device<br>(nonremovable with<br>system residence). | Device is initialized<br>automatically. Any permanent<br>files that reside on device are<br>lost.                                                                                                                                                             | None.                                                                                                                                                                                                                    |

Table 2-3. Mass Storage Device Recovery (Sheet 1 of 5)

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# Table 2-3. Mass Storage Device Recovery (Sheet 2 of 5)

| Recovery Function                                                                                                                                                                                                                                                                                                                                                                                           | Level of<br>Deadstart | Description of Error                                                                                                                                                                                                                        | Type of Device                                                                                                    | System Response to Error                                                                                                                                                                                                                                                     | Action                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                             | 1, 2, 3               | Label verification error.<br>The label was read but<br>could not be verified.<br>For example, label<br>indicates device is first<br>unit of a three-unit<br>multispindle pack (DK-3),<br>but units 2 of 3 and/or 3<br>of 3 are not present. | Removable (no active<br>direct access files).<br>Nonremovable or<br>removable with active<br>direct access files. | Error code indicates cause of<br>error and status U set in MST;<br>device is left unavailable.<br>The following message appears on<br>the right console display and<br>deadstart processing halts.<br>ERROR ON DEVICE WITH<br>ACTIVE FILES.                                  | Examine E,M display after<br>deadstart is complete to<br>determine corrective<br>action.<br>Perform level 0 deadstart<br>or redefine configuration<br>to match that of system<br>being recovered. |
|                                                                                                                                                                                                                                                                                                                                                                                                             |                       |                                                                                                                                                                                                                                             |                                                                                                                   | NOTE<br>Active direct access files<br>are attached when checkpoint<br>is taken (level 1 or 2) or<br>when deadstart is initiated.<br>It is assumed that all<br>removable devices have active<br>direct access files.                                                          |                                                                                                                                                                                                   |
| Chain removable<br>devices with<br>consecutive physical<br>unit numbers<br>(applies only to<br>844-21 (DI or DK)<br>and 844-41/44 (DJ<br>or DL). This will<br>allow a multispindle<br>pack (for example,<br>DK-3) to be mounted<br>on devices defined<br>in EST as single<br>spindle devices<br>(for example, DK-1).<br>Definition for<br>devices in EST is<br>changed to reflect a<br>multispindle device. | 0, 1, 2               | Label verification error.<br>Label on remaining<br>spindles of multispindle<br>pack could not be<br>verified.                                                                                                                               | Removable.                                                                                                        | All units are returned to their<br>original status in EST and device<br>with label specifying multispindle<br>pack is left unavailable (U status<br>set in MST). The labels on<br>remaining devices that were<br>chained are then checked to<br>determine if they are valid. | Examine the E,M display<br>after deadstart is<br>complete to determine<br>corrective action.                                                                                                      |

| Recovery Function                                                                         | Level of<br>Deadstart | Description of Error                                                                                                                                            | Type of Device                                                   | System Response to Error                                                                                                                                                                                                   | Action                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Read TRT into<br>central memory.                                                          | 0                     | TRT could not be read<br>successfully.                                                                                                                          | A11.                                                             | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>LENGTH OF DEVICES TRT BAD -<br>RECOVERY OF DEVICE<br>IMPOSSIBLE.                                                       | Type GO,SYS. or PAUSE,SYS.<br>to proceed. If GO.<br>is entered, the device<br>is initialized using<br>parameters in existing<br>label; permanent files<br>will be lost.                                                                              |
|                                                                                           | 1,2                   | TRT could not be read<br>successfully.                                                                                                                          | Removable (no active<br>direct access files).                    | Error code TL and status U set in<br>MST; device is left unavailable.                                                                                                                                                      | Examine the E,M display<br>after deadstart is com-<br>plete to determine cor-<br>rective action.                                                                                                                                                     |
|                                                                                           |                       |                                                                                                                                                                 | Nonremovable or<br>removable with active<br>direct access files. | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>LENGTH OF DEVICES TRT BAD.                                                                                             | Perform level 0 deadstart<br>and initialize the device.                                                                                                                                                                                              |
| Edit TRT to remove<br>nonpermanent file<br>information.                                   | 0                     | Edit was not successful.<br>This could be caused by<br>specifying a new SPF/SLF<br>entry (flawed track)<br>APRDECK.                                             | A11.                                                             | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>PERM. FILE LINKAGE ERROR<br>RECOVERY OF DEVICE<br>IMPOSSIBLE.                                                          | Type GO,SYS. or PAUSE,SYS.<br>to proceed. If GO.<br>is entered, the device<br>is initialized using<br>parameters in existing<br>label; permanent files<br>will be lost. If SPF/SLF<br>entry was specified,<br>redeadstart and omit<br>SPF/SLF entry. |
| Verify all mass<br>storage devices in<br>system to ensure<br>permanent file<br>integrity. | 0                     | Two devices in same family<br>have the same device<br>number or the same bits<br>set in the device mask,<br>or two auxiliary devices<br>have the same packname. | System device<br>(nonremovable with<br>system residence).        | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>EQest1 EQest2<br>DN.<br>CONFLICTING DM.<br>PN.<br>est1 and est2 are the EST<br>ordinals of the conflicting<br>devices. | <ul> <li>Perform one of the following:</li> <li>Remove one of the specified devices and redeadstart.</li> <li>Redeadstart and logically turn off one of the specified devices (via EQPDECK entry).</li> </ul>                                        |
|                                                                                           |                       |                                                                                                                                                                 | Nonsystem device.                                                | Error code DN, DM, or PN and<br>status U set in MST; both of the<br>devices are left unavailable.                                                                                                                          | Examine the E,M display<br>after deadstart is<br>complete to determine the<br>type of error. Either<br>remove, or logically turn<br>off one of the devices;<br>the remaining device is<br>recovered automatically.                                   |

Table 2-3. Mass Storage Device Recovery (Sheet 3 of 5)

| Recovery Function                                     | Level of<br>Deadstart | Description of Error                                                                                                                                      | Type of Device | System Response to Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Action                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clear interlock data 0<br>for direct access<br>files. | 0                     | Failure to read legal<br>system sector. The TRT<br>indicates track is<br>beginning of direct access<br>chain but first sector was<br>not a system sector. | A11.           | Increment count of direct access<br>files in error. The message<br>appears in the dayfile in the<br>following format.<br>• EQest files PRESERVED<br>FILE ERRORS.<br>est EST ordinal of<br>device.<br>files Number of files<br>in error.                                                                                                                                                                                                                                                                         | Examine dayfile after<br>deadstart completes.<br>Message described in<br>preceding column indicates<br>the number of direct<br>access files in error.                                                                                                                                                                                                                                           |
|                                                       |                       | Interlock data specified<br>file was in WRITE mode and<br>last sector for file in<br>TRT was not an EOI sector.                                           | A11.           | Clear interlocks for file and<br>rewrite system sector. Issue<br>the following message to error<br>log and system dayfile:<br>LENGTH ERROR filename uindex.<br>filename Name of file on<br>which error was<br>encountered.<br>uindex User index of file<br>owner.<br>Also, increment count of direct<br>access file errors. The following<br>message appears in the system<br>dayfile.<br>EQest count DIRECT ACCESS<br>FILE ERRORS.<br>est EST ordinal of<br>device.<br>count Total number of<br>length errors. | Examine system and error<br>log dayfiles after<br>deadstart completes. The<br>number of LENGTH ERROR<br>messages issued and the<br>count of DIRECT ACCESS FILE<br>ERRORS should match.<br>To recover files in error:<br>1. ATTACH,oldfilename.<br>2. PURGE,oldfilename.<br>3. DEFINE,newfilename<br>with oldfilename.<br>4. COPY,oldfilename<br>to newfilename.<br>or<br>CHANGE,oldfilename/CE. |
| Recovering queued<br>files.                           | 0                     | Last sector of file<br>specified by TRT is not<br>an EOI sector.                                                                                          | A11.           | The following message is issued<br>to the dayfile and error log:<br>QF LENGTH ERROR filname.<br>filname Name of file being<br>recovered.<br>The following message is issued<br>to the dayfile at the end of<br>recovery:<br>EQest count QUEUED FILE<br>ERROR COUNT.<br>est EST ordinal of<br>device.<br>count File count.                                                                                                                                                                                       | The utility QREC issues<br>messages to the system<br>dayfile indicating the<br>location and job name of all<br>files in error during the<br>requeue operation.<br>The message format is:<br>filname TKxxxx LENGTH<br>ERROR.                                                                                                                                                                     |

Table 2-3. Mass Storage Device Recovery (Sheet 4 of 5)

| Recovery Function                               | Level of<br>Deadstart | Description of Error                                                                                                                                                                                                                     | Type of Device   | System Response to Error                                                                                                                         | Action                                                                                                                                                                                         |
|-------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recovery of multi-<br>mainframe link<br>device. | 0                     | Extended memory resident<br>table containing machine<br>IDs of active mainframes<br>is full.                                                                                                                                             | Extended memory. | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>MAXIMUM NUMBER MIDS ACTIVE                   | <ol> <li>Verify that the correct<br/>machine ID is specified<br/>in the CMRDECK.</li> <li>Run MREC on active<br/>machine for specified<br/>machine ID if not<br/>initial deadstart.</li> </ol> |
|                                                 | 0, 1, 2, 3            | A valid label track<br>for extended memory<br>was not found within<br>predetermined limits.                                                                                                                                              | Extended memory. | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>EXTENDED MEMORY LABEL TRACK<br>NOT FOUND     | Perform a level 0<br>deadstart with INITIALIZE<br>and PRESET selected if no<br>other machines are active.                                                                                      |
|                                                 | 0                     | Machine ID selected if<br>CMRDECK is in use.                                                                                                                                                                                             | Extended memory. | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>MID CURRENTLY ACTIVE                         | Either redeadstart<br>specifying a different<br>machine ID or, if the<br>correct machine ID was<br>entered, run MREC on<br>another machine.                                                    |
|                                                 | 1, 2, 3               | The machine ID as<br>maintained in CMR was not<br>found in the extended<br>memory resident table.<br>This indicates that<br>extended memory has been<br>changed, either abnormally<br>or by the execution of<br>MREC on another machine. | Extended memory. | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>MID UNDEFINED IN EXTENDED<br>MEMORY.         | Perform a level O<br>deadstart.                                                                                                                                                                |
|                                                 | 0, 1, 2, 3            | Error exit was taken while<br>attempting to execute<br>instruction accessing<br>extended memory.                                                                                                                                         | Extended memory. | The following message appears on<br>the right console display and<br>deadstart processing halts.<br>EXTENDED MEMORY READ/WRITE<br>PARITY ERRORS. | Inform a customer engineer.<br>Recovery is impossible.                                                                                                                                         |

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Table 2-3. Mass Storage Device Recovery (Sheet 5 of 5)

## **ERROR IDLE RECOVERY**

Setting the device error idle status helps to prevent error propagation by inhibiting new file assignment on the device and by inhibiting any new PFM, PFLOAD, or QLOAD activity from occurring on the device. The error idle status is indicated by the EI error code on the E,M display. Error idle status is set when:

- Mass storage read or write errors occur in the catalog or permit chains.
- There is an incorrect user index in the permit sector.
- Direct or indirect access files are too long or too short.

Correcting the error idle condition requires total initialization of the affected device. This can be accomplished online for a removable device, but must be performed during a level O deadstart for a nonremovable device. Suggested recovery procedures follow.

#### **Removable Device**

- 1. Dump inactive queued files, if present on the device (QDUMP).
- 2. Dump permanent files (PFDUMP).
- 3. Perform a total initialization of the device (INITIALIZE,AL,est.). If the error idle status was caused by a mass storage error, the appropriate track should be flawed.
- 4. Reload inactive queued files, if applicable (QLOAD).
- 5. Reload permanent files (PFLOAD).

## Nonremovable Device

- 1. Dump queued files (QDUMP).
- 2. Terminate any dayfiles that must be saved (DFTERM).
- 3. Dump permanent files (PFDUMP).
- 4. Idle the system and perform a level 0 deadstart.
- 5. Perform a total initialization of the device affected by the error idle condition (INITIALIZE,AL,est.). If the error idle status was caused by a mass storage error, the appropriate track should be flawed.
- 6. Reload queued files (QLOAD).
- 7. Reload permanent files (PFLOAD).

# **DEADSTART DECKS**

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# **DEADSTART DECKS**

Deadstart decks are text records that reside on the deadstart file. This section describes the following deadstart decks.

| Deck    | Description                            |
|---------|----------------------------------------|
| CMRDECK | Central memory resident deck.          |
| EQPDECK | Equipment deck.                        |
| APRDECK | Auxiliary mass storage parameter deck. |
| IPRDECK | System installation parameter deck.    |
| LIBDECK | System library deck.                   |

This section contains detailed information about how you can modify the released versions of the deadstart decks.

# CMRDECK

The central memory resident deck (CMRDECK) resides on the deadstart file as a text record that is processed during system initialization. It contains entries defining the following types of information.

- Central memory.
- Table sizes.
- Configuration information not oriented to equipment.

The deadstart file can contain up to  $100_8$  CMRDECKs. Having several CMRDECKs on the same deadstart file is advantageous because one file can deadstart several configurations. You can obtain a listing of all CMRDECKs by accessing the system file SYSTEM with an ASSIGN or COMMON command, then using the T parameter on the CATALOG command (refer to the NOS 2 Reference Set, Volume 3 for more information concerning these commands). CMRDECKs are named CMRDnn, where nn is from 00 to  $77_8$ .

You can modify the released settings of the CMRDECK in two ways: type a new entry when the CMRDECK is displayed during deadstart, or create a new deadstart file. The usual method of modifying a CMRDECK follows.

1. Deadstart, using the released deadstart file, and select the CMRINST and the CMRDECK to be displayed (refer to section 2, Deadstart).

CMRINST lists all valid CMRDECK entries. Default values, described in this section, are assumed if the entries do not appear in the CMRDECK being used. If either CMRDECK or CMRINST overflows two screens, you can page the display.

2. Modify the released version of CMRDECK by entering the changes or additions from the system console while either the CMRDECK or CMRINST is displayed. Each console entry supersedes the value currently specified in the CMRDECK (or the default value).

## NOTE

The modified CMRDECK remains in effect only until the next deadstart is performed, except for a level 3 deadstart. That is, changes to the CMRDECK are not recovered across level 0, 1, and 2 deadstarts unless a new deadstart file is created to reflect them.

3. To expedite subsequent deadstarts, modify the CMRDECK on the deadstart file using SYSGEN (refer to the NOS 2 Installation Handbook).

When constructing or modifying a CMRDECK, separate parameters with commas and terminate each entry with a period. When an error exists in an entry in a CMRDECK on the deadstart file, the CMRDECK is displayed and the error is indicated. This occurs even if you do not select the display CMRDECK option.

## **CENTRAL MEMORY DESCRIPTIONS**

The general function of central memory description entries is to assign the amount of central memory to be used for central memory resident (CMR) and the amount to be used for job processing. The simplified relationship is: the more central memory that is assigned to tables in CMR, the less is available for job field lengths.

If you will run only a few batch jobs, fewer control points may be required. Thus, you could decrease the control point area in CMR, which requires 200g words per control point.

The following entries are specified in the SET program with the released default values listed.

| Entry Format | Released<br>Default Value | Significance                                                                                                                                                                                         |
|--------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CLT=number.  | 0                         | Specifies the octal number of common library table (CLT) entries allowed. The number can range from 0 to $100_8$ .                                                                                   |
|              |                           | If the table exists, the first entry is reserved for<br>the system, so you should equate CLT with the number<br>of entries you want, plus l. For example, if you<br>want three entries, enter CLT=4. |
|              |                           | Common library table entries are described in the IPRDECK entry COMLIB.                                                                                                                              |

| Entry Format | Released<br>Default Value |                                                                                                                                                          | Significance                                                                                                                                  |
|--------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| EJT=number.  | 620 <sub>8</sub>          | Specifies an octal number of entries for the executing job table (EJT). The system uses the EJT entries to keep track of executing jobs.                 |                                                                                                                                               |
|              |                           | The maximum val<br>value is 3.                                                                                                                           | we for number is $7777_8$ ; the minimum                                                                                                       |
| EQP=number.  | Number of<br>CMRDECK      | deadstart. The<br>assignments. U                                                                                                                         | number of the EQPDECK to use at<br>E EQPDECK contains equipment<br>Up to 1008 EQPDECKs can exist on a<br>the number can range from 00 to 778. |
|              |                           |                                                                                                                                                          | y is not included in the CMRDECK, the<br>EQPDECK with the same number as the<br>used.                                                         |
| FNT=number.  | 23 <sub>8</sub>           | Sets the octal number of entries allowed in the<br>system file name table (FNT). The system FNT con-<br>tains the system file and all fast-attach files. |                                                                                                                                               |
|              |                           | Determine the n<br>using the formu                                                                                                                       | necessary number of FNT entries by<br>lla:                                                                                                    |
|              |                           | number = SY                                                                                                                                              | /+RS+(VL+PR)*FM+SFA                                                                                                                           |
|              |                           | Variable                                                                                                                                                 | Description                                                                                                                                   |
|              |                           | SY                                                                                                                                                       | Number of system files.                                                                                                                       |
|              |                           | RS                                                                                                                                                       | Number of resource files.                                                                                                                     |
|              |                           | VL                                                                                                                                                       | Number of VALIDUs files per family.                                                                                                           |
|              |                           | PR                                                                                                                                                       | Number of PROFILa files per family.                                                                                                           |
|              |                           | FM                                                                                                                                                       | Number of families that can be active at any one time.                                                                                        |
|              |                           | SFA                                                                                                                                                      | Site defined fast-attach files.                                                                                                               |
|              |                           | with no addition                                                                                                                                         | estalled with the released defaults and<br>mal files added to the system FNT by<br>e maximum number of FNT entries<br>N18.                    |
|              |                           | The maximum val<br>value is 3.                                                                                                                           | ue for number is 7777 <sub>8</sub> ; the minimum                                                                                              |

| Entry Format | Released<br>Default Value             | Significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FOT=number.  | 10 <sub>8</sub>                       | Sets the number of entries in the family ordinal<br>table (FOT). Each family is allowed one entry in the<br>table. The first entry in the FOT is reserved for<br>system use. The system uses family name and user<br>index for job ownership and file routing. The family<br>ordinal is a 6-bit number that corresponds to a<br>particular family name. The FOT maintains the family<br>name to family ordinal relationship. If a family is<br>unloaded and later reloaded, it continues to use the<br>same family ordinal. |
|              |                                       | The maximum value for number is 1008; the minimum value is 3. The size of the FOT need not be the same for each mainframe in a multimainframe environment.                                                                                                                                                                                                                                                                                                                                                                  |
| IPD=number.  | First IPRDECK<br>on deadstart<br>file | Specifies the number of the IPRDECK to use at<br>deadstart. The IPRDECK contains installation<br>parameters. Up to 1008 IPRDECKs can exist on a<br>deadstart file; the number can range from 00 to 778.                                                                                                                                                                                                                                                                                                                     |
|              |                                       | If an IPD entry is not included in the CMRDECK, the first IPRDECK on the deadstart tape is processed and is not displayed.                                                                                                                                                                                                                                                                                                                                                                                                  |
| LDT=number.  | 0                                     | Specifies the number of central memory words allocated to the LID table. The minimum value is $0$ ; the maximum value is $1100_8$ . The value to be specified can be determined by using this formula:                                                                                                                                                                                                                                                                                                                      |
|              |                                       | (3+1id)*pid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|              |                                       | lid is the maximum number of LIDs allowed per PID.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|              |                                       | pid is the total number of PIDs in all networks defined on this mainframe.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|              |                                       | One central memory word is always allocated for the LID table header.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|              |                                       | As an example, assume lid=5 and pid=6. By using the formula, you come up with (3+5)*6=48. Adding one word for the LID table header makes 49, or 618, central memory words that should be allocated to the LID table.                                                                                                                                                                                                                                                                                                        |
| LIB=number.  | 0                                     | Specifies the number of the LIBDECK to use at<br>deadstart; the number can range from 00 to 77 <sub>8</sub> .<br>LIBDECK is a directive record used by SYSEDIT.                                                                                                                                                                                                                                                                                                                                                             |
| MID=id.      | AA                                    | Specifies the 2-character machine identification (id)<br>that is associated with the mainframe. The id<br>characters must be alphanumeric.                                                                                                                                                                                                                                                                                                                                                                                  |

| Entry Format    | Released<br>Default Value          |                                                                                                                                                                                | Significance                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MINCM=size.     | 1400 <sub>8</sub>                  | Reserves an amount of central memory for system<br>operation (UEM is defined in the extended memory<br>equipment EST entry). The minimum and default value<br>for size is 49K. |                                                                                                                                                                                                                                                                                                                                                               |
|                 |                                    | Parameter                                                                                                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                   |
|                 |                                    | size                                                                                                                                                                           | The 1- to 4-digit octal value (1- to<br>5-digit octal value for a model 865,<br>875, or CYBER 180-class machine) that<br>restricts the actual central memory<br>size; this value represents the amount<br>of central memory in hundreds (octal);<br>the value cannot be 0 and cannot exceed<br>the total number of words of memory<br>present in the machine. |
|                 |                                    |                                                                                                                                                                                | Memory Size                                                                                                                                                                                                                                                                                                                                                   |
|                 |                                    |                                                                                                                                                                                | 49K         1400           65K         2000           98K         3000           131K         4000           198K         6000           262K         10000                                                                                                                                                                                                   |
| NAME=date line. | CDC NETWORK<br>OPERATING<br>SYSTEM | on the syste                                                                                                                                                                   | ne system date line, which is displayed<br>em console display and on the terminal<br>eractive user logs in to the system.                                                                                                                                                                                                                                     |
|                 |                                    | Parameter                                                                                                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                   |
|                 |                                    | date line                                                                                                                                                                      | Alphanumeric string; must be fewer than<br>39 characters. If the date line is not<br>terminated with a period, one will be<br>appended. If the date line is 38<br>characters, the last character must be a<br>period.                                                                                                                                         |
| NCP=number.     | 128                                | Sets the num processing.                                                                                                                                                       | mber of control points available for job                                                                                                                                                                                                                                                                                                                      |
|                 |                                    | section for                                                                                                                                                                    | o Control Information later in this<br>a discussion of the proper number of<br>hts to select.                                                                                                                                                                                                                                                                 |
|                 |                                    | Parameter                                                                                                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                   |
|                 |                                    | number                                                                                                                                                                         | Number of control points available in central memory; number can be from 2 to $34_8$ .                                                                                                                                                                                                                                                                        |

| Entry Format | Released<br>Default Value | Significance                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                    |
|--------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OPSECM=n .   | 0                         | Specifies the operating system security mode. The<br>value for this entry should be supplied by the site<br>security administrator. Refer to the NOS 2 Security<br>Administrator's Handbook for information on this<br>entry. |                                                                                                                                                                                                                                                                                                                                    |
|              |                           | <u>n</u>                                                                                                                                                                                                                      | Description                                                                                                                                                                                                                                                                                                                        |
|              |                           | 0 or<br>omitted                                                                                                                                                                                                               | Sets the system to unsecured mode.                                                                                                                                                                                                                                                                                                 |
|              |                           | 1                                                                                                                                                                                                                             | Enables multilevel security. The values<br>of the system access level limits can be<br>set by the SECURES IPRDECK entry or by<br>the console command. The SECURES<br>console command can be used to raise or<br>lower system access level limits.                                                                                  |
|              |                           | 2                                                                                                                                                                                                                             | Enables multilevel security. The values<br>of the system access level limits are<br>set by the SECURES IPRDECK entry. The<br>SECURES console command can be used to<br>raise but not to lower system access<br>level limits.                                                                                                       |
|              |                           | 3                                                                                                                                                                                                                             | Enables multilevel security. The values<br>of the system access level limits are<br>set by the SECURES IPRDECK entry only;<br>the SECURES console command is not<br>allowed.                                                                                                                                                       |
| PPB=number.  | 1                         | Reserves space in central memory for accessing files on buffered I/O devices.                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                    |
|              |                           | Parameter                                                                                                                                                                                                                     | Description                                                                                                                                                                                                                                                                                                                        |
|              |                           | number                                                                                                                                                                                                                        | The number of blocks (each block has a length of $102_8$ words) reserved for PP I/0. It must be sufficient to handle the demand for PP access to the buffered device I/0 handler. Ideally, there should be one block for each pool PP. More blocks mean better performance. The maximum value for the number parameter is $17_8$ . |

| Entry Format                                             | Released<br>Default Value       |                                                                                                                                                                                                                                                                                                                                                                                                             | Significance                                                                                                                                                      |
|----------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PPU=pp <sub>1</sub> ,pp <sub>2</sub> ,,pp <sub>n</sub> . | All available<br>PPs are active | Toggles the active status of the physically avail-<br>able PPs, † except for PPs 1, 2, and 10, which are<br>always active. Active means the PP is available for<br>system use; inactive means it is not available for<br>system use. The PPU entry is not in the released<br>CMRDECK; therefore, all available PPs are active.<br>PPU is a toggle entry: each entry changes the activ<br>status of the PPs. |                                                                                                                                                                   |
|                                                          |                                 | Parameter                                                                                                                                                                                                                                                                                                                                                                                                   | Description                                                                                                                                                       |
|                                                          |                                 | pp <sub>i</sub>                                                                                                                                                                                                                                                                                                                                                                                             | Number of the PP; from 0 to 118 and<br>208 to 318. Specifying an asterisk<br>(*) on the entry instead of pp <sub>1</sub><br>toggles the status of PPs 208 to 318. |
|                                                          |                                 | This entry may be useful if PP memory is failing or<br>if a channel is causing problems on its associated<br>PP. For example, the following entry deactivates PP<br>3 and PP 4 (assuming no other entries have been made<br>for PP 3 and PP 4).                                                                                                                                                             |                                                                                                                                                                   |
|                                                          |                                 | PPU=3,4.                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                   |
| QFT=number.                                              | 620 <sub>8</sub>                | Sets the number of entries allowed for the queued<br>file table (QFT). The system uses the QFT to manage<br>all files in the input and output queues. number is<br>a 1- to 4-digit number from 3 to 77778.                                                                                                                                                                                                  |                                                                                                                                                                   |
| VERSION=name.                                            | NOS 2.3<br>617/587              | Specifies the system version that is displayed on the system console display.                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                   |
|                                                          |                                 | Parameter                                                                                                                                                                                                                                                                                                                                                                                                   | Description                                                                                                                                                       |
|                                                          |                                 | name                                                                                                                                                                                                                                                                                                                                                                                                        | Alphanumeric string; must be fewer than<br>19 characters. If name is not<br>terminated with a period, one will be                                                 |

appended. If name is 18 characters, the

last character must be a period.

<sup>†</sup> A PP that has been turned off by CTI is physically unavailable and cannot be turned on by the PPU entry.

## EQPDECK

The equipment deck (EQPDECK) resides on the deadstart file as a text record that is processed during system initialization. It contains entries defining the following types of information.

- Dayfile buffer size.
- Hardware configuration.
- File residence on mass storage devices.
- Permanent file family residence.
- Multimainframe configurations.
- Software attributes associated with hardware (such as forms code).

An EQPDECK entry is described under the type of information it defines.

The deadstart file can contain up to  $100_8$  EQPDECKs. Having several EQPDECKs on the same deadstart file is advantageous because one file can deadstart several configuraions. You can obtain a listing of all EQPDECKs by accessing the system file SYSTEM with a COMMON command, then using the T parameter on the CATALOG command (refer to the NOS 2 Reference Set, Volume 3 for more information concerning these commands). EQPDECKs are named EQPDnn, where nn is from 00 to  $77_8$ .

You can modify the released settings of the EQPDECK in two ways: type a new entry when the EQPDECK is displayed during deadstart, or create a new deadstart file. The usual method of modifying an EQPDECK follows.

1. Deadstart, using the released deadstart file, and select the EQPINST and the EQPDECK to be displayed (refer to section 2, Deadstart).

EQPINST lists all valid EQPDECK entries. Default values, described in this section, are assumed if the entries do not appear in the EQPDECK being used. If either EQPDECK or EQPINST overflows two screens, you can page the display.

2. Modify the released version of EQPDECK by entering the changes or additions from the system console while either the EQPDECK or EQPINST is displayed. Each console entry supersedes the value currently specified in the EQPDECK (or the default value).

# NOTE

The modified EQPDECK remains in effect only until the next deadstart is performed, except for a level 3 deadstart. That is, changes to the EQPDECK are not recovered across level 0, 1, and 2 deadstarts unless a new deadstart file is created to reflect them.

3. To expedite subsequent deadstarts, modify the EQPDECK on the deadstart file using SYSGEN (refer to the NOS 2 Installation Handbook).

Several equipment status displays are available during deadstart (refer to section 2, Deadstart).

When constructing or modifying an EQPDECK, the following restrictions apply.

• The equipment assignment entry (EQ) must precede any other assignments for a device (such as assigning it for permanent file, system, or temporary file use). If you redefine the EQ entry (by clearing the entry and retyping a new entry or by changing the device type in the entry), reenter all other assignments for that equipment. If you need to modify an EQ entry, you need only enter the changes rather than reentering the entire entry. You do not need to reenter other assignments for that equipment. This is especially useful for changing channels or units and for reconfiguring around hardware malfunctions.

Example:

The following mass storage assignments are in the EQPDECK.

EQ7=DI,ST=ON,UN=60,CH=1.

PF=7,F,125,125,SYSTEM,3,200.

If you want to specify unit 70 rather than 60, you need only enter:

EQ7=DI,UN=70.

You do not need to modify the PF entry.

- EST ordinals range from 1 to 7778. This range depends on the value of ESMX (refer to PPCOM parameters in the NOS 2 Installation Handbook). Ordinals 1 through 4 are reserved for psuedoequipment EST entries that are automatically defined by the system and cannot be changed. Ordinal 5 is reserved for extended memory equipment (refer to EQ - Extended Memory EST Entry later in this section). This entry need not be defined, but cannot be used for any other device type.
- The device from which you are deadstarting must be defined.
- Commas must separate parameters.
- A period must terminate each entry.
- Except where explicitly specified that controllers and/or equipment can be shared between mainframes, assume they cannot be shared. For example, NOS does not support sharing a two-channel tape controller between mainframes; nor does it support sharing mass storage controllers, except as specified in section 13, Multimainframe Operations.

When an error exists in an entry in an EQPDECK on the deadstart file, the EQPDECK is displayed and the error is indicated. This occurs even if you do not select the display EQPDECK option or if you enter GO after displaying the EQPDECK.

# **DAYFILE DESCRIPTIONS**

One of the functions of dayfile description entries is to assign the amount of central memory to be used for buffers. The more central memory assigned to dayfile buffers in CMR, the less central memory available for job field lengths.

If, for example, you need a large portion of central memory to run a job, it might be advisable to decrease the size of the dayfile buffers area in CMR to accommodate that job. However, when dayfile buffers are smaller, the information stored in them is written to mass storage more often, which requires more system overhead.

The following entries are specified in the SET program with the released default values listed.

| Entry Format        | Released<br>Default Value |                                                                                                                                                                                                                                                                                                                                                                                                               | Significance                                                                                                                                                                                                                                                                                                                                                     |  |  |  |
|---------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| ACCOUNT=est,length. | ,400 <sub>8</sub>         | Sets the residence of the account dayfile and the length of the account dayfile buffer.                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
|                     |                           | The account dayfile is an accounting record<br>containing information such as type and<br>quantity of resources used, and job and<br>execution times. This account information<br>written to the central memory account dayfi<br>buffer during job processing; the central<br>memory buffer is written to mass storage wh<br>it is full. The account dayfile buffer res<br>in CMR in the dayfile buffer area. |                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
|                     |                           | Parameter                                                                                                                                                                                                                                                                                                                                                                                                     | Description                                                                                                                                                                                                                                                                                                                                                      |  |  |  |
|                     |                           | est                                                                                                                                                                                                                                                                                                                                                                                                           | The 1- to 3-digit octal equipment<br>status table (EST) ordinal of the<br>equipment on which the account<br>dayfile is to reside. A null<br>value means the system uses the<br>first system device it can find.<br>If the existing account dayfile<br>is recovered, the account dayfile<br>buffer resides on that equipment<br>and the est parameter is ignored. |  |  |  |
|                     |                           | length                                                                                                                                                                                                                                                                                                                                                                                                        | The 3- or 4-digit octal length of<br>the account dayfile buffer in<br>CMR; must be a multiple of $100_8$<br>and less than or equal to<br>$1000_8$ . If 0 (zero) is<br>specified, messages issued to the                                                                                                                                                          |  |  |  |

account dayfile are discarded.

Released Default Value

DAYFILE=est,length.

,400<sub>8</sub>

# Significance

Sets the residence of the system dayfile and the length of the system dayfile buffer.

The dayfile buffer contains the dayfile information, which is maintained in the same way as the account dayfile buffer. It resides in CMR in the dayfile buffer area.

#### Parameter

est The 1- to 3-digit octal EST ordinal of equipment on which the dayfile is to reside. A null value means the system uses the first system device it can find. The residence of this dayfile is normally determined by the recovery of the existing dayfile. Use this parameter if no system dayfiles are recovered.

Description

length The 3- or 4-digit octal length of the system dayfile buffer in CMR; must be a multiple of 100g and less than or equal to 1000g. If 0 is specified, messages issued to the system dayfile are discarded.

ERRLOG=est,length.

,100<sub>8</sub>

Sets the residence of the error log and the length of the error log buffer.

The error log is a record of hardware error and status messages. This information is maintained in the same way as the account dayfile buffer.

## Parameter Description

est The 1- to 3-digit octal EST ordinal of equipment on which the error log is to reside. A null value means the system uses the first system device it can find. If the existing error log is recovered, the error log buffer resides on that equipment and the est parameter is ignored.

length The 3- or 4-digit octal length of the error log buffer in CMR; must be a multiple of 100g and less than or equal to 1000g. If 0 is specified, messages issued to the error log are discarded.

| Entry Format        | Released<br>Default Value | Significance                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                             |  |  |
|---------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| MAINLOG=est,length. | ,100 <sub>8</sub>         | Sets the residence of the binary maintenance<br>log and the length of the binary maintenance<br>log buffer. The binary maintenance log is a<br>record of hardware diagnostic information. |                                                                                                                                                                                                                                                                                                                                                             |  |  |
|                     |                           | Parameter                                                                                                                                                                                 | Description                                                                                                                                                                                                                                                                                                                                                 |  |  |
|                     |                           | est                                                                                                                                                                                       | The 1- to 3-digit octal EST<br>ordinal of equipment on which the<br>binary maintenance log is to<br>reside. A null value means the<br>system uses the first system<br>device it can find. If the<br>existing binary maintenance log<br>is recovered, the binary<br>maintenance log buffer resides on<br>that equipment and the est<br>parameter is ignored. |  |  |
|                     |                           | length                                                                                                                                                                                    | The 3- or 4-digit octal length of<br>the binary maintenance log buffer<br>in CMR; must be a multiple of<br>$100_8$ and less than or equal to<br>$1000_8$ . If 0 (zero) is<br>specified, messages issued to the<br>binary maintenance log are                                                                                                                |  |  |

discarded.

### **GENERAL DESCRIPTION OF EQUIPMENT ASSIGNMENT ENTRIES**

The general format of the EQ entry is:

 $EQest=type, keyword_1 = value_1, \dots, keyword_n = value_n$ .

Keyword=value entries are order independent.

Depending on the type of equipment being defined, certain keywords are required, while others are optional, as shown in table 3-1.

You can redefine an EST entry by entering an EQ entry for the EST ordinal with a different equipment type. This action clears the original entry before creating the new entry. You can also modify an EST entry by entering an EQ entry with the same equipment type and only the keyword(s) you want changed.

| Equipment<br>Type | Required<br>Keywords     | Optional<br>Keywords | Equipment<br>Type | Required<br>Keywords | Optional<br>Keywords |
|-------------------|--------------------------|----------------------|-------------------|----------------------|----------------------|
| сс                | EQ,CH                    | ST                   | DV                | UN,CH,HT             | ST,AP                |
| См                | EQ,CH                    | CW                   | DW                | UN,CH,HT             | ST,AP                |
| СР                | EQ,CH                    | ST,ID,FC             | LP                | EQ,CH                | ST,ID,FC,TN,<br>PS   |
| CR                | EQ,CH                    | ST,ID                | TD                | FO CH                |                      |
| CS                | EQ,UN,CH,CI,<br>MI,UI,PT | ST                   | LR                | EQ,CH                | ST,ID,FC,TN,<br>PS   |
| СТ                | EQ,UN,CH,CP,<br>MI,UI,PT | ST                   | LS                | EQ,CH                | ST,ID,FC,TN,<br>PS   |
| DB                | UN,CH,HT                 | ST,AP                | LT                | EQ,CH                | ST,ID,FC,TN,<br>PS   |
| DD                | UN                       | ST,AP                | MP                | СН                   | ST                   |
| DE                | SZ                       | ST,MA,ET,AP,<br>MC   | МТ                | EQ,UN,CH,TF          | ST                   |
| DI                | UN, CH                   | ST,AP                | NC                | СН                   | ST                   |
| DJ                | UN,CH                    | ST,AP                | NP                | EQ,CH,PI,ND,<br>SA   | ST                   |
| DK                | UN,CH                    | ST,AP                | NT                | EQ,UN,CH,TF          | ST                   |
| DL                | UN,CH                    | ST,AP                | RM                | СН,РТ                | ST                   |
| DM                | UN,CH                    | ST,AP                | RP                | СН                   | ST                   |
| DP                | SZ ,CH                   | ST,MA,ET,AP,<br>MC   | SS                | EQ,UN,CH             | ST                   |
| DO                | UN CH                    |                      | TT                | EQ,CH                | ST,PT                |
| DQ                | UN,CH                    | ST,AP                | **                | WO                   | W1                   |

Table 3-1. Required And Optional Keywords

# **Clear EST Assignment Entry**

Use the following entry to clear an assignment that currently exists for an EST ordinal. Clearing the assignment does not clear flaw entries for that equipment. The EQ=0 entry is not required when you are assigning the EST entry to a different type of equipment.

EQest=0.

or

EQest=.

### Parameter

## Description

est

EST ordinal of the equipment; est can be from 5 to 7778.

60459300 D

### EQUIPMENT ASSIGNMENTS: NONMASS STORAGE

The following EST entries are described in this subsection.

- Nonstandard equipment
- Pseudoequipment
- Unit record equipment
- Magnetic tape equipment
- Mass Storage Facility equipment
- Mass Storage Archival Subsystem equipment
- Stimulator equipment
- Network processing unit
- Network access device
- Two-port multiplexer
- MAP III or IV equipment
- 6683 Satellite Coupler
- CYBERPLUS ring port equipment

### Nonstandard Equipment EST Entry

The nonstandard equipment EST entry allows you to define nonstandard equipment or to add site debugging modifications.

Use the following format to enter the actual octal value that is to reside at that EST ordinal.

EQest=\*\*,W0=value0,W1=value1

| Parameter          | Description                                                                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| est                | EST ordinal of the equipment; est can be from 6 to 777 <sub>8</sub> .                                                                                                                          |
| value <sub>i</sub> | The 1- to 20-digit octal value; this value is entered in the EST word i for the specified ordinal. The word is right-justified and zero-filled if value <sub>i</sub> has fewer than 20 digits. |

### Pseudoequipment

The system automatically defines EST ordinals 0 through 4 as psuedoequipment EST entries; they cannot be used for other equipment definitions. You cannot declare, change, or remove psuedoequipments.

Ordinal O (RD)

This ordinal reserves an EST entry and MST entry to be used for device reconfiguration.

#### Ordinal 1 (DS)

This ordinal reserves an entry for the system display console.

### Ordinal 2 (NE)

The system uses 2 internally to signify that a file is assigned, but that no space exists on the device. If a read is tried, end-of-information (EOI) status occurs. If a write is attempted, the data is discarded.

For example, you can use ordinal 2 with the permanent file utility (PFDUMP) to validate the integrity of a permanent file device, without taking the time to actually create a dump file on tape. In this case, enter:

X.DIS. ASSIGN,NE,TAPE. PFDUMP.

This causes all dump data to be discarded, even though the permanent file device is read and informative messages about the permanent file device are issued to the system console. These messages are described in the NOS 2 Operations Handbook.

#### Ordinal 3 (TE)

If an association is established between file name and volume serial number with an ASSIGN, LABEL, REQUEST, or VSN command, the system automatically enters EQ3 in the file's FNT/FST entry. When a tape having the desired volume serial number is assigned to the file, the system replaces EQ3 in the file's FNT/FST entry with the EST ordinal of the tape unit on which the tape is mounted. If a file that has had the file name and volume serial number association established by a VSN command is returned prior to attempting to assign the tape equipment to the file, the FNT/FST entry is canceled.

# Ordinal 4 (TT)

The system assigns to this equipment a file used for either input form or output to an interactive terminal. This allows the system to determine whether a file requires the special handling needed to accomplish terminal input/output. Byte 4, set by the NAMIAF IPRDECK entry, stores the number of network terminals.

### Unit Record Equipment EST Entry

A unit record equipment EST entry defines card readers, card punches, and line printers.

EQest=type,ST=status,TN=tn,EQ=eq,CH=ch,ID=id,FC=fc,PS=ps.

or

EQest=type-P,ST=status,TN=tn,EQ=eq,CH=ch,ID=id,FC=fc,PS=ps.

Parameter

EST ordinal of the unit record equipment; from 6 to  $777_8$ .

type

est

Unit record equipment type; NOS supports the following unit record equipments.

-

| type | Equipment                    |  |  |  |  |
|------|------------------------------|--|--|--|--|
| CR   | Card reader<br>405-3447/3649 |  |  |  |  |
|      | Card punch                   |  |  |  |  |
| CP   | 415-3446/3644                |  |  |  |  |
| CP   | 415-30                       |  |  |  |  |
|      | Line printer                 |  |  |  |  |
| LP   | Any line printer             |  |  |  |  |
| LR   | 580-12                       |  |  |  |  |
| LS   | 580-16                       |  |  |  |  |
| LT   | 580-20                       |  |  |  |  |

P

TN=tn

Specifies that a 580 printer is equipped with a programmable format controller.

Print train for local batch line printer; from 1 to 7. NOS supports the following print trains.

| <u>tn</u> | Print Train | Description                                                                                |
|-----------|-------------|--------------------------------------------------------------------------------------------|
| 1         | 595-1/596-1 | CDC graphic 63/64-character set.                                                           |
| 5         | 595-5/596-5 | ASCII graphic 63/64-character set.                                                         |
| 6         | 595-6/596-6 | ASCII graphic 95-character set.                                                            |
| 7         | 595-6/596-6 | ASCII graphic 95-character set used as an ASCII 63/64-character set (as on a 595-5/596-5). |

If you set a nonsupported print train value, tn defaults to a supported value. If you omit tn or specify 2 or 3, the actual value of tn is 1. If you specify 4, the actual value is 5.

ST=status

EQ=eq

Specifies whether unit record equipment is available for system use; enter one of these values:

| status | Description                                                                             |
|--------|-----------------------------------------------------------------------------------------|
| ON     | Unit record equipment is available.                                                     |
| OFF    | Unit record equipment is ignored during system operation.                               |
|        | nber for equipment; from 0 to 7. To determine the at the dial switch on the controller. |

### Parameter

# Description

CH=ch

Number of channel to which unit record equipment is connected; from 0 to 138 and from 208 to 338.

### NOTES

When performing a coldstart, a card reader must be available on channel 12g or 13g.

To ensure that all printers are restored to their original states (such as 8 lines per inch and auto page eject) after a master clear has been issued, all unit record equipment should be available on dedicated channels. If it is not, printers revert to 6 lines per inch, and no auto page eject status after a master clear is issued.

ID=id The 1- or 2-digit octal numeric identifier assigned to the device; from 0 to 678. This id is assigned to any output created by a job. For card readers, all jobs loaded from this card reader are assigned the identifier id.

FC=fc The 2-character optional forms code assigned to a line printer or card punch. If the forms code is not present, the forms code field is cleared. The forms code must either be null (not specified) or in the range from AA to 99.

### NOTE

The forms code cannot be assigned to a card reader.

PS=ps Paper size, L or S, for local batch line printer. Default is L. L Long (11 inch) paper will be mounted.

S Short (8 1/2 inch) paper will be mounted.

Examples:

EQ11=CR,ST=ON,EQ=4,CH=12. EQ11=CP,EQ=5,CH=12,ST=ON. EQ20=LR,ST=ON,CH=12,EQ=6,ID=15,FC=AA. EQ21=CR,ID=15,ST=ON,EQ=7,CH=12. EQ22=LT-P,TN=6,ST=ON,EQ=2,CH=12.

# Magnetic Tape Equipment EST Entry

The released tape subsystem supports a maximum of 16 magnetic tape units. The minimum number of magnetic tape units that NOS requires is two 667s, 669s, 677s, or 679s. The format of the entry is:

EQest=MT-n,ST=status,EQ=eq,UN=un,CH=ch1/ch2/.../chn,TF=tf.

EQest=NT-n,ST=status,EQ=eq,UN=un,CH=ch1/ch2/.../chn,TF=tf.

| Parameter | Description                                                                                                                                                                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| est       | EST ordinal of the tape unit; from 6 to 7778. Refer to the MT-n or NT-n parameter.                                                                                                                                                                              |
| MT-n      | Equipment type; MT specifies 7-track tape units, and NT specifies<br>9-track tape units. n is the total number of magnetic tape units                                                                                                                           |
| or        | connected to the controller, from 1 to $20_8$ for $677$ and $679$ units with a $7021-31/32$ controller and from 1 to $10_8$ for $667$ and $669$                                                                                                                 |
| NT-n      | units with a 7021-21/22 controller. The system automatically<br>generates n EST entries with consecutive EST ordinals beginning with<br>the ordinal specified in the est parameter. The n units begin with<br>the unit number specified in the UN=un parameter. |
|           | For 639 units, n should not be specified; if it is specified, it should be given a value of 0 (zero).                                                                                                                                                           |
|           | NOTE                                                                                                                                                                                                                                                            |

To clear an MT-n or NT-n assignment, enter an EQest=0 entry for all n units. For example, to clear EQ50=MT-4,ST=ON,..., enter:

EQ50=0. EQ51=0. EQ52=0. EQ53=0.

| ST=status | Indicates whether of these values: | the | tape | unit   | is   | available | for | access; | enter | one |
|-----------|------------------------------------|-----|------|--------|------|-----------|-----|---------|-------|-----|
|           | status                             |     | ]    | Descri | lpti | Lon       |     |         |       |     |

# Description

- ON Magnetic tape unit is available for access.
- OFF Magnetic tape unit is ignored during system operation.

#### Parameter

#### Description

# NOTE

If a magnetic tape unit is accessible from more than one mainframe, concurrent use must be disabled by one of these methods:

- Set access switches on the tape controller so that only one mainframe can access the unit at any time.
- Make sure that the EST entry for each shared unit is defined as ON in only one of the mainframes.

EQ=eq Controller number for the tape unit; from 0 to 7. This number is usually 0 unless the controller is switched to a different number. Ask your customer engineer for the correct number if you are unsure.

UN=un Number of the lowest numbered magnetic tape unit to be processed; units must have consecutive physical unit numbers; from 0 to 7 for 667 and 669 units or from 0 to 178 for 677 and 679 units. The unit number is on the front of the tape unit, either as a switch or a label.

CH=ch<sub>i</sub> Number of the channel to which the tape unit is connected; from 0 to 13g and from 20g to 33g.

A controller can be connected to from one to four channels, depending on the controller model. However, a maximum of four channels can be handled regardless of the number of controllers.

TF=tf Hardware features available. This parameter specifies the following hardware characteristics of the tape unit(s) being defined; select one option.

677/679 units:

# <u>tf</u> <u>Description</u>

ATS The unit(s) being defined cannot process 6250-cpi group-encoded (GE) tapes. If the system detects a unit with this capability, it automatically changes this value to ATSGE, indicating the availability of the GE feature.

ATSGE The unit(s) being defined can process 6250-cpi GE tapes. Specify this value only if a unit being defined has the capability of processing GE tapes but is down. In such a case, the system would not be able to connect to the unit to determine the availability of the GE feature.

| 667/669 units: |                                                                                                                                                                                                                                                                                |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tf             | Description                                                                                                                                                                                                                                                                    |
| MTS            | The FCOs needed to implement the block<br>identification feature have been installed in the<br>7021 controller for the unit(s) being defined. If<br>the controller is a two-channel model, the block<br>identification feature must have been implemented on<br>both channels. |
| 639 units:     |                                                                                                                                                                                                                                                                                |
| tf             | Description                                                                                                                                                                                                                                                                    |
| 639            | For 639 units, specify TF=639.                                                                                                                                                                                                                                                 |

Description

# Mass Storage Facility Equipment EST Entry

The Mass Storage Facility (MSF) hardware consists of a cartridge storage unit (CSU) and from one to four mass storage transports. The CSU and each transport is represented by a unique EST entry. The EST entries for the transports on a CSU must immediately follow the EST entry for that CSU. There must be no other EST entry between the entry describing a CSU and those describing its transports.

A mainframe that runs MSSEXEC in slave mode must have a CSU equipment type entry, even though no MSF hardware is actually configured for this mainframe.

### CSU Entry

Parameter

The CSU entry format is:

EQest=CS,ST=status,EQ=eq,UN=un,PT=pt,CH=ch,CI=ci,MI=mi,UI=ui.

| Parameter | Description                                                                                                                                                                                         |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| est       | EST ordinal of CSU; from 6 to $777_8$ . Although the software allows an ordinal of $777_8$ , the ordinal must be lower than that value because the entries for transports must follow the CS entry. |
| CS        | Indicates a CSU.                                                                                                                                                                                    |
| ST=status | Specifies whether the CSU is available for use; enter one of these values:                                                                                                                          |
|           | status Description                                                                                                                                                                                  |
|           | ON CSU is available.                                                                                                                                                                                |
|           | OFF CSU is ignored during system operation.                                                                                                                                                         |
| EQ=eq     | Number of the mass storage coupler (MSC); from 0 to 7.                                                                                                                                              |

| Parameter | Description                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------|
| UN=un     | Mass storage adapter (MSA) unit number; from 0 to 3.                                              |
| PT=pt     | Number of the MSA port to which the CSU is connected; from 0 to 7.                                |
| CH=ch     | Number of the channel to which the CSU is connected; from 0 to $13_8$ and from $20_8$ to $33_8$ . |

CI=ci Identifier of the CSU; one of the letters A through M.

# NOTE

The following two parameters are the MSA and CSU identifiers that are hardwired into the MSA and CSU equipment.

MI=mi

Number from 0 to  $17_8$ . Obtain this number from the customer engineer. Use 0 if the FCO that supports this parameter is not installed.

UI=ui Number from 0 to 3778. Obtain this number from the customer engineer. Use 0 if the FCO that supports this parameter is not installed.

### Mass Storage Transport Entry

The format of the mass transport entry is:

EQest=CT,ST=status,EQ=eq,UN=un,PT=pt,CH=ch,CP=cp,MI=mi,UI=ui.

| Parameter | Description                                                                      |
|-----------|----------------------------------------------------------------------------------|
| est       | EST ordinal of the transport; from 6 to 7778.                                    |
| CT        | Indicates the mass storage transport.                                            |
| ST=status | Specifies whether the transport is available for use; enter one of these values: |
|           | status Description                                                               |
|           | ON Transport is available.                                                       |

OFF Transport is ignored during system operation.

ParameterDescriptionEQ=eqNumber of MSC; from 0 to 7.UN=unMSA unit number; from 0 to 3.PT=ptNumber of the MSA port to which the transport is connected; from 0 to 7.CH=chNumber of the channel to which the transport is connected; from 0 to 13g and from 20g to 33g.CP=cpPhysical position of the transport in the CSU; from 0 to 3. Obtain this number from the customer engineer.

# NOTE

The following two parameters are the MSA and transport identifiers that are hardwired into the MSA and transport equipment.

- MI=mi Number from 0 to 17g. Obtain this number from the customer engineer. Use 0 if the FCO that supports this parameter is not installed.
- UI=ui Number from 0 to 3778. Obtain this number from the customer engineer. Use 0 if the FCO that supports this parameter is not installed.

### Mass Storage Archival Subsystem EST Entry

The Mass Storage Archival Subsystem (MSAS) hardware consists of a 7991 storage module and a 7990 controller.

A mainframe that runs SSEXEC in slave mode must have an MSAS EST entry, even though no MSAS hardware is actually configured for this mainframe.

The MSAS EST entry format is:

EQest=SS,ST=status,EQ=eq,UN=un,CH=ch.

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| est       | EST ordinal of the 7990 controller; from 6 to $77_8$ . |
| SS        | Indicates a 7990 controller.                           |

| Parameter | Description                                                                                                                               |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------|
| ST=status | Specifies whether the 7990 controller is available for use; enter one of these values:                                                    |
|           | status Description                                                                                                                        |
|           | ON 7990 controller is available.                                                                                                          |
|           | OFF 7990 is ignored during system operation.                                                                                              |
| EQ=eq     | Logical controller number.                                                                                                                |
|           | This number sets the controller location in the unit device table within SSEXEC's memory. Enter one of these values:                      |
|           | eq Description                                                                                                                            |
|           | 0 First 7990 controller.                                                                                                                  |
|           | 2 Second 7990 controller.                                                                                                                 |
|           | 4 Third 7990 controller.                                                                                                                  |
|           | 6 Fourth 7990 controller.                                                                                                                 |
| UN=un     | 7991 storage module unit number; must be $0$ (zero).                                                                                      |
| CH=ch     | Number of the channel to which the $7990$ controller is connected; from 0 to 13g and from 20g to 33g. You can specify up to two channels. |

# Stimulator Equipment EST Entry

NOS supports a stimulator called STIMULA. However, there are other stimulators such as PACER that can use this EST entry. (PACER is a product that can be ordered from the Special Products Library.)

The format of the EST entry used by the interactive subsystem during stimulation is:

EQest=TT,ST=status,EQ=eq,CH=ch,PT=lines.

| Parameter | Description                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------|
| est       | EST ordinal of the interactive stimulator; from 6 to $777_8$ .                                |
| TT        | Indicates an interactive stimulator.                                                          |
| ST=status | Specifies whether the interactive stimulator is available for use; enter one of these values: |
|           | status Description                                                                            |
|           | ON Stimulator is available.                                                                   |

OFF Stimulator is ignored during system operation.

| Parameter | Description                                                                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| EQ=eq     | Number of the controller; from $0$ to $7$ . Refer to the description of the channel parameter.                                                     |
| CH=ch     | Number of the channel; from 0 to $13_8$ and from $20_8$ to $33_8$ . The channel/controller combination must not have any equipment attached to it. |
| PT=lines  | Number of lines to stimulate; from 1 to $1000_8$ . If this parameter is omitted, $100_8$ is used.                                                  |

# Network Processing Unit EST Entry

The format of the EST entry is:

EQest=NP,ST=status,EQ=eq,PI=pip,CH=ch,ND=node,SA=sa.

| Parameter | Description                                                                                                                                                                                                                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| est       | EST ordinal of the NPU; from 6 to 7778.                                                                                                                                                                                                                                                                 |
| NP        | Indicates a 255X NPU.                                                                                                                                                                                                                                                                                   |
| ST=status | Specifies whether the NPU is available for use; enter one of these values:                                                                                                                                                                                                                              |
|           | status Description                                                                                                                                                                                                                                                                                      |
|           | ON NPU is available.                                                                                                                                                                                                                                                                                    |
|           | OFF NPU is ignored during system operation.                                                                                                                                                                                                                                                             |
| EQ=eq     | Number of the controller for the NPU; from 0 to 7.                                                                                                                                                                                                                                                      |
| PI=pip    | Peripheral interface program index, which determines which copy of<br>the PP driver drives this NPU; from 1 to 4. Up to four EST entries<br>can have the same PIP index (that is, one PP can drive four NPUs).                                                                                          |
| CH=ch     | Number of the channel to which the NPU is connected; from 0 to $13_8$ and from $20_8$ to $33_8$ .                                                                                                                                                                                                       |
| ND=node   | Node number of coupler associated with the NPU being defined; from 1 to $77_8$ . This value is the same as the NODE parameter on the COUPLER statement in the network configuration file definition. For the procedure to assign this value, refer to the Network Definition Language Reference Manual. |

-

#### Parameter

### Description

SA=sa

System autostart module (SAM) flag. This parameter is required.

| sa  | Description     |
|-----|-----------------|
| ON  | SAM is present. |
| OFF | SAM is absent.  |

If an NPU is channel-connected to a single host in a single-host network, the NPU does not need a SAM. However, if an NPU is channel-connected or remotely connected to more than one host, the NPU should have a SAM. The NPU EST entries for channel-connected hosts should specify SA=ON.

# NOTE

The node parameter is specified as an octal value on the NPU entry. The NODE parameter is specified on NDL statements as a decimal value.

Example:

Assume that three NPUs exist on channels 4, 5, and 6, all with controller 7. The NPUs are connected to coupler nodes 2, 8, and 11, respectively. The NPU on channel 5 has a system autostart module; the others do not. The first two NPUs are to be driven by the same PP. The EST entries for these NPUs follow.

EQ70=NP, ST=ON, CH=4, EQ=7, PI=1, ND=2, SA=OFF.

EQ71=NP, ST=ON, CH=5, EQ=7, PI=1, ND=10, SA=ON.

EQ72=NP, ST=ON, CH=6, EQ=7, PI=2, ND=13, SA=OFF.

The NDLP input for the network configuration would include the following statements (refer to the Network Definition Language Reference Manual for a complete description of these statements).

- CPL1: COUPLER NODE=2, HNAME=HOST1.
- CPL2: COUPLER NODE=8,HNAME=HOST1.
- CPL3: COUPLER NODE=11, HNAME=HOST1.

The node parameter of the EST entry and NODE on the COUPLER statement have the same numeric values, in this case 2, 8 ( $10_8$ ), and 11 ( $13_8$ ).

# Network Access Device EST Entry

The format for the network access device (NAD) EST entry is:

EQest=NC,ST=status,CH=ch.

| Parameter | Description                                                                                    |
|-----------|------------------------------------------------------------------------------------------------|
| est       | EST ordinal of the NAD; from 6 to 7778.                                                        |
| NC        | Indicates a NAD.                                                                               |
| ST=status | Specifies whether the NAD is available for use; enter one of these values:                     |
|           | status Description                                                                             |
|           | ON NAD is available.                                                                           |
|           | OFF NAD is ignored during system operation.                                                    |
| CH=ch     | Number of the channel to which the NAD is connected; from 0 to $13_8$ and from 20g to $33_8$ . |

# Two-Port Multiplexer EST Entry

The two-port multiplexer (TPM) must be described in the EST to allow use of the Remote Diagnostic Facility (RDF) on models 865 and 875 and CYBER 180-class machines.

The format of the TPM EST entry is:

EQest=RM,ST=status,PT=pt,CH=ch.

| Parameter | Description                                                                                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| est       | The 1- to 3-digit octal EST ordinal of the TPM; 6 to $777_8$ .                                                                  |
| RM        | TPM equipment type.                                                                                                             |
| ST=status | Specifies whether the TPM is available for use; enter one of these values:                                                      |
|           | status Description                                                                                                              |
|           | ON TPM is available.                                                                                                            |
|           | OFF TPM is ignored during system operation.                                                                                     |
| PT=pt     | Port number to be used by RDF; 0 or 1. RDF normally uses port 1.<br>RDF and the system console cannot use the same port number. |
| CH=ch     | Channel number on models 865 and 875 and CYBER 180-class machines; channel 15 is required.                                      |

# MAP III or MAP IV Equipment EST Entry

The MAP III or IV equipment EST entry allows use of the matrix algorithm processor (MAP). The format of the MAP III or IV EST entry is:

EQest=MP,ST=status,CH=ch.

| Parameter | Description                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------|
| est       | EST ordinal of MAP; from 6 to 778.                                                                                  |
| мр        | Indicates MAP equipment.                                                                                            |
| ST=status | Specifies whether the MAP is available for use; enter one of these values:                                          |
|           | status Description                                                                                                  |
|           | ON MAP is available.                                                                                                |
|           | OFF MAP is ignored during system operation.                                                                         |
| CH=ch     | Number of the channel to which the MAP is connected; from 0 to $13_8$ and from 20 <sub>8</sub> to 33 <sub>8</sub> . |

# 6683 Satellite Coupler EST Entry

The 6683 satellite coupler EST entry allows use of the NOS-SCOPE 2 Station Facility. The format for the entry is:

EQest=CC,ST=status,EQ=eq,CH=ch.

| Parameter | Description                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------|
| est       | EST ordinal of 6683 coupler; from 6 to 7778.                                                  |
| сс        | Indicates 6683 coupler.                                                                       |
| ST=status | Specifies whether the 6683 coupler is available for use; enter one of these values:           |
|           | status Description                                                                            |
|           | ON 6683 coupler is available.                                                                 |
|           | OFF 6683 coupler is ignored during system operation.                                          |
| EQ=eq     | Controller number for equipment; from 0 to 7.                                                 |
| CH=ch     | Number of channel to which coupler is connected; from 0 to $13_8$ and from $20_8$ to $33_8$ . |

# CYBERPLUS Ring Port EST Entry

The CYBERPLUS ring port equipment EST entry allows use of the CYBERPLUS Subsystem. The format of the entry is:

EQest=RP,ST=status,CH=ch.

| Parameter | Description                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------|
| est       | EST ordinal of the ring port; from 6 to 7778.                                                                            |
| RP        | Indicates ring port.                                                                                                     |
| ST=status | Specifies whether the ring port is available for use; enter one of these values:                                         |
|           | status Description                                                                                                       |
|           | ON Ring port is available.                                                                                               |
|           | OFF Ring port is ignored during system operation.                                                                        |
| CH=ch     | Number of the channel to which ring port is connected; from 0 to $13_8$ and from 208 to 338. This parameter is required. |

## EQUIPMENT ASSIGNMENTS: MASS STORAGE

This subsection describes the following EST entries and mass storage equipment assignments.

| Equipment                       | Entry  |
|---------------------------------|--------|
| Disk units                      | EQ     |
| Control module                  | EQ     |
| Extended memory                 | EQ     |
| Equipment Assignment            | Entry  |
| Mass storage allocation control | MSAL   |
| Permanent files device          | PF     |
| System library device           | SYSTEM |
| Alternate system library device | ASR    |
| System checkpoint file device   | SCKP   |
| Logical device removal          | DOWN   |
| Default family name             | FAMILY |
| Removable device                | REMOVE |
| Shared device                   | SHARE  |

| Equipment Assignment       | Entry  |
|----------------------------|--------|
| Independent shared device  | ISHARE |
| Load buffer controllers    | LBC    |
| Extended memory allocation | XM     |

#### NOS Mass Storage Concepts

Following are descriptions that define the NOS mass storage terminology and summarize the kinds of mass storage equipment assignments that can be specified in the EQPDECK. Table 3-2 summarizes the various functions that a particular mass storage device can serve. For example, if a device is an alternate system device (listed under the Alternate System column in table 3-2), then it cannot be a system device; it can contain temporary files, direct access files, and indirect access files; it can be a master device or a nonmaster device; it cannot be removable; it can be either an auxiliary device or a family device; and it can be a shared device or a link device.

### Alternate System Device

Whereas a system device contains all the routines in the system library, an alternate system device contains copies of selected system library routines. The ASR entry in the EQPDECK (refer to ASR - Alternate System Library Device Assignment Entry later in this section) specifies which mass storage devices are to be alternate system devices; the \*AD LIBDECK entry on the deadstart file specifies which system library routines are to reside on these alternate system devices. During system processing, the routines on the alternate system device are used instead of the ones on the system device.

This feature allows each routine in the system library to reside on the mass storage device that is most appropriate to the routine's use. For example, instead of using an 844 system device, a routine that is frequently used could use extended memory, which has a faster transfer rate, as an alternate system device.

### NOTE

Use care when specifying alternate system devices. A mistake could result in no alternate system device defined. For example, suppose you specify the following in your EQPDECK:

ASR=7. ASR=11.

and you specify the following in the corresponding LIBDECK:

\*AD,5,ABS/COMPASS \*AD,11,PP/1SJ

Since the system could not match equipment numbers between the EQPDECK and the corresponding LIBDECK, the system library routine COMPASS will not be on equipment 7 or 5. However, 1SJ will be on equipment 11 as specified.

# Table 3-2. Mass Storage Device Functions

|                                  |        |                     |                                  | Dev                                     | vice Type                                 |           |                   | · <u>····</u> |      |
|----------------------------------|--------|---------------------|----------------------------------|-----------------------------------------|-------------------------------------------|-----------|-------------------|---------------|------|
| Other Possible<br>Functions      | System | Alternate<br>System | Containing<br>Temporary<br>Files | Containing<br>Direct<br>Access<br>Files | Containing<br>Indirect<br>Access<br>Files | Auxiliary | Default<br>Family | Shared        | Link |
| Alternate system<br>device       | No     | -                   | Yes                              | Yes                                     | Yes                                       | Yes       | Yes               | Yes           | Yes  |
| System device                    | -      | No                  | Yes                              | Yes                                     | Yes                                       | Yes       | Yes               | Yes           | Yes  |
| Contain temporary<br>files       | Yes    | Yes                 | -                                | Yes                                     | Yes                                       | Yes       | Yes               | Yes           | Yes  |
| Contain direct<br>access files   | Yes    | Yes                 | Yes                              | -                                       | Yes                                       | Yes       | Yes               | Yes           | Yes  |
| Contain indirect<br>access files | Yes    | Yes                 | Yes                              | Yes                                     | -                                         | Yes       | Yes               | Yes           | Yes  |
| Master device                    | Yes    | Yes                 | Yes                              | Yes                                     | Yes                                       | Yes       | Yes               | Yes           | Yes  |
| Nonmaster device                 | Yes    | Yes                 | Yes                              | Yes                                     | No                                        | No        | Yes               | Yes           | Yes  |
| Removable device                 | No     | No                  | No                               | Yes                                     | Yes                                       | Yes       | No                | Yes           | No   |
| Nonremovable<br>device           | Yes    | Yes                 | Yes                              | Yes                                     | Yes                                       | Yes       | Yes               | Yes           | Yes  |
| Auxiliary device                 | Yes    | Yes                 | Yes                              | Yes                                     | Yes                                       | -         | No                | Yes           | Yes  |
| Family device                    | Yes    | Yes                 | Yes                              | Yes                                     | Yes                                       | No        | -                 | Yes           | Yes  |
| Shared device                    | Yes    | Yes                 | Yes                              | Yes                                     | Yes                                       | Yes       | Yes               | -             | -    |
| Link device                      | Yes    | Yes                 | Yes                              | Yes                                     | Yes                                       | Yes       | Yes               | -             | -    |
|                                  |        |                     |                                  |                                         |                                           |           |                   |               |      |
|                                  |        |                     |                                  |                                         |                                           |           |                   |               |      |

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### Alternate Permanent File Family

More than one permanent file family can exist in a system: one default permanent file family and one or more alternate permanent file familes. One permanent file family is defined as the default family by the EQPDECK FAMILY entry (refer to FAMILY - Default Family Name Assignment Entry later in this section). If another system's permanent file family is introduced, it is an alternate permanent file family; it can be added without interrupting the default permanent file family's operation.

This is a useful feature if a site has more than one system or has groups of installations. If one system fails, its permanent files can be accessed from another system.

As an example, a site with two systems might run with the mass storage configuration shown in table 3-3.

| System | Ordinal | Device | Spindles | Access<br>Used | Contents            |
|--------|---------|--------|----------|----------------|---------------------|
| X      | 7       | 844    | 2        | A              | Direct access files |
| Y      | 7       | 844    | 2        | В              | Direct access files |

Table 8-3. Mass Storage Configuration for Two Systems at One Site

If system Y became inoperative, the B access could be connected to system X. This could be done without interrupting operations of system X.

The EQPDECK entries in system X would be:

| Entries                       | Comments                                                        |
|-------------------------------|-----------------------------------------------------------------|
| EQ7=DI,ST=ON,UN=0/1,CH=0/3.   | Defines access A.                                               |
| EQ10=DI,ST=OFF,UN=0/1,CH=1/4. | Defines access B.                                               |
| REMOVE=10.                    | Allows introduction of access B into system X during operation. |

The EQPDECK entries in system Y would be:

|     | Entries                      | Comments                                                        |
|-----|------------------------------|-----------------------------------------------------------------|
| E   | Q7=DI,ST=ON,UN=0/1,CH=1/4.   | Defines access B.                                               |
| . E | Q10=D1,ST=OFF,UN=0/1,CH=0/3. | Defines access A.                                               |
| R   | EMOVE=10.                    | Allows introduction of access A into system Y during operation. |

To allow for introduction of an alternate permanent file family:

- 1. Define the equipment to be introduced or removed in the EQPDECKs for both systems (refer to the previous example).
- 2. Specify all of the equipment that may be introduced or removed during system processing as removable.
- 3. When you want to introduce the equipment into a system, use the ON operator command to indicate that the equipment that was set to the OFF position in the system in operation is now available. This introduces the alternate permanent file family.
- 4. Enable the validation files for the family by entering X.ISF(FM=familyname). Refer to section 20, System File Initialization.

#### Auxiliary Device

An auxiliary device is a mass storage device that is not part of a family. It is a supplementary permanent file storage device, which may be privately owned (PRIVATE) or may be shared by many users (PUBLIC). An auxiliary device resides on either a removable or nonremovable device. On the permanent file entry (PF) for an auxiliary device (for both a removable device and a fixed device without packs), a pack name is specified instead of a family name.

Refer to the NOS 2 Reference Set, Volume 3, for additional information about private and public auxiliary devices.

As an example, four 844 spindles to be used as a public auxiliary device could be defined as follows:

EQ6=DI,ST=ON,UN=1-4,CH=2. PF=6,X,name.

Private auxiliary devices can be created only after the system is up and running. An operator can make a public device a private device by entering the INITIALIZE command with the UN and TY=X parameters (refer to section 8, K-Display Utilities).

### Family Device

A family device is a mass storage device that is part of a family. It can be either a removable device or a nonremovable device. The only difference between the two is that a nonremovable device containing permanent files can also contain a copy of the system library and/or temporary files. Refer to Alternate Permanent File Family earlier in this section.

On the PF entry, the family name is important if two systems' permanent files are to run on the same system. A user can only use one family of permanent files at one time; if the user does not specify one, the default FAMILY entry is used.

A family device can contain direct and indirect access files. These files are defined in the NOS 2 Reference Set, Volume 3. The files that are allowed are set by the device mask and secondary mask on the PF entry.

### Link Device

Either extended core storage or extended semiconductor memory is the medium through which several computer systems are linked to form a multimainframe operating environment (shared MMF). The link device contains the information necessary for the orderly management of the mass storage that can be shared by more than one mainframe. For a description of shared mass storage, refer to SHARE - Shared Device Entry and ISHARE - Independent Shared Device Entry later in this section.

#### Master Device

The master device contains all of the permanent file catalog entries and indirect access files for a specific user. If permanent file access is required, the user's master device must be available on the system, unless all access is to be to an auxiliary device. The user index and family name uniquely describe a user's master device.

Each master device is organized into five logical sections.

1. Allocation information.

A master device, like all mass storage devices, maintains device labels and track reservation tables (TRTs).

The device label contains information describing the device, such as family name and user mask, as well as locations of permit and catalog information and indirect access files. Refer to the INITIALIZE - Initialization Entry later in this section.

The TRT is the key to allocating information on the master device and to describing the physical layout of data on the device. Refer to APRDECK later in this section.

2. Catalog information.

Catalog entries are used to determine the locations and attributes of permanent files. The catalogs for a master device are allocated to contain catalog entries for a specific group of user indexes. A particular catalog track may contain entries for many users, the number depending upon the number of catalog tracks defined for the device. The user index provides the mechanism for differentiating between user's files on a particular catalog track.

3. Permit information.

Users can explicitly or implicitly allow other users to access their permanent files. Refer to the PERMIT command in the NOS 2 Reference Set, Volume 3. Information describing the permission for all permanent files is in the permit file. Catalog entries contain a relative sector address within this permit file for permissions that have been granted for the file.

4. Indirect access files.

The master device contains all of the user's indirect access files. These files can be accessed by commands that generate working copies for manipulation by the user.

5. Direct access files.

Direct access files can reside either on the master device or on another device in the family, depending on the device masks specified on the PF entries. Direct access files are files that can be accessed at their location on mass storage. A working copy is not generated, so any updates or alterations made to the files are permanent.

### Multispindle Device

To accommodate files that are larger than one device, you can specify multispindle device assignments. Up to eight spindles of 844 disk drives or up to three spindles of 885 disk drives can be included in the equipment definition of one logical device, when the device is first defined. All spindles must be available for access whenever the device is accessed.

Multispindle devices are treated as one logical device, having a track size equal to n times the single-spindle track size (n is the number of spindles in the device). The tracks of an n-spindle device are broken down into n equally-sized segments, each having a length equal to the single-spindle track size. Each segment is contained on a different physical unit.

### 844 Expander

A nonexpanded controller can have up to eight disk drives connected to it. Each of the connection paths is called a port and is identified by a port number ranging from 0 to 7. An expander (10304 extender) is a hardware device that can be connected between controllers and 844 disk drives to increase the number of disk drives that each controller can access.

The expander can be used only with 844-21 drives, although all equipment definitions and equipment driving software support the 64-drive addressing scheme for both 844-21 (DI/DK) and 844-41 (DJ/DL) type equipment.

Each expander consists of either two or four expansion elements. An expansion element connects to a single controller port and forms a connection path from that port to from one through eight disk drives. The connection paths between an expansion element and the eight possible disk drives are called ranks and are identified by a rank number ranging from 0 to 7. Two expanders with four expansion elements each can be connected to a single controller to allow that controller to access a maximum of 64 disk drives. Each expansion element, however, is logically independent and, as such, could be connected to any port of any controller.

|               |   |    |    | Cont | roller | Port    |    |    |                          |
|---------------|---|----|----|------|--------|---------|----|----|--------------------------|
|               |   | 0  | 1  | 2    | 3      | 4       | 5  | 6  | 7                        |
|               | 0 | 00 | 01 | 02   | 03     | 04      | 05 | 06 | 07                       |
|               | 1 | 10 | 11 | 12   | 13     | 14      | 15 | 16 | 17                       |
| Expander Rank | 2 | 20 | 21 | 22   | 23     | 24      | 25 | 26 | 27                       |
|               | 3 | 30 | 31 | 32   | 33     | 34      | 35 | 36 | 37                       |
|               | 4 | 40 | 41 | 42   | 43     | 44      | 45 | 46 | 47                       |
|               | 5 | 50 | 51 | 52   | 53     | 54      | 55 | 56 | 57                       |
|               | 6 | 60 | 61 | 62   | 63     | 64      | 65 | 66 | 67                       |
|               | 7 | 70 | 71 | 72   | 73     | 74      | 75 | 76 | Unit Numbers<br>(octal)  |
|               | İ | L  |    | I    | 1      | <u></u> |    | L  | Port Digit<br>Rank Digit |

A single controller maximum configuration can be visualized as an 8- by 8-square checkerboard with each square representing one of 64 disk drives (figure 3-1).

Figure 3-1. Expander Addressing Map

A column of squares in figure 3-1 represents all the drives that are accessed through a single controller port. A row of squares represents all the drives that have the same expander rank. Each disk drive that can be accessed by the controller is addressed by a 6-bit unit number. The rightmost 3 bits of this unit number select to which of the eight controller ports the drive is connected. The leftmost 3 bits of the unit number select to which of the eight ranks on an expansion element the drive is connected. This unit number is specified as a 2-digit octal number in the mass storage equipment EST entry (refer to EQ - Disk Equipment EST Entry later in this section). The right digit (port digit) of the unit number is the port number and the left digit (rank digit) is the rank of the unit in the particular expansion element.

If two disk drives are vertically adjacent on the expander addressing map (figure 3-1), their unit numbers are considered to be vertically ordered; that is, both drives are connected to the same expansion element, both have the same port number, and their rank numbers differ by one (refer to example 1).

If two disk drives are horizontally adjacent on the expander addressing map (figure 3-1), their unit numbers are considered to be horizontally ordered; that is, both drives have the same rank number, and their port numbers differ by one (refer to example 2). The special case of rank numbers of 0 for two horizontally adjacent drives is equivalent to the definition of consecutive unit numbers for other equipment.

All drives connected to a controller, either directly or through an expansion element, are supported as single-unit or multiunit logical devices. Unit numbers can range from 0 to 778, rather than from 0 to 7, as for other equipment. Thus, a maximum of sixty-four 844 disk drives connected to a single controller can be addressed. However, a maximum of eight units can be specified per multiunit device. In addition, all units of a multiunit device must be connected to the same channel and, therefore, to the same controller.

Figure 3-2 illustrates a configuration in which two expansion elements and 20 disk drives are connected through one controller. An expansion element with eight drives is connected to port 0, an expansion element with six drives is connected to port 1, and six drives are connected to six ports (ports 2 through 7). Each disk drive is shown as a square with its appropriate unit number inside. This configuration is used in the following three examples to illustrate multiunit device assignments. The controller is assumed to be connected to channel 1. Refer to EQ - Disk Equipment EST Entry later in this section for specific information on assigning these devices.

|               |   |    |    | Con | troller | Port |    |    |    |
|---------------|---|----|----|-----|---------|------|----|----|----|
|               |   | 0  | 1  | 2   | 3       | 4    | 5  | 6  | 7  |
|               | 0 | 00 | 01 | 02  | 03      | 04   | 05 | 06 | 07 |
|               | 1 | 10 | 11 |     |         |      |    |    |    |
| Expander Rank | 2 | 20 | 21 |     |         |      |    |    |    |
|               | 3 | 30 | 31 |     |         |      |    |    |    |
|               | 4 | 40 | 41 |     |         |      |    |    |    |
|               | 5 | 50 | 51 |     |         |      |    |    |    |
|               | 6 | 60 |    |     |         |      |    |    |    |
|               | 7 | 70 |    |     |         |      |    |    |    |

Figure 3-2. 844 Expander Configuration With 20 Drives

|--|

The following examples illustrate multiunit device assignment of devices. For a description of the mass storage EST entry in the EQPDECK, refer to EQ - Disk Equipment EST Entry later in this section. Example 1:

Figure 3-3 illustrates a possible configuration for a three-unit vertically adjacent multiunit device. This device could be assigned in the EQPDECK, specifying EST ordinal 6, as:

|               |   |    |          | Conti | roller | Port     |         |        |        |          |    |
|---------------|---|----|----------|-------|--------|----------|---------|--------|--------|----------|----|
|               |   | 0  | 1        | 2     | 3      | 4        | 5       | 6      | 7      |          |    |
|               | 0 | 00 | 01       | 02    | 03     | 04       | 05      | 06     | 07     |          |    |
|               | 1 | 10 | 11       |       |        |          |         |        |        |          |    |
| Expander Rank | 2 | 20 | 21       |       |        |          |         |        |        |          |    |
|               | 3 | 30 | 31       | 1     |        |          |         |        |        |          |    |
|               | 4 | 40 | 41       |       |        |          |         |        |        |          |    |
|               | 5 | 50 | 51       |       |        |          |         |        |        |          |    |
|               | 6 | 60 |          | -     |        |          |         |        |        |          |    |
|               | 7 | 70 | <b>~</b> |       | — v    | ertical  | ly Adja | cent T | hree-T | Jnit Dev | ic |
|               | • |    |          |       | v      | erticali | гу Адја | cent 1 | uree-l |          | L  |

EQ6=D1,ST=ON,UN=50/60/70,CH=1.

Figure 3-3. Vertically Adjacent Three-Unit Device

Example 2:

Figure 3-4 illustrates a possible configuration for a two-unit horizontally adjacent multiunit device. This device could be assigned in the EQPDECK, specifying EST ordinal 7, as:

EQ7=D1,ST=ON,CH=1,UN=40-41.

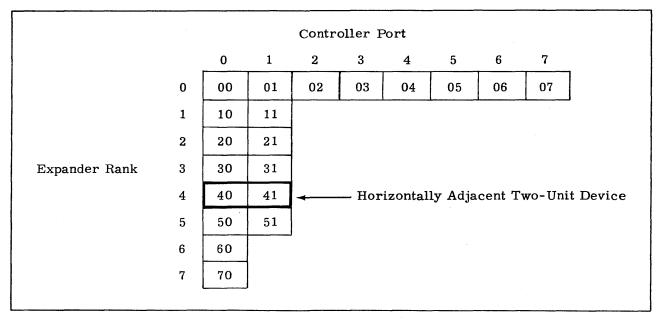


Figure 3-4. Horizontally Adjacent Two-Unit Device

Example 3:

Figure 3-5 illustrates a possible configuration of 20 disk drives into seven devices. These devices could be assigned in the EQPDECK as follows:

EQ6=DI, ST=ON, UN=60, CH=1. EQ7=DI, ST=ON, UN=70, CH=1. EQ10=DI, ST=ON, UN=50-51, CH=1. EQ11=DI, ST=ON, UN=10/20/30/40, CH=1. EQ12=DI, ST=ON, UN, 11/21/31/41, CH=1. EQ13=DI, ST=ON, UN=0-3, CH=1. EQ14=DI, ST=ON, UN=4-7, CH=1.

Devices on ordinals 6 and 7 are defined as single units. These units may be initialized online into a two-unit device if they are also defined as removable.

|               |   |      | Cont | roller | Port | -    |    |    |    |    |  |
|---------------|---|------|------|--------|------|------|----|----|----|----|--|
|               |   |      | 0    | 1      | 2    | 3    | 4  | 5  | 6  | 7  |  |
|               |   |      | EQ13 |        |      | EQ14 |    |    |    |    |  |
|               | 0 |      | 00   | 01     | 02   | 03   | 04 | 05 | 06 | 07 |  |
|               | 1 | (    | 10   | 11     |      |      |    |    |    |    |  |
| Expander Rank | 2 | EQ11 | 20   | 21     |      | 10   |    |    |    |    |  |
|               | 3 |      | 30   | 31     | } EQ | 12   |    |    |    |    |  |
|               | 4 | l    | 40   | 41     |      |      |    |    |    |    |  |
|               | 5 | EQ10 | 50   | 51     | ,    |      |    |    |    |    |  |
|               | 6 | EQ6  | 60   |        | -    |      |    |    |    |    |  |
|               | 7 | EQ7  | 70   |        |      |      |    |    |    |    |  |
| L             |   |      |      |        |      |      |    |    |    |    |  |

Figure 3-5. Hardware Configured into Seven Devices

### Nonremovable Device

A nonremovable device cannot be physically removed during system operation. It can contain a copy of the system library, which means it is a system device; it can also be available for temporary files. It may or may not contain permanent files.

### Removable Device

A removable device can be logically or physically added or removed during system operation without causing system malfunction.

A device is specified as removable with the REMOVE entry in the EQPDECK. During deadstart, a removable device is recovered just as is any other mass storage device, if the status is on. If the device is not available, then the status is displayed for the operator (E,M display).

Removable devices can contain permanent files but cannot contain the system library or temporary files, because a device containing active files (such as temporary or library files) cannot be removed from the system. It can be either an auxiliary device or an alternate permanent file family device.

### Shared Device

A shared device contains permanent files that can be accessed by more than one mainframe. To have these permanent files accessible to the mainframe, the device must be defined as shared in the mainframe. Refer to SHARE - Shared Device Entry and ISHARE - Independent Shared Device Entry later in this section.

A shared device can be removable. However, when unloading a shared device, it must be in global unload status before you remove it. Refer to the DSD commands UNLOAD and MOUNT in section 5 for more information concerning removable shared devices.

#### System Device

The system device is a nonremovable device on which the system library resides. It can also contain permanent and temporary files.

### Temporary File Device

The temporary file device is a nonremovable device on which the following temporary system files reside:

- Library files
- Local files
- Queued files
- Rollout files
- System files
- Timed/event rollout files

### Buffered Mass Storage Devices

Buffered mass storage devices are those devices for which the system provides an extended memory data buffer. For the model 176 only, an 819 mass storage device with the buffer in LCME is a buffered device. For all models except models 176 and CYBER 180-class machines, the buffered device is an 885-42 Mass Storage Subsystem with the buffer in ESM. Using extended memory as a data buffer provides the following capabilities.

- The system treats the buffer as a disk cache so that multiple requests for a particular disk data block can potentially be satisfied by doing only one disk read.
- The system buffers data to maintain maximum transfer rates regardless of the user's buffer size.

To maintain maximum transfer rates, a CPU program that resides in CPUMTR controls the buffered device I/O request processing. The system maintains the standard disk I/O interface to the user's programs.

The buffered device error reporting process logs read/write errors in the binary maintenance log but not in the system error log or dayfile. When an unrecovered read/write error occurs, the error message appears at the system control point. The binary maintenance log must be processed by the Hardware Performance Analyzer (HPA) to get detailed information concerning buffered device errors.

The following considerations are important to system performance.

- The amount of I/O buffer space in extended memory. Refer to XM Declare Extended Memory Space for Buffers or User Access later in this section.
- The size of the hash buffer parameter. Refer to EQ Mass Storage Equipment EST Entry later in this section.
- The amount of space reserved in central memory for providing PP access to buffered devices. Refer to the PPB=number entry under Central Memory Descriptions earlier in this section.

There may be situations when a particular user job runs slower with buffered devices. This happens if the job issues CIO reads when a buffer is full or issues CIO writes when a buffer is empty. (Both cases indicate inefficient programming techniques.) You can speed up the job by entering the DSD command ENABLE,LOGGING. The system will perform faster I/O and issue warning messages to the job dayfile.

### **Specifying Ranges of EST Ordinals**

Several EQPDECK entries allow you to specify multiple EST ordinals in the same entry. For example, instead of entering

REMOVE=6,7,10,11,12.

you can enter:

REMOVE=6-12.

Ranges of ordinals can be mixed with individual ordinals, such as:

REMOVE=6,10-16,23.

Empty ordinals within a range are ignored. For example, specifying a range of 6 through 12 will ignore an unassigned ordinal 7. However, inappropriate devices within a range or specified individually (such as specifying a printer as a removable device) are diagnosed as errors.

### EQ — Disk Equipment EST Entry

The purpose of the mass storage equipment (EQ) entries is to describe all mass storage peripheral equipment. This includes disk equipment and extended memory equipment. NOS requires that at least 6 million words of mass storage be available.

There can be up to 200 logical mass storage devices, and therefore, up to 200 mass storage EST entries (this number does not include ordinals 0 through 4, which are reserved for specific uses). An entry, however, can refer to more than one physical unit. For example, two 844 spindles can be defined as either two logical devices with two EQ entries or as one logical device with one EQ entry.

A unit is a dual-access unit if it is accessed by one mainframe through two different controller-channel access routes. To define a unit as a dual-access unit with its EQ entry, specify two channel parameters. The channels should be from two controllers. Only one channel of a dual-channel access controller is recommended for use on a single mainframe, since using both channels of the controller results in a performance degradation rather than an improvement. Therefore, if both channel accesses of a controller are physically connected to the same mainframe, you should define only one of them on an EQ entry.

# NOTE

A device's EQ entry must precede any of the following entries for that device: ASR, MSAL, REMOVE, PF, SYSTEM, FAMILY, INITIALIZE, SHARE, ISHARE, DOWN, and XM. If you redefine a device's EQ entry, then you must also redefine those entries. The format of the EQ entry for disk units is:

EQest=type,ST=status,UN=units, CH=ch<sub>1</sub>/ch<sub>2</sub>,AP=ap,HT=ht.

# Parameter

# Description

EST ordinal of the disk units; from 6 to 7778.

type

est

Equipment type. The following disk units are supported by NOS.

| type   | Equipment                                 | Number<br>of Units |
|--------|-------------------------------------------|--------------------|
| db‡    | 885-42, 7155-401 (full track)             | l through 3        |
| dd††   | 834, 7255-1 (full track)                  | l through 8        |
| DI     | 844-21, 7054/7154 (half track)            | l through 8        |
| DJ     | 844-41/44, 7054/7154 (half track), 7155-1 | 1 through 8        |
| DK     | 844-21, 7154 (full track)                 | l through 8        |
| DL     | 844-41/44, 7154 (full track), 7155-1      | l through 8        |
| DM     | 885-11/12, 7155-1 (half track)            | l through 3        |
| DQ     | 885-11/12, 7155-1 (full track)            | 1 through 3        |
| dvttt  | Single-density 819                        | 1                  |
| DW TTT | Double-density 819                        | 1                  |

Not applicable for CYBER 180-class machines.

<sup>##</sup>Applicable for models 810, 815, 825, and 830 only. You must also specify the control
module EQ entry.

tftApplicable to model 176 only.

#### Parameter

### Description

ST=status

Specifies whether or not the equipment is available for access; enter one of these values:

status

#### Description

ON Equipment is available.

OFF Equipment is not accessed during system operation. Specify OFF if the equipment is malfunctioning and access is not desirable.

If the equipment is removable and is not available at deadstart, the system determines that it is unavailable, even if its EQ status entry specifies ON. If INITIALIZE is entered, the equipment is not initialized until it is set to ON status. During system operation, the operator can initiate access to this device by entering the ON command.

If the equipment can be used with either one of two different systems (removable devices, not dual access), define the status of the EQ entry as ON in the system to which it is currently available for access; define the status of the EQ entry as OFF in the system to which it is not currently available for access.

UN=units

Defines unit number(s).

For 834 units, unit numbers are generated as follows:

unit number = (control module equipment number)\*10<sub>8</sub>+ (834 disk equipment number)

For 819 units, unit numbers are either from 0 to 3, if on FLPP channels 2 and 3, or from 4 to 7, if on FLPP channels 6 and 7.

For 844 and 885 units, unit numbers are from 0 to  $77_8$ .

You can define the 834, 844, and 885 physical units with a separate EQ entry for each unit, or, if more continuous storage is needed than is possible with one unit, you can define more than one physical unit as one logical device with one EQ entry. If the EQ entry is defining more than one unit of a multispindle device, unit numbers can be specified as  $UN=un_1-un_n$ , if units are contiguous, or as  $UN=un_1/un_2/.../un_n$ , if units are noncontiguous. For 834 units, contiguous means that the units are all on the same control module.

For example, three 844 units (0, 1, and 2) to be accessed as three units are defined as follows:

EQest=DI,ST=status,UN=0,CH=ch,AP=ap.

EQest=DI,ST=status,UN=1,CH=ch,AP=ap.

EQest=DI,CH=ch,UN=2,AP=ap,ST=status.

Parameter

#### Description

Three 844 units (0, 1, and 2) to be accessed as one logical unit are defined as follows:

EQest=DI,ST=status,UN=0-2,CH=ch,AP=ap.

or

EQest=DI,ST=status,UN=0/1/2,CH=ch,AP=ap.

An advantage to accessing the three units as one logical unit is that less space is used in CMR ( $662_8$  words for the 844-21). A disadvantage is that if any of the units malfunctions or is destroyed, all units are affected.

CH=ch1

For all devices except 819s and 834s, number of the channel or channels to which the controller is connected; from 0 to  $13_8$  and from 208 to 338. For 819s, the channel pair for input/output (I/O) multiplexer (primary access); enter one of these values:

| <sup>ch</sup> 1 | Description       |  |  |  |
|-----------------|-------------------|--|--|--|
| 2               | Channels 2 and 3. |  |  |  |
| 4               | Channels 4 and 5. |  |  |  |
| 6               | Channels 6 and 7. |  |  |  |

For 834s, the channel number is specified on the control module EQ entry.

/ch<sub>2</sub>

For all devices except 819s and 834s, indicates dual-access unit; cannot be 0;  $ch_1$  and  $ch_2$  should be connected to different controllers. Ch<sub>2</sub> is assigned first if it is free.

For 819s, the secondary access channel pair; one of the values described for  $ch_1$ .

For 834s, dual access is indicated on the control module EQ entry.

The 1- or 2-digit octal number that indicates which APRDECK to use. If AP=ap is omitted, the first APRDECK, APRDOO, is assumed.

HT=ht

AP=ap

Length of hash table segment for this unit; must be a power of 2 and from 10g to 400g. The hash table is maintained in extended memory. The hash table keeps track of the extended memory copies of disk segments for DV, DW, and DB disk units. The ht parameter should be as large as possible for maximum efficiency. If the hash buffer is too small, the system's ability to recognize disk data already in buffers is diminished, thus causing unnecessary disk reads.

## EQ — Control Module EST Entry

The 834 Disk Storage Subsystem consists of from one to eight 834 disk units and from one to eight control modules. To be operational, both the disk units and the control modules must be defined in the EQPDECK. The EQ entry for the 834 disk unit is described under EQ - Disk Equipment EST Entry earlier in this section. The description of the EQ entry for the control module follows.

A control module for the 834 Disk Storage Subsystem is a controller that drives up to four 834 disks and that interfaces with the operating system using one or two 7255-1 adapters (one per channel). The control module EQ entry is used to:

- Specify the channels to be used to access the 834 drives defined on the control module. Channel entries are not allowed on the 834 disk unit EQ entries.
- Specify what level of controlware is to be loaded into the control module during deadstart or when you use a LOADBC command.
- Allow maintenance access to a control module without affecting other control modules on the same channel(s).

The format of the control module entry is:

EQest=CM,EQ=eq,CH=ch<sub>1</sub>/ch<sub>2</sub>,CW=cw.

| Parameter | Description                                                                                                                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| est       | EST ordinal of the control module; from 6 to 7778.                                                                                                                                                                                                          |
| EQ=eq     | Physical equipment number of the control module; from 0 to 7.                                                                                                                                                                                               |
| CH=ch1    | Number of the channel to which the control module is connected; from 0 to $13_8$ and from 208 to $33_8$ .                                                                                                                                                   |
| / ch2     | Indicates a dual-access control module; from 1 to 13g and from $20_8$ to 33g.                                                                                                                                                                               |
| C₩=cw     | Indicates if controlware is to be installed in the control module.<br>The control module load sequence takes at least 15 seconds for each<br>control module. It is advised that you load controlware only when<br>necessary. cw can be one of these values: |
|           | <u>cw</u> <u>Description</u>                                                                                                                                                                                                                                |
|           | CM Install controlware (default).                                                                                                                                                                                                                           |
|           | NCM Do not install controlware.                                                                                                                                                                                                                             |

#### EQ — Extended Memory EST Entry

Three possible extended memory configurations exist. The first configuration is for ECS, LCME, and ESM. It allows a CPU (or two, if dual CPUs are available) to communicate with extended memory. The second configuration is the same as the first except additionally it uses the distributive data path (DDP) or low-speed port (LSP). This configuration allows PPs in the system, as well as the CPU, to communicate directly with ECS or ESM. It does not apply to LCME. NOS supports up to two DDPs or LSPs per mainframe. (Refer to both User Extended Memory and XM - Declare Extended Memory Space for Buffers or User Access later in this section for information regarding user-access extended memory.) For the third configuration, part of central memory is used as unified extended memory (UEM) on models 865 and 875 and CYBER 180-class machines.

You can use extended memory as an alternate system residency for often accessed system routines. The faster access may result in a performance improvement. However, you should use caution when placing system routines in UEM to avoid possible performance degradation instead of an improvement. This can happen because a portion of central memory is reserved for UEM and therefore that portion is unavailable to users. Also, accessing the system routines that reside in UEM may require additional CPU overhead. Use the TRACER utility to determine the impact on system resources when using UEM.

# NOTE

If extended memory is not included in the hardware configuration, do not make an extended memory EST entry. EST ordinal 5 cannot be used to define any other equipment.

The format of the entry is:

EQ5=type,ST=status,MA=mode,ET=xmem/ddp,SZ=size,CH=ch1/ch2,AP=ap,MC=mc.

Parameter

Description

| type      | Extended memo                  | ry equipment type; enter one of these values:               |
|-----------|--------------------------------|-------------------------------------------------------------|
|           | type                           | Description                                                 |
|           | DE                             | DDP or LSP is not available.                                |
|           | DP                             | DDP or LSP is available (not applicable for UEM).           |
| ST=status | Specifies whe<br>of these valu | ther extended memory is available for access; enter one es: |
|           | status                         | Description                                                 |
|           | ON                             | Extended memory is available.                               |
|           | OFF                            | Extended memory is ignored during system operation.         |

| Parameter   |                                              | Description                                                                                                                                                                                                                                                                                          |
|-------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA=mode     | online exten<br>of extended<br>controller.   | mode (not applicable for UEM). If you specify MA=ON,<br>ded memory diagnostics are allowed to reference the half<br>memory that is placed in maintenance mode at the<br>The other half of extended memory is available to the<br>size of available physical extended memory is divided<br>start.     |
|             | mode, all ma<br>When you pla<br>PRESET entry | tially place an extended memory device in maintenance<br>inframes using the extended memory must initialize it.<br>ice ECS in maintenance mode, you must also make the<br>for multimainframe operation. Refer to INITIALIZE and<br>in this section. If you omit the MA=mode parameter,<br>is MA=OFF. |
|             |                                              | art of extended memory in maintenance mode and you have<br>t also use the MC=mc parameter to define which<br>port to use.                                                                                                                                                                            |
| ET=xmem/ddp | assumed. If                                  | e memory and ddp. If you do not specify xmem, El is<br>you do not specify ddp, Dl is assumed if type is DP (if<br>o value is assumed). If you specify ddp, you must also                                                                                                                             |
|             | xmem                                         | Description                                                                                                                                                                                                                                                                                          |
|             | E 1                                          | ECS I for all mainframes except models 176 and CYBER 180-class machines.                                                                                                                                                                                                                             |
|             | E2                                           | ECS II or ESM for all mainframes except models 176 and CYBER 180-class machines.                                                                                                                                                                                                                     |
|             | LE                                           | LCME only for model 176.                                                                                                                                                                                                                                                                             |
|             | ЕМ                                           | UEM for models 865 and 875 and CYBER 180-class<br>machines. type must be DE. The system ensures that<br>the sum of memory words specified by the MINCM CMRDECK<br>entry and specified by this entry for UEM is present.                                                                              |
|             | ES                                           | ESM accessed through maintenance port. If ES is specified, you must also specify the MC=mc parameter.                                                                                                                                                                                                |
|             |                                              | If you specify MA=ON, the portion of ESM accessed for<br>maintenance mode is the portion that is available to<br>the system, not the portion that online diagnostics<br>can reference.                                                                                                               |
|             | ddp                                          | Description                                                                                                                                                                                                                                                                                          |
|             | <u></u> F                                    |                                                                                                                                                                                                                                                                                                      |
|             | D1                                           | DC135 DDP.                                                                                                                                                                                                                                                                                           |

## Description

Size of extended memory; one of the values in the following table for ECS I. For ECS II, ESM, and LCME, size ranges from a minimum value of 10g, which specifies 4K (K represents 1024 words) through a maximum value of 100008, which specifies 2048K. For UEM, size ranges from a minimum value of 108, which assigns 4K for UEM, through a maximum value of 100008-MINCM, which assigns 2000K-MINCM (convert MINCM to decimal) for UEM. Size can be specified in increments of 1, if necessary (for example, 108, 118, 128, 4018, or 20038).

| Size (Octal) | ECS I Available | Number of Banks |
|--------------|-----------------|-----------------|
| 400          | 125K            | 1               |
| 1000         | 250K            | 2               |
| 2000         | 500K            | 4               |
| 4000         | 1000K           | 8               |
| 10000        | 2000K           | 16              |

CH=ch1,/ch2

Numbers of the channels to which the DDP is connected; from 0 to 13g and from 20g to 33g.

If the equipment type is DE, do not specify a channel parameter. If a channel parameter is specified, the system recognizes the DE entry as a DP entry.

If the equipment type is DP, specify either one or two channels. The second channel cannot be 0 (zero). If a DDP is present, the loading of CPU programs residing in ECS or ESM still occurs via the CPU. A DDP must be connected to a channel by itself.

AP=ap The 1- or 2-digit octal number that indicates which APRDECK to use. If you omit AP=ap, the first APRDECK, APRDOO, is assumed.

MC=mc Number of the channel to which the maintenance port is connected; from 0 to 13 and from 20g to 33g. This channel is for ESM only. If MC=mc is specified, you must also specify MA=ON.

#### Examples:

EQ5=DE, ST=OFF, SZ=1000, AP=21. EQ5=DP,ST=ON,SZ=2000,CH=2/3,AP=10. EQ5=DE, ST=ON, MA=ON, ET=E2, SZ=1000. EQ5=DP,ST=OFF,ET=E1/D2,SZ=2000,CH=2,AP=6. EQ5=DP,ST=ON,ET=ES/D2,SZ=10000,CH=5/6,MC=7.

Parameter

SZ=size

## MSAL — Mass Storage Allocation Control Entry

The MSAL entry assigns job files of the specified type to the mass storage devices defined by the specified EST ordinal.

The format of the MSAL entry is:

 $MSAL, t=est_1, est_2, \dots, est_n$ .

Parameter

#### Description

t

File type; one of these values:

- <u>t</u> <u>Description</u> B LGO files. D Job dayfiles.
  - I Input files.†
  - L Local files.
  - 0 Output files.†
  - P Primary files.
  - R Rollout files.
  - S Secondary rollout files.
  - T Temporary files.

esti

EST ordinal of a nonremovable mass storage device, from 5 to 578. Ranges of ordinals can be specified.

# NOTE

In most cases, using ESM as a secondary rollout device improves system performance. UEM, on the other hand, may not improve system performance since it takes more CPU overhead. Use the TRACER utility to determine the best use of system resources.

<sup>&</sup>lt;sup>†</sup> Routing a file to queues changes a file's type, not its residency. Thus specifying an MSAL,I=est or MSAL,O=est entry does not necessarily force all input or output queue files to the specified devices.

Secondary rollout files are rollout files whose size in sectors is smaller than a threshold specified by the IPRDECK or DSD entry SRST. These files are rolled out to devices specified by the MSAL,S= entry. All files selected for rollout that are equal to or greater in size than the threshold are rolled out to devices specified by the MSAL,R= entry. The default value of SRST is 0 (zero); thus, no secondary rollout files exist unless this value is changed. A possible use of this feature is:

```
Entries <u>Comments</u>
EQPDECK
EQ5=DP,ST=ON,SZ=1000,CH=27. Specify equipment 5 as extended memory with a DDP.
MSAL,S=5. Direct secondary rollout files to extended memory.
IPRDECK
SRST=20. Set threshold count so that no large rollout files are rolled out to extended memory.
```

## **PF** — Permanent Files Device Assignment Entry

Before initializing a mass storage device (with the INITIALIZE entry in the EQPDECK), add a PF entry for that device to the EQPDECK anywhere after the device's EQ entry. The PF entry information becomes part of the device's label when it is initialized; this label is recovered during subsequent deadstarts. For subsequent deadstarts, it is not necessary that the PF entry be part of the EQPDECK on the deadstart file; if it is, it is ignored.

If the unit is a family device, the format is:

PF=est,type,dm,sm,name,device,nc.

If the unit is an auxiliary device, the format is:

PF=est,type,name,nc.

#### Parameter

#### Description

est

type

Type of device; one of these values:

EST ordinal of the device; from 5 to  $777_8$ .

## type

#### Description

- F Family device. It can contain indirect access files if the dm parameter is from 1 to 3778. It can contain direct access files if the sm parameter is from 1 to 3778. It is a master device if the dm parameter is specified.
- X Auxiliary device, which can contain both direct and indirect access files. X must be specified on a unit's PF entry if any of the auxiliary device commands are to be used for the device.

Refer to table 3-4 for dependencies.

Table 3-4. PF Entry

|                      |                                           |      | PF Ent             | ry Parameter | Settings |        |
|----------------------|-------------------------------------------|------|--------------------|--------------|----------|--------|
| Type of<br>PF Device | Files Permitted<br>on Device              | type | dm                 | name         | device   | SM     |
| Auxiliary †          | Indirect and/or<br>direct                 | X    | Omit               | pack         | Omit     | Omit   |
| Family               | Direct only                               | F    | 0                  | family       | 1-778    | 1-3778 |
|                      | Indirect only<br>(master device)          | F    | 1-377 <sub>8</sub> | family       | 1-778    | 0      |
|                      | Indirect and<br>direct (master<br>device) | F    | 1-377 <sub>8</sub> | family       | 1-778    | 1-3778 |

<sup>†</sup> If the device is to be a private auxiliary device, enter the INITIALIZE command after deadstart and specify the user name. Refer to section 8, K-Display Utilities, for the procedure.

## Parameter

# Description

| dm   | Specifies the unit's device mask; from 0 to $377_8$ . Set according to information in section 17, PF Utilities. Omit this parameter if the device is an auxiliary device.                                                                                                   |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | The device mask for a permanent file device defines the groups of users whose catalogs reside on the device for a particular family.                                                                                                                                        |
| sm   | Specifies the unit's secondary mask; from 0 to 3778. Set<br>according to information in section 17, PF Utilities. Omit this<br>parameter if the device is an auxiliary device.                                                                                              |
|      | This parameter controls the residence of direct access files in the same way that dm controls the residence of indirect access files.                                                                                                                                       |
| name | Designates either the name of the family to which the unit belongs<br>or its pack name if it is an auxiliary device; from 1 to 7<br>alphanumeric characters. Do not use the family name 0: it is<br>reserved.                                                               |
|      | The family name describes the permanent file devices available to a user.† A family may consist of from 1 to 63 logical devices; however, the master devices within the family must have device masks totaling $377_8$ if all possible user indexes are to be accommodated. |

<sup>&</sup>lt;sup>†</sup> If not otherwise specified, the default family name becomes part of the tape label information. It is checked and verified if the user specifies the FA=A parameter on a command. Refer to the NOS 2 Reference Set, Volume 3 for a discussion of FA=A.

#### Parameter

device

nc

## Description

Usually a system runs with one family of permanent file devices available. But you can activate additional families on a system, in order to allow the users of these families to access their permanent files through an alternate system. This might be helpful if one system supplies backup service to another system. When more than one family is active on a system, users with matching user indexes access the same permanent files on a public auxiliary device. You can avoid this situation by predetermining a range of user indexes for each family running on a system. When a new family is introduced into a system, its user indexes should be checked against those of the family or families currently running and any matching indexes should be changed. Refer to the IPRDECK entry COMLIB later in this section.

The pack name is the unique 7-character name associated with an auxiliary device. An auxiliary device is a self-contained permanent file device: all permanent files (whether direct or indirect access) represented by the catalogs on the device reside on that device. To access a file on an auxiliary device, users must specify the pack name as part of the permanent file request. The pack name is used instead of the usual algorithm for determining catalog location (user masks and family name). An auxiliary device can be private or public. Any user who knows the pack name and has the appropriate permissions and validations can access files on an auxiliary device. Only the owner user name can create files on a private auxiliary device (perform DEFINE, SAVE, or REPLACE requests).

Number of the device in the family; from 1 to  $77_8$ . Omit this parameter if the device is an auxiliary device.

A permanent file that does not reside on the master device has a device number in the catalog entry or on the master device. The device number specifies on which alternate device within the family the file resides.

Number of catalog tracks (optional) used only for master devices; from 1 to  $200_8$ . This value must be a power of 2. If you do not specify nc, one of the following default values (based on the equipment type) is supplied.

| Default |           |       | Default |                        |       |
|---------|-----------|-------|---------|------------------------|-------|
| nc      | Equipment | Туре  | nc      | Equipment              | Туре  |
| 40      | 834       | DD    | 10      | 819                    | DV/DW |
| 40      | 844-21    | DI/DK | 4       | Extended<br>memory     | DE    |
| 40      | 844-41/44 | DJ/DL |         | •                      |       |
| 10      | 885-11/12 | DM/DQ | 4       | ECS or ESM<br>with DDP | DP    |
| 10      | 885-42    | DB    | 1       | Private<br>device      |       |

Examples:

PF=6,F,125,125,SYSTEM,3,200. PF=17,X,PACK.

### SYSTEM — System Library Device Assignment Entry

The SYSTEM entry specifies which mass storage devices are to contain copies of the NOS system library from the deadstart file. A system device can be any mass storage device as well as extended memory.

Throughput can be greatly improved by specifying more than one system device. For example, if two system devices are specified and they are on different channels, the time required to access system programs can be reduced. When the channel for one system device is busy, the other is accessed. Also, if hardware problems occur on one system device, the other system device can still be accessed.

The following restrictions apply.

- The EQ entry for a system device cannot have the status set to OFF.
- A REMOVE entry cannot exist in the EQPDECK for a device being specified as a system device.
- If more than one device is specified as a system device, all devices specified must be of the same type. For example, if there are two system devices and the equipment EST ordinal for one of them specifies DI, the equipment EST ordinal for the other one must also specify DI.
- If no devices are specified as system devices, the system library resides on the first nonremovable mass storage device.
- An ASR entry cannot exist in the EQPDECK for a device being specified as a system device.

The SYSTEM entry format is:

 $SYSTEM=est_1, est_2, \dots, est_n$ .

#### Parameter

#### Description

est<sub>i</sub>

EST ordinal of the device to contain a copy of the system library on the deadstart file; from 5 to 7778. The EQ entry must be set to ON status. One or more ordinals can be specified with one SYSTEM entry. Ranges of ordinals can be specified. The maximum number of system devices allowed depends upon the value of MXSY (refer to COMSMSC Parameters in the NOS 2 Installation Handbook).

## ASR — Alternate System Library Device Assignment Entry

This entry specifies which mass storage devices are to be alternate system devices. An alternate system device is a mass storage device on which duplicate copies of system routines can be placed by the system, either for faster access than is possible from a system device or because they are frequently used programs. The following restrictions apply.

- The device must be a mass storage device, including extended memory.
- The device cannot be a removable device.
- The device cannot be a system device.

When loading a system routine, the system will access the routine from the alternate system device if practical. However, if the alternate system device is down or its access is more congested than the system device, the system will access the routine from the system device.

The procedure for selecting the records to be placed on the alternate device is in LIBDECK.

The ASR entry format is:

 $ASR=est_1, est_2, \dots, est_n$ .

#### Parameter

## Description

est<sub>i</sub>

EST ordinal of mass storage device to be used as an alternative system device; from 5 to  $777_8$ . Ranges of ordinals can be specified.

## SCKP — System Checkpoint File Device Assignment Entry

The SCKP entry specifies on which mass storage devices the checkpoint file is to reside. This entry is processed during a level 0, 1, or 2 deadstart. If no checkpoint devices are defined, the checkpoint file will reside on the first default mass storage device.

A level 0 deadstart clears the checkpoint status on all mass storage devices. To clear the checkpoint status for a specific mass storage device, use the RESET entry.

The SCKP entry format is:

 $SCKP=est_1, est_2, \dots, est_n$ .

#### Parameter

#### Description

esti

EST ordinal of the mass storage device to be defined as a system checkpoint file device; from 5 to  $777_8$ . Ranges of ordinals can be specified.

#### DOWN --- Logical Device Removal Entry

The DOWN entry specifies which EST ordinals will be logically removed (or down) at deadstart time. You can use this entry for all types of equipment that are defined as nonshared and removable. It is particularly useful either in allowing online diagnostics of nonshared extended memory or in removing mass storage devices that cannot be removed online (perhaps due to hardware malfunctioning).

The DOWN entry format is:

DOWN=est1,est2,...,estn.

Parameter

## Description

est<sub>i</sub>

EST ordinal of the device to be logically removed; from 5 to 7778. Ranges of ordinals can be specified.

The DOWN entry has the following characteristics.

- It can be entered anywhere after the EQ entries for nonmass storage devices.
- For removable, nonshared mass storage devices, it can be entered anywhere after the EQ and REMOVE entries.
- Shared devices (including the link device) cannot be defined as DOWN in an MMF environment.
- It forces down and off status for the EST ordinal, regardless of what was specified in the EQ entry.
- The deadstart device cannot be defined as DOWN at deadstart time.
- If extended memory is not shared, it can be specified as DOWN at deadstart time, and it will remain DOWN until another level 0 deadstart is performed. Extended memory cannot be brought up online.
- DOWN cannot be specified for a device that has initialization requested.

If a control module is to be downed, all of the above characteristics must be true for each 834 disk unit defined on that control module.

DOWN entry examples follow.

EQ6=DI, ST=ON, UN=3, CH=32/26. REMOVE=6. DOWN=6. EQ25=CR, ST=OFF, EQ=4, CH=12. EQ26=LP, ST=ON, EQ=6, CH=12. DOWN=25, 26. EQ5=DE, ST=OFF, SZ=400. DOWN=5.

#### FAMILY — Default Family Name Assignment Entry

The FAMILY entry defines the default family. The family that is to be defined as the default family may reside on more than one device. The EST ordinal of any device within the family can be specified on the FAMILY entry, except in the following situation. If the member of the family whose device mask will have bit  $2^7$  (2008 in mask) set is being initialized, the FAMILY entry must specify the ordinal of this device. In all cases, the FAMILY entry must follow the EQ entry for the device specified.

The following restrictions apply.

- The status parameter for a family device's EQ entry cannot be set to OFF.
- A REMOVE entry cannot exist in the EQPDECK for a device being specified as a family device.

The FAMILY entry format is:

FAMILY=est.

Parameter

#### est

EST ordinal number of the mass storage device that the system automatically uses to determine your family when the you do not specify a family name at login or job initiation; from 5 to 7778.

Description

#### **REMOVE** — Removable Device Assignment Entry

If a mass storage device is to be considered removable, you must specify it as such at deadstart with the REMOVE entry. This allows it to be introduced or removed during system operation. A device specified as removable cannot also have associated with it an ASR, SYSTEM, MSAL,T=, FAMILY, DAYFILE, ACCOUNT, ERRLOG, or MAINLOG entry (refer to Dayfile Descriptions earlier in this section for the last four entries).

The format is:

REMOVE=est<sub>1</sub>,est<sub>2</sub>,...,est<sub>n</sub>.

Parameter

#### Description

est<sub>i</sub>

EST ordinal of mass storage device that is to be removable; from 6 to 7778. One or more ordinals may be specified with one REMOVE entry. Ranges of ordinals can be specified.

## SHARE — Shared Device Entry

This entry identifies the rotating mass storage devices to be shared through a link device (ECS or ESM) by from two to four mainframes in a multimainframe complex. The tables necessary for the management of these devices (MST, TRT, MRT, and DAT) are maintained on the link device. The presence of the SHARE entry implies a multimainframe complex; shared status will be set for the link device. If the link device is the only device to be shared, it must be specified in the SHARE entry. If the SHARE entry is specified, the ISHARE entry must be omitted. Refer to PRESET - Present the Link Device Entry later in this section.

Following is a list of the equipment types that can be shared.

| Equipment           | Туре  |
|---------------------|-------|
| Extended memory     | DE    |
| ECS or ESM with DDP | DP    |
| 844-21              | DI/DK |
| 844-41/44           | DJ/DL |
| 885-11/12           | DM/DQ |

The format of SHARE is:

-- ·

SHARE=est,,est,,...,est,.

Parameter

Description

est<sub>i</sub> EST ordinal of the mass storage device being shared; from 5 to  $777_8$ . Ranges of ordinals can be specified.

Refer to section 13, Multimainframe Operations, for suggestions on shared device configurations.

### **ISHARE** — Independent Shared Device Entry

This entry identifies the rotating mass storage devices that are to be independently shared by from 2 to 16 mainframes in a multimainframe complex. The tables necessary for the management of these devices (MST, TRT, MRT, and DIT) are maintained on the shared device. You cannot designate ECS or ESM in an ISHARE entry. When the ISHARE entry is specified, the SHARE entry must be omitted. Refer to PRESET - Preset the Independent Shared Device Entry later in this section.

Listed are the equipment types that can be independent shared devices.

| Equipment | Туре  |
|-----------|-------|
| 834       | DD    |
| 844-21    | DI/DK |
| 844-41/44 | DJ/DL |
| 885-11/12 | DM/DQ |

The ISHARE entry format is:

ISHARE=est<sub>1</sub>,est<sub>2</sub>,...,est<sub>n</sub>

### Parameter

### Description

esti

EST ordinal of the mass storage device shared; from 6 to 7778. Ranges of ordinals can be specified, as described under Specifying Ranges of EST Ordinals earlier in this section.

Refer to section 13, Multimainframe Operations, for suggestions on shared device configurations.

#### LBC — Load Buffer Controllers Entry

This entry identifies the type of controlware to be installed on the specified disk channels. Depending on the specified parameters, this entry can identify the channels as having half-track or full-track controlware but not install the controlware.

Unless you specify the LBC entry, the system examines the mnemonics of the device in the EQPDECK entry and causes the default version of controlware to be installed as follows:

| Device Type | Controlware<br>Version Number |
|-------------|-------------------------------|
| db †        | MA722                         |
| dd ‡‡       | MA462                         |
| DI          | MA710                         |
| DJ          | MA710                         |
| DK          | MA401                         |
| DL          | MA401                         |
| DM          | MA721                         |
| DQ          | MA721                         |
|             |                               |

<sup>&</sup>lt;sup>†</sup> Not applicable for CYBER 180-class machines.

*<sup>†</sup>*<sup>†</sup>Applicable for models 810, 815, 825, and 830 only.

Use the LBC entry to override these defaults. The LBC entry format is:

LBC, type,  $c_1, c_2, \ldots, c_n$ .

Parameter

# Description

type

| Controlware to | be installed; one of these values.                                                             |
|----------------|------------------------------------------------------------------------------------------------|
| type           | Description                                                                                    |
| FM             | Install controller with full-track (MA721) controlware.                                        |
| FT             | Install controller with full-track (MA401) controlware.                                        |
| НТ             | Install controller with half-track (MA710) controlware.                                        |
| ID             | Install 7255-1 adapter with full-track (MA462) controlware.                                    |
| M8             | Install 7990 controller with MB466 controlware.                                                |
| NF             | Identify channel(s) as having full-track controller,<br>but do not install the controlware.    |
| NH             | Identify channel(s) as having half-track controller,<br>but do not install the controlware.    |
| NI             | Identify channel(s) as having full-track 7255-1<br>adapter, but do not install controlware.    |
| NM             | Identify channel(s) as having full-track 7155-1 controller but do not install the controlware. |
| NN             | Identify channel(s) as having NADs, but do not install the controlware.                        |
| NP             | Identify channel as having 7155-401 controller, but do not install the controlware.            |
| N8             | Identify channel(s) as having 7990 controller, but do not install the controlware.             |
| рн             | Install 7155-401 controller with MA722 controlware.                                            |
|                |                                                                                                |

ci

Disk channels; type determines if controlware is installed on these channels.

The controlware version number that can be loaded into the adapter or controller types is:

| Adapter<br>Controller | Controlware<br>Version Number |
|-----------------------|-------------------------------|
| 7054                  | MA710                         |
| 7152                  | MA710, MA401                  |
| 7154                  | MA710, MA401                  |
| 7155-1                | MA721                         |
| 7155-401              | MA722                         |
| 7255 <del>-</del> 1   | MA462                         |
| 380-170               | MG101                         |
| <b>799</b> 0          | MB466                         |

## XM — Declare Extended Memory Space for Buffers or User Access

The XM entry reserves space for I/O buffers and causes initialization of tables for user access to extended memory.

# NOTE

Except on models 865 and 875, the assignment of user access to extended memory forces jobs using user access to use CPU 0. This prevents CPUMTR from being locked out during large block transfers to or from extended memory on dual-CPU mainframes.

The XM entry is required if the system contains UEM or buffered devices. If UEM is the only use for extended memory, you do not need to specify EST ordinal 5 in the EQPDECK.

## The XM entry format is:

XM=id,iob,uec,EM.

| Parameter | Description                                                                                                                                                                                                                                                                                                               |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| id        | Identifier of the mainframe that will access the reserved extended memory space; id is required.                                                                                                                                                                                                                          |
| ·         | In a multimainframe complex, you must specify XM entries for each<br>mainframe in the complex in all EQPDECKs, enabling the first<br>mainframe to reserve ECS or ESM space for all mainframes in the<br>complex.                                                                                                          |
| iob       | Number of words/ $1000_8$ reserved for buffers for DB, DW, or DV devices; from $40_8$ to 77778. The optimum number of words to reserve is the amount left after the alternate system library and user ECS are taken into account. If no buffered devices are defined, enter 0.                                            |
| uec       | Number of words/1000g of extended memory to reserve for user access; maximum value is $7774_8$ .                                                                                                                                                                                                                          |
| EM        | For models 865 and 875 and CYBER 180-class machines, user access<br>extended memory can be allocated in UEM without allocating UEM as an<br>equipment. If you want only user-access extended memory in UEM,<br>clear or do not specify EST ordinal 5 in the EQPDECK and enter XM<br>with the uec size and the EM keyword. |
|           | For models 865 and 875, if you specify EM, user access extended<br>memory is allocated in UEM regardless of the presence of ECS or ESM;<br>if you omit EM, user access extended memory is allocated in the<br>device defined in the extended memory EST entry.                                                            |

## ACCESS

The ACCESS entry allows you to specify equipment access level limits for mass storage, magnetic tape, two-port multiplexer, stimulator multiplexer, and unit record type equipment. This entry is invalid for other types of equipment. This entry determines the upper and lower limits for the range of access levels of the data allowed to be read from or written to the equipment. The default equipment access level limits are zero; no secure data can be read from or written on the equipment. Values for this entry should be supplied by a site security administrator.

If you want the equipment access level limits specified by this entry to become the device access level limits for mass storage equipment, that equipment must be initialized. Refer to the NOS 2 Security Administrator's Handbook for more information about equipment access and device access level limits.

This entry is ignored if the system is running in unsecured mode.

The format of the ACCESS entry is:

ACCESS, lower, upper, list.

#### Parameter

Description

- lower Access level name specified in deck COMSMLS (refer to the NOS 2 Installation Handbook) corresponding to the desired lower limit.
- upper Access level name specified in deck COMSMLS corresponding to the desired upper limit.
- list One or more EST ordinals, separated by commas, or a range of ordinals as described in Specifying Ranges of EST Ordinals earlier in this section.

#### EQPDECK ENTRIES MADE ONLY DURING DEADSTART

The following entries are valid only from the system console at deadstart time. They cannot be included as part of the EQPDECK on the deadstart file.

## AUTOLOAD

The AUTOLOAD entry toggles the selection of buffer controller autoloading for all 7054/7152/7155 controllers and the 7255 adapter. The AUTOLOAD format is:

AUTOLOAD.

## GRENADE

The GRENADE entry causes unit reservations to be cleared on all 844 units physically connected to each 7054/7154/7152/7155 controller and any 834 units connected to a 7255 adapter. The GRENADE format is:

GRENADE .

## **INITIALIZE** — Initialization Entry

To use a mass storage device that is defined with an EQ entry, it must have a label. A label is written on a device when you initialize it by using either the INITIALIZE command, during system operation, or the INITIALIZE entry in the EQPDECK, when it is displayed at the system console at deadstart time.

A mass storage device's label is contained on a logical track (usually track 0). It contains information about the allocation and characteristics of a device (and its units, if there is more than one unit on a device). This information is in the form of a label sector for the first unit, a TRT for the device, and a label sector for each unit.

Initialization does not automatically occur at each deadstart because mass storage device labels are recovered during all deadstarts. Therefore, initialize a device only in the following situations.

- To add a new mass storage device (no label exists on the device) use the INITIALIZE entry.
- If parts of the label on a permanent file device have been destroyed by maintenance operations (permanent files having been dumped to another device before diagnostics were run), use the INITIALIZE entry during deadstart to write a new label. Then reload the permanent files.
- If a device (usually a private auxiliary, public auxiliary, or alternate permanent file family device) is added to a system during operation, use the DSD INITIALIZE command to initialize it if it does not have a valid label on it when it is added to the system.
- When an extended memory device is initially placed in maintenance mode, all mainframes using extended memory must initialize it (the maintenance mode parameter is described under EQ - Extended Memory EST Entry earlier in this section). You must also enter the PRESET entry for multimainframe operation.

During a deadstart, the INITIALIZE entry has the following characteristics.

• During a level 0 deadstart, it can be entered at the system console only when the EQPDECK is displayed. It can be entered anywhere after the EQ entry for the device.

If it is placed in the deadstart file EQPDECK, the system issues the error message INCORRECT ENTRY when the EQPDECK is read from the tape.

- A total initialization (op=AL) assumes that no valuable information exists on the device and creates a new label. When the new label is created, all previously existing information on the device, except CTI, CDA, HIVS, and MSL, is lost.
- If the EQ status for the device is OFF when INITIALIZE is entered, initialization of the device occurs whenever the device is set to ON status by the operator with the DSD ON command during normal system operation.
- If the device is not a master device, INITIALIZE (op=AL) only writes a label; if it is a master device, then it also initializes the catalog track and writes EOIs at the beginning of the permit track, the indirect access track (data chain), and each catalog track.
- During a deadstart initialization (op=AL), all flaw reservations specified for a device are lost and must be reentered, except for 844 type devices with factory-formatted disk packs.

The format of INITIALIZE is:

# INITIALIZE, op, est, est, ..., est,

Parameter

op

#### Description

Level of initialization; one of these values:

- op Description
- AF Initialize account dayfile.
- AL Total initialization.
- DF Initialize system dayfile.
- EF Initialize error log.
- MF Initialize binary maintenance log.
- PF Initialize permanent files.
- QF Initialize queued files.

est<sub>i</sub> EST ordinal of mass storage device to be initialized; from 5 to  $777_{8}$ .

If the ordinal refers to a family permanent file device, then family name, device number, and mask (if it is a master device) are specified on the PF entry.

If it is an auxiliary device, the pack name is specified on the PF entry.

Total initialization (op=AL or FP) is the only initialization that is independent of the content of the pack, if the initialization occurs during deadstart. If the initialization is done while the system is running, it is applied to the device after the check mass storage (CMS) routine has recovered it. If CMS cannot recover the device, the initialization is similar to a deadstart initialization (that is, all information on the device is lost).

The device number, family name, and device masks can only be changed during a total initialization. Since all devices may contain permanent files, you should include a PF entry for a device when performing a total initialization. If you do not, the device is assigned a default family name, device number, and device masks. It is possible that these parameters may conflict with other devices in the system. If a conflict occurs, resolve it by using PF entries. If you do not specify a PF entry when initializing a device, the default family name is SYSTid (where id is the machine identifier), and the default device numbers begin at 1 and increase by 1 for each device that you initialize without a PF entry. If you initialize equipment 5 without a PF entry, the device mask and secondary mask are set to 3778. For all other equipment, the default masks are set to 0 (zero).

The INITIALIZE entry operates in conjunction with the dayfile entries DAYFILE, ACCOUNT, ERRLOG, and MAINLOG (refer to Dayfile Descriptions earlier in this section) to determine where the dayfiles actually reside. The following examples illustrate the various cases. Assume that the system has three mass storage devices (EST ordinals 6, 7, and 10). Example 1:

For this example, no dayfile entries are made and no previous dayfiles exist.

The following EQPDECK entry is made.

INITIALIZE, AL, 6, 7, 10.

All dayfiles reside on ordinal 6.

Example 2:

In this example dayfile entries are made, but no previous dayfiles exist.

The following EQPDECK entries are made.

DAYFILE=6,200. ACCOUNT=7,200. ERRLOG=10. MAINLOG=10,200. INITIALIZE,AL,6,7,10.

In this case, the dayfiles reside on the indicated devices (system dayfile on ordinal 6, account dayfile on ordinal 7, error log and binary maintenance log on ordinal 10). The default buffer length is used for the error log buffer.

Example 3:

In this example, dayfile entries are made and previous dayfiles do exist.

Assume that the EQPDECK entries in example 2 are used.

Since a total initialization has been done on each device, no dayfiles are recovered. They reside on the indicated devices.

Example 4:

In this example, dayfile entries are made, previous dayfiles exist, but no dayfile initialization entries are made.

The following EQPDECK entries are made.

```
DAYFILE=6.
ACCOUNT=7.
ERRLOG=10.
INITIALIZE,PF,6.
```

The dayfiles may already reside on the specified devices, or they may reside on some combination of the possible devices. In either case, since no dayfile initialization entries are made, the old dayfiles are recovered. The residence of these dayfiles is governed by the residence of the old dayfiles. The PF initialization entry returns all permanent file space and relabels the device based on the recovered device parameters. The dayfiles and queued files on this device are not affected by this entry.

#### Example 5:

In this example, dayfile entries are made, previous dayfiles exist, no dayfile initialization entries are made, and duplicate dayfiles are in existence.

Assume that the EQPDECK entries in example 4 are used.

For the dayfiles that do not have duplicates, the residence is defined by the current residence of the files, not the EQPDECK entries. But assume that an error log is recovered from ordinals 6 and 10. In this case, the most recent file becomes the active error log. Its previous residence overrides the EQPDECK entry. The other file becomes an inactive error log (an entry exists in the mass storage table of the device pointing to the inactive file, but the file is not in use by the system).

To produce an inactive error log, the site must run in the following manner.

- 1. Assume an 844 disk subsystem with two or more spindles is being used. Run with unit 1 equated to EQ6 and unit 0 unused.
- 2. Redeadstart, equate unit 0 to EQ6, and do not use unit 1.
- 3. Redeadstart, equate unit 0 to EQ6, and unit 1 to EQ7.

Since unit 0 has the most recent copy of the error log, this copy would become an active error log and the copy on unit 1 would become an inactive error log.

Example 6:

In this example, dayfile entries are made, the previous dayfiles from example 2 exist, and initialization entries are made.

The following EQPDECK entries are made.

DAYFILE=7. ACCOUNT=7. ERRLOG=10,300. MAINLOG=10. INITIALIZE,DF,6. INITIALIZE,QF,6.

In this case, the account dayfile is recovered and continued on ordinal 7. The binary maintenance log is recovered and continued on ordinal 10 with a CM buffer length of 100. The error log is recovered and continued on ordinal 10 with a CM buffer of 300g words. The system dayfile space on ordinal 6 (from example 2) is released and the new system dayfile starts on ordinal 7. The QF initialization entry releases all space reserved by queued files on ordinal 6.

The CM buffer length is not affected by dayfile recovery. It is always specified by the values defined in the EQPDECK entries. If no buffer length entries exist, the system default values are used.

### **PRESET** — Preset the Link Device Entry

This entry defines allocation space and initializes the tables (MST, TRT, MRT, and DAT) on the link device that are required for management of shared multimainframe mass storage devices. The entry is valid only for level 0 deadstarts by the first mainframe in the multimainframe complex to deadstart.

Once PRESET is issued, the SHARE entry is disabled. Therefore, all SHARE entries must precede the PRESET entry. The PRESET entry has two formats:

PRESET.

or

PRESET, n.

Parameter

Description

n

Number of shared devices; from 1 to 778.

If you specify n, space is allocated for the specified number of shared devices. Use this entry when the total number of shared devices is greater than the number of shared devices defined in the EQPDECK of the first mainframe in the multimainframe complex to do a level 0 deadstart.

If you do not specify n, the link device is preset, and the amount of table space reserved for the shared devices is determined by the number of shared entries in the EQPDECK.

## **PRESET** — Preset the Independent Shared Device Entry

This entry presets the independent shared devices in a multimainframe complex. The MST, TRT, MRT, and DIT are maintained on the mass storage device itself and are not affected by the PRESET entry. This entry is used in conjunction with the ISHARE entry. It is valid only on a level 0 deadstart by the first mainframe in the multimainframe complex to deadstart. All ISHARE entries must precede the PRESET entry.

The format is:

PRESET=est<sub>1</sub>, est<sub>2</sub>, ..., est<sub>n</sub>.

Parameter

### Description

esti

EST ordinal of the ISHARE device; from 6 to 7778.

Refer to section 13, Multimainframe Operations, for suggestions on shared device configurations.

## RESET

The RESET entry rescinds all device-related attributes resulting from entries such as REMOVE, SYSTEM, MSAL, and so on. It restores the values specified with the last EQest entry encountered. If the DOWN entry was specified, EQest will be OFF, regardless of what was specified on the ST= parameter on the EQ entry. The format is:

RESET=est<sub>1</sub>,est<sub>2</sub>,...,est<sub>n</sub>.

Ranges of ordinals are not allowed; each ordinal must be entered individually.

# APRDECK

The auxiliary mass storage parameter deck (APRDECK) is a text record on the deadstart file that is processed during system initialization. APRDECK entries identify areas of mass storage that are unusable (flawed areas) and prevent the system from accessing them. The system uses the information in the APRDECK entries to build the TRT for each device that resides in CMR and also in the mass storage device label.

You can place up to 1008 APRDECKs on the deadstart file. Placing several APRDECKs on the same deadstart file allows you to use the same file to deadstart several configurations.

## APRDECK FORMAT

The first line in an APRDECK is the deck name. The format of the APRDECK name is:

APRDnn

nn is the number identifying the APRDECK; from 00 to 778.

An APRDECK must have a name and may have flaw entries. The first APRDECK must contain the deck name APRD00 and nothing else. Subsequent APRDECKs must be numbered consecutively and can contain flaw entries.

The released version of the APRDECK contains no entries. You can enter flaws at three different times:

- During deadstart, after entering all EQPDECK modifications.
- During system operation, using the FLAW entry (refer to section 8, K-Display Utilities).
- During the configuration of a deadstart file.

If during deadstart you initialize a device and then enter NEXT, the system displays both the parameters on the device's EST entry and the APRDECK referenced by the EST entry. You can then change the flaws for the device. If the first APRDECK is referenced by the EST entry, the system displays the parameters on the device's EST entry and the APRDECK name, APRD00. You can then enter flaws for the device. These changes to the APRDECKs remain in effect until the next deadstart.

For example, in a EQPDECK, the EST entry for an 844-21 disk is:

EQ07=D1,ST=ON,EQ=0,CH=31/33,AP=5,UN=2.

After you initialize equipment 07 and enter NEXT, the following display appears.

| EQ TYPE ST EQ UNITS CHANNELS<br>07 DI-1 ON 0 02 31 33<br>APRD05<br>STK=4173.<br>STK=7062. |       |      |    |    |       |          |  |
|-------------------------------------------------------------------------------------------|-------|------|----|----|-------|----------|--|
| APRD05<br>STK=4173.                                                                       | EQ    | TYPE | ST | EQ | UNITS | CHANNELS |  |
| STK=4173.                                                                                 | 07    | DI-1 | ON | 0  | 02    | 31 33    |  |
|                                                                                           | STK=4 | 173. |    |    |       |          |  |

The APRDECK entries described in this section are those to be used for entering flaws during deadstart or during the configuration of the deadstart file. Use the entries as follows.

- Use the CAF entry to clear all flaw reservations on a device.
- Use the SPF entry to specify the physical address of a flaw in extended memory. (If a reservation for that physical address already exists, it remains in effect.)
- Use the SPF entry to specify the cylinder, track, and sector of a flaw in a disk. (If a reservation for that physical area already exists, it remains in effect.)
- Use the CPF entry to cancel a particular SPF entry.
- Use the SLF entry to specify the logical address of a flaw. (If a reservation for that logical address already exists, it remains in effect.)
- Use the CLF entry to cancel an SLF entry.

Either obtain flaw addresses from a customer engineer, or run the MST (mass storage test) on the device to determine the bad areas. MST specifies the physical address of flaws.

The system reads the flaw information recorded on the utility flaw map of an 881/883/885 disk pack during the initialization of 844/885 equipment and reserves the appropriate areas. For multiunit devices, the flaw reservation is the union of all utility flaw maps. This automatic flawing process occurs in addition to any APRDECK entries. However, you cannot clear areas recorded as flawed on the utility flaw map of an 881/883/885 disk pack with the CAF entry. Refer to appendix F for information on clearing these flaws.

You can list all APRDECKs on the deadstart file by accessing the system file SYSTEM with an ASSIGN or COMMON command, then using the T parameter on the CATALOG command. Refer to the NOS 2 Reference Set, Volume 3 for more information.

# CAF — Clear All Flaw Reservations

The CAF entry clears all flaw reservations previously made with SLF or SPF entries. The format is:

CAF.

## SLF — Set Logical Flaws on Any Mass Storage Device

Use this entry to specify the logical address of a flaw. If the track was previously reserved, that reservation remains in effect. The format is:

SLF=track.

Parameter

Description

track

Logical track number. Refer to table 3-5 for valid ranges of track numbers.

### CLF — Clear Logical Flaws on Any Mass Storage Device

To cancel a reservation made with an SLF entry, enter the identical track number using the CLF entry. The format is:

CLF=track.

Parameter

track

Logical track number. Refer to table 3-5 for valid ranges of track numbers.

Description

# SPF — Set Physical Extended Memory Track or Disk Area Flaws

Two formats exist for the SPF entry. One format prevents the system from using blocks (tracks) of extended memory. The other format prevents the system from using sectors on disks.

Use the following SPF format to prevent the system from using blocks (tracks) of extended memory.

SPF=Aaddress.

or

SPF=Aaddress1-Aaddress2.

### Parameter

## Description

Aaddress

The 1- to 7-digit octal logical address in a track of extended memory; track containing the absolute address is reserved. The letter A must precede the address.

Aaddress1-Lowest (Aaddress1) and highest (Aaddress2) addresses in a range Aaddress<sub>2</sub> of logical addresses in one or more tracks of extended memory. All tracks in the range are reserved. The letter A must precede the addresses; the hyphen is required.

Use the following SPF format to prevent the system from using sectors on disks.

SPF=Ccylinder,Ttrack,Ssector.

Refer to table 3-5 for the number of cylinders, tracks, and sectors for each device.

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| Ccylinder | Cylinder number; the letter C must precede the number. |
| Ttrack    | Track number; the letter T must precede the number.    |
| Ssector   | Sector number; the letter S must precede the number.   |

## CPF — Clear Physical Extended Memory Track or Disk Area Flaws

To cancel a reservation made with an SPF entry, enter the identical information with a CPF entry. The format is the same as for the SPF entries.

Table 3-5. Information for Setting or Clearing Flaw Areas

| Device                  | Device<br>Type | Logical<br>Track Range† | Cylinders/<br>Device † | Tracks/<br>Cylinder† | Sectors/<br>Track † |
|-------------------------|----------------|-------------------------|------------------------|----------------------|---------------------|
| 844-21, half track      | DI             | 4000-7137               | 630                    | 22                   | 30                  |
| 844-41/44, half track   | DJ             | 4000-7147               | 1464                   | 23                   | 30                  |
| 844-21, full track      | DK             | 4000-7137               | 630                    | 23                   | 30                  |
| 844-41/44, full track   | DL             | 4000-7147               | 1464                   | 23                   | 30                  |
| 885-11/12, half track   | DM             | 4000-7221               | 1511                   | 50                   | 40                  |
| 885-11/12, full track   | DQ             | 4000-7221               | 1511                   | 50                   | 40                  |
| 834                     | DD             | 4000-7133               | 1456                   | 12                   | 40                  |
| 819, single density     | DV             | 4000-5465               | 633                    | 12                   | 21                  |
| 819, double density     | DW             | 4000-7153               | 1466                   | 12                   | 24                  |
| 885-42, full track      | DB             | 4000-7221               | 1511                   | 12                   | 40                  |
| 2048K extended memory   | DE/DP          | 4000-7620               |                        |                      |                     |
| † Numbers are in octal. |                |                         |                        | ,                    |                     |

# **IPRDECK**

The IPRDECK contains the system installation parameters that determine the system's operation mode. From 1 to 100g IPRDECKs can exist on a deadstart file. The IPD entry in the CMRDECK specifies which IPRDECK to use. If you omit the IPD entry, the system uses the first IPRDECK on the deadstart file. IPRDECKs are named IPRDnn, where nn is from 00 to  $77_8$ .

There are two IPRDECK console displays. The initial display, IPRINST, is an instruction display. It gives a brief description of all valid IPRDECK entries. The second display is the current IPRDECK. If either display overflows two screens, you can page the display.

You can modify the IPRDECK by entering the appropriate changes or additions from the console keyboard. Make these entries while either the IPRINST or IPRDECK is displayed. Each console entry supersedes the value currently specified in the IPRDECK.

# NOTE

The modified IPRDECK remains in effect only until the next deadstart is performed; that is, changes to the IPRDECK are not recovered across deadstart unless you create a new deadstart file to reflect those changes.

You can list all IPRDECKs on your system by accessing the system file SYSTEM with a COMMON command, then using the T parameter on the CATALOG command. Refer to the NOS 2 Reference Set, Volume 3 for more information concerning these commands.

Most of the IPRDECK entries are also valid DSD commands that can be used to make changes during system operation. Changes to the IPRDECK using DSD commands are not retained after any level of recovery deadstart.

### JOB CONTROL INFORMATION

The QUEUE, SERVICE, and DELAY entries in the IPRDECK relate to job control. General information concerning job control follows.

## Job Scheduling

Job scheduling is the control of jobs in the input (IN), executing (EX), and output (OT) queues for each service class. Scheduling in the input and output queues is based on the priority of a queue entry relative to all queue entries in the system. The priority of a queue entry depends both upon how long the entry has been waiting in the queue and upon the parameters specified on the QUEUE entry in the IPRDECK. The following formula shows how the system computes the priority; all values are octal.

$$p = \frac{(ct-et)}{WF} + LP$$

Variable

#### Description

- p Priority; LP  $\leq p \leq$  UP. UP (a parameter on the QUEUE entry) is the highest priority.
- WF Weighting factor; a parameter on the QUEUE entry.
- ct Current time in seconds.
- et Time in seconds at which the job entered the queue.
- LP Lowest priority; a parameter on the QUEUE entry.

When an input or output queue entry is created, its priority is the lowest priority (LP) for its service class. The queue priority of the queue entry increases as time passes. The rate at which the priority increases depends upon the weighting factor (WF). The larger the weighting factor, the slower the priority increases. (The queue priority of an entry with a WF of 10g increases eight times slower than an entry with a WF of 1.) The queue priority increases either until the queue entry is selected for processing or until the queue priority reaches the highest priority (UP). If the queue priority of an entry reaches UP, it remains at UP until the entry is selected for processing. If the queue priority is zero, the job or file is never selected by the job scheduler and stays in the queue until the operator either enters a DROP command or resets the priority to a nonzero number.

Queue control for job execution determines how much continuous execution time a job gets. The amount of execution time depends both on the parameters specified on the QUEUE and SERVICE entries in the IPRDECK and whether other jobs are waiting for execution.

When a job in the input queue is selected for execution, it gets an initial priority (IP; a parameter on the QUEUE entry) for the execution queue. Scheduling priority increases for a job in the execution queue in the same way as in the input and output queues. When the job is selected for execution, it executes either until completion or until it is preempted by a higher priority job. When the job is preempted by a higher priority job, it goes to the rollout queue with the queue priority increases like any other job in the rollout queue. When a job exceeds its first time slice, its priority becomes the initial slice priority (IL; a parameter on the QUEUE entry). On expiration of subsequent time slices the job reenters the execution queue with the lowest priority (LP; a parameter on the QUEUE entry). The IL and LP parameters provide two opportunities for you to change the job's scheduling priority.

For the interactive service class, there is an additional execution queue priority, TP (a parameter on the QUEUE entry). It is assigned to the execution queue entry of a job restarting after terminal I/O. The value of TP aids response time to program prompts. Also, for the interactive service class, the initial priority (IP) has an added significance. In addition to being the priority at which jobs are scheduled from the input queue to the execution queue, IP is the priority assigned to each newly initiated interactive job step. Using separate TP and IP parameters allows the system to give faster responses to users interacting with a job. To achieve this, a value for the TP parameter slightly greater than the value for the IP parameter is recommended (refer to table 3-6 and figure 3-6).

The relative values of the QUEUE and SERVICE parameters, both among service classes and within a service class, affect system performance. For an example of ranges of service class priorities, refer to figure 3-6. For an example set of specific entries for the QUEUE and SERVICE parameters, refer to table 3-6.

## **Job Control**

The parameters on the SERVICE entry in the IPRDECK direct control of the jobs. The parameters set the following conditions:

- Initial CPU priority at job initiation.
- CPU time slice in milliseconds divided by 64.
- Central memory time slice in seconds.
- Number of jobs per service class.
- Time-out delay for interactive and detached jobs.

A job leaves a central memory control point when the following conditions are present:

- A job completes, aborts, or is suspended.
- A system request causes a job to be rolled out.

A system request includes a job request for a tape or disk pack, a ROLLOUT command from the generator, and execution of the ROLLOUT macro. Whenever a job rolls out, it is assigned whatever priority it has at that point. The priority increases as time passes, giving that job a better chance to be selected for execution again. When the job is selected and rolled in, its priority becomes the value of the UP parameter on the QUEUE entry, and the job scheduling priority cycle begins again. This description on job rollout applies to batch, remote batch, and interactive jobs that are not doing interactive I/O. For interactive jobs that do terminal I/O within a time slice, scheduling priority is slightly different. When I/O is complete and input, for example, is available, the system assigns the rolled-out job the terminal I/O scheduling priority (TP parameter on the SERVICE entry). The TP parameter gives the job a priority equal to the priority of jobs still within their initial time slice, an advantage over jobs in a second time slice, and a larger advantage over jobs in a third or higher time slice. Terminal input/output is required.

A job leaves central memory when the following conditions occur:

- The system requests terminal input.
- You request terminal output and the recall parameter is specified on the request.
- You issue a RECALL macro after a request for terminal output that omitted the recall parameter.
- The control point is made available for a higher priority job.

This ensures reasonable service to all users in the system. The operating system controls the amount of central processor or central memory time each type of job can use when it is at a control point. This ensures that one job does not monopolize system resources.

If a job exceeds either the central processor or central memory time slice, and it is not a subsystem, the scheduling priority is set to the lower bound priority (the IL parameter on the QUEUE entry) for its service class. Thus, any job in the queue with a higher priority forces the executing job with the lower priority to be rolled out. The rolled-out job ages normally until its priority is higher than the priorities of either the jobs in the input queue or a job that is executing; then it is again scheduled to a control point.

Once a job is scheduled, it is desirable to use the resources allocated before another job forces it out. If a job maintained its scheduling priority when it was assigned to a control point, another job could age past that job and force it to be rolled out before it had an opportunity to use its time slice. For this reason, when a job is assigned to a control point and its priority is within the queue aging range, it is given a priority equal to the highest priority (the UP parameter in the QUEUE entry) for its service class.

Selecting the number of control points available on the system depends on the amount of memory space available, the job mix, and the mode in which the system is being run. Each control point needs 200g words of CMR space. For example, if an installation is running only TAF, then four or five control points may suffice. On the other hand, if the system is running a large number of interactive terminals with heavy permanent file activity, then 20 or more control points may be needed. You may need to study memory and control point use in order to correctly determine the setting of this option. If memory use is high and control point use is low, select fewer control points. If control point use is high and memory use is low, select more control points.

## **Memory Control**

You can control the maximum memory allowed for job types and for service classes with the parameters you specify on the SERVICE entry in the IPRDECK.

These parameters specify these lengths:

- Maximum field length divided by 100g for a job in a service class.
- Maximum field length divided by 100g for all jobs of the specified service class.
- Maximum extended memory length in words divided by 1000g for a job in a service class.
- Maximum extended memory length in words divided by 1000g for all jobs of the specified service class.

Initially, the scheduler attempts to find the highest priority job that meets the memory constraints. However, if the scheduler is unable to schedule a job and has explicitly rejected one or more jobs because of these memory constraints, it attempts to schedule a job a second time. During this second attempt, any job that requires other jobs to be rolled out is not scheduled; otherwise, the constraints are ignored, and the job is scheduled at the lower bound priority, IL (a parameter on the QUEUE entry). This means that the constraints are applied as long as there are enough jobs of each service class. However, if central memory is unused because batch jobs are at a maximum and no other jobs are available, the scheduler attempts to schedule the batch jobs.

All of these parameters can be changed by using the SERVICE, QUEUE, and DELAY entries.

## **Example of Job Control Parameters**

An example set of entries for the job control parameters is shown in table 3-6. These entries fall within the example of ranges of service class priorities shown in figure 3-6. Neither the specific entries nor the ranges are recommended; they are strictly examples to aid you in selecting QUEUE and SERVICE entry parameters.

The following discussion indicates the significance of the values chosen and how they relate to each other.

The entry (lowest) priority (LP parameter in the QUEUE entry) of the system service class input queue is higher than all entry priorities, except the network supervision and subsystem entry priorities, because it is assumed that an operator-initiated job should receive prompt attention. A system job rolls out any batch job. Most system jobs and all subsystems are coded to adjust their priorities correctly, once execution begins. The entry priority (LP) of the network supervision service class input queue is set high to ensure adequate response time from network programs and facilities such as CS, NS, and NVF.

The queue priorities for batch, remote batch, and detached jobs are similar. The time slice for detached jobs is shorter than for the batch and remote batch jobs. The assumption is that detached jobs need less CPU time than either batch or remote batch jobs.

The queue priorities are explained under Job Scheduling earlier in this section.

The time slices for the various service classes reflect the following objectives.

- To keep system jobs with their high entry priority from monopolizing system resources.
- To keep at a minimum rollout activity caused by diagnostics running as maintenance service class jobs.
- To allow most interactive jobs to compile, load, and begin execution in one time slice.
- To give batch jobs a large time slice, because little is gained from rolling out batch jobs. There is no problem with the time slices for batch jobs compared to interactive jobs, because, with the priorities shown, an interactive job generally causes a batch job to roll out.
- To ensure prompt service to all interactive users, without employing an excessive number of rollouts, by setting the time slices for interactive jobs low. The time slice parameters are critical to good interactive performance. In some cases, depending on the system load, job size, and so forth, it may be desirable to change these parameters during operation.

Interactive performance is sensitive to the relative values of the QUEUE and SERVICE scheduling parameters, both within a service class and among service classes. Table 3-6 shows almost no overlaps of values except that batch, remote batch, and detached jobs could age slightly past interactive jobs if they remained rolled out for a very long time (about 26 minutes). For the interactive service class, the range between entry (lowest) priorities and the highest priority is wide, so that few jobs are at the highest priority simultaneously. If many jobs reach the highest priority, their priorities are the same, and the order in which the jobs entered the queue is lost. The job scheduler selects jobs with equal queue priority in a random manner. The terminal I/O priority (TP) is set slightly higher than the initial priority (IP) to reduce response time for the user interacting with a job as compared to the user initiating a new job step. This parameter setting improves the perceived responsiveness of the system for the interactive users.

|                                                                                                                                                                                                                                                                                                                                                                                                                                            |      | ut Queue<br>Paramet  |    |                 | Execut<br>QUEUE   |    |   |                |                                 |  | Interactive<br>Job Initial<br>Scheduling<br>TP QUEUE<br>Parameter |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|----|-----------------|-------------------|----|---|----------------|---------------------------------|--|-------------------------------------------------------------------|
| Service Class                                                                                                                                                                                                                                                                                                                                                                                                                              | LP   | UP                   | WF | LP              | UP                | WF | 7 | IP             | IL                              |  | -                                                                 |
| SY (system)                                                                                                                                                                                                                                                                                                                                                                                                                                | 7770 | 7776                 | 1  | 2000            | 7000              | 1  | L | 7000           | 4000                            |  | -                                                                 |
| BC (batch)                                                                                                                                                                                                                                                                                                                                                                                                                                 | 10   | 4000                 | 1  | 1000            | 4004              | 1  | L | 2000           | 2000                            |  | -                                                                 |
| RB (remote batch)                                                                                                                                                                                                                                                                                                                                                                                                                          | 10   | 4000                 | 1  | 1000            | 4004              | 1  | L | 2000           | 2000                            |  | -                                                                 |
| CT (communication task)                                                                                                                                                                                                                                                                                                                                                                                                                    | 7770 | 7776                 | 1  | 3000            | 7000              | 1  | L | 7000           | 4000                            |  | -                                                                 |
| TS (interactive)                                                                                                                                                                                                                                                                                                                                                                                                                           | 7000 | 7770                 | 1  | 3700            | 7000              | 1  | L | 4004           | 3770                            |  | 4024                                                              |
| NS (network<br>supervision)                                                                                                                                                                                                                                                                                                                                                                                                                | 7770 | 7776                 | 1  | 7770            | 7776              | 1  | L | 7772           | 7772                            |  | <del>.</del>                                                      |
| DI (detached)                                                                                                                                                                                                                                                                                                                                                                                                                              | 10   | 4000                 | 1  | 1000            | 4000              | 1  | L | 2000           | 2000                            |  | -                                                                 |
| SS (subsystem)                                                                                                                                                                                                                                                                                                                                                                                                                             | 7770 | 7776                 | 1  | 7770            | 7776              | 1  |   | 7772           | 7772                            |  | -                                                                 |
| MA (maintenance)                                                                                                                                                                                                                                                                                                                                                                                                                           | 1    | 10                   | 1  | 1               | 10                | 1  | L | 10             | 4                               |  | -                                                                 |
| $I_n$ (installation)††                                                                                                                                                                                                                                                                                                                                                                                                                     | 10   | 4000                 | 1  | 1000            | 4004              | 1  |   | 2000           | 2000                            |  | -                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                            |      | ut Queue<br>Paramete |    | Time<br>SERVICE | Slice<br>Paramete |    |   | CPU<br>riority | Number<br>of Jobs<br>NJ SERVICE |  | Time-Out<br>Delay                                                 |
| Service Class                                                                                                                                                                                                                                                                                                                                                                                                                              | LP   | UP                   | WF | СР              | СМ                |    |   | rameter        | Paramete                        |  | Parameter                                                         |
| SY (system)                                                                                                                                                                                                                                                                                                                                                                                                                                | 7000 | 7776                 | 1  | 100             | 20                |    |   | 30             | 7777                            |  | -                                                                 |
| BC (batch)                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1    | 7000                 | 1  | 400             | 200               |    |   | 30             | 7777                            |  | -                                                                 |
| RB (remote batch)                                                                                                                                                                                                                                                                                                                                                                                                                          | 1    | 7000                 | 1  | 400             | 200               |    |   | 30             | 7777                            |  | -                                                                 |
| CT (communication<br>task)                                                                                                                                                                                                                                                                                                                                                                                                                 | 7000 | 7776                 | 1  | 400             | 200               |    |   | 30             | 7777                            |  | -                                                                 |
| TS (interactive)                                                                                                                                                                                                                                                                                                                                                                                                                           | 1    | 7000                 | 1  | 40              | 10                |    |   | 30             | 7777                            |  | 113 †††                                                           |
| NS (network<br>supervision)                                                                                                                                                                                                                                                                                                                                                                                                                | 1    | 7000                 | 1  | 400             | 200               |    |   | 31             | 7777                            |  | -                                                                 |
| DI (detached)                                                                                                                                                                                                                                                                                                                                                                                                                              | 1    | 7000                 | 1  | 100             | 20                |    |   | 30             | 7777                            |  | 341 ††††                                                          |
| SS (subsystem)                                                                                                                                                                                                                                                                                                                                                                                                                             | 7400 | 7776                 | 1  | 100             | 20                |    |   | 30             | 7777                            |  | -                                                                 |
| MA (maintenance)                                                                                                                                                                                                                                                                                                                                                                                                                           | 7000 | 7776                 | 1  | 100             | 20                |    |   | 2              | 7777                            |  | -                                                                 |
| I <sub>n</sub> (installation)††                                                                                                                                                                                                                                                                                                                                                                                                            | 1    | 7000                 | 1  | 400             | 200               |    |   | 30             | 7777                            |  | _                                                                 |
| $\dagger$ All values are octal; DELAY parameters are JS=1, CR=30, AR=1750, MN=10, MX=20, and JQ=2.<br>$\dagger$ Installation classes I <sub>1</sub> , I <sub>2</sub> , I <sub>3</sub> , and I <sub>4</sub> all have release values the same as class BC.<br>$\dagger$ TS suspended job times out after 10 minutes when the time-out delay is 113.<br>$\dagger$ TS suspended job times out after 30 minutes when the time-out delay is 341. |      |                      |    |                 |                   |    |   |                |                                 |  |                                                                   |

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# Table 3-6. Example Set of Job Control Parameters†

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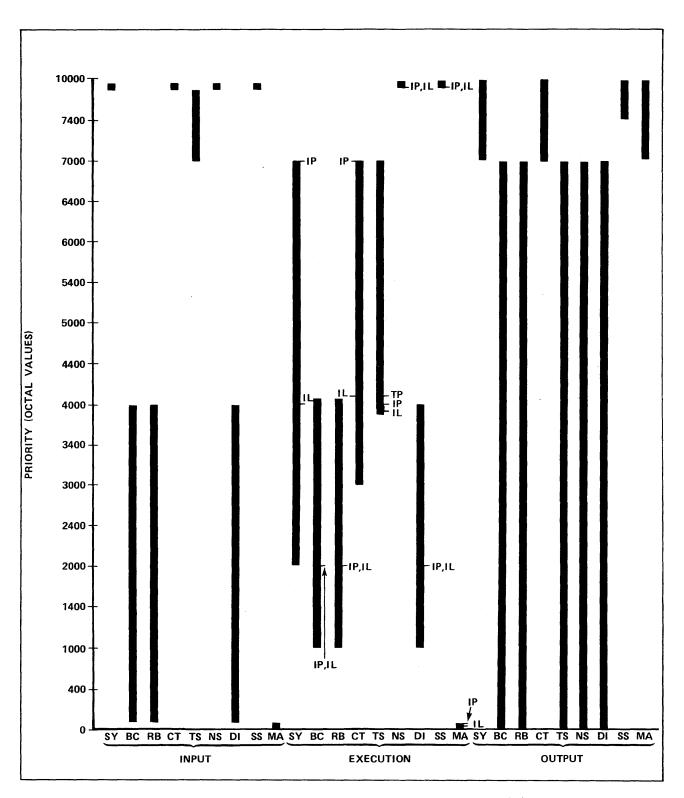


Figure 3-6. Example of Ranges of Service Class Priorities

The CPU priorities reflect the following objectives.

- The maintenance service class jobs are run at the lowest priority. This handles the background CPU and memory diagnostics.
- All other jobs, except network supervision service class jobs, run at the same priority. It is generally not desirable to run one class of jobs at a higher priority than another because the system would roll in jobs that occupy memory without executing, until they exceed the central memory time slice.
- The network supervision service class is set high to ensure adequate performance from network programs and facilities such as CS, NS, and NVF.

### **IPRDECK ENTRIES MADE ONLY DURING DEADSTART**

You can enter the following IPRDECK entries on the IPRDECK only during deadstart. They cannot be entered as DSD commands. Changes to the IPRDECK are not retained across deadstart unless a new deadstart file is created to reflect those changes. The entries are described in alphabetical order.

#### COMLIB

Format:

COMLIB, username, family, D.

#### Default:

None.

Significance:

This entry specifies a user name and family for a library of permanent files that can be accessed by users on all other families. This feature eliminates the need to maintain duplicate copies of the files on the families that require access to the files. This entry can also be used to reduce validation file accesses for user names such as LIBRARY in a single family environment. The number of COMLIB entries that can be specified is controlled by the CMRDECK entry CLT.

| Parameter | Description                                                                                                                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| username  | The l- to 7-character user name to be associated with the files to be accessed. This parameter should be unique to all families in the system. It cannot be associated with more than one family. |
| family    | Family name to be associated with username.                                                                                                                                                       |
| D         | If D is specified, the associated username and family are deleted from the common library table.                                                                                                  |

# CPM

### Format:

 $CPM, s_1=n_1, s_2=n_2.$ 

### Default:

System selection.

### Significance:

This entry alters the central processor multiplier of type  $s_i$ , which is used in SRU calculations. The  $s_i$  parameters are either 0 or 1 to indicate the multipliers S0 or S1, respectively. Entering 0=n obtains a multiplier to be used for S0 and entering l=n obtains a multiplier to be used for S1. (Refer to the NOS 2 Administration Handbook for a discussion of multiplier use.) The values of  $n_i$  range from 1 to 45<sub>8</sub> and are used as indexes to values defined in COMSSRU in order to determine the multiplier value. The default values are listed in table 3-7.

| n <sub>i</sub> (Octal) | COMSSRU Name | Mainframe Model | COMSSRU Default<br>Multiplier Value |
|------------------------|--------------|-----------------|-------------------------------------|
| 1                      | CP 62        | 6200            | 1.0                                 |
| 2                      | CP64         | 6400            | 1.0                                 |
| 3                      | CP 65        | 6500            | 1.0                                 |
| 4                      | CP66         | 6600            | 1.0                                 |
| 5                      | СР67         | 6700            | 1.0                                 |
| 6                      | CP71         | 71              | 1.0                                 |
| 7                      | СР72         | 72              | 1.0                                 |
| 10                     | СР73         | 73              | 1.0                                 |
| 11                     | CP 74        | 74              | 1.0                                 |
| 12                     | C171         | 171             | 1.0                                 |
| 13                     | C172         | 172             | 1.0                                 |
| 14                     | C173         | 173             | 1.0                                 |
| 15                     | C1 74        | 174             | 1.0                                 |
| 16                     | C175         | 175             | 1.0                                 |
| 17                     | C1 76        | 176             | 1.0                                 |

Table 3-7. CPM Default Values for  $n_i$  (Sheet 1 of 2)

| n <sub>i</sub> (Octal) | COMSSRU Name | Mainframe Model                    | COMSSRU Default<br>Multiplier Value |
|------------------------|--------------|------------------------------------|-------------------------------------|
| 20                     | C720         | 720                                | 1.0                                 |
| 21                     | C7 30        | 730                                | 1.0                                 |
| 22                     | C740         | 740                                | 1.0                                 |
| 23                     | C7 50        | 750                                | 1.0                                 |
| 24                     | C760         | 760                                | 1.0                                 |
| 25                     | C810         | 810                                | 1.0                                 |
| 26                     | C815         | 815                                | 1.0                                 |
| 27                     | C825         | 825                                | 1.0                                 |
| 30                     | C830         | 830                                | 1.0                                 |
| 31                     | C835         | 835                                | 1.0                                 |
| 32                     | C845         | 845                                | 1.0                                 |
| 33                     | C855         | 855                                | 1.0                                 |
| 34                     | C865         | 865                                | 1.0                                 |
| 35                     | C875         | 875                                | 1.0                                 |
| 36 through 40          | Reserved for | Control Data                       |                                     |
| 41                     | ICM1         | Model on which you are installing. | 1.0                                 |
| 42                     | ICM2         | Model on which you are installing. | 2.0                                 |
| 43                     | ICM3         | Model on which you are installing. | 3.0                                 |
| 44                     | ICM4         | Model on which you are installing. | 4.0                                 |
| 45                     | ICM5         | Model on which you are installing. | 5.0                                 |

Table 3-7. CPM Default Values for  $n_i$  (Sheet 2 of 2)

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# CSM

#### Format:

CSM=csm.

Default:

64

Significance:

This entry sets the operating system character set mode. To change the character set mode for the products, a change must be made in IPARAMS, and the products must be reassembled.

### csm Description

- 63 63-character set.
- 64 64-character set.

The system assumes a 64-character set if there is no CSM entry in the current IPRDECK.

# NOTE

Unpredictable and possibly serious problems occur if the operating system is operating in one character set and the products are operating in another. Therefore, ensure that all installed products and the operating system are in the same mode.

# DSD

# Format:

DSD, level, command1 #command2#...#commandn

### Default:

None.

### Significance:

This entry specifies the initial command(s) to be executed by the DSD program when the deadstart is complete. The commands can be the minimum number of characters recognizable by DSD. Only the last DSD entry on the IPRDECK for a given deadstart level is processed; other DSD entries for the same level are ignored. The DSD entry cannot exceed one line.

| Parameter | Description                                                                                                                                                                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| level     | Level of deadstart (0, 1, or 2).                                                                                                                                                                                                                                |
| commandi  | DSD command to be executed for the level of deadstart specified.                                                                                                                                                                                                |
|           | Several commands can be specified by separating them with the $\#$ (6-bit display code 60) or $\%$ (6-bit display code 63) character.<br>These characters may misposition parts of the console display of IPRDECK if they appear as the upper 6 bits in a byte. |
| •         |                                                                                                                                                                                                                                                                 |

#### Example:

DSD,0,MAI%X.QREC(PO=N)

# EI

Format:

EI=nn1, nn2, ..., nn<sub>x</sub>.

### Default:

None.

#### Significance:

The EI entry should be used to ensure loading of the correct environment interface for the operating system. This entry specifies up to six 2-character environment interface names, one of which must be loaded while deadstarting a CYBER 180-class machine. The deadstart will not be allowed to continue if the environment interface loaded by CTI is not one of those specified by the EI entry. You will have to load the correct environment interface or modify the EI entry in the IPRDECK. If an EI entry is not present, you will not be warned at deadstart.

# EXTENDED STACK PURGING

### Formats:

ENABLE, EXTENDED STACK PURGING.

DISABLE, EXTENDED STACK PURGING.

Default:

Disabled.

Significance:

These entries specify the default action for instruction-stack purging for nonsystemorigin jobs on CYBER 180-class machines. Refer to the MODE macro in the NOS 2 Reference Set, Volume 4 for a description of instruction-stack purging.

#### **KEYPM**

Format:

KEYPM=cc.

### Default:

26

# Significance:

This entry specifies the keypunch mode to be assumed during system operation.

cc Description

26 026 keypunch mode.

29 029 keypunch mode.

This entry is used for all batch jobs submitted if the keypunch mode is not specified on the job command. This does not apply to RBF.

# **MEMORY CLEARING**

# Formats:

ENABLE, MEMORY CLEARING.

DISABLE, MEMORY CLEARING.

Default:

Disabled.

#### Significance:

When memory clearing is enabled, central and extended memory are cleared when released from a job (that is, when a job is rolled out, terminates, or reduces its field length). When memory clearing is disabled, memory is cleared only when a job requests additional memory.

### MICRO

Format:

MICRO=name1, name2, ..., name7.

Default:

None.

Significance:

The MICRO entry should be used to ensure loading of the correct microcode for the operating system. This entry specifies up to seven 7-character microcode names, one of which must be loaded while deadstarting a CYBER 180-class machine. The deadstart will not be allowed to continue if the microcode loaded by CTI is not one of those specified by the MICRO entry. You will have to load the correct microcode or modify the MICRO entry in the IPRDECK. If a MICRO entry is not present, you will not be warned at deadstart.

### NAMIAF

### Format:

NAMIAF=maxt.

#### Default:

2008

# Significance:

This entry specifies the number of network terminals that can be connected to IAF at one time.

Parameter Description

maxt Total number of network terminals; maxt can range from 1 to 14408.

### PROBE

```
Formats:
```

ENABLE, PROBE.

DISABLE, PROBE.

#### Default:

Disabled.

Significance:

These entries enable and disable the data gathering facility of CPUMTR.

# SCP

Formats:

ENABLE, SCP.

DISABLE, SCP.

### Default:

Disabled.

# Significance:

These entries specify whether to use the system control point facility. You must enable SCP if CDCS, IAF, MAP, MAS, MCS, MSS, NAM, RBF, RHF, SSF, or TAF will be used. If none of these will be used, leave SCP disabled so that more CMR space is available.

### SCRSIM

## Formats:

ENABLE, SCRSIM.

DISABLE, SCRSIM.

#### Default:

Disabled.

#### Significance:

These entries enable or disable the simulation of the status/control register using the interlock register on CYBER 70 Computer Systems (refer to appendix D for information on the SCRSIM simulator).

### SECCATS

Format:

SECCATS=cat<sub>1</sub>, cat<sub>2</sub>,..., cat<sub>n</sub>.

#### Default:

All categories are enabled.

#### Significance:

This entry specifies the security access categories that will be allowed in the system for processing when the system is in a secured mode. The values should be supplied by a site security administrator. Refer to the NOS 2 Security Administrator's Handbook.

#### Parameter

#### Description

cati

Category names specified in deck COMSMLS corresponding to the desired access categories. Initially, all categories are enabled. The first SECCATS entry clears all categories, then sets the specified categories. Subsequent SECCATS entries set additional categories:

> SECCATS=ALL. Enables all 32 categories. SECCATS=NUL. Disables all 32 categories.

# SPC

# Format:

SPC,d=lines.

# Defaults:

64 lines at 6 lines per inch.

85 lines at 8 lines per inch.

## Significance:

This entry specifies the charge in number of lines for a page of printed output at the specified print density on non-PFC printers.

Description

### Parameter

| d     | Density in lines per inch; d can be 6 or 8 lines per inch. |
|-------|------------------------------------------------------------|
| lines | Lines per page; lines can range from 16 to 255.            |

# SPD

# Format:

SPD=d.

# Default:

# 6

# Significance:

This entry specifies the assumed density for printed output.

- d Description
- 6 6 lines per inch.
- 8 8 lines per inch.

# SPL

### Format:

SPL=length.

### Default:

60

#### Significance:

This entry specifies the assumed page length in number of lines for printed output; length can range from 16 to 255.

# SPW

#### Format:

SPW=width.

Default:

136

#### Significance:

This entry specifies the assumed page width in number of characters for printed output; width can range from 40 to 136.

# SUBCP

Formats:

ENABLE, SUBCP.

DISABLE, SUBCP.

### Default:

Disabled.

#### Significance:

These entries specify whether CPUMTR is to be initialized to handle subcontrol point (TAF) processing.

If SUBCP is disabled, CPUMTR is not initialized to handle subcontrol point processing. If you are not running TAF and if no user applications use subcontrol point processing, disable SUBCP so that CPUMTR uses less central memory.

# TCVM

# Format:

TCVM=mode.

Default:

AS

Significance:

This entry sets the tape conversion mode to be assumed during system operation.

,

| mode | Description                                                       |
|------|-------------------------------------------------------------------|
| AS   | ASCII 9-track conversion.                                         |
| US   | ANSI (previously known as USASI) 9-track conversion (same as AS). |
| ЕВ   | EBCDIC 9-track conversion.                                        |

# TDEN

Format:

TDEN=density.

# Default:

HY for 7-track tapes.

PE for 9-track tapes.

# Significance:

This entry sets the system tape density. When the density is set, any tape unit accessed is automatically set to this density unless specified otherwise by a magnetic tape request. Two TDEN entries may be present, one for 7 track and one for 9 track.

| density | Description         |
|---------|---------------------|
| LO      | 200 cpi (7 track).  |
| HI      | 556 cpi (7 track).  |
| НҮ      | 800 cpi (7 track).  |
| HD      | 800 cpi (9 track).  |
| PE      | 1600 cpi (9 track). |
| GE      | 6250 cpi (9 track). |

# TDTR

### Format:

TDTR=tracktype.

### Default:

NT

# Significance:

This entry sets the default track type.

| tracktype | Description |
|-----------|-------------|
| MT        | 7 track.    |
| NT        | 9 track.    |

# DEADSTART ENTRIES AND DSD COMMANDS

You can enter the following IPRDECK entries on the IPRDECK during deadstart and online during system operation using the L display or DSD commands. The reason for entering them online is to change the system's operation between deadstarts. Entries made during system operation are not retained across deadstarts. Entries made during deadstart are not retained across deadstarts unless a new deadstart file is created to reflect the changes.

A description of the enabling and disabling of subsystems follows. The remaining IPRDECK entries are described in alphabetical order.

#### **Subsystems**

Before you can enable or disable a subsystem that uses a system control point, you must enable the system control point facility with the ENABLE, SCP IPRDECK entry. Refer to SCP earlier in this section.

All subsystems, except BIO and MAG, are disabled by default. You must enable a subsystem before you can initiate it. You can enable or disable a subsystem by using IPRDECK entries or by using the SUBSYST L-display utility. (For information about the SUBSYST L display, refer to the NOS 2 Operations Handbook.)

The IPRDECK entries that enable and disable subsystems also assign a default control point for a subsystem. Thus, even if you do not want to enable a subsystem, you may want to explicitly disable a subsystem with an IPRDECK entry to assign a default control point for the subsystem.

Once you have enabled a subsystem, you can initiate the subsystem using either of the following methods.

- Call the subsystem procedure file by entering the name of the procedure file. ٠
- Name the subsystem procedure file the same name as the subsystem and store the file . as an indirect access permanent file under the system user name (SYSTEMX) with user index 3777778. Then, the subsystem will be automatically initiated when you enter the AUTO or MAINTENANCE commands.

Use these IPRDECK entries to enable or disable a subsystem:

ENABLE, subsystem, cp.

DISABLE, subsystem, cp.

Parameter

subsystem

Description

Three characters that select the desired subsystem; one of these values:

| subsystem | Description                                                                           |
|-----------|---------------------------------------------------------------------------------------|
| BIO       | Central site batch I/O for line printers, card readers, and card punches.             |
| CDC       | CYBER Database Control System.                                                        |
| IAF       | Interactive Facility. Do not specify the cp<br>parameter on the ENABLE entry for IAF. |

# TDTR

### Format:

TDTR=tracktype.

### Default:

NT

### Significance:

This entry sets the default track type.

| tracktype | Description |
|-----------|-------------|
| MT        | 7 track.    |
| NT        | 9 track.    |

### DEADSTART ENTRIES AND DSD COMMANDS

You can enter the following IPRDECK entries on the IPRDECK during deadstart and online during system operation using the L display or DSD commands. The reason for entering them online is to change the system's operation between deadstarts. Entries made during system operation are not retained across deadstarts. Entries made during deadstart are not retained across deadstarts unless a new deadstart file is created to reflect the changes.

A description of the enabling and disabling of subsystems follows. The remaining IPRDECK entries are described in alphabetical order.

#### **Subsystems**

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The IPRDECK entries that enable and disable subsystems also assign a default control point for a subsystem. Thus, even if you do not want to enable a subsystem, you may want to explicitly disable a subsystem with an IPRDECK entry to assign a default control point for the subsystem.

Once you have enabled a subsystem, you can initiate the subsystem using either of the following methods.

- Call the subsystem procedure file by entering the name of the procedure file. .
- Name the subsystem procedure file the same name as the subsystem and store the file . as an indirect access permanent file under the system user name (SYSTEMX) with user index 3777778. Then, the subsystem will be automatically initiated when you enter the AUTO or MAINTENANCE commands.

Use these IPRDECK entries to enable or disable a subsystem:

ENABLE, subsystem, cp.

DISABLE, subsystem, cp.

Parameter

subsystem

Description

Three characters that select the desired subsystem; one of these values:

| subsystem | Description                                                                           |
|-----------|---------------------------------------------------------------------------------------|
| BIO       | Central site batch I/O for line printers, card readers, and card punches.             |
| CDC       | CYBER Database Control System.                                                        |
| IAF       | Interactive Facility. Do not specify the cp<br>parameter on the ENABLE entry for IAF. |

### Parameter

### Description

| subsystem | Description                                                                                                                         |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------|
| MAG       | Magnetic Tape Subsystem. Enable MAG if removable<br>auxiliary packs are used. Disabling MAG frees a<br>control point for other use. |
| MAP       | MAP III or MAP IV.                                                                                                                  |
| MAS       | Mass Stoage Archival Subsystem.                                                                                                     |
| MCS       | Message Control System.                                                                                                             |
| MSS       | Mass Storage Subsystem.                                                                                                             |
| NAM       | Network Access Method.                                                                                                              |
| RBF       | Remote Batch Facility.                                                                                                              |
| RDF       | Remote Diagnostic Facility. Do not specify the CP parameter on the ENABLE entry for RDF.                                            |
| RHF       | Remote Host Facility.                                                                                                               |
| SMF       | Screen Management Facility.                                                                                                         |
| SSF       | NOS-SCOPE 2 Station Facility.                                                                                                       |
| STM       | STIMULA. Do not specify the cp parameter on the ENABLE entry for STM.                                                               |

TAF Transaction Facility.

# NOTES

When MCS and RBF are started by the NAMI startup master file, the ENABLE and DISABLE commands are ignored.

ср

Control point where the subsystem will reside. If you omit cp, the current control point is used. If you enter 0 (zero) as the control point, the subsystem may reside at any control point.

Omit cp for IAF, RDF, and STM.

# CLASS

#### Format:

 $CLASS, ot, sc_1, sc_2, \dots, sc_n$ .

#### Default:

| Origin Type  | Service Class |
|--------------|---------------|
| Batch        | BC            |
| Remote Batch | RB            |
| Interactive  | TS            |

#### Significance:

Specifies the valid service classes for each origin type. The system stores this information in the service class table (refer to the NOS 2 Systems Programmer's Instant).

### Parameter Description Origin type; must be BC (batch), RB (remote batch), or IA ot (interactive). This parameter is required. sci Service classes. Each class selected causes validation for that service class for the origin type specified by ot. Entering a service class that already has validation clears validation for that service class. You can select from 1 to 36 service classes for each origin type. This command does not accept class SS (subsystem). Service class is one of these values: Description sc BC Batch. СТ Communication task. DI Detached interactive. TO Installation class 0. H Installation class 1. Installation class 2. 12 Installation class 3. 13 MA Maintenance. NS Network supervisor.

- RB Remote batch.
- SS Subsystem.

### Parameter

# Description

Description

| SC |  |  |
|----|--|--|
|    |  |  |
|    |  |  |
|    |  |  |
|    |  |  |

- SY System.
- TS Interactive.
- ALL Causes validation of all service classes except subsystem.
- NUL Clears validation for all service classes.

### DEBUG

Format:

DEBUG.

### Default:

Disabled.

Significance:

This entry selects or clears debug mode, depending upon the current status.

If enabled, debug mode is selected. The message DEBUG appears in the header of the left screen display. Debug mode provides system origin privileges to validated users and allows modifications to be made to the running system.

If disabled, debug mode is cleared. It is recommended that debug mode not be allowed in a normal production environment.

On a secured system, this entry is ignored. While the console is in security unlock status, debug mode can be set using DSD command DEBUG.

#### DELAY

### Format:

DELAY, CRcr, ARar, MXmx, MNmn, JQjq, JSjs.

### Default:

None.

#### Significance:

This entry specifies the system delay parameters. Refer to table 3-6 for an example set of parameter entries. Refer to figure 3-6 for an example of ranges of service class priorities.

| Parameter | Description                                                                                                                                                                              |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CRcr      | CPU recall delay in milliseconds; cr is from 1 to 77778.                                                                                                                                 |
| ARar      | PP/auto recall delay in milliseconds; ar is from 1 to $7777_8$ .                                                                                                                         |
| MXmx      | Maximum job switch delay in milliseconds; mx is from 1 to $7777_8$ .                                                                                                                     |
| MNmn      | Minimum job switch delay in milliseconds; mn is from 1 to $7777_8$ .                                                                                                                     |
| JQjq      | Exponent used to determine the input job (QFT to EJT) scheduling delay; jq is from 0 to 148 seconds. The delay in seconds between the scheduling of input jobs is calculated as follows: |
|           | delay=2jq                                                                                                                                                                                |
| JSjs      | Job scheduler delay in seconds; js is from 1 to 77778.                                                                                                                                   |

# **DDP ROLLOUT PATH**

#### Formats:

ENABLE, DPP ROLLOUT PATH

DISABLE, DDP ROLLOUT PATH

#### Default:

Disabled.

#### Significance

These entries determine which path a rollout to extended memory will take (CPU or PP). The required supporting hardware (EM or DDP) must be present.

# ENGR

Formats:

ENABLE, ENGR.

DISABLE, ENGR.

#### Default:

Disabled.

#### Significance:

These entries enable or disable engineering mode. If enabled, the ENGR message appears in the header of the left screen display. Engineering mode allows the peripheral processing unit (PPU)/hardware diagnostics and the 881/883 pack reformatting utility FORMAT to run while the system is in operation.

On a secured system, these entries are ignored. When the console is in security unlock status, engineering mode can be enabled using the DSD command ENABLE,ENGR.

# **FILE STAGING**

### Formats:

ENABLE, FILE STAGING.

DISABLE, FILE STAGING.

Default:

Disabled.

#### Significance:

These entries specify whether permanent files that reside on the alternate storage facility (MSS or MSAS) are staged to disk. If disabled, jobs attempting to access MSS/MSAS resident files are aborted.

### LOCK

Format:

LOCK.

#### Default:

Unlocked.

#### Significance:

This entry specifies the system is locked. This software function prevents entry of restricted commands; all other DSD commands can be entered. The console is normally locked when the system is being used in a production environment.

### LOGGING

#### Formats:

ENABLE, LOGGING.

DISABLE, LOGGING.

#### Default:

Disabled.

#### Significance:

These entries specify whether dayfile messages intended for system analysis are logged in the dayfile. Typical messages deal with informing the user that the program is making inefficient CIO calls, such as reading to a full buffer or writing from an empty buffer. The dayfile messages are documented in an appendix of the NOS 2 Operations Handbook.

# MASTER MAS

## Formats:

ENABLE, MASTER MAS

DISABLE, MASTER MAS

#### Default:

Disabled.

### Significance:

These entries specify whether the MSAS executive program (SSEXEC), when initialized, is to run in master (enabled) or slave (disabled) mode.

.

# **MASTER MSS**

#### Formats:

ENABLE, MASTER MSS.

DISABLE, MASTER MSS.

### Default:

Disabled.

### Significance:

These entries specify whether the MSS executive program (MSSEXEC), when initialized, is to run in master (enabled) or slave (disabled) mode.

### **FILE STAGING**

#### Formats:

ENABLE, FILE STAGING.

DISABLE, FILE STAGING.

Default:

Disabled.

### Significance:

These entries specify whether permanent files that reside on the alternate storage facility (MSS or MSAS) are staged to disk. If disabled, jobs attempting to access MSS/MSAS resident files are aborted.

# LOCK

Format:

LOCK.

### Default:

Unlocked.

### Significance:

This entry specifies the system is locked. This software function prevents entry of restricted commands; all other DSD commands can be entered. The console is normally locked when the system is being used in a production environment.

### LOGGING

Formats:

ENABLE, LOGGING.

DISABLE, LOGGING.

#### Default:

Disabled.

#### Significance:

These entries specify whether dayfile messages intended for system analysis are logged in the dayfile. Typical messages deal with informing the user that the program is making inefficient CIO calls, such as reading to a full buffer or writing from an empty buffer. The dayfile messages are documented in an appendix of the NOS 2 Operations Handbook.

# MASTER MAS

Formats:

ENABLE, MASTER MAS

DISABLE, MASTER MAS

### Default:

Disabled.

### Significance:

These entries specify whether the MSAS executive program (SSEXEC), when initialized, is to run in master (enabled) or slave (disabled) mode.

.

# **MASTER MSS**

# Formats:

ENABLE, MASTER MSS.

DISABLE, MASTER MSS.

# Default:

Disabled.

### Significance:

These entries specify whether the MSS executive program (MSSEXEC), when initialized, is to run in master (enabled) or slave (disabled) mode.

# **MS VALIDATION**

## Formats:

ENABLE, MS VALIDATION.

DISABLE, MS VALIDATION.

#### Default:

Disabled.

Significance:

This entry enables or disables mass storage validation. If enabled, CMR is increased by  $60_8$  words, and the system verifies that, for each mass storage device, the sum of the counts of unreserved tracks and preserved files equals values specified in the device's mass storage table.

If the device is a master device (contains user catalogs), the system also verifies these conditions:

- The device's track reservation table (TRT) specifies that the first tracks of the indirect access file chain and the permit area are reserved and preserved.
- The label track is linked to the first catalog track.
- The number of catalog tracks is a power of 2.
- The catalog chain is reserved, of correct length, and contiguous if flagged as such in the device's MST.

To enable/disable mass storage validation with a DSD command entry, enable the validation in the IPRDECK during a level 0, 1, or 2 deadstart.

### OQSH

Format:

OQSH=level.

Default:

None.

Significance:

This entry specifies the value of the output queue special handling (OQSH) level. Output files with an access level equal to or greater than the output queue special handling level will remain in the queue until released by the DSD command RELEASE. When no OQSH level or access level name LVLO is selected, all files will be processed. The value for this entry is supplied by the site security administrator.

#### Parameter

#### Description

level

Access level name specified in deck COMSMLS (refer to the NOS 2 Installation Handbook) that corresponds to the desired output queue special handling level.

# PCLASS

#### Format:

PCLASS, sc0, sc1, ..., sc7.

### Default:

None.

#### Significance:

Specifies the service class associated with each priority level (PO through P7) for selection on the Job command (refer to the NOS 2 Reference Set, Volume 3).

#### Parameter

sci

Description

The 2-character service class symbol. Because parameters are positional, a comma must appear for any null parameter. The default for a null parameter is that no service class will be associated with the priority level represented by the null parameter's position in the string. This command does not accept the SS (subsystem) service class. Refer to the SERVICE IPRDECK entry later in this section for a list of service classes.

# **PF VALIDATION**

Formats:

ENABLE, PF VALIDATION.

DISABLE, PF VALIDATION.

#### Default:

Disabled.

#### Significance:

These entries enable or disable preserved file (PF) validation. If enabled, the system aborts an attach of a direct access permanent file if its end-of-information (EOI) was altered during recovery of the file. If NA (no abort) is specified on the attach request, the system attaches the file.

If mass storage validation is also enabled, TRT verification of preserved files takes place during a level 3 deadstart as follows:

- For all files, the system ensures that all tracks are reserved and that no circular linkage exists.
- For all queued, permanent direct-access, and fast-attach files, the system also ensures that the first track is preserved.

If mass storage validation is enabled on a level 1 or 2 deadstart, TRT verification takes place automatically, regardless of the status of PF VALIDATION.

#### **PRIVILEGED RDF**

# Formats:

ENABLE, PRIVILEGED RDF.

DISABLE, PRIVILEGED RDF.

#### Default:

Disabled

#### Significance:

These entries enable or disable privileged mode of RDF. If enabled, a user's commands are checked to ensure that a maintenance function is being performed.

### QUEUE

### Format:

QUEUE,sc,qt,LP1p,UPup,IPip,WFwf,ILi1,TPtp.

#### Default:

None.

#### Significance:

This entry specifies the queue priorities associated with the input, executing, and output queues for each job service class. Refer to table 3-6 for an example set of parameter entries and to figure 3-6 for an example of ranges of service class priorities.

# Parameter

#### Description

sc

#### Service class.

- sc Description
- BC Batch.
- CT Communication task.
- DI Detached interactive.
- 10 Installation class 0.
- Il Installation class 1.
- I2 Installation class 2.
- I3 Installation class 3.
- MA Maintenance.

| Parameter | Description                                                                                                                                                                                 |  |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|           | sc Description                                                                                                                                                                              |  |
|           | NS Network supervisor.                                                                                                                                                                      |  |
|           | RB Remote batch.                                                                                                                                                                            |  |
|           | SS Subsystem.                                                                                                                                                                               |  |
|           | SY System.                                                                                                                                                                                  |  |
|           | TS Interactive.                                                                                                                                                                             |  |
| qt        | Job queue type.                                                                                                                                                                             |  |
|           | <u>qt</u> <u>Description</u>                                                                                                                                                                |  |
|           | EX Executing jobs.                                                                                                                                                                          |  |
|           | IN Input queued files.                                                                                                                                                                      |  |
|           | OT Output queued files.                                                                                                                                                                     |  |
| LPlp      | Lowest priority at which a file or job can enter the specified queue; 1p ranges from 0 to 7777 <sub>8</sub> .                                                                               |  |
| UPup      | Highest priority a job or queued file can reach in the specified queue; up ranges from 0 to 77778.                                                                                          |  |
| IPip      | Initial priority only for executing jobs (EX). ip ranges from 0 to $7777_8$ .                                                                                                               |  |
| WFwf      | Weighting factor for queue priority calculation; wf must be a power<br>of 2, from 0 to 40008. The smaller the weighting factor, the<br>faster the queue entry reaches its highest priority. |  |
| ILil      | Lower bound priority for the initial time slice; il ranges from 0 to $7777_8$ . This parameter is valid only for executing jobs (EX).                                                       |  |
| TPtp      | Initial scheduling priority for online interactive jobs; tp ranges from 0 to 77778.                                                                                                         |  |

# **REMOVABLE PACKS**

### Formats:

ENABLE, REMOVABLE PACKS.

DISABLE, REMOVABLE PACKS.

### Default:

Enabled.

### Significance:

These entries enable or disable automatic label checking for mass storage devices that are defined as removable.

If enabled, automatic label checking occurs. This status must be available to perform label verification before removable devices can be accessed.

If disabled, any removable devices introduced into the system will not be recognized.

#### **RESIDENT RDF**

#### Formats:

ENABLE, RESIDENT RDF.

DISABLE, RESIDENT RDF.

#### Default:

Disabled.

# Significance:

These entries enable or disable resident mode of RDF. While in resident mode, RDF remains active, regardless of terminal inactivity, until RDF is disabled. When resident mode is disabled, RDF becomes inactive if no one is logged on at the remote diagnostic terminal for 15 minutes.

#### SECONDARY USER COMMANDS

#### Formats:

ENABLE, SECONDARY USER COMMANDS.

DISABLE, SECONDARY USER COMMANDS.

Default:

Disabled.

Significance:

The enable option allows jobs to issue more than one USER command. These entries are ignored on a secured system since secondary USER commands are not allowed on a secured system.

# SECURES

### Format:

SECURES, ot, LA=1a, UA=ua.

Default:

The security access limits of the system origin type (SY) are set to access level name LVLO. All security access limits for other origin types are set to system limits.

Significance:

This entry specifies system limits for the system origin type (ot equals SY) or limits for other origin types (ot equals BC, IA, or RB). System limits define the highest and lowest levels allowed in the system. No job may execute and no file may be accessed or created at a level outside this range.

Limits for origin types other than SY must be within the system limits. If origin type SY is specified, limits for all origin types are set to the selected values.

Both la and ua must be entered; they can be set to the same value, restricting system access or a particular origin type access to a single level. These values are supplied by a site security administrator.

This entry is not meaningful in an unsecured system.

Origin type.

### Parameter

Description

ot

- ot Description
- SY System.
- BC Batch.
- IA Interactive.
- RB Remote Batch.
- la Access level name specified in deck COMSMLS (refer to the NOS 2 Installation Handbook) corresponding to the desired lower access level limit.
- ua Access level name specified in deck COMSMLS corresponding to the desired upper access level limit.

### SERVICE

# Format:

SERVICE, sc, PRpr, CPcp, CMcm, NJnj, FLf1, AMam, ECec, EMem, FCfc, CScs, FSfs, DSds, TDtd, DTsc.

### Default:

None.

#### Significance:

This entry specifies the service limits associated with each service class. Refer to table 3-6 for an example set of parameter entries and to figure 3-6 for an example of ranges of service class priorities.

#### Parameter

# Description

sc

| Service class; one of these values:                                                                                                                                                                                                                                                                                                             |                       |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--|
| SC                                                                                                                                                                                                                                                                                                                                              | Description           |  |
| BC                                                                                                                                                                                                                                                                                                                                              | Batch.                |  |
| CT                                                                                                                                                                                                                                                                                                                                              | Communication task.   |  |
| DI                                                                                                                                                                                                                                                                                                                                              | Detached interactive. |  |
| 10                                                                                                                                                                                                                                                                                                                                              | Installation class 0. |  |
| 11                                                                                                                                                                                                                                                                                                                                              | Installation class 1. |  |
| 12                                                                                                                                                                                                                                                                                                                                              | Installation class 2. |  |
| 13                                                                                                                                                                                                                                                                                                                                              | Installation class 3. |  |
| MA                                                                                                                                                                                                                                                                                                                                              | Maintenance.          |  |
| NS                                                                                                                                                                                                                                                                                                                                              | Network supervisor.   |  |
| RB                                                                                                                                                                                                                                                                                                                                              | Remote batch.         |  |
| SS                                                                                                                                                                                                                                                                                                                                              | Subsystem.            |  |
| SY                                                                                                                                                                                                                                                                                                                                              | System.               |  |
| TS                                                                                                                                                                                                                                                                                                                                              | Interactive.          |  |
| CPU priority; pr ranges from 2 to $77_8$ . All service classes except<br>network supervisor (NS) and maintenance (MA) jobs are normally set<br>to the same CPU priority. Since jobs with lowest priority access<br>the CPU last, MA jobs are usually set to the lowest priority to<br>prevent them from interfering with other system activity. |                       |  |
| CPU time slice/100g in milliseconds. This parameter specifies the maximum amount of time a job of the specified service class can use the CPU before its scheduling priority is set to its lower bound priority. cp must be an octal number.                                                                                                    |                       |  |

PRpr

CPcp

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CMcm      | Central memory time slice in seconds; cm ranges from 0 to 77778.<br>This parameter specifies the maximum amount of time a job of the<br>specified service class can remain at a control point before it<br>becomes eligible to be rolled out.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| NJnj      | Maximum number of jobs; nj ranges from 0 to $7777_8$ . This parameter specifies the number of jobs that can be active at one time in the specified service class.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| FLf1      | Maximum field length/100g for any job of the specified service<br>class; fl ranges from 0 to 7777g. Jobs with field length<br>requirements that exceed this value are not considered for<br>scheduling, unless no other jobs are to be run and sufficient unused<br>memory is available to run the job without rolling out a running<br>job. However, an interactive service class job that exceeds its<br>maximum field length aborts. You typically use this parameter to<br>limit the memory requirement for jobs of a specific service class<br>during certain hours of the day. For example, you may use the FL<br>parameter to specify a maximum field length for all batch service<br>class jobs between the hours of 2 p.m. and 4 p.m.                                                                     |
| AMam      | Maximum field length/100g for all jobs of the specified service<br>class; am ranges from 0 to 7777g. This parameter partitions<br>central memory by limiting the field length available to each<br>service class. For example, if a job whose field length exceeds<br>that specified for its service class is scheduled to a control<br>point, it may not be scheduled until the required field length is<br>available. This means that a lower priority job from a different<br>service class may be scheduled first. However, a job that would<br>normally exceed the field length for its service class can be<br>scheduled to a control point if not enough jobs exist to fill the<br>field length specified for another service class. The system<br>attempts to use central memory to its greatest capacity. |
| ECec      | Maximum extended memory length in words divided by $1000_8$ for any job of the specified service class; ec ranges from 0 to $7777_8$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| EMem      | Maximum extended memory length in words divided by $1000_8$ for all jobs of the specified service class; em ranges from 0 to $7777_8$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FCfc      | Number of permanent files allowed. fc indicates a limit value that is the maximum number of permanent files allowed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|           | fc Limit Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|           | 0 Unlimited                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|           | 1 10 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|           | 2 20 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|           | 3 30 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|           | 4 40 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|           | 5 50 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|           | 6 100 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

7 Unlimited

| CScs | Cumulative size in PRUs allowed for all indirect access permanent<br>files. cs indicates a limit value for the cumulative size. | t |
|------|---------------------------------------------------------------------------------------------------------------------------------|---|
|      | <u>cs Limit Value</u>                                                                                                           |   |
|      | 0 Unlimited                                                                                                                     |   |
|      | 1 1000 <sub>8</sub>                                                                                                             |   |
|      | 2 2000 <sub>8</sub>                                                                                                             |   |
|      | 3 5000 <sub>8</sub>                                                                                                             |   |
|      | 4 10000 <sub>8</sub>                                                                                                            |   |
|      | 5 50000 <sub>8</sub>                                                                                                            |   |
|      | 6 100000 <sub>8</sub>                                                                                                           |   |
|      | 7 Unlimited                                                                                                                     |   |
| FSfs | Size in PRUs allowed for individual indirect access permanent files. fs indicates a limit value for the size of the files.      |   |
|      | fs Limit Value                                                                                                                  |   |
|      | 0 Unlimited                                                                                                                     |   |
|      | 1 10 <sub>8</sub>                                                                                                               |   |
|      | 2 30 <sub>8</sub>                                                                                                               |   |
|      | 3 50 <sub>8</sub>                                                                                                               |   |
|      | 4 100 <sub>8</sub>                                                                                                              |   |
|      | 5 150 <sub>8</sub>                                                                                                              |   |

6

7

300<sub>8</sub>

Unlimited

Description

Parameter

| Parameter |                                                                                                                             | Description                                                                                                                             |  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--|
| DSds      | Size in PRUs allowed for individual direct access permanent file<br>ds indicates the limit value for the size of the files. |                                                                                                                                         |  |
|           | ds                                                                                                                          | Limit Value                                                                                                                             |  |
|           | 0                                                                                                                           | Unlimited                                                                                                                               |  |
|           | 1                                                                                                                           | 10008                                                                                                                                   |  |
|           | 2                                                                                                                           | 20008                                                                                                                                   |  |
|           | 3                                                                                                                           | 5000 <sub>8</sub>                                                                                                                       |  |
|           | 4                                                                                                                           | 100008                                                                                                                                  |  |
|           | 5                                                                                                                           | 50000 <sub>8</sub>                                                                                                                      |  |
|           | 6                                                                                                                           | 1000008                                                                                                                                 |  |
|           | 7                                                                                                                           | Unlimited                                                                                                                               |  |
| TDtd      | job will a                                                                                                                  | on time-out delay; td ranges from 0 to 77778. A suspended<br>not be timed out for td*108 seconds. The maximum delay<br>imately 9 hours. |  |

DTsc Service class to which a job of the service class specified by sc will be assigned if the job is detached. The default is detached interactive (DI).

# **SPINDOWN**

Formats:

ENABLE, SPINDOWN.

DISABLE, SPINDOWN.

Default:

Enabled.

Significance:

These entries enable or disable the spindown of 834 disk units. When spindown is enabled, entering a CHECK POINT SYSTEM command will cause all 834 disk units that are on and not globally unloaded to automatically spin down. When spindown is disabled, entering a CHECK POINT SYSTEM command will not spin down the 834 disk units.

### SRST

Format:

SRST=n.

Default:

0

Significance:

This entry specifies the secondary rollout sector threshold. Any rollout file smaller than n sectors ( $0 \le n \le 7777_8$ ) is considered a secondary rollout file for the purpose of equipment selection.

# NOTE

The size of the rollout file for any job must be at least seven sectors larger than the combined size in sectors of the job's central memory and extended memory field lengths.

### UNLOCK

Format:

UNLOCK.

### Default:

Unlocked.

### Significance:

This entry specifies the system console is unlocked. All DSD commands can be entered when the console is unlocked. The console is usually locked when the system is being used in a production environment. Refer to LOCK earlier in this section.

#### USER EXTENDED MEMORY

#### Formats:

ENABLE, USER EXTENDED MEMORY.

DISABLE, USER EXTENDED MEMORY.

Default:

Disabled.

### Significance:

These entries enable or disable scheduling of jobs that access user extended memory.

# LIBDECK

LIBDECK is a SYSEDIT directive record on the deadstart file. SYSEDIT reads LIBDECK during the system load. LIBDECK specifies program residence, field length, record type, and parameter format.

Up to 100<sub>8</sub> LIBDECK records can be placed on the deadstart file. LIBDECKs are named LIBDnn, where nn is 00 to 77<sub>8</sub>. A specific record can be selected with a LIB=n entry in CMRDECK. The multiple deadstart deck capability enables the use of a single deadstart file on virtually any system configuration.

You can list all LIBDECKs on the deadstart file by accessing the system file SYSTEM with a COMMON command, then using the T parameter on the CATALOG command. Refer to the NOS 2 Reference Set, Volume 3 for more information concerning these commands.

The following list provides brief descriptions of SYSEDIT directives acceptable in LIBDECK. Complete descriptions of all SYSEDIT directives are in section 19, SYSEDIT. A list of valid record types follows the directives.

#### Directive Format

\*AD,nn,ty1/rec1,ty2/rec2,...,tyn/recn

\*CM,ty<sub>1</sub>/rec<sub>1</sub>,ty<sub>2</sub>/rec<sub>2</sub>,...,ty<sub>n</sub>/rec<sub>n</sub>

\*FL,  $ty_1/rec_1-fl_1$ ,  $ty_2/rec_2-fl_2$ , ...,  $ty_n/rec_n-fl_n$ 

Significance

Specifies the alternate device to be used in addition to the system device(s) for storing ABS, OVL, PP, and REL type records. nn is either the EST ordinal or the equipment type,  $ty_1$  is the record type, and  $rec_1$  is the record name.

Defines record rec<sub>i</sub> of type ty<sub>i</sub> as being central memory resident; valid only for record types ABS, OVL, or PP. Like any other job in NOS, SYSEDIT has a field length restriction of  $376000_8$  central memory words. You cannot use more than approximately  $326000_8$  central memory words ( $376000_8$ - $50000_8$  words for SYSEDIT's program FL) when defining records to be central memory resident.

Record rec<sub>i</sub> of type  $ty_i$  is loaded with a field length specified by  $fl_i$  (fl<sub>i</sub> is field length divided by  $100_8$ ).

Defines record  $rec_i$  of type  $ty_i$  as being mass storage resident. This is the default residence for routines with no storage area specified in LIBDECK.

Defines record  $\operatorname{rec}_1$  of type PROC as a procedure file.

Defines record rec<sub>1</sub> of type  $ty_1$  as product set format commands. The command parameters are processed in product set format (refer to the NOS 2 Reference Set, Volume 3).

Defines comment lines.

\*PROC, rec1, rec2, ..., recn

\*SC,ty1/rec1,ty2/rec2,...,tyn/recn

\*MS,ty1/rec1,ty2/rec2,...,tyn/recn

\*/ comments

The following record types may be specified in SYSEDIT directives. Some directives do not allow all types.

| Type (ty <sub>i</sub> ) | Description                               |
|-------------------------|-------------------------------------------|
| ABS                     | Multiple entry point overlay.             |
| CAP                     | Fast dynamic load capsule.                |
| OPL                     | Modify old program library deck.          |
| OPLC                    | Modify old program library common deck.   |
| OPLD                    | Modify old program library directory.     |
| OVL                     | Central processor overlay.                |
| PP                      | Peripheral processor program.             |
| PPU                     | Peripheral processor unit program.        |
| PROC                    | Procedure.                                |
| REL                     | Relocatable central processor program.    |
| TEXT                    | Unrecognizable as one of the other types. |
| ULIB                    | User library program.                     |

# **DIS OPERATIONS**

| DIS Job Dayfile Display (A)      | 4-3  |
|----------------------------------|------|
| DIS Exchange Package Display (B) | 4-4  |
| DIS Memory Displays (C, D, F, G) | 4-5  |
| DIS Job Status Display (J)       | 4–7  |
| DIS Directory Display (Z)        | 4-9  |
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| PP Call Commands                 | 4-18 |

## **DIS OPERATIONS**

DIS displays information about a single job. Under DIS, the B display shows the exchange package area for the job. Central memory addresses relative to the job's reference address are used for the data and program displays.

Initiate DIS at a control point to monitor the progress of a job by using any of the following methods.

- You can call DIS by entering X.DIS,f1 (f1=field length desired) or X.DIS (field length of 600008 assumed by default). This brings DIS to an empty control point to initiate utility programs.
- Enter a command in the form DIS (the job must be system origin or have system origin privileges).
- On a secured or unsecured system, before you can call DIS, the console must be unlocked (refer to the DSD UNLOCK command in section 5). For a secured system the console must be unlocked by the security administrator. When the system display console shows UNLOCK status or SECURITY UNLOCK status, you can call DIS by entering the command:

DIS,jsn.

jsn is the job sequence name to which you want DIS assigned.

You can toggle between DSD and DIS. DIS permanently returns control to DSD when you enter DROP.; the job is not dropped unless no commands remain.

When DIS is called to a control point, automatic command processing stops and the A and J displays for DIS appear on the left and right display screens, respectively. Keyboard entry is necessary to begin processing subsequent commands. Unless automatic command processing is reenabled, is the job is stopped after each command is processed. That is, only one command can be processed at a time. Under DIS, the J display shows only the condition of the job to which it is assigned, including upcoming commands. When the job is not using the central processor, a copy of its exchange package is displayed on the B display. Displays available under DIS are selected in the same manner as DSD displays. Refer to Console Operation later in this section for information concerning display selection commands and to DIS Keyboard Entries for information about other DIS commands.

<sup>&</sup>lt;sup>†</sup>You can initiate automatic command processing by entering either a period (.) or the RCS command (refer to Console Operation and to DIS Keyboard Entries later in this section).

### The displays available under DIS are:

| Display<br>Identifier | Description                                                                                                                                                                                   |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                     | Job dayfile. Messages and files (local FNT entries) attached to the job.                                                                                                                      |
| В                     | Exchange package. Breakpoint address and the exchange package.                                                                                                                                |
| C,D                   | Central memory. Contents of central memory words (selectable 8-word<br>groups) in five columns of four octal digits with display code equivalents<br>(same as the DSD C and D displays).      |
| F                     | Central memory. Contents of central memory words (selectable 8-word groups) in four columns of five octal digits with display code equivalents.                                               |
| G                     | Central memory. Contents of central memory words (selectable 8-word groups) in four columns of five octal digits with COMPASS instruction equivalents.                                        |
| Н                     | File status. All files assigned to the job as well as equipment assigned to files.                                                                                                            |
| J                     | Job status. Individual job status, equipment assigned, current messages, and command buffer.                                                                                                  |
| М                     | Extended memory. Contents of 60-bit words of extended memory (selectable<br>8-word groups) in five columns of four octal digits with display code<br>equivalents (same as the DSD M display). |
| N                     | Blank screen.                                                                                                                                                                                 |
| T,U                   | Text display. Displays text from central memory in coded lines (up to 60 characters per line). The display terminates after 256 words have been displayed.                                    |
| V                     | Central memory buffer. Displays directly from central memory. The display terminates after 512 words have been displayed.                                                                     |
| Y                     | Monitor functions. Displays mnemonics and the values of all monitor functions (same as the DSD Y display).                                                                                    |
| Z                     | Directory. DIS displays available.                                                                                                                                                            |

### NOTE

Although all displays listed may appear on the left screen, only the C, D, J, and N displays may appear on the right screen. If you attempt to bring any other display to the right screen, the message INCORRECT COMMAND is issued to the job dayfile and is displayed in the message buffer of the J display.

### **DIS JOB DAYFILE DISPLAY (A)**

Figure 4-l shows the DIS job dayfile display (A). The figure shows the job dayfile messages for the control point to which DIS is currently assigned and as many files attached to that control point as will fit in the display. All files attached to the job can be observed by using the file status display (H).

DIS A. JOB DAYFILE. 09.46.34.RFL (060000) 09.46.34.DIS. 09.47.31.USER, ABC1234,. 09.47.31.ABSC, S. Dayfile 09.48.43.PACKNAM, 721C, R=DL. messages 09.49.39.NOS. 09.50.06. GET, NOS/PN=PACKC, R=DJ, UN=KRONMOD. 09.50.06. DEVICE UNAVAILABLE. 09.50.29. EXIT. 09.50.41. GET, NOS/PN=PACKV2, R=DJ, UN=KRONMOD. 09.50.41. DEVICE UNAVAILABLE. 09.55.21.COMMON, SYSTEM. NUMBER FILE TYPE EST **STATUS** LEVEL ID 0 INPUT\* IN\* 7 ND 5 LVLO Files (local FNT LI\* 5 SYSTEM 6 LVLO entries) attached 1 10 ZZZZZCO LI\* 7 ND 5 LVLO to the job 11 ZZZZZC2 L0 6 ND 307 LVLO

Figure 4-1. DIS Job Dayfile Display (A)

The level field, shown in the figure, is displayed only on a secured system.

### DIS EXCHANGE PACKAGE DISPLAY (B)

The DIS B display shows the breakpoint address (BKP=addr) if a breakpoint was set at address addr. The breakpoint address is followed by the job's exchange package.

Figure 4-2 shows the DIS exchange package display (B).

DIS B. EXCHANGE PACKAGE. BKP = 100. Ρ = 452 AO =600 B0 =0 RA = B1 = 174100 A1 = 1 1 FL = 600 A2 = 0 B2 = 777776 EM = 74070000A3 = 0 B3 = 1 RAE = 0 A4 =0 B4 = 3 FLE = 0 A5 = B5 = 2 1 MA = 600 A6 = 1 B6 = 0 EEA = 0 A7 = 375 87 = 0 XO = 7777 7777 7777 7700 0000 X1 = 0000 0000 0000 0000 0000 $X2 = 0000 \ 0000 \ 0000 \ 0000 \ 0375$ С x3 = 0000 0000 0000 0000 0000X4 = 0000 0000 0000 0000 0003 С x5 = 2331 2324 0515 0000 0001 SYSTEM A X6 = 0516 0420 0000 0000 0000ENDP X7 = 0000 0000 0000 0000 0000+ AND - WILL SET \*BKP\* TO (P) +/- 1.

Figure 4-2. DIS Exchange Package Display (B)

### DIS MEMORY DISPLAYS (C, D, F, G)

Figure 4-3 shows the DIS data storage display (F). The contents of each central memory word is displayed in columns of five octal digits along with the display code equivalent. Only the memory locations currently assigned to the job can be displayed. The message \*\*\*\*SECURED AREA\*\*\*\* is displayed for all other locations.

The DIS C and D displays have the same format as the DSD C display, except that the DIS memory displays may show a managed table bias word preceding the groups of central memory words.

| DIS F. C             | ENTRAL | MEMOR | Y.    |       | ·           |  |
|----------------------|--------|-------|-------|-------|-------------|--|
| 00000040             | 00000  | 00000 | 00000 | 00000 |             |  |
| 00000060<br>00000061 | 00000  |       | 00000 |       |             |  |
| 00000081             |        |       | 00000 |       |             |  |
| 00000063             |        |       | 00000 |       |             |  |
| 00000064             | 03171  | 51517 |       |       | COMMON A    |  |
| 00000065             |        |       | 00010 |       | 5 A EG      |  |
| 00000066             | 40000  | 00000 |       |       | 5 BAY       |  |
| 00000067             | 40000  |       | 00000 |       | 5           |  |
| 0000000              | 40000  | 00000 | 00000 | 00000 | 5           |  |
| 00000070             | 03171  | 51517 | 16562 | 33123 | COMMON, SYS |  |
| 00000071             |        |       | 00000 |       | TEM.        |  |
| 0000072              | 00000  | 00000 | 00000 | 00000 |             |  |
| 00000073             | 00000  | 00000 | 00000 | 00000 |             |  |
| 00000074             | 00000  | 00000 | 00000 | 00000 |             |  |
| 00000075             | 00000  | 00000 | 00000 | 00000 |             |  |
| 00000076             | 00000  | 00000 | 00000 | 00000 |             |  |
| 00000077             | 00000  | 00000 | 00000 | 00000 |             |  |
|                      |        |       |       |       |             |  |

Figure 4-3. DIS Data Storage Display (F)

Figure 4-4 shows the DIS program storage display (G). The G display shows the contents of central memory and the COMPASS mnemonic translation.

DIS G. CENTRAL MEMORY. 00000000 00000 00000 00000 PS PS 00000001 05160 42000 00000 00000 NE BB PS 0000002 23312 32405 15000 00001 AX XB DXX+X BXX\*-X PS 0000003 00000 00000 00000 00000 PS PS 00000004 00000 00000 00000 00000 PS PS 0000005 00000 00000 00000 00000 PS PS 00000 00000 00000 00000 0000006 PS PS 0000007 00000 00000 00000 00000 PS PS 00000010 00000 00000 00000 00000 PS PS 00000 00000 00000 00000 00000011 PS PS 00000012 00000 00000 00000 00000 PS PS 00000013 00000 00000 00000 00000 PS PS 00000014 00000 00000 00000 00000 PS PS 00000015 00000 00000 00000 00000 PS PS 00000 00000 00000 00000 00000016 PS PS 00000 00000 00000 00000 00000017 PS PS Address Memory COMPASS mnemonic contents translation

Figure 4-4. DIS Program Storage Display (G)

### **DIS JOB STATUS DISPLAY (J)**

The DIS J display shows the status of a specific job executing at a control point. It also shows: any equipment assigned exclusively to the job by EST ordinal, message 1 and message 2 from the control point area, and the current command buffer, allowing you to anticipate future job requirements.

Figure 4-5 shows the DIS job status display (J).

DIS J. JOB STATUS. JSN = AAACEJTO =2046 5 P = SRUA = RA = 1741 1 UI = 2755 SRUL = 777777 FL =26 Job status FM = MLSTEST CS = BATCHRAE = 160 PN = 721CCONN = 0 FLE = 0 LEVEL = LVLOCPA = 600 EST = 1 Equipment assigned MS1 = DEVICE UNAVAILABLE. Current messages MS2 =NOS, PACKV2. RETURN, NOS. REVERT, NOLIST. EXIT. REVERT, ABORT. PACKC OR PACKV2 NOT FOUND. Command buffer REVERT, NOLIST. EXIT. REVERT.CCL EXIT.CCL REVERT, ABORT.CCL

Figure 4-5. DIS Job Status Display (J)

The job status portion of the display shows three columns of information. Each item has the form item=value. The items are described next in the order that they appear on the display.

| Item  | Description                                    |
|-------|------------------------------------------------|
| JSN   | Job sequence name of the DIS job.              |
| UI    | User index.                                    |
| FM    | Current family name.                           |
| PN    | Current pack name.                             |
| EJTO  | Executing job table ordinal.                   |
| SRUA  | System resource units accumulator.             |
| SRUL  | Account block limit for system resource units. |
| CS    | Connection status (interactive jobs only).     |
| CONN  | Connection number (interactive jobs only).     |
| LEVEL | Job access level (secured systems only).       |
| Р     | P register address from exchange package.      |
| RA    | Central memory reference address.              |
| FL    | Central memory field length.                   |
| RAE   | Extended memory reference address.             |
| FLE   | Extended memory field length.                  |
| СРА   | Control point area address.                    |

# DIS DIRECTORY DISPLAY (Z)

Figure 4-6 shows the DIS directory display (Z). The Z display lists all displays available under DIS control. If the letter entered to select the left screen display is not a valid display identifier, the Z display is selected automatically.

| DIS Z. DI | RECTORY. LEFT SCREEN ONLY DISPLAY      |
|-----------|----------------------------------------|
|           | A JOB DAYFILE.                         |
|           | B EXCHANGE PACKAGE.                    |
|           | F CENTRAL MEMORY. FOUR GROUPS OF FIVE. |
|           | G CENTRAL MEMORY. FOUR GROUPS OF FIVE. |
|           | H FILE STATUS.                         |
|           | M EXTENDED MEMORY.                     |
|           | T TEXT DISPLAY.                        |
|           | U TEXT DISPLAY.                        |
|           | V CM BUFFER.                           |
| •         | Y MONITOR FUNCTIONS.                   |
|           | Z DIRECTORY.                           |
|           | LEFT AND RIGHT SCREEN DISPLAYS         |
|           | C CENTRAL MEMORY. FIVE GROUPS OF FOUR. |
|           | D CENTRAL MEMORY. FIVE GROUPS OF FOUR. |
|           | J JOB STATUS.                          |
|           | N BLANK SCREEN.                        |

Figure 4-6. DIS Directory Display (Z)

### **CONSOLE OPERATION**

Unlike DSD, DIS is not interpretive. You must complete every entry and signal DIS to act upon the message by pressing CR or NEXT. The following rules apply to all DIS commands.

- For input, spaces in an octal field are ignored but can be inserted for readability.
- For output, all octal fields are right-justified with leading zero fill; excess octal digits are ignored.

In addition to the command entries, the following keys have special meaning to DIS when entered as the first character. The corresponding special keys for both the 721 and CC545 console types are listed along with a description of the use of each key.

| <u>721</u> | CC545                        | Description                                                                                                                                                                                                                                                                                                                                                |
|------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F15        | *                            | If DSD has relinquished the main display console to DIS,<br>this key acts as a quick hold, and DIS drops the display<br>channel so that DSD can use it.                                                                                                                                                                                                    |
| +          | +                            | Pages the left screen forward for the A, C, D, F, G, H, M,<br>T, and U displays. Increments the breakpoint address for<br>the B display.                                                                                                                                                                                                                   |
| -          | -                            | Pages the left screen backward for the C, D, F, G, M, T, and<br>U displays. Decrements the breakpoint address for the B<br>display. Resets the A and H displays to the beginning.                                                                                                                                                                          |
| (          | (                            | Pages the right screen forward for the C and D displays.                                                                                                                                                                                                                                                                                                   |
| )          | )                            | Pages the right screen backward for the C and D displays.                                                                                                                                                                                                                                                                                                  |
| 1          | /                            | Advances the left screen memory display address by the value<br>in the lower 18 bits of the first word displayed (applicable<br>only to memory displays C, D, F, G, and M).                                                                                                                                                                                |
| •          |                              | Sets AUTO MODE (initiates automatic command processing).<br>This key performs the same function as the RCS command<br>described under DIS Keyboard Entries later in this section.                                                                                                                                                                          |
| 8          | 8                            | Advances the pointer indicating the first address of managed<br>tables for the left screen (applicable only to memory<br>displays C, D, F, and G).                                                                                                                                                                                                         |
| 9          | 9                            | Decrements the pointer indicating the first address of<br>managed tables for the left screen (applicable only to<br>memory displays C, D, F, and G).                                                                                                                                                                                                       |
| <b>→</b>   | Right blank<br>(display key) | Advances the left screen display sequence established by the<br>SET,screen. command (refer to Display Selection Commands<br>later in this section).                                                                                                                                                                                                        |
| NEXT       | CR (carriage<br>return)      | Sets the repeat entry flag; the message REPEAT ENTRY is<br>displayed on the error message line of the left screen. The<br>subsequent command entry is processed but is not erased<br>after completion. That command is processed each time this<br>key is pressed. To clear the repeat entry mode, press the<br>left blank (erase) key or the <b>Key</b> . |

The following keys are interpreted as control characters by DIS.

| <u>721</u> | <u>CC545</u>            | Description                                                                                                                        |
|------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| or ERASE   | Left blank<br>(erase)   | Clears current DIS keyboard entry and any resultant error<br>message; AUTO MODE (automatic command processing) is also<br>cleared. |
| -          | BKSP<br>(backspace)     | Deletes last character displayed and clears error message (if one exists).                                                         |
| NEXT       | CR (carriage<br>return) | Initiates processing of an entered command.                                                                                        |

The following keyboard messages may appear above your entry.

| e following keyboard mess         | ages may appear above your entry.                                                                                                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Message                           | Description                                                                                                                                                              |
| AUTO MODE.                        | The command buffer is read automatically. Automatic command processing can be selected by the RCS command or by entering a period.                                       |
| COMMAND BUFFER FULL.              | The ELS command has been entered and there is insufficient room in the command buffer to add the characters requested.                                                   |
| COMMAND TOO LONG.                 | The command you entered is too long.                                                                                                                                     |
| COMMANDS ON FILE.                 | The ELS command has been entered and commands are currently located in a file instead of in a command buffer. It is not possible to add a command to the file.           |
| DIRECT CPU INPUT.                 | The N command has been entered and all data entered from the keyboard is being passed directly to central memory.                                                        |
| DISK BUSY.                        | DIS is waiting for an overlay to be loaded from a mass storage device.                                                                                                   |
| EXTENDED MEMORY<br>NOT AVAILABLE. | You entered the ENFLE command, but user extended memory is not defined.                                                                                                  |
| INCORRECT ENTRY.                  | The command cannot be processed.                                                                                                                                         |
| INCORRECT FL<br>REQUEST.          | You entered an ENFL command to set the field length. The requested field length must be greater than $10000_8$ and less than $377700_8$ including negative field length. |
| INCORRECT PRIORITY.               | The priority you entered using the ENPR command is not correct. CPU priority must be greater than 1 and less than $71_8$ .                                               |
| INSUFFICIENT FIELD<br>LENGTH.     | Your field length is not long enough to support either extended memory or 026.                                                                                           |
| JOB ACTIVE.                       | The prievious request has not completed. The command must be reentered when the job is not active.                                                                       |
| OUT OF RANGE.                     | The memory entry address is greater than the field length.                                                                                                               |
| PP BUSY.                          | DIS is waiting for a PP to be assigned in order to process a keyboard entry.                                                                                             |

| Message                         | Description                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| REPEAT ENTRY.                   | The command in the command buffer is repeated each time you press CR or NEXT. This can be cleared by pressing the left blank or $\leftarrow$ key. |
| REQUEST EXCEEDS<br>MAXIMUM FLE. | You requested more extended memory than your system can support.                                                                                  |
| STORAGE NOT<br>AVAILABLE.       | The amount of central memory requested by the ENFL command or required by the 026 file editor is not available.                                   |
| WAITING FOR<br>EXTENDED MEMORY. | DIS is waiting for extended memory after you entered the ENFLE command.                                                                           |
| WAITING FOR<br>STORAGE.         | DIS is waiting for central memory after you entered the ENFL or 026 command.                                                                      |

## **DISPLAY SELECTION COMMANDS**

Specify the displays you want shown on the console's left and right screens by using the following commands. Follow the entry with a carriage return.

| Command | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ху.     | Brings the x and y displays to the left and right screens,<br>respectively. Note that although all DIS displays may appear on the<br>left console screen, only the C, D, J, and N displays may appear on<br>the right screen. If you attempt to bring any other display to the<br>right screen, the entry is interpreted as a command and the message<br>INCORRECT ENTRY appears. In addition, if the letter entered to<br>select the left screen display (x) is not a valid display<br>identifier, the Z display is selected automatically. |
| xz,loc. | Brings specified memory display to the left screen, if not currently selected, and provides display modifications as follows:                                                                                                                                                                                                                                                                                                                                                                                                                |
|         | x Display identifier (C, D, F, G, or M).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|         | z Type of display modifications:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|         | z Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|         | 0-3 Changes the specified group to display the eight words beginning at location loc.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|         | 4 Changes the entire display so that all<br>8-word groups are contiguous locations<br>beginning at location loc.                                                                                                                                                                                                                                                                                                                                                                                                                             |
|         | 5 Advances the display by loc locations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|         | 6 Decrements the display by loc locations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|         | <pre>loc Location parameter (maximum of eight digits for central<br/>memory address or seven digits for extended memory<br/>address).</pre>                                                                                                                                                                                                                                                                                                                                                                                                  |

| Command    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x,addr.    | If x specifies one of the memory displays (C, D, F, G, or M), addr<br>is the address used to obtain the bias address for the managed table<br>display. (The bias address is the lower 18 bits of the word at<br>addr.)                                                                                                                                                                                                                         |
| SET, xxxx. | Sets the left screen display sequence; xxxx consists of one to four<br>display identifiers. Pressing the right blank (display) or $\longrightarrow$ key<br>after this command is entered causes the first display to appear on<br>the left console screen. Pressing the key again selects the second<br>display. The next display in the specified sequence appears on the<br>left screen each time the key is pressed, for example, SET,ACFD. |

### **DIS KEYBOARD ENTRIES**

You can enter the following commands while in DIS.

If a job is currently active (CPU active, waiting, on recall, or PP active), many commands are not accepted and the message JOB ACTIVE is displayed.

| Command              | Description                                                                                                                                                                                                                                                                                                                                               |  |  |  |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| BEGIN, pname, pfile. | Sets AUTO MODE and calls the procedure pname that is on file pfile.                                                                                                                                                                                                                                                                                       |  |  |  |
| BKP,addr.            | Breakpoint to address addr in the program. Central processor<br>execution begins at the current value of P and stops when P=addr,<br>and DIS is the only PP active at the control point.                                                                                                                                                                  |  |  |  |
| BKPA,addr.           | Breakpoint to address addr in the program with assigned PPs.<br>Central processor execution begins at the current value of P and<br>stops when P=addr. PPs attached to the control point can still be<br>active. DIS clears addr to stop the program at that point. The<br>breakpoint may be cleared by setting the breakpoint address to a new<br>value. |  |  |  |
| DCP.                 | Drops the central processor and displays the exchange package area on the B display.                                                                                                                                                                                                                                                                      |  |  |  |
| DIS.                 | Reloads the main DIS overlay.                                                                                                                                                                                                                                                                                                                             |  |  |  |
| DROP.                | Drops DIS, but normal processing of the job continues (it does not drop the job until all commands are processed).                                                                                                                                                                                                                                        |  |  |  |
| ELS.commandstring.   | Allows entry of the commandstring command after the last command in the command buffer, if there is space.                                                                                                                                                                                                                                                |  |  |  |
| ENAi,addr.           | Sets register Ai=addr in the exchange package area.                                                                                                                                                                                                                                                                                                       |  |  |  |
| ENBi,addr.           | Sets register Bi=addr in the exchange package area.                                                                                                                                                                                                                                                                                                       |  |  |  |
| ENEM,n.              | Sets CPU program exit mode to n (0 $\leq$ n $\leq$ 7).                                                                                                                                                                                                                                                                                                    |  |  |  |
| ENFL,fl.             | Sets central memory field length FL=fl in the exchange package area $(0 \le f1 \le 77777_8)$ . fl must be at least 100008 if user extended memory is assigned.                                                                                                                                                                                            |  |  |  |

| Command                       | Description                                                                                                                                                                                                                                                                                    |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ENFLE,fle.                    | Sets extended memory field length FLE to fle000 in the exchange package area ( $1 \le fle \le 7777_8$ ). If user extended memory is assigned (fle=0), central memory FL, set by the ENFL command, must be greater than or equal to $10000_8$ .                                                 |
| ENP,addr.                     | Sets P=addr (next instruction address).                                                                                                                                                                                                                                                        |
| ENPR, pr.                     | Sets job priority to pr (2 $\leq$ pr $\leq$ 708).                                                                                                                                                                                                                                              |
| ENS.commandstring.            | Allows entry of the commandstring command as the next unprocessed<br>command in the command buffer. The command can then be processed<br>using RNS, RSS, or DROP. Use of ENS with CCL procedure files<br>produces unexpected results. This command is valid only when AUTO<br>MODE is not set. |
| ENTER./commandl/<br>command2/ | Allows entry of the commandl and command2 commands from the keyboard and sets AUTO MODE.                                                                                                                                                                                                       |
| ENTL, tim1mt.                 | Sets the job time limit to timlmt $(77777_8$ specifies no limit).                                                                                                                                                                                                                              |
| ENXi,cont.                    | Sets register Xi=cont in the exchange package area.                                                                                                                                                                                                                                            |
| ENXi,Lcont.                   | Sets register Xi=cont, left-justified, in the exchange package area.                                                                                                                                                                                                                           |
| ENXi,Dcharacters.             | Sets register Xi to characters in display code.                                                                                                                                                                                                                                                |
| ENXi,b,value.                 | Sets byte b of register Xi to value.                                                                                                                                                                                                                                                           |
| ERR.                          | Sets forced error flag (FSE), terminates program execution, and clears AUTO MODE if set.                                                                                                                                                                                                       |
| GO.                           | Restarts a program that has paused.                                                                                                                                                                                                                                                            |
| HOLD.                         | DIS relinquishes the display console, but the job is held at the present status. The console must be reassigned to continue use of DIS.                                                                                                                                                        |
| M.characters.                 | Enters characters as a CPU program command. Data is stored at RA+CCDR.                                                                                                                                                                                                                         |
| N.characters.                 | Sets DIRECT CPU INPUT mode. Characters entered from keyboard are<br>passed one character at a time, right-justified, directly into<br>central memory at RA+CCDR. Pressing the left blank (erase) or<br>key twice clears DIRECT CPU INPUT mode.                                                 |
| OFFSWs.                       | Turns off sense switch s for the job ( $1 \leq s \leq 6$ ).                                                                                                                                                                                                                                    |
| ONSWs .                       | Sets sense switch s for the job (1 $\leq$ s $\leq$ 6).                                                                                                                                                                                                                                         |
| 026.                          | Calls the 026 file editor to a control point. You will need a CC545<br>console to use the 026 file editor. It does not work with a 721<br>console. Refer to the NOS 2 Systems Programmer's Instant for a<br>description of the editing commands.                                               |

| Command            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| RCP.               | Requests central processor. Depending on job priority, execution<br>begins at the next program address for a job suspended by a DCP<br>request.                                                                                                                                                                                                                                                                                                           |  |  |
| RCS.               | Sets AUTO MODE, which initiates automatic command processing. All<br>succeeding commands are read from the command buffer and processed<br>automatically until an SCS command, an erase function, or an error<br>is encountered. A period (.) may also be used to initiate automatic<br>command processing.                                                                                                                                               |  |  |
| RNS.               | Reads and processes the next command in the DIS command buffer.                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
| ROLLOUT.           | Allows the job to roll out. This command should be issued when the message ROLLOUT REQUESTED appears (or the * or F15 key may be used).                                                                                                                                                                                                                                                                                                                   |  |  |
| ROLLOUT, spr.      | Places job in rollout status for spr job scheduler delay intervals.<br>The job is automatically rolled back in after this period of time.<br>If a number greater than 7778 is specified for spr, 7778 is used.                                                                                                                                                                                                                                            |  |  |
| RSS.               | Reads the next command from the command buffer and stops prior to CPU execution. This is used to initiate breakpointing of a program.                                                                                                                                                                                                                                                                                                                     |  |  |
| RSS,commandstring. | Reads the commandstring command and stops prior to execution. The action is similar to ENS followed by RSS except that the command buffer is not cleared.                                                                                                                                                                                                                                                                                                 |  |  |
| SCS.               | Clears AUTO MODE, which stops automatic command processing.                                                                                                                                                                                                                                                                                                                                                                                               |  |  |
| SUI,userindex      | Allows access to a user index above AUIMX (3777008). Any<br>permanent file activity that is to be done on such user indices must<br>be done through system origin jobs. This command is not accepted by<br>a secured system.                                                                                                                                                                                                                              |  |  |
| T,addr.            | Changes the T display to start at address addr.                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
| U,addr.            | Changes the U display to start at address addr.                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
| UCC=c              | Sets the uppercase character c. This command does not terminate with a period.                                                                                                                                                                                                                                                                                                                                                                            |  |  |
| V,addr.            | Changes the V display to start at address addr.                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
| X.commandstring.   | Processes commandstring as the next command. Only the first 50 characters following X are used. This may be used to enter a leading slant or a command that is the same as DIS display.                                                                                                                                                                                                                                                                   |  |  |
| * commandstring.   | If an asterisk (*) followed by a blank and commandstring is<br>encountered during automatic command processing (AUTO MODE),<br>commandstring is interpreted as a direct DIS display selection<br>command. For example, * C4,100. will set the left screen display to<br>the central memory C display at address 100. Using this feature, it<br>is possible to set up procedure files that use DIS to breakpoint a<br>program to a desired stopping point. |  |  |
| commandstring.     | Processes commandstring as a command if it is not a recognizable DIS command.                                                                                                                                                                                                                                                                                                                                                                             |  |  |

### **MEMORY ENTRY COMMANDS**

The following commands are used in conjunction with the C, D, F, G, and M memory displays to change the contents of central memory and extended memory. Only locations relative to the reference address (RA) of the job to which DIS is assigned can be changed. When changing the contents of memory relative to a job, the negative field length area of the job can be accessed by specifying a negative address. For example, to change the content of RA-3, enter the address  $77775_8$ .

On a secured system no memory entry commands are allowed unless the security unlock status is set. The memory display shows the message

\*\*\*\*SECURED AREA\*\*\*\*

instead of the contents of the memory locations to prevent you from examining these locations; you may not alter the contents of these locations.

Character values or numeric data can replace the current word contents. Either one 12-bit byte, one 15-bit parcel, one 30-bit parcel, or 60 bits can be changed. A single byte can be changed by inserting the byte number after the location to be changed; bytes are numbered 0 through 4 from left to right. The address and contents are assembled right-justified with leading zero fill. Leading zeros may be omitted in the entry. Only words within the field length of the job may be changed.



Improper use of these commands may result in damage to the system or to user jobs.

Formats and descriptions of the memory entry commands follow.

| Command      | Description                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|
| addr,cont.   | Changes the contents of memory location addr to cont. The second form of the command performs essentially the same function but  |
| or           | leaves the address at addr+1, allowing immediate entry for the next memory location.†                                            |
| addr+cont.   |                                                                                                                                  |
| addr,b,cont. | Changes the contents of byte b at memory location addr (eight                                                                    |
| or           | digits) to cont. Each location consists of five 12-bit bytes,<br>numbered 0 through 4 from left to right. The contents are octal |
|              | characters. The second form of the command performs essentially the                                                              |
| addr+b,cont. | same function but leaves the address at addr+1, allowing immediate entry for the next memory location.†                          |

<sup>&</sup>lt;sup>†</sup>If the message REPEAT ENTRY is displayed above the entry line, the cont field is not cleared and may be entered in successive memory locations as many times as desired by pressing CR or NEXT. The repeat entry mode is enabled by pressing CR or NEXT before initial entry of the command. This is also applicable to the b and n fields of the second, fifth, and seventh commands.

| Command           | Description                                                                                                                                                                                                                                                              |  |  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| addr,Dcont.<br>or | Changes the contents of memory location addr (eight digits)<br>to display code characters cont (left-justified and zero-filled).<br>The second form of the command performs essentially the same<br>function but leaves the address at addr+1, allowing immediate entry  |  |  |
| addr+Dcont.       | for the next memory location. <sup>†</sup>                                                                                                                                                                                                                               |  |  |
| addr,Lcont.       | Changes the contents of memory location addr (eight digits) to<br>left-justified cont. The second form of the command performs                                                                                                                                           |  |  |
| or                | essentially the same function but leaves the address at addr+1, allowing immediate entry for the next memory location.                                                                                                                                                   |  |  |
| addr+Lcont.       |                                                                                                                                                                                                                                                                          |  |  |
| addr,In,cont.     | Changes the contents of instruction n (O through 3 from left to right) at memory location addr (eight digits) to cont; cont may be a                                                                                                                                     |  |  |
| or                | 15- or 30-bit instruction. However, one or more bits must be set in                                                                                                                                                                                                      |  |  |
| addr+In,cont.     | the upper 15 bits of a 30-bit instruction or the entry will be<br>treated as a 15-bit instruction. The second form of the command<br>performs essentially the same function but leaves the address at<br>addr+1, allowing immediate entry for the next memory location.† |  |  |
| Eaddr,cont.       | Changes the contents of extended memory location addr to cont. The second form of the command performs essentially the same function                                                                                                                                     |  |  |
| or                | but leaves the address at addr+1, allowing immediate entry for the                                                                                                                                                                                                       |  |  |
| Eaddr+cont.       | next extended memory location.                                                                                                                                                                                                                                           |  |  |
| Eaddr,b,cont.     | Changes the contents of byte b at extended memory location addr to cont. Each location consists of five 12-bit bytes, numbered 0                                                                                                                                         |  |  |
| or                | through 4 from left to right. The contents are four octal                                                                                                                                                                                                                |  |  |
| Eaddr+b,cont.     | characters. The second form of the command performs essentially the<br>same function but leaves the address at addr+1, allowing immediate<br>entry for the next extended memory location.                                                                                |  |  |
| Eaddr,Dcont.      | Changes the contents of extended memory location addr to display code characters cont (left-justified and zero-filled). The second                                                                                                                                       |  |  |
| or                | form of the command performs essentially the same function but<br>leaves the address at addr+1, allowing immediate entry for the next                                                                                                                                    |  |  |
| Eaddr+Dcont.      | extended memory location.                                                                                                                                                                                                                                                |  |  |

<sup>&</sup>lt;sup>†</sup>If the message REPEAT ENTRY is displayed above the entry line, the cont field is not cleared and may be entered in successive memory locations as many times as desired by pressing CR or NEXT. The repeat entry mode is enabled by pressing CR or NEXT before initial entry of the command. This is also applicable to the b and n fields of the second, fifth, and seventh commands.

### **PP CALL COMMANDS**

Any PP program having a name that begins with a letter may be initiated by DIS. However, before entering any of these commands, it is necessary to have a working knowledge of the PP program to be called. This ensures correct use of the specified program.



Improper use of these commands may result in damage to the system or to user jobs.

In table 4-1, prg denotes the name of the PP program and n is the control point number.

| Command    | Description                                                                                   | Format of PP<br>Call Initiated |
|------------|-----------------------------------------------------------------------------------------------|--------------------------------|
| prg.       | Calls PP program prg to the control point.                                                    | 18/3Lprg,6/n,36/0              |
| prg,pl.    | Calls PP program prg to the control point; pl<br>is an octal parameter required by prg.       | 18/3Lprg,6/n,18/0,18/pl        |
| prg,pl,p2. | Calls PP program prg to the control point; pl<br>and p2 are octal parameters required by prg. | 18/3Lprg,6/n,18/p1,18/p2       |
|            |                                                                                               |                                |

Table 4-1. PP Call Formats

# **DSD COMMANDS**

| Dayfile Commands                       | 5-2  |
|----------------------------------------|------|
| Queued File Utility Commands           | 5-3  |
| Job Processing Control Commands        | 5-3  |
| General Job Control Commands           | 5-4  |
| Interactive Job Control Commands       | 5-6  |
| Job Communication Commands             | 5-7  |
| Job Flow Commands                      | 5-8  |
| Peripheral Equipment Control Commands  | 5-18 |
| Subsystem Control Commands             | 5-33 |
| System Control Commands                | 5-37 |
| Secured System Control Commands        | 5-46 |
| Memory Entry Commands                  | 5-47 |
| Channel Control Commands               | 5-50 |
| Extended Memory Flag Register Commands | 5-51 |

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## DSD COMMANDS

After the system has been deadstarted successfully, you can enter the DSD commands necessary to provide optimum performance and reliability for users. The following general categories of DSD commands are available for this purpose.

| Dayfile                       | Dumps the system, account, or error log dayfile to a specified device.                                                      |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Queued file utility           | Provides control over selected queued files.                                                                                |
| Job processing control        | Provides added control over job scheduling and processing.                                                                  |
| Peripheral equipment control  | Controls the peripheral equipment available to the system.                                                                  |
| Subsystem control             | Schedules a subsystem to a control point or terminates a current subsystem.                                                 |
| System control                | Maintains system integrity in a normal production<br>environment or debugs a system that is in an abnormal<br>state.        |
| Memory entry                  | Changes the contents of central memory and extended memory.                                                                 |
| Channel control               | Controls activity on a specified data channel in circumstances where abnormal hardware and/or system operation is detected. |
| Extended memory flag register | Clears and sets bits in the extended memory flag register.                                                                  |

Although all DSD commands are generally available, many of them are seldom used in a normal production environment. Many DSD commands are used only by the system analyst for maintenance or debugging purposes. These commands include all memory entry and channel control commands as well as several commands in the other categories listed on an unsecured system. Memory entry commands and several other commands are restricted on a secured system (refer to the UNLOCK command later in this section).

When unusual problems arise, do not attempt corrective action unless you have considerable experience relating to the current problem. Misguided attempts to correct a system problem can often destroy information required to successfully analyze the problem. To assist customer engineers in maintaining the hardware, the system enters the first characters (up to 25) of the following commands into the error log after each execution.

DOWN, param.

FORM, param.

INITIALIZE, param.

LOG, param.

OFF, eq.

ON,eq.

REDEFINE, param.

99.

Memory entry commands

Channel control commands

Any other commands that you specify at installation time

These commands are prefixed by the characters DS in the error log but otherwise appear exactly as they are entered. This feature can be enabled and disabled using the 99 command (refer to System Control Commands later in this section).

The manner in which the DSD commands are entered and the use of special keyboard characters are described in the NOS 2 Operations Handbook. Command formats are fixed field; that is, the fields in the command format must be specified as shown. Embedded blanks are allowed in octal fields. Leading spaces in command entries are not allowed.

### **DAYFILE COMMANDS**

The system saves messages in five types of dayfiles.

- Account dayfile
- Binary maintenance log
- Error log
- Job dayfile
- System dayfile

The account dayfile keeps a record of all resources charged to a job. This dayfile can be used for customer billing and other accounting purposes. The binary maintenance log records the information used in Control Data maintenance in binary format. The error log records system error messages, such as disk errors. Job dayfiles keep entries for individual jobs. The system dayfile keeps a history of all commands for all jobs processed. The following commands dump the account dayfile, system dayfile, or error log to a system-defined mass storage device. The resultant mass storage file is put in the output queue for printing. The system automatically prints the job dayfile at the end of the job's output.

| Command | Description                                                                                                                                                         |  |  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| X.AFD.  | Requests that the account dayfile be dumped to a system-defined mass<br>storage device. The resultant mass storage file is put in the<br>output queue for printing. |  |  |
| X.DFD.  | Requests that the system dayfile be dumped to a system-defined mass<br>storage device. The resultant mass storage file is put in the<br>output queue for printing.  |  |  |
| X.ELD.  | Requests that the error log be dumped to a system-defined mass<br>storage device. The resultant mass storage file is put in the<br>output queue for printing.       |  |  |

Refer to section 18, Queue/Dayfile Utilities, for more information on dayfile dumps.

The binary maintenance log is designed to be processed through an interpreter program, and therefore is normally dumped to tape or disk.

Refer to the NOS 2 Operations Handbook for descriptions of dayfile displays.

### **QUEUED FILE UTILITY COMMANDS**

The following commands are used to control queued input and output files.

| Co | m | m | a | n | d |  |
|----|---|---|---|---|---|--|
|    |   |   |   |   |   |  |

Description

X.QREC Deactivates or activates selected queued files and purges selected inactive queued files.

X.QMOVE Moves queued files from one mass storage device to another.

Refer to section 18, Queue/Dayfile Utilities, for more information on queued file utility commands.

### JOB PROCESSING CONTROL COMMANDS

Under normal circumstances, control over job processing is performed automatically by the system. Although the following commands may not be used frequently, they provide an added measure of control over job processing.

#### **GENERAL JOB CONTROL COMMANDS**

Several of the commands described here change internal system parameters which control job scheduling and processing. Give careful consideration to their use since job flow and overall system performance can be affected. Refer to the individual command descriptions for further information.

#### Command

CKP,jsn.

# Description

Checkpoints the job with job sequence name jsn. The checkpoint information includes a copy of the job's field length, the system information used for job control, and the name and contents of all local files currently assigned to the control point. It is the responsibility of the user's job to establish a magnetic tape or mass storage permanent file to receive the checkpoint information. Otherwise, checkpoint information is automatically written to a local file named CCCCCCC and is not available if a restart becomes necessary (restart is user-controlled and is accomplished using the RESTART command). Refer to the NOS 2 Reference Set, Volume 3 for supplementary information concerning the checkpoint/restart feature available to users.

### NOTE

If the current job command has secure system memory (SSM) status set, the job cannot be checkpointed. SSM status is set for certain jobs to prevent dumping of the job's field length. Subsystems cannot be checkpointed.

DROP, jsn, qt, ujn. Drops the job with job sequence name jsn from the queue qt where it currently resides. If a jsn is not specified, a 1- to 7-character user job name ujn can be specified after the queue type.

If no jsn or ujn is specified, all jobs in the specified queue type are dropped. If the queue type is not specified, the default is the executing queue.

The DROP command cannot be used to terminate a subsystem. Also the DROP command will not terminate an interactive user's session (this can be done only with a KILL command).

The queue type is one of the following.

qt

#### Queue Type

- ALL All jobs and queued files.
- EX All jobs in the executing queue (including the rolled out jobs).
- IN All jobs in the input queue.
- PL All jobs in the plot queue.
- PR All jobs in the print queue.
- PU All jobs in the punch queue.
- WT All jobs in the wait queue.

| ENQP,jsn,pr. | Enters queue priority of pr for a queue type file with job sequence<br>name jsn. The value of pr can range from the minimum to the maximum<br>for the job's service class. If the priority is zero, the file is<br>not scheduled back to a control point automatically. The value<br>specified overrides the current queue priority for the file. The<br>current queue priority can either be increased or decreased using<br>this command. |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| KILL,jsn.    | Drops the job with job sequence name jsn from the executing job                                                                                                                                                                                                                                                                                                                                                                             |

KILL,jsn. Drops the job with job sequence name jsn from the executing job table (EJT) without exit processing. If you want the job to proceed with exit processing, use the DROP command. The KILL command cannot be used to drop a subsystem.

> KILL is the only command that immediately terminates an interactive user's session. The DROP and OVERRIDE commands only terminate the current job step and do not log the user out of the system. There will be no recoverable job after you issue the KILL command.

Description

| NOTE |
|------|
|      |

Before initiating the command, ensure that the correct job sequence name has been specified.

In some cases, a KILL command will be intercepted by a job's reprieve processing. If the job does not terminate after finishing its reprieve processing, issue another KILL command to terminate the job.

OVERRIDE, jsn. Certain types of job processing are unaffected by the DROP, KILL, or STOP commands. These include operations such as setting permanent file device interlocks, interlocking files/tracks, clearing VSN entries, and waiting for certain types of tape/PP activity to end. The OVERRIDE command terminates this type of processing and drops the job with job sequence name jsn from the executing job table regardless of queue priority. The OVERRIDE command will not terminate an interactive user's session (this can be done only with a KILL command). Unlock the console (refer to the UNLOCK command later in this section) to enter this command. Use of this command is recorded in the error log.

| Ν | 0 | T | E |  |
|---|---|---|---|--|
|   |   |   |   |  |

Exercise extreme caution in using the OVERRIDE command. Undesirable situations (such as interlocks being left set, VSN entries remaining uncleared, or certain tape/PP activities left outstanding) could occur that would cause potentially damaging system activity. Never use this command during normal operations.

Command

| Command         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RERUN,jsn.      | Terminates the job with job sequence name jsn, then reruns the job<br>from the beginning. The job must be in rerun status as set by the<br>RERUN command or macro.                                                                                                                                                                                                                                                                                                                                        |
| ROLLIN,jsn,L.   | Allows the job defined by job sequence name jsn to be scheduled to<br>an available control point. L is optional; if omitted, the job can<br>be selected by the scheduler for rollout.                                                                                                                                                                                                                                                                                                                     |
| ROLLOUT,jsn,sd. | Removes the currently executing job with job sequence name jsn and<br>makes it a rolled out job. A subsystem cannot be rolled out. sd is<br>the number of scheduler intervals before the job can be scheduled<br>again. The acceptable range for sd is between 0 and 7778. If sd<br>is not present or is 0, the job is not scheduled back to a control<br>point automatically. That is, your action is required to return the<br>job to a control point. This can be done by using the ROLLIN<br>command. |
|                 | The amount of time required for one job scheduler interval is<br>initially set in the IPRDECK but may be changed by using the DELAY<br>command (JS parameter) described later in this section. Normally,<br>it is a l-second interval.                                                                                                                                                                                                                                                                    |

### INTERACTIVE JOB CONTROL COMMANDS

The following commands apply only to interactive online jobs. The interactive facility subsystem must be active at control point 1.

| Command                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIAL,jsn,<br>messagetext. | Sends message messagetext (48 characters maximum) to the terminal<br>currently assigned to the job with job sequence name jsn. Examine<br>the T display to determine the appropriate job sequence name. The<br>message is sent to the terminal immediately except when output is<br>being sent to the terminal. In that case, the message follows the<br>output data.                                                                                                                                               |
| WARN, messagetext.        | Sends message messagetext (48 characters maximum) to all terminals<br>currently logged into IAF. The message is received at a terminal<br>upon completion of the current command or at the end of a job step.<br>Each subsequent terminal that logs into IAF also receives this<br>message. This continues until either a new message is entered or<br>the message is cleared by using the WARN command. In addition, the<br>current message also appears at the IAF Subsystem control point on<br>the B,O display. |
|                           | When sent to an interactive terminal, the message messagetext is always preceded by the statement                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                           | hh.mm.ss. WARNING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                           | specifying the time (hours.minutes.seconds) when you entered the                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

WARN command.

Command

### Description

For example, if you enter

WARN, SYSTEM SHUTDOWN AT 1500.

the following information would be transmitted to all interactive terminals.

hh.mm.ss. WARNING

SYSTEM SHUTDOWN AT 1500.

This command is typically used to notify interactive users of an interruption in service or system shutdown.

WARN.

Clears the message entered by the WARN, messagetext command. Unless this command is entered, the existing message (if any) continues to be transmitted to each new terminal that logs into IAF.

### JOB COMMUNICATION COMMANDS

The following job communication commands are used to communicate with a job currently in the executing job table.

| Command                                                         | Description                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CFO,jsn,<br>messagetext.                                        | Sends a message messagetext (36 characters maximum) from the console<br>to the job with job sequence name jsn. Bit 14 of the job's RA must<br>be set before the CFO command is accepted. The message is placed in<br>locations RA+70 <sub>8</sub> through RA+74 <sub>8</sub> of the program's field length. |
| COMMENT,jsn,<br>messagetext                                     | Enters comment messagetext (48 characters maximum) in the dayfile for the job with job sequence name jsn.                                                                                                                                                                                                   |
| GO,jsn.                                                         | Clears the pause bit of the job with job sequence name jsn. A job<br>may set the pause bit if an error is encountered or if an operator<br>response is required. If jsn is not specified, the command applies<br>to the system control point.                                                               |
| OFFSW,jsn,s <sub>1</sub> ,<br>s <sub>2</sub> ,,s <sub>6</sub> . | Turns off one or more sense switch(es) $s_i$ ( $1 \le s_i \le 6$ ) of the job with job sequence name jsn. Refer to Subsystem Control Commands later in this section for definitions of the sense switches that can be set for the BIO, IAF, MAS, and TAF Subsystems.                                        |
| ONSW,jsn,s <sub>1</sub> ,<br>s <sub>2</sub> ,,s <sub>6</sub> .  | Turns on sense switch(es) $s_1$ ( $1 \le s_1 \le 6$ ) of the job with job sequence name jsn. Refer to Subsystem Control Commands later in this section for definitions of the sense switches that can be set for the BIO, IAF, MAS, and TAF Subsystems.                                                     |

PAUSE, jsn. Sets the pause bit of the job with job sequence name jsn. If jsn is not specified, the command applies to the system control point.

#### **JOB FLOW COMMANDS**

The following job flow commands affect scheduling and execution of jobs in the system. Improper use of these commands can drastically hamper job flow as well as system performance. In certain cases, jobs may be lost.

The priority associated with each priority parameter in the following commands is established by an entry in the IPRDECK for each service class. The value of each priority parameter for each service class is listed on the system control display(s) (refer to the NOS 2 Operations Handbook for more information on the S display).

#### Command

#### Description

CLASS, ot, sc<sub>1</sub>, sc<sub>2</sub>,..., sc<sub>n</sub>. Defines the authorized service class for each origin type. Refer to the SCTD L display in section 9, L-Display Utilities, for further information.

#### Parameter

#### Description

- ot Origin type (must be batch, remote batch, or interactive). This parameter is order dependent.
  - ot Origin Type
  - BC Batch.
  - RB Remote batch.
  - IA Interactive.
- sci Authorizes service classes for the specified origin
  type.

| sc | Service | Class |
|----|---------|-------|
|    |         |       |

- BC Local batch.
- CT Communication task.
- DI Detached interactive.
- In Installation class n  $(0 \le n \le 3)$ .
- MA Maintenance.
- NS Network supervisor.
- RB Remote batch.
- SY System.
- TS Interactive.
- ALL Sets all the service classes except subsystem (SS) and deadstart (DS).
- NUL Clears all service classes.

Command

#### Description

DELAY, p1, p2,

Alters current system delay parameters. Examine the S display to determine the current delay parameter values.

 $P_i$ 

ARint PP auto recall interval in milliseconds. This parameter specifies the time interval at which peripheral processor units (PPs) in auto recall are recalled. One PP routine is activated each time period. The acceptable range for int is from 1 to 77778.

Delay

- CRrp CPU recall period in milliseconds. This parameter specifies the amount of time a job remains in recall (X status) when an RCL request is placed in RA+1. The acceptable range for rp is from 1 to 77778.
- JQdel Exponent used to determine the input job scheduler delay in seconds. The acceptable range for del is from 0 to 148. The delay in seconds between scheduling of input jobs is calculated as follows:

delay = 2\*\*del

- JSint Job scheduler interval in seconds. This parameter specifies the interval at which the job scheduler and priority evaluation routines are called. The scheduler may also be called at other times. The acceptable range for int is from 1 to 77778.
- MNsi Minimum CPU job switch interval in milliseconds. The acceptable range for si is from 1 to 7777<sub>8</sub>.
- MXsi Maximum CPU job switch interval in milliseconds. The acceptable range for si is from 1 to 7777<sub>8</sub>.

The value for each system delay parameter may be established by using a DELAY command entry in the IPRDECK. If no DELAY entry is present, default values are provided. Figure 5-1 provides space to record the original values (specified in the S display) in the event that any are altered temporarily. For additional information concerning the DELAY command, refer to section 3, Deadstart Decks.

| DELAY | VALUES |
|-------|--------|
| AR    |        |
| CR    |        |
| JQ    |        |
| JS    |        |
| MN    |        |
| MX    |        |

Figure 5-1. Record of Original Values in S Display (Delay Values)

#### Description

PCLASS,sc0,sc1,
 ...,sc7.

Command

Selects the service class associated with each priority level ( $p_0$  through P7) on the Job command. This parameter is order dependent; a comma must appear for any parameters not specified. The default for any parameters not specified is 0 (zero). Subsystem (SS) service class is not allowed with this command. Refer to the SCTD L display in section 9, L-Display Utilities, for more information.

#### Description

sci

The 2-character service class parameter.

| sc | Service Class                               |
|----|---------------------------------------------|
| BC | Local batch.                                |
| CT | Communication task.                         |
| DI | Detached interactive.                       |
| In | Installation class n (0 $\leq$ n $\leq$ 3). |
| MA | Maintenance.                                |
| NS | Network supervisor.                         |
| RB | Remote batch.                               |
| SY | System.                                     |
| TS | Interactive.                                |

QUEUE,sc,qt,qp1, qP2,,...,qPn.

Alters the queue priorities qp<sub>1</sub> associated with the input, executing, and output queues qt for each service class sc. Examine the S display to determine the priority values currently associated with each service class. These changes are valid only until the next deadstart.

| sc | Service Class |
|----|---------------|
|    |               |

- BC Local batch.
- CT Communication task.
- DI Detached interactive.
- In Installation class n ( $0 \le n \le 3$ ).
- MA Maintenance.
- NS Network supervisor.
- RB Remote batch.
- SS Subsystem.
- SY System.
- TS Interactive.

60459300 D

Command

- qtJob Queue TypeEXExecuting.
- IN Input.
- OT Output.

# <sup>qp</sup>i

#### Queue Priority

- ILpr Lowest priority pr an executing job can have for an initial time slice. The acceptable range for pr is from 0 to  $7777_8$ .
- IPpr Initial scheduling priority pr for an executing job. The acceptable range for pr is from 0 to  $7777_8$ .
- LPpr Lowest priority pr at which a job can enter the queue. The acceptable range for pr is from 0 to  $7777_8$ .
- UPpr Highest priority pr a job can reach in the specified queue; aging stops when this priority is reached. The job is also given this priority when initially assigned to a control point. The value of pr, which can range from 0 to 7777<sub>8</sub>, is normally greater than LPpr but cannot exceed the maximum of the job's service class.
- WFnn Weighting factor nn for queue priority calculations. nn must be a power of 2, from 0 to 40008.

The priority associated with each queue is established by using QUEUE command entries in the IPRDECK for each service class. These entries normally reflect the ideal queue priorities for the job mix of the particular installation. The values specified in the IPRDECK are considered critical to optimum system performance and are not normally altered. Figure 5-2 provides space to record the original values specified in the S display. For additional information on the QUEUE command, refer to section 3, Deadstart Decks.

| JOB<br>SERVICE |             | PRIORITIES FOR EACH QUEUE TYPE |    |    |                 |    |    |    |    |              |    |    |    |
|----------------|-------------|--------------------------------|----|----|-----------------|----|----|----|----|--------------|----|----|----|
| CLASS          | INPUT QUEUE |                                |    |    | EXECUTING QUEUE |    |    |    |    | OUTPUT QUEUE |    |    |    |
|                | LP          | UP                             | WF | IP | IL              | LP | UP | WF | IP | LP           | UP | WF | IP |
| SY             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| BC             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| RB             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| TS             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| DI             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| NS             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| SS             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| MA             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| СТ             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| 10             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| I1             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| 12             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |
| 13             |             |                                |    |    |                 |    |    |    |    |              |    |    |    |

Figure 5-2. Record of Original Values in S Display (Queue Priorities)

| Command                                                          |                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SERVICE,sc,p <sub>1</sub> ,p <sub>2</sub> ,<br>,p <sub>n</sub> . |                | service limits p <sub>i</sub> associated with each service class changes are valid only until the next deadstart.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                  | sc             | Service Class                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                  | BC             | Local batch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                  | CT             | Communication task.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                  | DI             | Detached interactive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                  | In             | Installation class n (0 $\leq$ n $\leq$ 3).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                  | MA             | Maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                  | NS             | Network supervisor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                  | RB             | Remote batch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                  | SS             | Subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                  | SY             | System.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                  | TS             | Interactive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                  | <sup>p</sup> i | Service Limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                  | AMfl           | Maximum field length divided by 100g for all jobs of<br>the specified service class. This parameter is used to<br>partition central memory by limiting the total field<br>length available to each service class. For example, if<br>scheduling a job to a control point exceeds the field<br>length specified for its service class, it may not be<br>scheduled until the required field length is available.<br>This means that a lower priority job from a different<br>service class may be scheduled first. However, a job<br>that would normally exceed the field length for its<br>service class can be scheduled to a control point if<br>there are not enough jobs to fill the field length<br>specified for another service class. The system always<br>attempts to use central memory to its greatest<br>capacity. The acceptable range for fl is from 0 to<br>777778. |
|                                                                  | CMts           | Central memory time slice in seconds. This parameter specifies the maximum amount of time a job of the specified service class can remain at a control point before the job becomes eligible to be rolled out. A job is not necessarily rolled out when its time slice is exceeded. The job is set to a lower priority and then may be replaced by a job of higher priority. The value of ts can range from 0 to $7777_8$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                  | CPts           | CPU time slice (milliseconds*64). This parameter specifies the maximum amount of time a job of the specified service class can use the CPU before its queue priority is set to the lower boundary. The value of ts can range from 1 to $7777_8$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|                | Description                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P <sub>i</sub> | Service Limits                                                                                                                                                      |
| CSv            | Cumulative size in PRUs allowed for all indirect access<br>permanent files; v is used to specify the corresponding<br>values shown next:                            |
|                | v Limit Value in Octal                                                                                                                                              |
|                | 0 Unlimited                                                                                                                                                         |
|                | 1 1000                                                                                                                                                              |
|                | 2 2000                                                                                                                                                              |
|                | 3 5000                                                                                                                                                              |
|                | 4 10000                                                                                                                                                             |
|                | 5 50000                                                                                                                                                             |
|                | 6 100000                                                                                                                                                            |
|                | 7 Unlimited                                                                                                                                                         |
| DSv            | Size in PRUs allowed for individual direct access<br>permanent files; v is used to specify the corresponding<br>values shown next:                                  |
|                | v Limit Value in Octal                                                                                                                                              |
|                | 0 Unlimited                                                                                                                                                         |
|                | 1 1000                                                                                                                                                              |
|                | 2 2000                                                                                                                                                              |
|                | 3 5000                                                                                                                                                              |
|                | 4 10000                                                                                                                                                             |
|                | 5 50000                                                                                                                                                             |
|                | 6 100000                                                                                                                                                            |
|                | 7 Unlimited                                                                                                                                                         |
| DTsc           | Detached service class for interactive jobs. The default value for sc is DI (detached interactive).                                                                 |
| ECf1           | Maximum extended memory divided by 1000 <sub>8</sub> for any job<br>of the specified service class. The acceptable range<br>for fl is from 0 to 7777 <sub>8</sub> . |

EMf1 Maximum extended memory divided by 10008 for all jobs of the specified service class. The acceptable range for fl is from 0 to 77778.

## Description

<sup>p</sup>i

FCv

Number of permanent files allowed; v is used to specify the corresponding values shown next:

Service Limits

| <u>v</u> | Limit Value in Octal |
|----------|----------------------|
| 0        | Unlimited            |
| 1        | 10                   |
| 2        | 20                   |
| 3        | 30                   |
| 4        | 40                   |
| 5        | 50                   |
| 6        | 100                  |
| 7        | Unlimited            |

- FLf1 Maximum field length divided by  $100_8$  for any job of the specified service class. Jobs with field lengths that exceed this value are not considered for scheduling unless no other jobs are waiting to be scheduled and sufficient field length is available without rolling out any jobs. The acceptable range for fl is from 0 to 7777<sub>8</sub>.
- FSv
  - Size in PRUs allowed for individual indirect access permanent files; v is used to specify the corresponding values shown next:

| <u>v</u> | Limit Value in Octal |
|----------|----------------------|
| 0        | Unlimited            |
| 1        | 10                   |
| 2        | 30                   |
| 3        | 50                   |
| 4        | 100                  |
| 5        | 150                  |
| 6        | 300                  |
| 7        | Unlimited            |

NJn

Maximum number of jobs. For each service class, this parameter specifies the number of jobs that can be executing in the system. The value for n can range from 0 to  $7777_8$ .

<sup>p</sup>i

#### Description

#### Service Limits

- PRpr CPU priority  $(2 \le pr \le 77_8)$ . Jobs with the highest priority get the CPU first. All service classes except maintenance (MA) and network supervisor (NS) are normally set to the same CPU priority. MA jobs are run at the lowest CPU priority. NS jobs are run at a higher priority than any of the other job service classes to provide good response time to network users. Subsystems control their own priorities.
- TDs Suspension time-out delay. A suspended job is timed out for s times  $10_8$  seconds. s can range from 0 to 77778. The maximum time-out delay is approximately 9.1 hours.
- TPpr Initial scheduling priority. This is the priority assigned to the start of a new command or after terminal I/0 for an interactive terminal. The acceptable range for pr is from 2 to 77778.

The service limits associated with each service class are established by using SERVICE command entries in the IPRDECK. These entries normally reflect the ideal service limits for the job mix of the particular installation. The values specified in the IPRDECK are important to optimum system performance and are not normally altered. However, when changes are necessary they are usually temporary and the original values will be reset. Figure 5-3 provides space to record the original values specified in the S display. For additional information concerning the SERVICE command, refer to section 3, Deadstart Decks.

SRST,t. Changes the secondary rollout sector threshold to the value t  $(0 \le t \le 7777_8)$ . Any rollout file smaller than t sectors is considered a secondary rollout file for the purpose of equipment selection.

## NOTE

The size of the rollout file for any job must be at least seven sectors larger than the combined size in sectors of the job's central memory and extended memory field lengths.

| JOB<br>SERVICE |    |    |    |    |    | SI | ERVIC | ELIMI | LTS |    |    |    |    |    |    |
|----------------|----|----|----|----|----|----|-------|-------|-----|----|----|----|----|----|----|
| CLASS          | PR | CP | СМ | NJ | TD | FL | AM    | TP    | DT  | EC | EM | DS | FC | cs | FS |
| SY             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| BC             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| RB             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| TS             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| DI             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| NS             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| SS             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| MA             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| ст             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| 10             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| 11             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| 12             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |
| 13             |    |    |    |    |    |    |       |       |     |    |    |    |    |    |    |

| Figure 5-3. | Record of | Original | Values | in S | Display | (Service Limits | s) |
|-------------|-----------|----------|--------|------|---------|-----------------|----|
|-------------|-----------|----------|--------|------|---------|-----------------|----|

# PERIPHERAL EQUIPMENT CONTROL COMMANDS

The commands described in this category provide control of the peripheral equipment available to the system.† You should become familiar with the following DSD displays, which are closely associated with the use of these and other commands described throughout this section.

- Equipment status display (E,A).
- Disk configuration display (E,C).
- Family status display (E,F).
- Disk status display (E,M).
- Resource requests display (E,P).
- Tape status display (E,T).
- BIO status display (I).

A complete description of each of these displays is given in the NOS 2 Operations Handbook.

| Command         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASSIGN,jsn,est. | Assigns equipment defined by EST ordinal est (normally a tape unit) to the job with job sequence name jsn. This command is entered in response to a flashing REQUEST message. Use of this command for assignment of a tape unit should not normally be required because tape assignment is performed automatically when a volume serial number (VSN) is specified in the job request. However, if a VSN is not specified in the job request for a labeled or unlabeled tape, the REQUEST message appears at the job's control point (on the B,O display), and the ASSIGN command must be entered to assign a tape unit to the job. |
| BKSP,est,rr.    | Backspaces rr octal logical records on the print file for the BIO<br>equipment defined by EST ordinal est. When rr is not specified, the<br>default is one record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| BKSPF,est,ff.   | Backspaces ff octal files on the print file for the BIO equipment<br>defined by EST ordinal est. When ff is not specified, the default<br>is one file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| BKSPRU,est,ss.  | Backspaces ss physical record units (PRUs) on the print file for the<br>BIO equipment defined by EST ordinal est. The PRU count, ss, must<br>be specified. There is no default setting. Printing resumes at the<br>beginning of a line.                                                                                                                                                                                                                                                                                                                                                                                            |
| CONTINUE,est.   | Resumes printing on the BIO equipment defined by EST ordinal est.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

<sup>&</sup>lt;sup>†</sup>Operation of peripheral equipment is described in the NOS 2 Operations Handbook.

| Command                                   | Description                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CP,est,id.                                | Assigns a numeric identifier id to the BIO card punch defined by EST<br>ordinal est. The value of id can range from 00 to 678. Only<br>those files in the punch queue with an identifier equal to id are<br>directed to card punch est. Refer to the descriptions of the LOAD<br>and CR commands to assign an identifier to a job or queue type file. |
| CR,est,id.                                | Assigns a numeric identifier id to the card reader defined by EST<br>ordinal est. The value of id can range from 00 to 678. All<br>subsequent jobs loaded from card reader est are assigned the<br>identifier id.                                                                                                                                     |
| DOWN,CHcc,EQest.<br>or                    | The first form of the command discontinues use of channel cc for the equipment specified by EST ordinal est. If the EQest parameter is omitted, channel cc is discontinued for all equipments in the EST.                                                                                                                                             |
| DOWN, MCHcc, EQest.<br>or<br>DOWN, EQest. | The second form of the command discontinues use of MUX channel cc<br>for the equipment specified by EST ordinal est (this form only<br>applies to model 176). If the EQest parameter is omitted, MUX<br>channel cc is discontinued for all equipments in the EST.                                                                                     |
| Bonn, Equal •                             | The third form of the command discontinues the use of equipment with EST ordinal est for all channels.                                                                                                                                                                                                                                                |
|                                           | If channel cc is the only channel available to a mass storage equipment, its use is not discontinued. If channel cc is                                                                                                                                                                                                                                |
|                                           | <ul> <li>not defined as a magnetic tape or mass storage channel</li> </ul>                                                                                                                                                                                                                                                                            |
|                                           | <ul> <li>the last active channel on an equipment that is not globally<br/>unloaded (status N on the E,M display)</li> </ul>                                                                                                                                                                                                                           |
|                                           | the command is ignored and the following message appears on the left screen.                                                                                                                                                                                                                                                                          |
|                                           | INCORRECT ENTRY                                                                                                                                                                                                                                                                                                                                       |
|                                           | Correct the entry and retry the command.                                                                                                                                                                                                                                                                                                              |

## Description

If you attempt to DOWN an equipment

- already with a DOWN status
- assigned to a job
- not listed as removable in the EST<sup>†</sup>
- listed in the EST as removable but not globally unloaded<sup>†</sup>
- that is an independent shared device (multimainframe)<sup>†</sup>

the following message appears.

#### INCORRECT ENTRY

Correct the entry and retry the command.

### NOTE

This command should be used with caution since it directly affects the operation of system peripheral equipment.

END,est,rc.

Terminates the current operation on the BIO equipment defined by EST ordinal est. If est defines a line printer or card punch, BIO then assigns the next available file to that equipment. If est defines a card reader that is actively reading cards when END, est is entered, the job terminates at the last card read. The next card is treated as the beginning of a new job. If another card deck follows the end-of-information card (multipunch 6/7/8/9), it is processed normally.

If est defines a card reader that is stopped because of a compare error when END, est. is entered, perform the following steps:

- 1. Remove the remainder of the card deck, except the end-of-information card, from the card reader input hopper.
- 2. Ready the card reader to read the end-of-information card.

The job terminates and if another card deck follows the end-of-information card, it is processed normally.

The rc parameter cancels a portion of the repeat count specified for that equipment (refer to the REPEAT command later in this section). For example, if the current operation on equipment est had been set to be repeated five times (operation performed six times), entering a value of 4 for rc would permit the operation to be performed just two times. If the repeat count is zero, this command performs the END operation once.

<sup>†</sup>Applies only to mass storage equipment.

| Command                                        |                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FORM,est,fc.                                   | punch defin<br>queue assig<br>user can as<br>command. (<br>2 Reference<br>from AA to | -character forms code fc to the BIO line printer or card<br>ed by EST ordinal est. Only those files in the output<br>ned the forms code fc are directed to equipment est. A<br>sign a forms code to an output file using the ROUTE<br>For a description of the ROUTE command, refer to the NOS<br>Set, Volume 3.) The value of the forms code can range<br>99. If the forms code is not present, the current forms<br>is cleared (value is null). |
| IDLEFAMILY,est.                                |                                                                                      | d performs one of the two following functions, depending us of the family.                                                                                                                                                                                                                                                                                                                                                                        |
|                                                | new<br>spe                                                                           | the family is active, the IDLEFAMILY command causes all<br>jobs and USER commands for the family on the equipment<br>cified by EST ordinal est to be aborted. Jobs in<br>gress are allowed to complete.                                                                                                                                                                                                                                           |
|                                                | job                                                                                  | the family is inactive, the IDLEFAMILY command allows<br>s to access the family on the equipment specified by EST<br>inal est.                                                                                                                                                                                                                                                                                                                    |
|                                                |                                                                                      | lumn of the E,F display shows the number of jobs in the equipment.                                                                                                                                                                                                                                                                                                                                                                                |
| <pre>INITIALIZE,op,est1,<br/>est2,,est5.</pre> | devices def                                                                          | rrent setting of initialize option op for mass storage<br>ined by EST ordinals est (maximum of five devices).<br>E,A display to determine correct EST ordinals.                                                                                                                                                                                                                                                                                   |
|                                                | op                                                                                   | Level of Initialization                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                | AF                                                                                   | Initialize inactive account dayfile.                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                | AL                                                                                   | Total initialization.                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                | DF                                                                                   | Initialize inactive system dayfile.                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                | EF                                                                                   | Initialize inactive error log.                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                | FP                                                                                   | Format pending. †                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                | FT                                                                                   | Total initialization as full-track device.††                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                | нт                                                                                   | Total initialization as half-track device. ††                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                | MF                                                                                   | Initialize binary maintenance log.                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                | PF                                                                                   | Initialize permanent files.                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                | QF                                                                                   | Initialize inactive queue files.                                                                                                                                                                                                                                                                                                                                                                                                                  |

<sup>†</sup> Sets format pending bit in the MST for 881/883 pack reformatting. Refer to the description of the FORMAT program in appendix F. †† Device must be removable.

#### Description

This command provides the capability to initialize and flaw tracks on any mass storage device during normal system operation. Each time this command is entered it is logged in the error log.

If local unload (L) status is set for the device, the INITIALIZE command is ignored and the following message appears on the left console screen.

INCORRECT ENTRY

However, the INITIALIZE command is allowed to execute while local unload status is set if an error code (CE, IL, LE) is set.

Entry of this command does not in itself initialize the specified device. It merely sets initialize status for the device so that it may be initialized. However, if fast attach files (special system files) are active on the specified device and initialization level of AL or PF is specified, initialize status cannot be set until these files are returned. In this case, the message

FAST ATTACH FILES ON DEVICE.

appears at the system control point on the system status display (B,0). Refer to the description of this message in the NOS 2 Operations Handbook for additional information.

The procedure involved in initializing a mass storage device is described in section 8, K-Display Utilities, under the heading Initialize K Display. The following describes system activity when initialization occurs.

If the device is shared in a multimainframe environment, initialization does not proceed until all other mainframes sharing the device have processed an UNLOAD command for the device and user counts on all machines are zero. If all machines have not unloaded the device, this control point message is displayed:

EQest BUSY ON ID=id.

est is the EST ordinal. id is the machine identifier of the first machine found without unload status set.

If initialize status is set on this device for another mainframe, the INITIALIZE command is ignored and this message appears at the system control point on the system status display (B,0):

INITIALIZE PENDING ON THIS DEVICE.

| Command |
|---------|
|         |

When the AL initialization option is specified, the label on the device to be initialized is either updated or a new label is created. If the label on the device is bad or cannot be recognized, the new label is created and all current data on the device is lost. If the label is found to be good, it is updated and all permanent file information is cleared. In this case, system library or temporary files (local, rollout, and so forth) residing on the device are not disturbed. If the device being initialized is a master device, the system scans all other mass storage devices in the family that contain direct access files and releases the space for files with catalogs on this device. If the device being initialized contains direct access files, the system scans all other master devices and sets the catalog entries on those devices to indicate that the files were purged. All or part of the permanent file system can be initialized and then reloaded if necessary (refer to the description of permanent file utilities in section 17, Permanent File Utilities.

LOAD, est, id. Requests that a job be loaded from equipment defined by EST ordinal est (normally tape unit). The job is assigned a numeric identifier id ranging from 00 to 678. If id is not specified, it defaults to 00. Examine the E,A display to determine the EST ordinal of the equipment to be used.

LP,est,id. or Assigns a numeric identifier id to the line printer defined by EST ordinal est. The value of the identifier can range from 00 to 678. Only those files in the print queue with an identifier equal to id LR,est,id. or or LS,est,id. LP,est,id. Assigns a numeric identifier id to the line printer est. Refer to the descriptions of the LOAD and CR commands in this section to assign an identifier to a job or queue type file. The user usually assigns the identifier to the file.

or

LT,est,id.

MSAL=est<sub>1</sub>,est<sub>2</sub>, ...,est<sub>n</sub>.

2, Reverses current set or clear condition of temporary file status for mass storage devices defined by EST ordinals est<sub>i</sub>. When temporary file status is set, the system can use the specified device for allocation of temporary files. This command is not valid if the device specified is defined as removable. Examine the disk status display (E,M) to determine:

- The EST ordinal of the device.
- If the device is defined as removable.
- If temporary file status is currently selected (set) for the device.

| Command                                  |                                                                                          | Description                                                                                                                                                                                                     |
|------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MSAL,t=est1,est2,<br>,est <sub>n</sub> . | ordinals est <sub>i</sub> . The specifi<br>nonremovable. A limit of 5                    | to mass storage devices defined by EST<br>ed mass storage device must be<br>7 octal est <sub>i</sub> s may be specified on a<br>disk status display (E,M) to determine if                                       |
|                                          | t File Type                                                                              | t <u>File Type</u>                                                                                                                                                                                              |
|                                          | B LGO                                                                                    | P Primary                                                                                                                                                                                                       |
|                                          | D Job dayfile                                                                            | R Rollout                                                                                                                                                                                                       |
|                                          | I Input                                                                                  | S Secondary rollout                                                                                                                                                                                             |
|                                          | L Local                                                                                  | T Temporary                                                                                                                                                                                                     |
|                                          | 0 Output                                                                                 |                                                                                                                                                                                                                 |
|                                          | If no devices are specified temporary device.                                            | for a file type, the system selects a                                                                                                                                                                           |
|                                          | t is the size in sectors of<br>threshold; the default valu<br>smaller than the threshold | not exist until the command SRST=t (where<br>the file, from 0 to 77778) defines a<br>e of a threshold is 0. All rollout files<br>are secondary rollout files. These files<br>specified with the MSAL,S command. |
|                                          | All files greater than or e rollout file devices (MSAL,                                  | qual to the threshold are assigned to the R command).                                                                                                                                                           |
|                                          | The following example illus                                                              | trates a use for secondary rollout files.                                                                                                                                                                       |
|                                          | EQPDECK                                                                                  |                                                                                                                                                                                                                 |

EQ005=DP, ST=ON, SZ=4000, CH=30.

٠ MSAL,S=5. Assigns secondary rollout files to extended memory. • . IPRDECK • • SRST=20. Sets the threshold count so rolled out files under 20 sectors ٠ long are assigned to extended . memory.

via DDP.

Equipment 5 is extended memory

For additional information concerning the SRST command, refer to section 3, Deadstart Decks.

## Description

MOUNT, est, P. Clears the local unload (L) and global unload (N) status for a mass storage device and reactivates the device. If the device is a spun down 834 drive, it will be automatically spun up. The device is defined by EST ordinal est (examine the E,A display to determine the EST ordinal).

> When you specify P in the MOUNT command for an independent shared device in a multimainframe environment, the system presets the device with EST ordinal est. The preset (P) option can be specified only on the first mainframe to access the device.

If the device defined by EST ordinal is not a mass storage device, the MOUNT command is ignored and this message appears on the left console screen:

#### **INCORRECT EQUIPMENT.**

If the device is shared in a multimainframe environment and another mainframe has an unsatisfied initialize request pending for that device, the MOUNT command is ignored and this message appears at the system control point on the system status display (B,0):

INITIALIZE PENDING ON THIS DEVICE.

- OFF,est. Logically turns off the device defined by EST ordinal est. This command allows you to logically remove a device from the operating environment. Examine the E,A display to determine the EST ordinal and current status (ON or OFF) of the device. If est specifies a mass storage device and the system library or temporary files (local, rollout, and so forth) reside on that device, it should not be turned off. Examine the disk status display (E,M) to determine which mass storage devices have system residency or allow system allocation of temporary files. In addition, if an MSAL entry is currently specified for a mass storage device, it is cleared when that device is turned off. The MSAL designation is not reset automatically when the device is turned back on and must be reset manually (if necessary) using the DSD command MSAL.
- ON,est. Logically turns on the device defined by EST ordinal est. This command allows you to activate a device currently having OFF status in the EST. If the device is a spun down 834 drive, it will be automatically spun up. Examine the E,A display to determine the EST ordinal and current status (OFF or ON) of the device.
- PRSIZE,est,ps. Sets the paper status ps to short (S) or long (L) paper for the printer with EST ordinal est. Short paper has a form length of 8.5 inches and long paper has a form length of 11 inches.
- REPEAT,est,rc.<sup>†</sup> Repeats the current operation on the BIO equipment defined by EST ordinal est the number of times specified by rc. The maximum value that can be entered for rc is 778.

<sup>&</sup>lt;sup>†</sup>When the current BIO operation is repeated, maximum line and card limits are reinitialized prior to printing or punching of the file being processed. User control limits apply individually to each output file copy produced.

| Command |
|---------|
|---------|

- REPRINT,est,pr. Terminates the current operation on the BIO printer equipment defined by EST ordinal est and reenters the job in the print queue with a queue priority specified by prOO (service class minimum  $\leq prOO \leq$  service class maximum; refer to the S display in the NOS 2 Operations Handbook; pr value is multiplied by 1008 internally). If pr is not specified, the service class default priority is assigned.
- REPUNCH,est,pr. Terminates the current operation on the BIO card punch equipment defined by EST ordinal est and reenters the job in the punch queue with a queue priority specified by prOO (service class minimum  $\leq$  prOO  $\leq$  service class maximum; refer to the S display in the NOS 2 Operations Handbook; pr value is multiplied by 1008 internally). If pr is not specified, the service class default priority is assigned.
- SCRATCH,est. Declares the tape mounted on an unassigned magnetic tape unit, defined by EST ordinal est, to be a scratch tape. This command enables a tape to be available to satisfy scratch VSN requests and still be assigned by its original VSN. Thus, the VSN defined on the tape (in VOL1 label) is not redefined as scratch although the VSN will appear as SCRATCH on the tape status display (E,T).

Scratch status is retained for only one job assignment. This allows a tape to be used for scratch purposes on a temporary basis. For example, a job requests a tape mounted on the tape unit defined in this command by specifying the current VSN for that tape in the request. The tape is then assigned to the job as a scratch tape (the original VSN is retained and not made scratch). When that job releases the tape, SCRATCH status is cleared, and unless this command is entered again, that tape would not be assigned as a scratch tape in future requests. To determine if SCRATCH status is in effect for a tape, monitor the tape status display (E,T).

SECUREQ,est, LA=lowerlevel, UA=upperlevel. Changes the equipment access level limits for the unit record equipment with EST ordinal est. On a secured system, only files that have access levels within these limits can be printed on the specified equipment. The original limits are set during deadstart by the ACCESS command entries in the EQPDECK. The parameters LA=lowerlevel and UA=upperlevel specify the lower and upper access level limits for the equipment.

## NOTE

On a secured system this command is accepted only if a security administrator has placed the system in security unlock status.

| Command        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SKIP,est,rr.   | Skips forward rr octal logical records on the print file for the BIO equipment defined by EST ordinal est. When rr is not specified the default is one record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SKIPF,est,ff.  | Skips forward ff octal files on the print file for the BIO equipment defined by EST ordinal est. When ff is not specified the default is one file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| SKIPRU,est,ss. | Skips forward ss PRUs on the print file for the BIO equipment<br>defined by EST ordinal est. All parameters must be specified; there<br>are no default settings. The PRU count, ss, is limited to 10g<br>PRUs (the current buffer size) plus the number of PRUs remaining in<br>the buffer. If the buffer was empty, ss would be limited to 20g<br>PRUs. If ss is larger than the number of PRUs remaining in the<br>buffer, the buffer is filled again and the additional PRUs are<br>skipped on the new print file. For example, if five PRUs remaining five<br>PRUs would be skipped, the buffer filled again, and five additional<br>PRUs skipped. Printing resumes at the beginning of a line. |
| SPINUP,est.    | Spins up the 834 disk storage device defined by EST ordinal est. To<br>enter this command, the console must be unlocked (refer to the<br>UNLOCK command later in this section).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| SPINDOWN,est.  | Spins down the 834 disk storage device defined by EST ordinal est.<br>To enter this command, the console must unlocked (refer to the<br>UNLOCK command later in this section).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

NOTE

Spinning down an 834 disk storage device that does not have global unload status (N), can cause mass storage device status errors or permanent file errors when the device is spun up.

STOP, est. Stops printing on the BIO equipment defined by EST ordinal est.

SUPPRESS,est.

Suppresses automatic printer carriage control on the BIO line printer defined by EST ordinal est. This command stops the page eject function on the line printer to provide a continuous listing for the current job.

## Description

- TRAIN,est,t. Assigns or changes print train identifier t of the line printer defined by EST ordinal est. This command can set the identification if it was not specified in the EQ entry of the EQPDECK, or change an identification previously included in the EQPDECK. An LR designation in the EQ entry indicates a 580-12 line printer, LS is a 580-16 line printer, and LT is a 580-20 line printer. LP is applicable to all line printer types. Print trains supported for the 580 printers are 596-1, 596-5, and 596-6. The t field specifies the print train.
  - t Print Train
  - 0 596-1 (CDC graphic 63/64-character set); default.
  - 1 596-1 (CDC graphic 63/64-character set).
  - 2 Reserved for future use. †
  - 3 Reserved for future use. †
  - 4 Reserved for future use. †
  - 5 596-5 (ASCII graphic 63/64-character set).
  - 6 596-6 (ASCII graphic 95-character set).
  - 7 596-6 (ASCII graphic 63/64-character set or ASCII graphic 95-character set).
- UNLOAD,est. Physically unloads a tape or logically removes a removable mass storage device from the operating system. The device to be unloaded is defined by EST ordinal est (examine the E,A display to determine the EST ordinal). Also, in a multimainframe environment, the UNLOAD command must be issued if another mainframe wants to initialize a shared mass storage device, whether the device is removable or nonremovable (refer to the INITIALIZE command earlier in this section). If a magnetic tape is specified, the tape is physically unloaded. If a removable mass storage device is specified, you can dismount the disk pack on that device.

## NOTE

If a nonremovable shared mass storage device is to be specified, the console must be unlocked (refer to the UNLOCK command later in this section).

<sup>†</sup> These values are allowed but will default to 596-1.

#### Description

<u>Magnetic tape units</u>: If a tape is currently assigned to a job, it cannot be unloaded. If you attempt to unload it, the UNLOAD command is ignored and this message appears on the left console screen:

#### UNIT NOT AVAILABLE

Examine the tape status display (E,T) before entering the UNLOAD command to determine if the tape to be unloaded is currently assigned to a job. If the tape is not currently assigned, entering this command unloads the specified tape.

<u>Mass storage devices</u>: The UNLOAD command is valid for any shared mass storage device in a multimainframe environment for the purpose of initialization. Otherwise, the command is valid only for removable devices. (Only removable devices may be physically removed by unloading.) After entering the UNLOAD command, monitor the disk status display (E,M). Execution of this command immediately causes local unload (L) status to appear in the STATUS field for that device. While L status is displayed, no new users are permitted to access files on the device. A user currently accessing files on the device is attached to the job. When the user count is zero and there are no checkpoint requests pending, one of the following two actions occurs.

• If the device is removable and the L status is set in all machines accessing the device, global unload (N) status is displayed. This indicates that the device may now be physically dismounted.

#### NOTE

If a multispindle family is mounted on a single spindle device, only the first device shows the global unload status.

• If an initialize is pending on the device and all other machines accessing the device have L status set, the initialization proceeds. However, initialization cannot take place if the device has been unloaded.

NOTE

A device should be physically dismounted only if global unload status (N) is displayed on all machines accessing the device.

If a removable pack is dismounted before the N status is displayed, the following may occur.

- Mass storage device status errors.
- Permanent file errors when the pack is remounted at some later date.
- If another pack has been mounted, accesses made by a previously attached user may destroy information on the new pack or the user may retrieve information from the new device which he is not necessarily privileged to access. Mass storage device status errors are also possible in this situation.

## NOTE

If the Mass Storage Subsystem (MSS) or Mass Storage Archival Subsystem (MSAS) is active, it must be idled before unloading a removable family pack which has MSS/MSAS files. After dismounting the family pack, MSS/MSAS can be initialized again.

- UP,CHcc,EQest. or UP,MCHcc,EQest.<sup>†</sup> Resumes normal use of channel cc or the equipment with EST ordinal est by tape units and/or mass storage devices, reversing the DOWN command. If EQest is specified, use of channel cc resumes only for the mass storage equipment with EST ordinal est. The equipment specification is valid only for mass storage equipments. If you attempt to UP a channel or equipment that
  - is already UP,
  - has a DOWN status and is assigned to a maintenance job,
  - was given a DOWN status by another mainframe that is sharing the equipment,

this error message appears:

**INCORRECT ENTRY** 

If the channel or equipment is already up, no further action is necessary. If the equipment is assigned to a maintenance job, you cannot bring up the equipment until the maintenance job releases it. If the DOWN,EQest command was entered from another mainframe in a multimainframe environment, that mainframe must enter the UP,EQest command.

or

UP,EQest.

Command

<sup>&</sup>lt;sup>†</sup>Model 176 only.

## Description

Putting an equipment in an UP status does not completely reverse the DOWN status. The equipment must also be turned on using the ON,est command.

| Ν | OT | Е |
|---|----|---|

This command should be used with caution since it directly affects the operation of system peripheral equipment.

VALIDATE,est. Causes validation of mass storage tables associated with the equipment defined by EST ordinal est. The equipment must be available mass storage and the MS VALIDATION option must have been selected in the IPRDECK at deadstart.

VSN,est,. Declares the tape mounted on an unassigned magnetic tape unit, defined by EST ordinal est, to be a scratch tape. This command is similar in function to the SCRATCH command in that it enables a tape to be available to satisfy scratch VSN requests. However, if the tape is labeled and a write function is performed, the VSN specified in the VOL1 label will be rewritten as a scratch VSN, destroying the original VSN and making the tape available for future scratch VSN requests. The VSN also appears as \*\*\*est (est is the ordinal of the est) on the tape status display (E,T). Refer to the VSN,est,vsn command, next, for a discussion of the INCORRECT ENTRY message which is also applicable to VSN,est,.

VSN,est,vsn.<sup>†</sup> Assigns VSN vsn to an unassigned magnetic tape unit defined by EST ordinal est. This command allows you to specify a 1- to 6-character VSN for a mounted, unlabeled tape so it may be assigned and referenced automatically. For example, when a job specifies a VSN in the request for an unlabeled tape, an entry for that job appears in the resource requests display (E,P). This display indicates the job sequence name of the job, the type of tape unit, 7 track (MT) or 9 track (HD, PE, or GE), on which the tape is to be mounted, the required VSN, user name of the job, and the required write ring status (IN or OUT). If the correct tape is not currently mounted, mount the tape on an available unit (ensuring that track type and write ring status are correct), ready the unit, and enter this command. The system equates the VSN you enter with that specified by the job and assigns the tape automatically upon demand.

<sup>&</sup>lt;sup>†</sup>Special characters cannot be entered using this command. If a special character is encountered in vsn, the VSN entered is truncated at the character preceding the special character.

If the tape mounted on the tape unit defined by EST ordinal est is a labeled tape, has already had a VSN assigned by console command, or has not yet been checked for a label by the magnetic tape subsystem, this command is ignored. The message

INCORRECT ENTRY

appears on the left console screen. To change a VSN previously assigned by this command, clear the first VSN by entering:

Description

VSN,est.

Parameter

est EST ordinal of the tape unit.

This command can then be entered:

VSN,est,vsn.

Parameter Description

vsn New VSN.

(The preceding message and procedure for changing a VSN are also applicable to the VSN,est,. command.)

If a job specifies a VSN in the request for a labeled tape, assignment occurs automatically, without your intervention, unless the correct tape is not mounted. In this case, an entry is formed in the resource requests display (E,P), which describes the tape to be mounted. When the tape is mounted and the tape unit made ready, assignment occurs automatically without additional intervention by you. For multireel files, automatic tape assignment occurs only if the tape units on which the tapes are mounted are similar and on the same channel(s). That is, if the first reel of the file is on a 669 tape unit on channels 13 and 33, all subsequent reels must be on a 669 unit on channels 13 and 33. When assigning tapes, models 679-2, 679-3, and 679-4 drives (800/1600 cpi) are similar. Also models 679-5, 679-6, and 679-7 drives (1600/6250 cpi) are similar.

If two or more unassigned tapes having identical VSNs are mounted on units of the same track type, the message

REQUEST, dt, vsn

appears on the B,O display. The dt field is either the device type MT or the density requirement HD, PE, or GE; vsn is the VSN required.

You must assign one of the tapes using the ASSIGN command. If the duplicate VSNs are SCRATCH, the resource executive routine assigns one automatically.

#### NOTE

It is not possible to specify a VSN of SCRATCH with this command since only six characters may be used to define a VSN. To define a scratch tape (used to satisfy scratch VSN requests), refer to the description of the SCRATCH command earlier in this section.

60459300 D

#### Command

# SUBSYSTEM CONTROL COMMANDS

The commands that follow provide control over which subsystems are to be used. When a system deadstart is performed, parameters specified in the IPRDECK determine which subsystems initially are available. Scheduling other subsystems to a control point or terminating a current subsystem depends on your action.

When a subsystem is scheduled to a specific control point, any job currently assigned to that control point is rolled out if it is not another subsystem or special system job. However, if the job cannot be rolled out, the command used to call the subsystem would not be valid. In this case, either terminate the job (if the subsystem required that control point) or specify another control point for the subsystem using the SUBSYST L-display utility (refer to section 9, L-Display Utilities, for more information).

## Command

#### Description

BTO.

Calls the Batch Input/Output (BIO) Subsystem. BIO must be active in order to use any of the local batch peripheral devices. BIO equipment activity can be monitored on the I display (refer to the NOS 2 Operations Handbook).

Response to line printer errors is controlled by setting sense switch 1 or 2 as follows:

| Lntry | ] | Eı | n | t | r | y |
|-------|---|----|---|---|---|---|
|-------|---|----|---|---|---|---|

| ONSW,BIO,1. | Lines  | causing   | print | error | messages | are | not |
|-------------|--------|-----------|-------|-------|----------|-----|-----|
|             | flagge | ed or ret | ried. |       |          |     |     |

ONSW,BIO,2. Lines causing print error messages are flagged and retried. The printer halts and is placed on hold until you correct the error and enter CONTINUE,est. The line reprints and printing continues.

Response

CDCffff.<sup>†</sup> Calls the CYBER Database Control System (CDCS). CDCffff calls a procedure file named CDCffff under the system user index to initiate the CDCS Subsystem.

IAFffff.<sup>†</sup> Calls the Interactive Facility (IAF) Subsystem to control point 1. IAFffff calls a procedure file named IAFffff under the system user index to initiate the IAF Subsystem. The IAF Subsystem must be active before jobs can be entered from an interactive terminal. Use the T display to monitor activity at the IAF Subsystem control point.

Ensure that NAM is active at a control point (refer to the B,O or B,A display before you enter the IAFffff command.

<sup>†</sup> The characters ffff are optional; if required, installation personnel must supply the necessary 1 to 4 alphanumeric characters.

Several options are available to control the operation of IAF. Select these options by setting sense switches after the subsystem is initiated. Although normal operation does not require these sense switches to be set, sense switch 5 (ONSW,IAF,5) is set by default when the IAF Subsystem is initiated. Once set, the sense switches may be turned off again by entering OFFSW,IAF,s (s is the sense switch number.)

# EntryResponseONSW,IAF,1.When the IAF Subsystem is terminated (by an<br/>IDLE,IAF command), enter users into a detached<br/>state and inhibit restarting operations.ONSW,IAF,2.The IAF Subsystem will not reload after an<br/>abort. This option releases the output file to<br/>the output queue.ONSW,IAF,3.Aborts the IAF Subsystem on all abnormal<br/>conditions. This ensures that the subsystem does<br/>not approximate of a participant.

- conditions. This ensures that the subsystem does not continue to operate if an internal malfunction occurs. This may be used with sense switch 5 to enable an analyst to determine the problem. Some conditions cause the IAF Subsystem to abort even though sense switch 3 is not set.
- ONSW,IAF,4. Enables a dump on normal termination. This option should be activated whenever a dump is desired after the IDLE,IAF command.
- ONSW,IAF,5. Dumps information to the output file after the IAF Subsystem is dropped or aborted. This option provides a listing that may assist an analyst in determining the problem that existed when the subsystem dropped or aborted. This sense switch is set by default when the IAF Subsystem is activated.
- ONSW, IAF, 6. Releases the output file containing dump information written after the IAF Subsystem is dropped or aborted (refer to the ONSW, IAF, 5 option) immediately after the dump is taken. When sense switch 6 is not set, the output file is not released until the IAF Subsystem is terminated. It is then printed with the job dayfile. This switch applies only when sense switch 5 is set.
- IDLE, sub. Sets idledown status for subsystem sub, except for NAM and RHF. NAM is idled by using the procedure shown in NAM Shutdown (refer to section 15, Network Operations). RHF is idled by using the RHF K display (refer to section 8, K-Display Utilities).

The subsystem terminates when idledown conditions are met. MAG terminates when no tapes are assigned. MSS/MSAS terminates when no requests are outstanding and no MSS/MSAS utilities are connected. BIO terminates when no active equipments remain. TAF terminates when no active transactions are outstanding. For all other subsystems, there are no idledown conditions; they terminate immediately.

#### Description

The system does not initiate new activity, such as assigning tapes and beginning print jobs, when idledown status is set. It is recommended that you use this command for terminating all subsystems.

MAGffff.<sup>†</sup> Calls the Magnetic Tape Subsystem (MAG) to the control point specified in the ENABLE command. MAG must be active in order for tape processing and resource allocation to take place and to make the resource requests available. Tape use can be monitored on the tape status (E,T) and resource rquests (E,P) displays. MAGffff executes a procedure file named MAGffff under the system user index to initiate the MAG Subsystem.

## NOTE

You must not change unit numbers or power down tape units after MAG is initialized. Also, MAG should not be stopped (via the STOP command) while tapes are assigned.

- MAPffff. † Calls the Matrix Algorithm Processor (MAP) Subsystem to the control point specified in the ENABLE command. MAPffff calls a procedure file named MAPffff under the system user index to initiate the MAP Subsystem.
- MASffff.<sup>†</sup> Calls the Mass Storage Archival Subsystem (MSAS) processing program to the control point specified in the ENABLE command. MASffff calls a procedure file named MASffff under the system user index to initiate the MSAS.

You can turn the trace mode on or off by using the following sense switch entries after the subsystem is initiated.

ONSW,MAS,1. Turn the trace mode on. The trace mode issues all MSAS messages to the job dayfile.

OFFSW,MAS,1. Turn the trace mode off. Default is trace mode off.

- MCSffff.<sup>†</sup> Calls the Message Control System (MCS) to the control point specified in the ENABLE command. MCSffff calls a procedure file named MCSffff under the system user index to initiate the MCS Subsystem. NAM must be active at a control point to use MCS.
- MSSfff.<sup>†</sup> Calls the Mass Storage Subsystem (MSS) processing program to the control point specified in the ENABLE command. MSSffff calls a procedure file named MSSffff under the system user index to initiate the MSS.

† The characters ffff are optional; if required, installation personnel must supply the necessary 1 to 4 alphanumeric characters.

| <pre>method (NAM) to the control point specified<br/>NAMffff calls a procedure file named NAMffff<br/>dex to initiate several NAM supervisor<br/>appear momentarily at different control<br/>NAM activity.<br/>NAM and NAMNOGO. Use NAM if you want to<br/>fith no operator intervention. Use NAMNOGO<br/>memory file. Refer to section 15, Network<br/>ormation.<br/>you can enter during NAM initiation are<br/>n 15, Network Operations.<br/>tic Facility (RDF) Subsystem to control<br/>a procedure file named RDFffff or IAFffff<br/>the site has the IAF enabled) under the<br/>tiate the RDF Subsystem.</pre> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>ith no operator intervention. Use NAMNOGO memory file. Refer to section 15, Network ormation. you can enter during NAM initiation are n 15, Network Operations. tic Facility (RDF) Subsystem to control a procedure file named RDFffff or IAFffff the site has the IAF enabled) under the</pre>                                                                                                                                                                                                                                                                                                                 |
| n 15, Network Operations.<br>tic Facility (RDF) Subsystem to control<br>a procedure file named RDFffff or IAFffff<br>the site has the IAF enabled) under the                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| a procedure file named RDFffff or IAFffff<br>the site has the IAF enabled) under the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| nsure that NAM is active at a control point<br>display) before you enter the RDFffff                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| cility (RHF) Subsystem to the control point<br>command. RHFffff calls a procedure file<br>system user index to initiate the RHF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ent Facility (SMF) Subsystem to the control<br>NABLE command. SMFffff calls a procedure<br>the system user index to initiate the SMF<br>active to use SMF.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| n Facility (SSF) Subsystem to the control<br>NABLE command. SSFffff calls a procedure<br>the system user index to initiate the SSF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| the last control point. STMffff calls a ffff under the system user index to initiate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| ubsystem sub. Any acceptable three-letter<br>ecified. Unlock the console to enter this<br>an cause termination errors in the subsystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

<sup>†</sup> The characters ffff are optional; if required, installation personnel must supply the necessary 1 to 4 alphanumeric characters.

TAFffff. †

Calls the Transaction Facility (TAF) Subsystem to the control point specified in the ENABLE command. TAF must be active for transaction processing to take place.

TAFffff calls a procedure file named TAFffff under the system user index to initiate the TAF Subsystem. NAM must be active at a control point for interactive access to TAF. Batch jobs can access TAF without NAM.

Response to an operator drop or fatal error is controlled by setting sense switches as follows:

## Response

- ONSW,TAF,3. Attempt recovery after TAF is dropped or aborted. To successfully drop the transaction subsystem once this entry has been made, the command OFFSW,TAF,3 must be entered prior to the STOP,TAF command.
- ONSW,TAF,5. Dump the entire field length and release the output file after the transaction is dropped or aborted.

ONSW, TAF, 6. Print the job dayfile upon termination.

Activity at the transaction control point can be monitored on the O displays (refer to the NOS 2 Operations Handbook).

Refer to the AUTO and MAINTENANCE commands in this section and the SUBSYST L display in the NOS 2 Operations Handbook for additional information concerning subsystem control.

Entry

# SYSTEM CONTROL COMMANDS

The following DSD commands control the operating system as well as the subsystems that run under the system. Several of these commands are typically used only for debugging purposes when the system is in an abnormal state. You may use others frequently to maintain system integrity in a normal production environment. Appropriate cautions are included with individual command descriptions in cases where you do not normally use the command or it is not recommended for use in a production environment.

#### Command

#### Description

AUTO. Calls enabled subsystems to control points, initiates automatic job processing, and spins up any 834 disk drive that is ON and not unloaded. The IPRDECK used at deadstart time determines which subsystems will be activated by default. However, any of those subsystems not currently assigned to a control point can be disabled or others enabled through use of the SUBSYST L display (refer to the NOS 2 Operations Handbook). Individual subsystems can also be called to a control point or removed independent of the AUTO command by using the Subsystem Control Commands described earlier in this section. For additional information concerning the AUTO command, refer to Initiating Job Processing in section 2, Deadstart.

<sup>&</sup>lt;sup>†</sup>The characters ffff are optional; if required, installation personnel must supply the necessary 1 to 4 alphanumeric characters.

| CHECK POINT SYSTEM. | Provides for termination of job processing and writes the contents of<br>central memory tables to mass storage. The SCKP EQPDECK entry speci-<br>fies which mass storage devices will contain a copy of the checkpoint<br>file. This command is typically entered in preparation for recovery<br>deadstart. The following sequence of operations takes place:     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <ol> <li>Sense switch 1 is set for the IAF Subsystem, which causes all<br/>users to be placed in detached job status when an operator<br/>drop occurs. When all users are in detached job status, the<br/>IAF Subsystem is dropped and the checkpoint continues.</li> </ol>                                                                                       |
|                     | <ol> <li>All job scheduling is inhibited. (This has the same effect<br/>as if the IDLE command was entered.)</li> </ol>                                                                                                                                                                                                                                           |
|                     | <ol> <li>Jobs with a zero subsystem identifier are rolled out. All<br/>of these jobs are recovered on a level 1 or level 2 recovery<br/>deadstart.</li> </ol>                                                                                                                                                                                                     |
|                     | <ol> <li>The system moves the system dayfile buffers maintained in<br/>CMR to disk.</li> </ol>                                                                                                                                                                                                                                                                    |
|                     | <ol> <li>All subsystems except the magnetic tape executive (MAG) are<br/>aborted.</li> </ol>                                                                                                                                                                                                                                                                      |
|                     | 6. MAG is rolled out when no other jobs are active. The rolling<br>out of MAG allows recovery of all tape files associated with<br>jobs rolled out if the tapes are not repositioned prior to<br>the level 1 or level 2 recovery deadstart. Because of this,<br>if a tape unit is used for deadstart, it should be unassigned<br>prior to the checkpoint command. |
|                     | 7. The system is left in an idle state. If SPINDOWN is<br>enabled, all 834 disk drives that are ON and not unloaded<br>are spun down. Normal processing may be continued with an<br>AUTO command. If this is done, no attempt should be made to<br>later perform a level 1 or level 2 recovery deadstart unless<br>another checkpoint command is performed.       |
|                     | During the processing of the checkpoint, the message                                                                                                                                                                                                                                                                                                              |
|                     | PROCESSING SYSTEM CHECKPOINT                                                                                                                                                                                                                                                                                                                                      |
|                     | is issued at the system control point. It is also possible that                                                                                                                                                                                                                                                                                                   |

under certain circumstances the checkpoint routine will not be able to properly abort a job (such as one that has NOEXIT selected and has a nonzero subsystem identifier). If such a job continues processing after it has been aborted by the system, the operator must then abort the job for the checkpoint to continue. A more desirable approach to this situation is to ensure that jobs such as permanent file dumps are finished prior to the checkpoint. For additional information concerning the CHECK POINT SYSTEM command, refer to Preparing for Recovery Deadstart in section 2, Deadstart.

Command

### Description

DATE.yy/mm/dd.

Changes the current system date. Unlock the console before entering this command (refer to the UNLOCK command later in this section).

| Parameter | Description           |
|-----------|-----------------------|
| уу        | Year; 00 through 99.  |
| mm        | Month; 01 through 12. |
| dd        | Day; 01 through 31.   |

DEBUG.

Reverses the current status of the debug mode. When the debug mode is set, the message DEBUG appears in the header of the left screen display. The debug mode provides system origin privileges to validated users and allows modifications to be made to the running system. Unlock the console before entering this command (refer to the UNLOCK command later in this section). Use of the debug mode is not commonly allowed in a normal production environment.

## NOTE

On a secured system, the console must be in security unlock status to accept this command (refer to the UNLOCK,username,password command later in this section).

DIS,jsn.

Calls the job display package (DIS) to the job with job sequence name jsn. The A and B displays for DIS automatically appear on the left and right console screen, respectively. Refer to section 4, DIS Operations, for complete information concerning the DIS package.

## NOTE

On a secured system, the console must be in security unlock status to accept this command (refer to the UNLOCK, username, password command later in this section).

DISABLE, op. Disables or enables option op.

or

ENABLE, op.

If you enter the ENABLE command and op is currently enabled, the system ignores the command. The system also ignores the DISABLE command if you enter it and op is already disabled.

op is one of the following options.

#### op

#### Description

DDP ROLLOUT PATH Enables or disables the use of the DDP for job rollout and rollin. If DDP equipment is not present, this entry has no effect.

## Description

<u>op</u>

ENGR

#### Description

Enables or disables engineering mode. When engineering mode is set, the message ENGR appears in the header of the left screen display. Engineering mode allows PP/hardware diagnostics and FORMAT/FDP to be executed if the user has system origin privileges. Unlock the console before entering this command (refer to the UNLOCK

command later in this section).

# NOTE

On a secured system, the console must be in security unlock status to accept this command (refer to the UNLOCK,username,password command later in this section).

| FILE STAGING | Enables or disables the staging of MSF/7990-<br>resident permanent files to disk. Disabling<br>FILE STAGING causes job attempts to access<br>MSF/7990-resident files to be aborted. If<br>the MSSEXEC/SSEXEC is running, enabling FILE<br>STAGING allows MSF/7990-resident files to be<br>staged to disk when accessed. |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LOGGING      | Enables or disables logging of dayfile<br>messages concerned with program efficiency.                                                                                                                                                                                                                                   |
| MASTER MAS   | Enables or disables master mainframe mode<br>for MAS processing. When MAS is brought to<br>a control point, the SSEXEC program runs if<br>master mainframe mode is enabled. The SSSLV<br>program runs if master mainframe mode is<br>disabled. This entry has no effect unless<br>MAS processing is activated.          |

MASTER MSS Enables or disables master mainframe mode for MSS processing. When MSS is brought to a control point, the MSSEXEC program runs if master mainframe mode is enabled. The MSSSLV program runs if master mainframe mode is disabled. This entry has no effect unless MSS processing is activated.

MS VALIDATION Enables or disables automatic verification of mass storage tables. This command cannot be used unless the MS VALIDATION option has been selected in the IPRDECK used at deadstart. The validation that occurs for each level of recovery deadstart is described under Preparing for Recovery Deadstart in section 2, Deadstart.

. . . . .

#### Description Description op **PF VALIDATION** Enables or disables verification of BOI/EOI on preserved files. Selection of this option causes BOI/EOI information to be verified when a direct access file is attached or purged, and when an existing local file is defined as a direct access permanent file. PRIVILEGED RDF Enables or disables privileged mode of the Remote Diagnostic Facility (RDF). When enabled, a user's commands are checked to ensure that a maintenance function is being performed. **REMOVABLE PACKS** Enables or disables automatic label checking for mass storage devices defined as removable. Examine the disk status display (E.M) (refer to the NOS 2 Operations Handbook) to determine which mass storage devices (if any) are defined as removable. If this option is disabled, all removable devices subsequently introduced into the system cannot be accessed. This option must be enabled to perform label verification before those devices can be accessed. RESIDENT RDF Enables or disables resident mode of RDF. While in resident mode, RDF remains active, regardless of terminal activity, until you disable RDF. When resident mode is disabled (the default condition), RDF becomes inactive if no one logs into the remote diagnostic terminal for 15 minutes. To allow terminal activity to resume, you must reactivate RDF with a call to RDFffff. SECONDARY USER Enables or disables the acceptance of more COMMANDS than one USER command in a job. If disabled, any USER command encountered after the first one causes the job to be aborted with no exit processing. An interactive origin type job that issues a USER command is logged off. Unlock the console (refer to the UNLOCK command later in this section) to enable or disable this option. This command is not accepted on a secured system. SPINDOWN Enables or disables the spinning down of the 834 disk storage devices during a system checkpoint. USER EXTENDED Enables or disables use of the user MEMORY accessible area of extended memory. If disabled, no job can access the user area of extended memory and, other than subsystems,

all jobs currently accessing the area are

rolled out.

| Command       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IDLE.         | Prevents any new jobs from being scheduled to a control point but<br>does not terminate the jobs currently assigned. If a job is rolled<br>out while this command is in effect, it will not be scheduled back<br>to a control point until the AUTO or MAINTENANCE command is<br>entered. When the BIO Subsystem is idle, it is terminated.                                                                                                                                                                                                                                              |
| K.messagetext | Allows entry of data messagetext in the user- or system-defined CPU<br>buffer for control when the K display is active. Refer to section<br>8, K-Display Utilities, for information about the K display.                                                                                                                                                                                                                                                                                                                                                                                |
| LOCK.         | Locks the console keyboard. This command prevents entry of<br>restricted commands (refer to the UNLOCK command later in this<br>section for a list of restricted commands). All other DSD commands<br>can be entered when the console is locked. The console is normally<br>locked when the system is being used in a production environment.                                                                                                                                                                                                                                           |
| MAINTENANCE.  | This command performs the same functions as the AUTO command but<br>additionally starts several maintenance routines. Refer to<br>Initiating Job Processing in section 2, Deadstart, for complete<br>information concerning this command.                                                                                                                                                                                                                                                                                                                                               |
| STEP.         | Sets the monitor in step mode. Setting the monitor in step mode<br>stops all central memory I/O operations and prevents the system from<br>processing PP requests when the next monitor function is encountered.<br>Pressing the space bar releases the present step and stops again for<br>each subsequent monitor function. <sup>†</sup> If a DSD command is entered<br>while the system is in step mode and all PPs are assigned, it is<br>possible the request cannot be satisfied. In that case, the<br>screen(s) blinks until you correct the condition by clearing the<br>entry. |
|               | When step mode is set, the message STEP appears in the header of the<br>left screen display. Unlock the console before entering this<br>command (refer to the UNLOCK command later in this section).                                                                                                                                                                                                                                                                                                                                                                                    |
|               | This command is generally used for debugging purposes and should not<br>be used in a normal production environment. In addition, the system<br>may set step mode automatically upon detection of a main power<br>failure or abnormal environmental condition.                                                                                                                                                                                                                                                                                                                           |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

 $<sup>^\</sup>dagger \, \text{Monitor}$  functions are described in the NOS 2 Systems Programmer's Instant.

| Command                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STEP,jsn,ff,b,v.<br>or<br>STEP,,ff,b,v. | Sets step mode for the job with job sequence name jsn (first form of the command) or all jobs (second form of the command) at the next occurrence of monitor function ff when output register byte b has value v.                                                                                                                                                                                                                                                                                                                                                                                                               |
| 51EP,,II,D,V.                           | If jsn is specified (first form of the command), the monitor function ff, the output register byte number b, and the output register value v can be optionally specified for more precise control of when the step mode is executed. The values for b can be from 0 to 4; the values for v can be from 0 to $7777_8$ .                                                                                                                                                                                                                                                                                                          |
|                                         | If jsn is not specified (second form of the command), the monitor function ff must be specified. The output register byte number b and value v can be optionally specified for more precise control of when the step mode is executed. The values for b can be from 0 to 4; the values for v can be from 0 to $7777_8$ .                                                                                                                                                                                                                                                                                                        |
|                                         | For either form of the command, pressing the spacebar releases the<br>current step and steps the job or system at the next occurrence of<br>the monitor function ff, if specified, or the next monitor function<br>from the job if the first form is used and no monitor function is<br>specified.                                                                                                                                                                                                                                                                                                                              |
|                                         | Using the second form of the command may stop all central memory I/O operations and prevent the system from processing PP requests. If a DSD command is entered while the system is in step mode and all PPs are assigned, it is possible the request cannot be satisfied. In this case, the screens blink until you clear the entry. The message STEP followed by the monitor function number ff (if specified) appears in the header of the left screen displays while this command is in effect. The console must be unlocked before entry of this command is permitted (refer to the UNLOCK command later in this section). |
|                                         | These commands are generally used only for debugging purposes. Do<br>not enter these commands if the system has automatically set step<br>mode because of a power failure or abnormal environmental condition.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| TIME.hh.mm.ss.                          | Changes the current system time. Unlock the console before entering this command (refer to the UNLOCK command later in this section).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                         | Parameter Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| hh | Hour; 00 through 23.   |
|----|------------------------|
| mm | Minute; 00 through 59. |
| SS | Second; 00 through 59  |

Command UNLOCK.

Unlocks the console keyboard. When this command is active, the message UNLOCK appears in the header of the left screen display. Although all DSD commands can be entered when the console is unlocked, the following commands are restricted to entry only when the console is unlocked.

DATE.yy/mm/dd.

DEBUG.T

DIS, jsn.†

DISABLE, SECONDARY USER COMMANDS.

ENABLE, ENGR.†

ENABLE, SECONDARY USER COMMANDS.

OVERRIDE, jsn.

QDSPLAY,jsn.†

SPINDOWN,est.

SPINUP,est.

STEP.

STEP, jsn, ff, b, v.

STOP, sub.

TIME.hh.mm.ss.

UNLOAD, est. (est specifies a nonremovable shared mass storage device)

UNSTEP.

All memory entry commandst

All channel control commands

All extended memory flag register commands

Always lock the console when the system is being used in a production environment. However, you can unlock the console to enter the STEP command if a system failure requiring a recovery deadstart occurs (refer to Preparing for Recovery Deadstart in section 2, Deadstart) or to enter the UNSTEP command after a power or environmental interrupt.

<sup>&</sup>lt;sup>†</sup>Refer to Secured System Control Commands later in this section for information on unlocking the console keyboard on a secured system.

#### 60459300 D

Command

UNSTEP.

X.MDD(p,d)

### Description

Clears step mode. This command clears the effect of any format of STEP command. Unlock the console before entering this command (refer to the UNLOCK command later in this section). Depending on current syntax overlay residency, you may have to enter the 99 command before entering the UNSTEP command (refer to the 99 command description later in this section). If the system has set step mode because of a main power failure or abnormal environmental condition, do not enter this command until the conditions that caused the automatic setting have returned to normal.

Initiates the monitor display driver (MDD). MDD is a PP program and is independent of the operating system. Refer to the NOS Online Maintenance Software Reference Manual for more information.

# Parameter P

d

#### Description

- Port number parameter. If you enter 1, the first port is connected. If you enter 2, the second port is connected. If you do not specify this parameter, the second port is connected by default.
- Time-out parameter. If you enter 0 (zero), MDD waits 15 minutes for a terminal to be connected before timing out. If you enter a nonzero, MDD waits indefinitely for the terminal connection. The default is 0.

Calls a system program or utility specified by name to an available control point. If parameters are to be passed to the program, the second form of the command is used where (parameters) specifies the meters) parameters. In both the first and second form of the command, the field length specified in the library for the command is used. If no field length is specified in the library, a value of 60000<sub>8</sub> is assumed. If a field length different from the default is required, the third form of the command is used. The field length is specified by fl. Only the first 38 characters following X. are used.

Disables or enables syntax overlay processing and logging of DSD commands in the system dayfile and error log. That is, depending upon current status, syntax overlay processing and logging are reversed. When this mode is enabled, 99 appears on the left screen header.

When syntax overlay processing and logging of DSD commands is disabled, DSD does not allow you to enter any command requiring the loading of an overlay from mass storage. Disable overlay loading only when the system is in an abnormal state to prevent PPs from being requested when they cannot perform the necessary tasks (for example, when a system disk channel is hung). A 99 command that enables logging will be logged itself, but a 99 command which disables logging will not be logged.

This command is normally used only for debugging purposes. When the system is in an abnormal state, the commands that require entry of the 99 command depend on which syntax overlays for DSD are in central memory.

or

X\_name.

X.name(parameters) or

X.name(f1)

99.

## SECURED SYSTEM CONTROL COMMANDS

The following commands are allowed only on a secured system.

<u>Command</u> OQSH=level. Specifies the output queue special handling (OQSH) level on a secured system. The (OQSH) level is set initially during deadstart by the OQSH IPRDECK entry. The current OQSH level appears on the DSD S display. The OQSH command can be entered at any time from the system console to change the current level. Output files with an access level greater than or equal to the OQSH level specified in this command are not printed but remain in the queue until released by the operator (refer to the RELEASE command, next). If level is set to the lowest access level or no level is specified, no files are held in the queue.

RELEASE, jsn. Allows the operator to release a file from the output queue whose access level is equal to or above the OQSH level on a secured system. Output queue files and their access levels can be examined using the DSD Q display. The output file with job sequence name jsn is released from the output queue and is processed by the Batch Input/Output Subsystem. The RELEASE command can be entered at any time from the system console. Other restrictions based on device access levels and file access levels set by your site continue to apply.

SECURES,ot, LA=lowerlevel, UA=upperlevel. Sets the security access level limits for the system (ot=SY) or the security access level limits for a particular origin type (ot=IA, BC, or RB). The system limits determine the range of access levels allowed in the system; jobs may not execute at an access level outside this range, and files may not be created or accessed at an access level outside this range. Origin type limits determine the range as it applies to jobs of one particular origin type. By default, all origin type limits are the same as the system limits.

> The options available for using this command to change the system limits (that is, whether they can be raised, lowered, or both) are controlled by the OPSECM CMRDECK entry (refer to section 3, Deadstart Decks). The origin type limits for ot=IA, BC, and RB can be changed to any values within the system limits. When the system limits are changed (ot=SY), all origin type limits are reset to the new system limits.

The parameters LA and UA specify the lower and upper access level limits. Both parameters must be specified. The value corresponding to the lower access level must be less than or equal to the value corresponding to the upper access level.

## Description

UNLOCK, username, password. Unlocks the console keyboard. When this command is active, the message SECURITY UNLOCK appears in the header on the left screen display. The following commands are restricted to entry only when the console is in security unlock status.

DEBUG.

DIS,jsn.

ENABLE, ENGR.

QDSPLAY, jsn.

SECURES, ot, LA=1owerlevel, UA=upperlevel.

SECUREQ, est, LA=lowerlevel, UA=upperlevel.

All memory entry commands.

All memory display commands.

# **MEMORY ENTRY COMMANDS**

The following commands are used to change the contents of central memory and extended memory. Either absolute locations or those relative to a specific job's reference address (RA) can be changed.

CAUTION

Use these commands with extreme caution to avoid damage to the system or to user jobs.

Before entering these commands you must unlock the console keyboard (refer to the UNLOCK command earlier in this section). To change central memory, you must bring a central memory display (C, D, F, or G) to the left screen. To change extended memory, you must bring the M display to the left screen. It is this display that controls whether the memory entry commands change absolute memory locations or relative memory locations.

For example, if you enter

С,.

to bring up the C display, any memory entry commands entered make changes to absolute memory locations. If you enter

C,jsn.

where jsn is a valid job sequence name, any memory entry commands entered make changes to memory locations relative to the job's RA.

Character values or numeric data can replace the current word contents. Either one 12-bit byte or a 60-bit word can be changed. A single byte can be changed by inserting the byte number after the location; bytes are numbered 0 through 4 from left to right. The address and contents are assembled right-justified with zeros filling unused leading positions. Leading zeros may be omitted in the entry.

When you are changing the contents of memory relative to a specific job (a valid job sequence name was specified when the memory display was brought to the left screen), the negative field length area of the job can be accessed. This area is accessed by specifying a negative address in the memory entry command. For example, to change the contents of word RA-3, you enter the address 77777758.

On an unsecured system when you are changing a memory location relative to a specific job's RA, the system checks for field length violations. If you specify an address larger than your job's RA plus field length, you cannot change its contents.

On a secured system no memory entry commands are allowed unless the security unlock status is set. The memory display shows the message

#### \*\*\*\*SECURED AREA\*\*\*\*

instead of the contents of the memory locations to prevent you from examining these locations; you may not alter the contents of these locations. When you are displaying the absolute memory you can see only the system tables.

Formats and descriptions for these commands are:

| Command                | Description                                                                                                                                                              |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| addr,cont.             | Changes the contents of central memory location addr (maximum of eight digits) to cont (maximum of 20 digits). The second form of                                        |
| or                     | the command performs essentially the same function but is used when<br>it is necessary to change successive memory locations.                                            |
| addr <u>+</u> cont.†   | it is necessary to change successive memory locations.                                                                                                                   |
|                        |                                                                                                                                                                          |
| addr,b,cont.           | Changes the contents of byte b at central memory location addr<br>(maximum of eight digits) to cont. Each location consists of five                                      |
| or                     | 12-bit bytes, numbered 0 through 4 from left to right. The contents                                                                                                      |
| addr <u>+</u> b,cont.† | are four octal characters. The second form of the command performs essentially the same function but is used when it is necessary to change successive memory locations. |

<sup>&</sup>lt;sup>†</sup>If the + sign is specified, the address is incremented by one location (addr+1) after the initial entry is processed; the - sign causes the address to be decremented by one location (addr-1). This allows immediate entry for the next (or previous) memory location. If the message REPEAT ENTRY is displayed above the entry, the cont field is not cleared and can be entered in successive memory locations as many times as desired.

| Command                 | Description                                                                                                                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| addr,Dcont.             | Changes the contents of central memory location addr (maximum of eight digits) to display code characters cont (left-justified and                                                      |
| or                      | zero-filled). The second form of the command performs essentially                                                                                                                       |
| addr <u>+</u> Dcont.†   | the same function but is used when it is necessary to change successive memory locations.                                                                                               |
| Eaddr,cont.             | Changes the contents of extended memory location addr (maximum of seven digits) to cont (maximum of 20 digits). The second form of                                                      |
| or                      | the command performs essentially the same function but is used when                                                                                                                     |
| Eaddr <u>+</u> cont •†  | it is necessary to change successive extended memory locations.                                                                                                                         |
| Eaddr,b,cont.           | Changes the contents of byte b at extended memory location addr (maximum of seven digits) to cont. Each location consists of five                                                       |
| or                      | 12-bit bytes, numbered 0 through 4 from left to right. The contents                                                                                                                     |
| Eaddr <u>+</u> b,cont.† | are four octal characters. The second form of the command performs<br>essentially the same function but is used when it is necessary to<br>change successive extended memory locations. |
| Eaddr,Dcont.            | Changes the contents of extended memory location addr (maximum of                                                                                                                       |
| or                      | seven digits) to display code characters cont (left-justified and zero-filled). The second form of the command performs essentially                                                     |
| Eaddr+Dcont.†           | the same function but is used when it is necessary to change successive extended memory locations.                                                                                      |

<sup>&</sup>lt;sup>†</sup>If the + sign is specified, the address is incremented by one location (addr+1) after the initial entry is processed; the - sign causes the address to be decremented by one location (addr-1). This allows immediate entry for the next (or previous) memory location. If the message REPEAT ENTRY is displayed above the entry, the cont field is not cleared and can be entered in successive memory locations as many times as desired.

# CHANNEL CONTROL COMMANDS

The following commands enable control activity on a specified data channel in circumstances where abnormal hardware and/or system operation is detected. Extreme caution must be exercised if any of these commands are entered during normal system operation. In addition, the console keyboard must be unlocked before entry of any of these commands is permitted (refer to the UNLOCK command earlier in this section). DSD does not reserve the channel specified in any of the channel control commands. The channels are numbered 0 to 13g in a 10 PP system and 0 to 13g, 20g to 33g in a 20 PP system.



Extreme caution must be exercised when using the following channel control commands.

| Command      | Description                                                                                                                                                                       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACN,cc.      | Activates channel cc. This command alerts and prepares peripheral equipment on channel cc for the exchange of data.                                                               |
| DCH,cc.      | Drops channel cc. This is a software function to release the current reservation of channel cc.                                                                                   |
| DCN,cc.      | Deactivates channel cc. As a result, peripheral equipment on channel cc stops and any current $I/O$ operation is terminated.                                                      |
| FCN,cc,func. | Outputs a function code func to channel cc. This releases all<br>equipment selections on that channel. If func is not specified, a<br>zero function code (no activity) is output. |
| IAN,cc.      | Inputs data to the pseudo A register from channel cc.                                                                                                                             |
| LDC,nnnn.    | Loads the pseudo A register with nnnn (normally a peripheral equipment function code). The current value of nnnn is shown in the channel staus display (W,C).                     |
| MCH,cc.      | Master clears and removes all 3000 Computer Systems peripheral equipment selections on channel cc (6681 function code $1700_8$ is issued).                                        |
| OAN,cc.      | Outputs the contents of the psuedo A register to channel cc.                                                                                                                      |

# **EXTENDED MEMORY FLAG REGISTER COMMANDS**

The extended memory flag register commands are used to set or clear specific bits in the extended memory flag register. These commands are typically used when debugging a problem in a multimainframe environment. The console must be unlocked (refer to the UNLOCK command earlier in this section).

# NOTE

Extreme caution must be exercised when using these commands.

| Command | Description                                                              |  |
|---------|--------------------------------------------------------------------------|--|
| CFR,bb. | Clears the extended memory flag register bit bb (0 $\leq$ bb $\leq$ 17). |  |
| SFR,bb. | Sets the extended memory flag register bit bb (0 $\leq$ bb $\leq$ 17).   |  |

,

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(Continued)

# (Continued)

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| remeer achae moethe nyamhtee                                                                   | 0 47         |

The deadstart dump interpreter (DSDI) is a utility program that converts selected portions of the binary information on an express deadstart dump (EDD) file into reports to be listed. The EDD file is generated on magnetic tape by the EDD utility, which may be run at deadstart time after a system malfunction has occurred. Refer to the CIP User's Handbook for complete information concerning the use of EDD.

Selection of data to be listed by DSDI is provided through input directives, either on an input file or on the DSDI command. Normal octal dumps of central memory, extended memory, and PP memory can be produced by these directives as well as specially formatted dumps of specific system tables and buffers.

EDD and DSDI offer these features:

- The EDD tape file contains a dump of memory, the executing exchange packages, the CYBER 170 status and control (S/C) registers, where applicable; maintenance registers for models 865 and 875 and CYBER 180-class machines, register file, exchange package, processor control store, where applicable; and all PPs except for PPO, which can be saved by either copying it to another PP or by biasing the PP switch on the deadstart panel. EDD can optionally dump all or part of extended memory and the selected buffer controllers. This permits analysis of a system malfunction to be performed entirely offline.
- Because DSDI copies the EDD file to a word-addressable random file on mass storage, dump data can be accessed in any order.
- EDD requires only a small amount of time during deadstart because the data is transferred in binary form to magnetic tape.
- The tape file created by EDD can be retained on magnetic tape or mass storage until it is no longer needed. Thus, a selective listing can be generated at any time.
- General information from the EDD file appears in the title and subtitle line of each page of listed output. The first 50 columns of each input directive are included in the title line of the output list it produces. An input directive is provided that enables insertion of comments into the subtitle line.
- Use of DSDI is possible from an interactive terminal as well as from the batch environment. The output produced by several directives is formatted for terminal output (72 columns). From a batch environment, output is formatted for a 136-column printer.

DSDI can also be used to create a message file containing the contents of the maintenance registers (input/output unit, memory, and processor) that were dumped to the EDD file for CYBER 180-class machines. This message file, which is similar in format to the binary maintenance log (BML), can then be analyzed by an interpreter progam, such as the Hardware Performance Analyzer (HPA), to produce maintenance register reports. Refer to the IOUMR, MEMMR, and PROMR DSDI input directives later in this section for additional information.

DSDI writes up to three messages to this message file: one message each for input/output unit errors, memory errors, and processor errors. If the status summary register for a particular element is zero (signifying no errors for that element), DSDI does not write the corresponding message to the message file.

# CALLING THE EXPRESS DEADSTART DUMP INTERPRETER

Processing of the EDD file is initiated with the DSDI command. The format of the command is:

DSDI, $p_1, p_2, \dots, p_n$ .

Each parameter  $\textbf{p}_{1}$  is either a keyword or a keyword equated to a value. All parameters are optional and order independent.

| <sup>p</sup> i | Description                                                                                                                                                                                                                                                                                                                                                                 |  |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| B=bmlfile      | The 1- to 7-character name of the message file on which the<br>maintenance register messages are to be written. This parameter is<br>valid only if maintenance registers have been dumped to the EDD file.                                                                                                                                                                  |  |
| B omitted      | No message file is to be created.                                                                                                                                                                                                                                                                                                                                           |  |
| D              | This parameter creates a random dump file with the same name as the<br>EDD file and returns the original EDD file. The created file can<br>then be used as the dump file on subsequent executions of DSDI,<br>eliminating the need to read the entire dump tape on each call.                                                                                               |  |
| D omitted      | No random dump file is to be created.                                                                                                                                                                                                                                                                                                                                       |  |
| DMB            | A binary dump file produced by the DMB or LOADBC command is to be analyzed instead of an EDD file.                                                                                                                                                                                                                                                                          |  |
| DMB omitted    | EDD file is to be analyzed.                                                                                                                                                                                                                                                                                                                                                 |  |
|                | When the DMB parameter is specified for a DMB-created dump, DSDI<br>uses directives as though the job were running at control point 1.<br>The DMB command dumps the exchange package, central memory, and<br>extended memory in binary (refer to the NOS 2 Reference Set, Volume<br>3). Use the following directives to dump selected portions of<br>memory to be analyzed. |  |
|                | Directive Description                                                                                                                                                                                                                                                                                                                                                       |  |
|                | CP,1 Dump exchange package.                                                                                                                                                                                                                                                                                                                                                 |  |
|                | RAC,1/C,fwa,1wa Dump central memory in C format.                                                                                                                                                                                                                                                                                                                            |  |
|                | RAC,1/D,fwa,1wa Dump central memory in D format.                                                                                                                                                                                                                                                                                                                            |  |
|                | RA,O/EC/C,fwa,lwa Dump extended memory in C format.                                                                                                                                                                                                                                                                                                                         |  |
|                | RA,O/EC/D,fwa,lwa Dump extended memory in D format.                                                                                                                                                                                                                                                                                                                         |  |
|                | fwa and lwa are the first and last word addresses of memory to be<br>dumped. When this parameter is specified to analyze a LOADBC<br>controlware dump, the only DSDL directive that each he wood is:                                                                                                                                                                        |  |

controlware dump, the only DSDI directive that can be used is:

BCDUMP/ops.

Refer to the BCDUMP directive described later in this section for a description of the ops parameter.

| <sup>p</sup> i | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| F=dumpfile     | The 1- to 7-character name of the EDD file that DSDI will interpret.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| F omitted      | Same as F=DUMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| I=infile       | The 1- to 7-character name of file on which input directives are written.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| I omitted      | Same as I=INPUT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| L=outfile      | The 1- to 7-character name of file on which list output is to be written. The user must save or print the file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| L omitted      | Same as L=OUTPUT, except that the file is automatically printed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| NR             | EDD file is not to be rewound.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| NR omitted     | EDD file is to be rewound before processing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| P              | CMR pointers from the running system are to be used. Selecting this parameter causes the CMR pointers from the running system to be used to locate tables and buffer areas on the EDD file. This parameter is typically used when it is known that the CMR pointers on the EDD file were destroyed by system malfunction (for example, a CPUMTR error exit leaves an exchange package in memory locations 0 through $20_8$ ). Directives used to dump CMR will dump the pointers contained on the EDD file, not those from the running system. This parameter should be used only when the configuration of the running system is the same as the system in use when the EDD file was created. |  |
| P omitted      | CMR pointers from EDD file are to be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| PD=n           | Print density in number of lpi (3, 4, 6, or 8).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| PD             | Same as PD=8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| PD omitted     | Same as the job's default print density.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| Z              | Input directives are contained on the command after the terminator.<br>The I parameter is ignored. This eliminates the need to use a<br>separate input file for the directives when only a few directives<br>are needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |

# Description

P<sub>i</sub> Z omitted

Input directives are not contained on the command. The system uses the I parameter.

When input directives appear on the DSDI command, the first character following the command terminator is the separator character for all directives on the command. Any display code character that is not used in any of the directives, including a space, can be used as the separator character. Each directive must be preceded by a separator and terminated by a period. The directives can extend to column 72 on the command. Continuation lines are not permitted.

For example, (slant used for separator):

DSDI,Z./SC./XP./P./D,0,20000./EC./D,0,10000.

If the directives are included in the input file, the following equivalent job would appear.

| :          |                                                     |
|------------|-----------------------------------------------------|
| DSDI.      |                                                     |
| EOR        |                                                     |
| SC.        | Dump CYBER 170 S/C register.                        |
| XP.        | Dump executing exchange packages.                   |
| Ρ.         | Dump all PPs.                                       |
| D,0,20000. | Dump the first 200008 locations of central memory.  |
| EC.        | Set memory type to extended memory.                 |
| D,0,10000. | Dump the first 100008 locations of extended memory. |
| E0I        |                                                     |

A request for the EDD tape must precede the DSDI command. Since EDD writes information on an unlabeled, 7- or 9-track tape at a density of 800 characters per inch (cpi) for 7 track and 1600 cpi for 9 track, the request should appear as follows:

LABEL, DUMP, D=density, tape, F=S, LB=KU, VSN=DUMP.

| Parameter | Description                                             |
|-----------|---------------------------------------------------------|
| density   | 800 cpi for 7-track tape.<br>1600 cpi for 9-track tape. |
| tape      | MT for 7-track tape.<br>NT for 9-track tape.            |

It is recommended that the vsn parameter be specified in the request. If this is done, the request is presented in the resource mounting preview display and the job is rolled out until the tape is mounted and assigned. Although the default express dump file name (DUMP) is used in this example, a different file name can be specified, provided the same file name is also specified on the DSDI command (F parameter).

# INPUT DIRECTIVES

DSDI input directives provide the capability to selectively dump only those portions of the EDD file that are of interest. The input directives are grouped into the following categories.

• List Control Directives

Enable you to control line printer page eject and print density, and to specify comments in subtitle line of the output listing.

• File Manipulation and Control Directives

Enable you to specify alternate files for DSDI input directives and listing output.

• Central Memory/Extended Memory Dump Directives

Provide octal dumps of specified portion of central memory or extended memory. Absolute or relative addresses can be printed (three print formats are available). Two additional dump formats are available to print 64-bit memory in hexadecimal for CYBER 180-class machines.

• PP Dump Directives

Provide octal memory dumps of all or selected PPs (two print formats are available). PP analysis data can be included in the dumps. Six additional formats are available to print 16-bit PP memory for CYBER 180-class machies.

• CMR Dump Directives

Provide specially formatted dumps of selected areas in central memory resident. These areas are specified by name rather than by address.

• Subsystem Dump/Analysis Directives

Provide specially formatted dumps of subsystem control points and associated tables and buffers.

• Hardware Register Dump Directives

Provide dumps of specified hardware registers.

Several of the DSDI input directives have interactive capabilities. The output produced by these directives is specially formatted for listing at an interactive terminal. Refer to Interactive Use of DSDI later in this section for information concerning directive entry and use of DSDI from an interactive terminal.

Refer to Printer Output Listing Examples, later in this section, for examples of listings produced by several of the DSDI input directives.

# DIRECTIVE FORMAT

A directive has the following format.

directive,p1,p2,...,pn.comments

| Field     | Description                                                                                                                                                                                                                                                                             |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| directive | The directive name starts in column 1. It is terminated by a separator or terminator character.                                                                                                                                                                                         |
| Pi        | Parameter(s) for the directive. Depending on the requirements of<br>the directive, the directive may have no parameters or a number of<br>parameters.                                                                                                                                   |
| comment   | Any characters following the directive terminator are considered<br>comments and are ignored by DSDI. However, the comments are<br>included with the directive in the title line of each page of the<br>output listing (a combined total of 50 characters appear in the<br>title line). |
| separator | You can use any character, includng a space, to separate the fields<br>of a directive. The exceptions are:<br>A to Z<br>0 to 9<br>+<br>-<br>*                                                                                                                                           |

Refer to Interactive Use of DSDI later in this section for additional information concerning directive entry from an interactive terminal.

#### LIST CONTROL DIRECTIVES

The list control directives provide the capability to specify print density and page eject options, and to add comments in the subtitle line of each page listed.

# EJ — Force Page Eject

The EJ directive forces DSDI to issue a page eject function before listing the output produced by the next directive processed. The EJ directive can also force a page eject upon reaching a specified point on the page being printed. The page eject function is performed automatically unless disabled by the EJOFF directive.

Format:

EJ,nn.

Parameter

nn

Force page eject only if less than nn decimal lines remain on the current page. If nn is omitted, page eject is forced before listing the output from the next directive processed.

Description

#### EJOFF — Turn Off Auto Page Eject

The EJOFF directive disables auto page eject. Until this directive is processed, DSDI automatically issues a page eject function before listing the output produced by each new directive.

Format:

EJOFF.

### EJON — Turn On Auto Page Eject

The EJON directive enables auto page eject (default condition). DSDI automatically issues a page eject function before listing the output produced by each new directive processed. This directive has no effect unless auto page eject has been disabled by the EJOFF directive.

Format:

EJON.

#### PD — Reset Print Line Density

The PD directive resets the print line density to a value other than that specified on the DSDI command.

Format:

PD,n.

Parameter

n

New print line density in number of 1pi (3, 4, 6, or 8). If n is omitted or an incorrect value is specified, a diagnostic message is issued.

Description

#### \*. -- Comment in Subtitle Line

The \*. directive specifies a comment that appears in the subtitle line of each page listed.

Format:

\*.ccc...ccc

Parameter

Description

222...222

Comment; up to 36 characters are printed.

#### FILE MANIPULATION AND CONTROL DIRECTIVES

File manipulation and control directives provide the capability to specify alternate files for DSDI input directives and listing output.

#### **DISPOSE** — Dispose Alternate List File to Print Queue

The DISPOSE directive causes the alternate list file specified by the OUTPUT directive to be disposed to the print queue. DSDI listing output then resumes on the original output file. This directive has no effect unless output has previously been assigned to an alternate list file (refer to the OUTPUT directive, next). Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

#### Format:

| DISPOSE . | username. |
|-----------|-----------|
|-----------|-----------|

Parameter

username

User name under which the remote batch terminal to receive the listing is logged in. If username is omitted, the listing is printed at a central site line printer.

Description

# OUTPUT — Assign Output to Alternate List File

The OUTPUT directive temporarily assigns DSDI listing output to a file other than that specified on the DSDI command. When the alternate file is disposed to the print queue (refer to the DISPOSE directive, above), output resumes on the original output file. If the alternate file is not disposed, both the original and the alternate output files remain at the job control point as local files. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

OUTPUT, filename.

#### Parameter

#### Description

filename

Name of alternate list file (from 1 to 7 characters). Only one alternate output file may be active at a time; filename cannot be the same name as the normal output file. If filename is omitted, the system assumes file name ALTRNT.

# **READ** — Read Alternate Directives File

The READ directive causes DSDI to temporarily stop reading the current directives file and begin reading directives from the specified record on the named alternate file or from the current position if the record name is omitted. DSDI reads from the specified alternate directives file until an end-of-record is encountered (end-of-file or empty record if \* is specified) and then resumes with the next directive on the original input directives file.

#### Format:

| READ,filename,rec,*. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Parameter            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| filename             | Name of alternate directives file (local file).                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| rec                  | Optional record name. If rec is specified, file filename is<br>searched for record rec from the current position to end-of-file or<br>an empty record. If rec is not found, DSDI issues an error<br>message. If rec is not specified, DSDI reads directives from the<br>current position to end-of-record. Records must be in text format<br>where the first word of the record is the record name, unless the<br>file is assigned to an interactive terminal; then, directives may be<br>entered directly. |  |
| *                    | Optional character specifying that DSDI is to read directives from all records until an end-of-file or an empty record is encountered.                                                                                                                                                                                                                                                                                                                                                                      |  |

#### **REWIND** — Rewind File

The REWIND directive repositions the specified file to beginning-of-information.

# Format:

REWIND, filename.

Parameter

Description

filename

Name of file to be rewound.

# **CENTRAL MEMORY/EXTENDED MEMORY DUMP DIRECTIVES**

The central memory/extended memory dump directives provide the capability to dump any portion of central memory or extended memory in instruction parcel, byte, or word format. There are 6-bit display code character equivalents included with each format. Either absolute or relative memory locations may be dumped. Refer to CMR Dump Directives later in this section for directives used to dump specific portions of NOS central memory resident (CMR).

#### **Dump Control Directives**

Dump control directives select the type of memory to be dumped (central memory or extended memory) and the addressing mode to be used (absolute or relative).

#### ALLMEM - Extend Central Memory Dumps

The ALLMEM directive enables central memory dumps to extend past the central memory boundary on machines with central memory extension.

Format:

ALLMEM.

### CM - Set Memory Type to Central Memory

The CM directive specifies that subsequent C, D, and E directives dump central memory locations. Unless the EC or UEC directive is specified, central memory locations are dumped by default.

Format:

CM.

#### EC - Set Memory Type to Extended Memory

The EC directive specifies that subsequent C, D, and E directives dump extended memory or unified extended memory (UEM) locations. Unless the EC or UEC directive is specified, central memory locations are dumped by default. The second format is for models 865 and 875 and CYBER 180-class machines.

Format:

| EC.       | Subsequent C, D, and E directives dump extended memory.                                                                                                                                                                                                                                                                                  |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| or        |                                                                                                                                                                                                                                                                                                                                          |
| EC,fwa.   | Subsequent C, D, and E directives dump UEM.                                                                                                                                                                                                                                                                                              |
| Parameter | Description                                                                                                                                                                                                                                                                                                                              |
| fwa       | First word address (fwa) divided by 1000g. fwa is added to the<br>fwa and last word address (lwa) parameters in subsequent C, D, and E<br>directives. If fwa is omitted, DSDI determines the beginning of<br>unified extended memory from the pointer in CMR and adds it to the<br>fwa and lwa parameters of the C, D, and E directives. |

This parameter is ignored on any machine other than models 865 and 875 and CYBER 180-class machines.

# RA - Reset Reference Address

The RA directive specifies that subsequent C, D, and E directives dump memory locations relative to a specified reference address. Unless the RA or RAC directive is entered, absolute memory locations are dumped by default.

Format:

RA,nnnnnn.

Parameter

Description

nnnnnn

Reference address; addresses specified on subsequent C, D, and E directives are relative to this address.

Clearing the reference address specified on the most recent RA or RAC directive reenables absolute addressing. This is done by entering the RA directive in this format:

RA,0.

#### RAC - Reset Reference Address to RA of Control Point

The RAC directive specifies that subsequent C, D, and E directives dump memory locations relative to the reference address of a specified control point. Unless the RA or RAC directive is entered, absolute memory locations are dumped by default.

Format:

RAC,nn.

## Parameter

#### Description

nn

Control point number; addresses specified on subsequent C, D, and E directives are relative to the reference address of this control point.

Refer to the description of the RA directive to reenable absolute addressing.

# UEC - Set Memory Type to User-Access Extended Memory

The UEC directive specifies that subsequent C, D, and E directives dump user-accessible extended memory locations. Unless the EC or UEC directive is specified, central memory locations are dumped by default.

Format:

UEC,fwa.

Parameter fwa

#### Description

First word address divided by 10008 for user-accessible extended memory. fwa is added to the fwa and lwa parameters in subsequent C, D, and E directives. If fwa is omitted, DSDI determines the beginning of user-accessible extended memory from the pointer in CMR and adds it to the fwa and lwa parameters of the C, D, and E directives.

#### **Memory Dump Directives**

Memory dump directives specify the area of memory to be dumped and determine the format of the output listing (refer to Printer Output Listing Examples later in this section for a sample output listing). The CM and EC or UEC directives determine the type of memory to be dumped (default is central memory). Absolute memory locations are dumped unless relative addressing has been enabled (refer to RA and RAC directives earlier in this section).

# C - Dump Memory in Instruction Parcel Format

The C directive causes the specified locations of central memory or extended memory to be dumped in four groups of five octal digits (three words per line) with 6-bit display code character equivalents. Repetitive data is suppressed.

Format:

C,fwa,lwa.

 Parameter
 Description

 fwa
 First word address to be dumped (mandatory).

 lwa
 Last word address, plus one location, to be dumped. If lwa is

omitted, fwa+l is assumed by default.

The output listing is read from top to bottom by column rather than across the page. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

#### D - Dump Memory in Byte Format

The D directive causes the specified locations of central memory or extended memory to be dumped in five groups of four octal digits (three words per line) with 6-bit display code character equivalents. Repetitive data is suppressed.

Format:

D,fwa,lwa.

Parameter

#### Description

fwa 1wa

Last word address, plus one location, to be dumped. If lwa is

First word address to be dumped (mandatory).

omitted, fwa+1 is assumed by default.

The output listing is read from top to bottom by column rather than across the page. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

#### E - Dump Memory in Word Format

The E directive causes the specified locations in central memory or extended memory to be dumped in word format (four words per line) with 6-bit display code character equivalents.

#### Format:

| E,fwa,lwa. |                                                                                              |           |
|------------|----------------------------------------------------------------------------------------------|-----------|
| Parameter  | Description                                                                                  |           |
| fwa        | First word address to be dumped (mandatory).                                                 |           |
| 1wa        | Last word address, plus one location, to be dumped.<br>omitted, fwa+1 is assumed by default. | If lwa is |

#### I - Dump 64-Bit Memory in Instruction Parcel Format

The I directive is valid on CYBER 180-class machines only. It prints the specified locations of central memory in four groups of four hexadecimal digits (three words per line) with 7-bit ASCII code character equivalents.

#### Format:

I,fba,lba,ei.

| Parameter | Description                                                                                                                                                   |  |  |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| fba       | First byte address (fba), hexadecimal, to be printed (mandatory).                                                                                             |  |  |
| 1ba       | Last byte address (lba), plus one location, to be printed. If lba<br>is omitted, fba+8 is assumed by default.                                                 |  |  |
| ei        | If ei is 1, fba and 1ba specify byte addresses relative to byte<br>the environment interface. If ei is omitted, fba and 1ba speci<br>absolute byte addresses. |  |  |

The output listing is read from top to bottom by column rather than across the page.

#### W - Dump 64-Bit Memory in Word Format

The W directive is valid on CYBER 180-class machines only. It prints the specified locations of 64-bit memory in hexadecimal (4 words of 16 digits per line) with 7-bit ASCII code character equivalents.

#### Format:

W,fba,lba,ei. <u>Parameter</u> <u>Description</u> fba First byte address, hexadecimal, to be printed (mandatory). lba Last byte address, plus one location, to be printed. If lba is omitted, fba+8 is assumed by default. ei If ei is 1, fba and lba specify byte addresses relative to byte 0 of the environment interface. If ei is omitted, fba and lba specify absolute byte addresses. 60459300 D

#### **PP DUMP DIRECTIVES**

PP dump directives provide the capability to obtain a memory dump of all or selected PPs. Two dump formats are available, block format and line format.

#### AP — Dump Analysis of PP and PP Memory in Octal Line Format

The AP directive causes PP memory to be dumped in line format with 6-bit display code character equivalents (same format as the Q directive). Repetitive lines are suppressed and zero bytes are represented by hyphens (----). An analysis of the PP is printed before the memory dump. Analysis data includes the associated PP communications area, resident entry point call addresses, and read-only variables in directive cells. Certain direct cell variables are verified and those in error are indicated.

#### NOTE

Correct operation of this directive requires that the PP communication area on the EDD file be intact.

#### Format:

AP,n1,n2,...,nm.

Parameter

ni

# Description

Number of PP to be dumped or a program name. If a program name is specified, all PPs executing that program are dumped. A warning message is issued if an incorrect number is specified or the program name is not found in any PP. If n<sub>i</sub> is omitted, all active PPs are dumped.

Refer to Printer Output Listing Examples for a sample of the printer output listing produced by this directive.

#### MPP — Move PP

The MPP directive causes the correct logical PP to be dumped if the logical position of PPOO has been changed prior to the full dump to tape. If the PPS-0/PPS-1 toggle switch has been toggled, the n parameter should not be specified. If PPOO has to be moved to another PP via a deadstart panel program, the n parameter should be specified.

Format:

MPP,n.

Parameter

#### Description

n

Number of PP to which PPOO was moved. n cannot equal O. If n is omitted, 10 is assumed (CYBER 170 and CYBER 70 Computer Systems with 20 PPs).

#### P — Dump PP Memory in Octal Block Format

The P directive causes PP memory to be dumped in block format, where each block represents 64 words of memory. The blocks are read by column (top to bottom), where each column contains eight 12-bit words in octal format numbered 0 through 7. There are eight columns in each block, numbered 0 through 7. Repetitive data is not suppressed and zero words are represented by hyphens (----). For models 865 and 875, bytes 77768 and 77778 contain the PP's R register.

Format:

P,n<sub>1</sub>,n<sub>2</sub>,...,n<sub>m</sub>.

Parameter

ni

Number of PP to be dumped. If omitted, all PPs are dumped.

Description

#### PF — Dump FLPP† Memory in Octal Block Format

The PF directive causes first-level peripheral processor (FLPP) memory to be dumped in block format, where each block represents 64 words of memory. The blocks are read by column (top to bottom), where each column contains eight 12-bit words in octal format numbered 0 through 7. There are eight columns in each block, numbered 0 through 7. Repetitive data is not suppressed and zero words are represented by hyphens (----).

Format:

PF,n1,n2,...,nm.

Parameter

ni

Number of FLPP to be dumped. If omitted, all FLPPs are dumped.

Description

#### PMS — Read PP Select Switches

The PMS directive causes the dump of the S/C register (maintenance register for models 865 and 875) to be read to determine the current value of the PP memory select switches and the correct logical PP to be dumped, if the logical position of PP00 has been changed prior to the full dump to tape. If the PP memory select switches have been changed, this directive should be specified with the binary value of the switches prior to the change. This directive is meaningful only on a CYBER 170 Computer System with the exception of models 815, 825, 835, 845, and 855.

Format:

PMS,n.

Parameter

Description

Previous select switch setting; 0 through 118. If n is the same value as that read from the S/C register, this directive is not meaningful.

<sup>†</sup> Hardware manuals define peripheral processors making up a peripheral processor subsystem as PPs, and the first-level peripheral processors as peripheral processing units (PPUs). In this manual, first-level peripheral processors are referred to as FLPPs. FLPPs are available only on model 176.

#### PO — Dump 16-Bit PP Memory in Octal Block Format

The PO directive is valid on CYBER 180-class machines only. It prints PP memory in block format, where each block represents 64 words of memory. DSDI represents each 16-bit word by six octal digits. Words whose upper 4 bits are zero are represented by four octal digits. Blocks are read by columns (top to bottom), where each column contains eight 16-bit words numbered 0 through 7. There are eight columns in each block, numbered 0 through 7. Repetitive data is not suppressed and zero words are represented by hyphens (----). The PP's R register is displayed preceding the first line of the dump.

Format:

| PO,n1,n2,,nm.  |                                                             |
|----------------|-------------------------------------------------------------|
| Parameter      | Description                                                 |
| n <sub>i</sub> | Number of PP to be dumped. If omitted, all PPs are printed. |

#### PX — Dump 16-Bit PP Memory in Hexadecimal Block Format

The PX directive is valid on CYBER 180-class machines only. It prints 16-bit memory in block format, where each block represents 256 words of memory. Each 16-bit word is represented by four hexadecimal digits. Blocks are read by columns (top to bottom), where each column contains sixteen 16-bit words in hexadecimal format numbered 0 through F. There are 16 columns in each block, numbered 0 through F. Repetitive data is not suppressed and zero words are represented by hyphens (----). The PP's R register is displayed preceding the first line of the dump.

Format:

PX, n1, n2, ..., nm.

Parameter

 $n_i$ 

Number of PP to be printed. If omitted, all PPs are printed.

Description

Q — Dump PP Memory in Octal Line Format

The Q directive causes PP memory to be dumped in line format with 6-bit display code character equivalents. Each line contains 16 bytes (PP words) printed in two sets of 8 bytes in octal format. Each set consists of an address, 8 bytes, and display code character equivalents. Repetitive lines are suppressed and zero bytes are represented by hyphens (----). Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

Q,n1,n2,...,nm.

Parameter

#### Description

Number of PP to be dumped. If omitted, all PPs are dumped.

ni

### QF — Dump FLPP † Memory in Octal Line Format

The QF directive causes FLPP memory to be dumped in line format with 6-bit display code character equivalents. Each line contains 16 bytes printed in two sets of 8 bytes in octal format. Each set consists of an address, 8 data bytes, and 6-bit display code character equivalents. Repetitive lines are suppressed and zero bytes are represented by hyphens (----).

Format:

QF,n1,n2,...,nm.

Parameter

ni

Description

Number of FLPP to be dumped. If omitted, all FLPPs are dumped.

#### QOA — Dump 16-Bit PP Memory in Octal/ASCII Line Format

The QOA directive is valid on CYBER 180-class machines only. It prints PP memory in line format with 7-bit ASCII code character representation. Each line contains 16 words printed in two sets of eight. Each set consists of an octal address, eight words (six digits per word if the upper 4 bits are nonzero, four digits otherwise), and 7-bit ASCII code character equivalents. Repetitive lines are suppressed and zero words are represented by hyphens (----). The PP's R register is displayed preceding the first line of the dump. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

QOA, n1, n2, ..., nm.

Parameter

ni

Description

Number of PP to be printed. If omitted, all PPs are printed.

<sup>&</sup>lt;sup>†</sup>Hardware manuals define peripheral processors making up a peripheral processor subsystem as PPs, and the first-level peripheral processors as peripheral processing units (PPUs). In this manual, first-level peripheral processors are referred to as FLPPs. FLPPs are available only on model 176.

# QOD — Dump 16-Bit PP Memory in Octal/Display Line Format

The QOD directive is valid on CYBER 180-class machines only. It prints PP memory in line format with 6-bit display code character representation. Each line contains 16 words printed in two sets of eight. Each set consists of an octal address, eight words (six digits per word if the upper 4 bits are nonzero, four digits otherwise), and 6-bit display code character equivalents. Repetitive lines are suppressed and zero words are represented by hyphens (----). The PP's R register is displayed preceding the first line of the dump. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

QOD, n1, n2, ..., nm.

Parameter

n;

Description

Number of PP to be printed. If omitted, all PPs are printed.

# QXA — Dump 16-Bit PP Memory in Hexadecimal/ASCII Line Format

The QXA directive is valid on CYBER 180-class machines only. It prints PP memory in line format with 7-bit ASCII code character representation. Each line contains 16 words printed in two sets of eight. Each set consists of a hexadecimal address, eight words (four hexadecimal digits per word), and 7-bit ASCII code character equivalents. Repetitive lines are suppressed and zero words are represented by hyphens (----). The PP's R register is displayed preceding the first line of the dump. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

QXA,n1,n2,...,nm.

Parameter

ni

Number of PP to be printed. If omitted, all PPs are printed.

Description

# QXD — Dump 16-Bit PP Memory in Hexadecimal/Display Line Format

The QXD directive is valid on CYBER 180-class machines only. It prints PP memory in line format with 6-bit display code character representation. Each line contains 16 words printed in two sets of eight. Each set consists of a hexadecimal address, eight words (four hexadecimal digits per word), and 6-bit display code character equivalents. Repetitive lines are suppressed and zero words are represented by hyphens (----). The PP's R register is displayed preceding the first line of the dump. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

QXD, n1, n2,..., nm.

Parameter

Description

Number of PP to be printed. If omitted, all PPs are printed.

<sup>n</sup>i

# **CMR DUMP DIRECTIVES**

The CMR dump directives provide the capability to selectively dump specified areas of central memory resident. Refer to the NOS 2 Systems Programmer's Instant for detailed illustrations of central memory resident.

Successful use of the CMR dump directives is dependent upon the integrity of central memory resident at the time EDD was performed. Most important is the integrity of the CMR pointers on the EDD file. If these pointers are not intact, the dump produced by DSDI may prove meaningless. Thus, if it is suspected that the CMR pointers are not intact, specifying the P keyword on the DSDI command allows DSDI to use the CMR pointers from the running system. This option should be used only when the configuration of the running system is the same as the system in use at the time the EDD file was created. If the CMR pointers on the EDD file are not intact, the integrity of the other areas of central memory is also questionable. In this case, the output produced by the CMR dump directives may be unpredictable.

#### ACCOUNT — Dump Account Dayfile Buffer

The ACCOUNT directive causes the account dayfile pointers and buffer to be dumped in word format (four words per line) with 6-bit display code character equivalents. This format is the same format as that for the E memory dump directive. This directive also dumps the buffer in a line-by-line format, as on the DSD A display.

Format:

ACCOUNT .

# CBT — Dump Control Buffer Table

The CBT directive causes all control buffer table entries to be dumped unless ordinal numbers are specified, then only the specified control buffer table entries are dumped. The dump is formatted to reflect the appropriate parameter fields for each word. Control buffer table entries that are output to a printer are listed in two columns. The format is the same format as that for the MST directive. The control buffer table entries can also be output to a terminal, but only when ordinal numbers are specified. Control buffer table entries that are output to a terminal are listed in a single column format.

Format:

CBT, n1, n2, ..., nm.

Parameter

ni

Description

Ordinal number of the control buffer table entry to be dumped. If  $n_i$  is omitted, all control buffer table entries are dumped.

#### CCT — Dump Channel Control Table

The CCT directive causes all nonzero channel control table entries to be dumped unless ordinal numbers are specified, then only the specified channel control table entries are dumped. The dump is formatted to reflect the appropriate parameter fields for each word. Channel control table entries that are output to a printer are listed in two columns. The format is the same format as that for the MST directive. The channel control table entries can also be output to a terminal, but only when ordinal numbers are specified. Channel control table entries that are output to a terminal are listed in a single column format.

Format:

CCT,n1,n2,...,nm.

Parameter

n<sub>i</sub>

#### Description

Ordinal number of the channel control table entry to be dumped. If  $n_i$  is omitted, all nonzero channel control table entries are dumped.

# **CP** — Dump Active Control Point Areas

The CP directive causes all active control point areas, or a selected subset, to be dumped. List options provide the capability to dump only desired portions of the control point area and other control point related data. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

#### Format:

 $CP, n_1/ops_1, n_2/ops_2, \dots, n_m/ops_m$ .

| Parameter        | Description                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n <sub>i</sub>   | Control point number.                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                              |
| ops <sub>i</sub> | List options; a string of up to 10 characters indicating the portion<br>of the control point area, or control point related data, to be<br>dumped. If list options are specified, they apply only to the<br>control point number with which they are associated. Valid options<br>are: |                                                                                                                                                                                                                                                                                                                                                              |
|                  | opsi                                                                                                                                                                                                                                                                                   | Description                                                                                                                                                                                                                                                                                                                                                  |
|                  | x                                                                                                                                                                                                                                                                                      | Dumps the exchange package, parameter summary,<br>control point's entry in the executing job table,<br>and contents of the memory locations indicated by<br>the values in each exchange package register. These<br>register values are treated as relative addresses<br>within the field length; invalid addresses are<br>represented with contents of zero. |
|                  |                                                                                                                                                                                                                                                                                        | The current command and special entry point<br>parameters are not printed for the system control<br>point. Refer to Printer Output Listing Examples<br>later in this section for a sample of the printer<br>output listing produced.                                                                                                                         |
|                  | Т                                                                                                                                                                                                                                                                                      | Provides a detailed dump of the control point area<br>with a description of each parameter field and<br>NOSTEXT symbol for each word.                                                                                                                                                                                                                        |
|                  | AŤ                                                                                                                                                                                                                                                                                     | Dumps the job dayfile pointers and buffer in word<br>format with 6-bit display code character<br>equivalents. This format is the same format as the<br>E memory dump directive. This option also dumps the<br>buffer in a line-by-line format, as on the DSD A<br>display.                                                                                   |
|                  | Fţ                                                                                                                                                                                                                                                                                     | Provides a dump of the 3-word FNT entry, EST, and<br>mass storage track chain, if one exists, for all<br>files attached to the specified control point.                                                                                                                                                                                                      |
|                  | C†                                                                                                                                                                                                                                                                                     | Dumps the field length of a specified control point<br>in instruction parcel format with 6-bit display code<br>character equivalents. This format is the same<br>format as the C memory dump directive. Repetitive<br>data is suppressed.                                                                                                                    |

<sup>†</sup>This option does not dump information for the system control point.

### Parameter

# Description

| ops <sub>i</sub> | Description                                                                                                                                                                                                                                                                                           |  |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| †<br>†           | Dumps the field length of a specified control point<br>in byte format with 6-bit display code character<br>equivalents. This format is the same format as the<br>D memory dump directive. Repetitive data is<br>suppressed.                                                                           |  |
| EŤ               | Dumps the field length of a specified control point<br>in word format with 6-bit display code character<br>equivalents. This format is the same format as the<br>E memory dump directive.                                                                                                             |  |
| G                | Dumps the control point area in instruction parcel<br>format with 6-bit display code character<br>equivalents. This format is the same format as the<br>C memory dump directive.                                                                                                                      |  |
| H                | Dumps the control point area in byte format with<br>6-bit display code character equivalents. This<br>format is the same format as the D memory dump<br>directive.                                                                                                                                    |  |
| I                | Dumps the control point area in word format with<br>6-bit display code character equivalents. This<br>format is the same format as the E memory dump<br>directive.                                                                                                                                    |  |
| ለ†               | Dumps the user-accessible extended memory of a<br>specified control point in byte format with 6-bit<br>display code character equivalents. This format is<br>the same format as the D memory dump directive.                                                                                          |  |
| NŤ               | Dumps the negative field length of a specified control point. This format is the same format as the D memory dump directive.                                                                                                                                                                          |  |
| P                | Provides a dump and analysis of all active PPs associated with control point n.                                                                                                                                                                                                                       |  |
| default          | If n is specified with no corresponding list<br>options, options XTAF are selected automatically.<br>Refer to Printer Output Listing Examples later in<br>this section for a sample of the printer output<br>listing produced. The default options selected can<br>be changed with the CPO directive. |  |

All of the list options specified for a particular control point area (up to 10) are processed. For example, if the C and D options are both specified, the control point field length is dumped twice, once in instruction parcel (C) format and again in byte (D) format.

<sup>&</sup>lt;sup>†</sup>This option does not dump information for the system control point.

#### CPO — Reset Default List Options

The CPO directive selects a new string of default list options for the CP directive.

Format:

CPO,ops.

 Parameter
 Description

 ops
 New default list options for CP directive, a string of up to 10 characters. Refer to the description of the CP directive for a list of valid option characters.

#### CT — Dump Channel Tables

The CT directive causes the channel status table, EJT assignment table, and channel controlware table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

CT.

#### DAYFILE — Dump System Dayfile Buffer

The DAYFILE directive causes the system dayfile pointers and buffer to be dumped in word format (four words per line) with 6-bit display code character equivalents. This format is the same format as that for the E memory dump directive. This directive also dumps the buffer in a line-by-line format, as on the DSD A display.

Format:

DAYFILE.

#### **DB** — Dump Disk Buffers

DB,id,n1,n2,...,nm.

The DB directive causes all disk buffers, or a selected subset, to be dumped to a printer in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

| Parameter | Description                                                                                                                                                                                                        |  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| id        | Specifies the machine identifier of the mainframe from which to dump<br>the disk buffers. If id is omitted, the default machine identifier<br>is taken from CMR of the mainframe that is dumping the disk buffers. |  |
| ni        | Number assigned to a disk buffer to be dumped. If $n_1$ is omitted, all active disk buffers are dumped.                                                                                                            |  |

# DBW — Dump Buffered Device/Buffer Statistics/PP-I/O Buffer Link Tables

The DBW directive causes the list control words from the buffered device table, the buffer statistics table, and the PP-I/O buffer link table to be dumped. The dump is formatted to reflect the appropriate parameter fields for each word. Output to a printer is listed in two columns. Output to a terminal is listed in one column. The format is the same format as that for the MST directive.

Format:

DBW.

#### DDB — Dump Dayfile Dump Buffer

The DDB directive causes the dayfile dump buffer to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

DDB.

### **DP** — Dump Dayfile Buffer Pointers

The DP directive causes the dayfile buffer pointers to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

DP.

# EJT — Dump Executing Job Table

The EJT directive causes the executing job table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

EJT.

#### EPB — Dump Extended Memory/PP Buffer

The EPB directive causes the extended memory/PP buffer to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

EPB.

#### ERRLOG — Dump Error Log Buffer

The ERRLOG directive causes the error log pointers and buffer to be dumped in word format (four words per line) with 6-bit display code character equivalents. This format is the same format as that for the E memory dump directive. This directive also dumps the buffer in a line-by-line format, as on the DSD A display.

#### Format:

ERRLOG.

#### EST — Dump Equipment Status Table

The EST directive causes the equipment status table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

EST.

#### FNT — Dump System File Name/File Status Table

The FNT directive causes the system file name/file status table (FNT/FST) to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

FNT.

# FOT — Dump Family Ordinal Table

The FOT directive causes the family ordinal table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

FOT.

#### HAT — Dump Hash Table

The HAT directive causes all nonzero hash table entries to be dumped unless ordinal numbers are specified, in which case only the specified hash table entries are dumped. The dump is formatted to reflect the appropriate parameter fields for each word. Hash table entries that are output to a printer are listed in two columns. The format is the same format as that for the MST directive. The hash table entries can also be output to a terminal, but only when ordinal numbers are specified. Hash table entries that are output to a terminal are listed in a single-column format.

Format:

HAT, n1, n2, ..., nm.

Parameter

Description

ni

Ordinal number of the hash table entry to be dumped. If  $n_i$  is omitted, all nonzero hash table entries are dumped.

#### JC — Dump Job Control Area for Each Service Class

The JC directive causes the job control area for each job service class to be dumped. The dump is formatted to reflect the appropriate parameter fields and NOSTEXT symbol for each word. This directive also dumps the service class control table (SCT) in a line-by-line format.

Format:

JC.

#### LC — Dump Low Central Memory

The LC directive causes DSDI to dump the contents of low central memory (that is, central memory locations 0 through 1778). Each word is divided into the appropriate parameter fields. Each field is listed on a separate line with a description of the parameter. The absolute address and 6-bit display code character equivalents are also listed for each word.

Format:

LC.

#### LDIS — Dump L-Display Buffer

The LDIS directive causes the L-display buffer to be dumped in instruction parcel format with 6-bit display code character equivalents. This format is the same format as that for the C memory dump directive.

Format:

LDIS.

#### LIDT — Dump Logical Identifier Table

The LIDT directive causes the logical identifier table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

LIDT.

### MAINLOG — Dump Binary Maintenance Log Buffer

The MAINLOG directive dumps the binary maintenance log pointers and buffer in word format, four words per line, with 6-bit display code character equivalents.

Format:

MAINLOG.

#### MST — Dump Mass Storage/Track Reservation Tables

The MST directive causes all mass storage and track reservation tables to be dumped unless EST ordinals are specified, in which case only the specified MSTs are dumped. The dump format for the mass storage tables reflects the appropriate parameter fields and NOSTEXT symbol of each word. The portion of the dump describing the track reservation tables is presented in byte format with 6-bit display code character equivalents. The track link byte ordinal and status bits (three groups of 4 bits) are indicated for each word. Refer to Printer Output Listing Examples later in this section for a sample of the printer output listing produced by this directive.

Format:

MST,est, est, ..., est, .

Parameter

Description

est<sub>i</sub> EST ordinal of equipment whose mass storage table is to be dumped. If est<sub>i</sub> is omitted, all mass storage and track reservation tables are dumped.

#### MTR — Dump CPU Monitor

The MTR directive causes the CPU monitor to be dumped. Exchange packages are dumped in exchange package format while the program area is dumped, using relative addressing, in instruction parcel format with 6-bit display code character equivalents. This format is the same format as that for the C memory dump directive.

Format:

MTR.

# MTRQUEUE — Dump CPUMTR Request and Recall Queues

The MTRQUEUE directive causes all CPUMTR request and recall queues, or a selected subset, to be dumped.

#### Format:

MTRQUEUE, idents.

| Parameter |                                                                                                                                                                                                                                            | Description     |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| idents    | A string of up to four characters indicating the queues to be<br>dumped. The queue identifiers can be specified in any order and are<br>dumped in the order specified. Default is to dump all four queues.<br>Valid queue identifiers are: |                 |
|           | idents                                                                                                                                                                                                                                     | Queue Name      |
|           | С                                                                                                                                                                                                                                          | CPUCIO Request. |
|           | P                                                                                                                                                                                                                                          | PP Request.     |

**ODIS** — Dump Operator Display Buffer

R

W

# The ODIS directive causes the operator display buffer (used for communication between an operator and a remote diagnostic user) to be dumped in instruction parcel format with 6-bit

Recall.

CPU Request.

display code character equivalents. This format is the same format as that for the C memory dump directive.

Format:

ODIS.

# PLD — Dump Peripheral Library Directory

The PLD directive causes the PP library directory to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

PLD.

#### PP — Dump PP Communication Areas

The PP directive causes the contents of all PP communication areas to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive. The control point assignment, channel assignment, and monitor function are listed with each communication area. Refer to Printer Output Listing Examples later in this section for a sample of the printer output listing produced by this directive. Refer to Interactive Use of DSDI later in this section for additional information concerning use of this directive from an interactive terminal.

Format:

PP.

#### **PROBE** — Dump **PROBE** Data Tables

The PROBE directive causes the PROBE data tables to be dumped in byte format with 6-bit display code character equivalents.

Format:

PROBE .

## PST — Dump Program Status Table and Entry Point Directory

The PST directive causes the program status table and the entry point directory to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

PST.

#### PUT --- Dump Physical Unit Table

The PUT directive causes all nonzero physical unit table entries to be dumped unless ordinal numbers are specified, then only the specified physical unit table entries are dumped. The dump is formatted to reflect the appropriate parameter fields for each word. Physical unit table entries that are output to a printer are listed in two columns. The format is the same format as that for the MST directive. The physical unit table entries can also be output to a terminal, but only when ordinal numbers are specified. Physical unit table entries that are output to a terminal are listed in a single column format.

Format:

PUT,n1,n2,...,nm.

Parameter

#### Description

ni

Ordinal number of the physical unit table entry to be dumped. If  $n_i$  is omitted, all nonzero physical unit table entries are dumped.

### QFT — Dump Queued File Table

The QFT directive causes the queued file table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

QFT.

#### **RCL** — Dump Resident Central Library

The RCL directive causes the resident CPU library to be dumped in instruction parcel format with 6-bit display code character equivalents. This format is the same format as that for the C memory dump directive. A warning is printed if the resident central library is empty.

Format:

RCL.

#### RPL — Dump Resident Peripheral Library

The RPL directive causes the resident PP library to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive. A header line for each PP program dumped indicates the name of the program and its length in bytes. Each succeeding line contains 10 bytes (two central memory words) of the PP program. The PP address of the first byte in each line, relative to address zero of the PP, is also listed.

Format:

RPL.

### SDA — Dump Extended Statistical Data Area

The SDA directive causes the extended statistical data area to be dumped. Each word is divided into the appropriate parameter fields and is listed with a description of the parameter. The absolute address and 6-bit display code character equivalents are also listed for each word.

Format:

SDA.

## SECDED — Dump SECDED Identifier Table

The SECDED directive causes the single error correction double error detection (SECDED) identifier table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

SECDED.

#### SST — Dump Subsystem Control Point/Subsystem Assignment Tables

The SST directive causes the subsystem control point table and subsystem assignment table to be dumped in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

Format:

SST.

#### SUBSYSTEM DUMP/ANALYSIS DIRECTIVES

The subsystem dump/analysis directives provide the capability to selectively dump portions of central and/or PP memory associated with a specific subsystem (BIO, MAG, and IAF). Although many other directives already described in this section can be used to dump the same areas of memory, these directives dump those areas most frequently analyzed when subsystem-related malfunctions occur. In addition, many of the dumps are specially formatted to provide a detailed description of the area being dumped. If the specified subsystem was not active at the time the EDD file was created, an error message is issued.

## BATCHIO (BIO) — Dump Associated Memory for Analysis

The BATCHIO directive causes the areas of central and/or PP memory that are most frequently analyzed when BATCHIO malfunctions are indicated to be dumped. The areas and type of memory dumped are determined by the list options specified.

#### Formats:

BATCHIO, ops.

or

#### BIO,ops.

#### Parameter

ops

## Description

List options; a string of characters indicating the areas of memory to be dumped. If no options are specified, all three options (PBN) are selected by default and are processed in order as listed.

#### ops

#### Description

P Provides analysis and full memory dump of PPs having resident copies of ICD, IIO, QAP, QAC, or DSP. The output listing generated is the same (in format and content) as that produced by entering the AP directive in this format:

## AP,1CD,110,QAP,QAC, DSP.

Refer to the description of the AP directive earlier in this section for additional information.

- B Provides specially formatted dumps of each active BATCHIO buffer point. Included with the dump of each buffer point is the associated equipment type and FET, as well as EST and FNT/FST entries.
- N Provides a dump of the negative field length associated with the BATCHIO control point in byte format with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.

#### IAF — Dump Associated Memory for Analysis

The IAF directive causes the areas of central and/or PP memory that are most frequently analyzed when IAF malfunctions to be dumped. The areas and type of memory are determined by the list options specified. The IAF current entry word (SSPA) is always printed at the beginning of the listing, in byte format, regardless of which list options are specified.

#### Format:

IAF,ops.

Parameter

ops

#### Description

List options; a string of up to five characters indicating the areas of memory to be dumped. If no options are specified, four options (ETLP) are selected by default and processed in order as listed.

#### ops

Ρ

## C Provides analysis of the IAF command table.

E Dumps the IAF reentry table in byte format (two words per line) with 6-bit display code character equivalents. The first word in each line is preceded by its ordinal within the table.

Description

- T Provides a specially formatted dump of the IAF terminal table in which each word reflects the appropriate parameter fields. The message status table entry is included when dumping network terminal tables. In addition, each word is preceded by a description of the parameter fields and its COMSREM symbol. Terminal table entries that are empty, except for having status bit 0 in word 3 (VROT entry) set, are not printed.
- L Provides a dump of pot link table and all pots. The pot link table is dumped in byte format with pot link byte ordinals indicated for each word, but no 6-bit display code character equivalents. Repetitive pot link table entries are suppressed. The pots are dumped in word format, three lines per pot, with the first line containing only the pot number.
  - Provides analysis and full memory dump of all PPs having resident copies of TLX, ITA, ITN, and ITO. This option also provides an analysis and dump of all PPs having resident copies of 1RO and 1RI that are associated with control points of interactive origin. The output listing generated is the same (in format and content) as that produced by entering the AP directive in this format:

AP,TLX,1TA,1TN,1TO,1RO,1RI.

The exception is that the AP directive also dumps all PPs having copies of 1R0 and 1RI rather than only those associated with control points of interactive origin. Refer to the description of the AP directive, earlier in this section, for additional information.

#### MAGNET (MAG) — Dump Associated Memory for Analysis

The MAGNET directive causes the areas of central and/or PP memory that are most frequently analyzed when a malfunction within the Magnetic Tape Subsystem is indicated to be dumped. The areas and type of memory dumped are determined by the list options specified.

Format:

MAGNET, ops.

or

MAG, ops.

Parameter

ops

Description

List options; a string of characters indicating the areas of memory to be dumped. If no options are specified, all three options (UQP) are selected by default and are processed in order as listed.

## ops U

Q

Ρ

#### Description

- Provides a specially formatted dump of the Magnetic Tape Subsystem unit descriptor tables with associated FET, EST, and FNT/FST. Each word of a unit descriptor table is formatted to reflect appropriate parameter fields. In addition, each word is preceded by a description of the parameter fields and its COMSMTX symbol. If extended labels are present, they appear with the FET in the output listing. The FET also indicates the address and control point number of the user.
- Provides a dump of the Magnetic Tape Subsystem queue table in byte format (two words per line) with 6-bit display code character equivalents. The first word in each line is preceded by its ordinal within the table.
- Provides analysis and full memory dump of all PPs having resident copies of IMT. The output listing generated is the same (in format and content) as that produced by entering the AP directive in this format:

#### AP,1MT.

Refer to the description of the AP directive earlier in section for additional information.

## **RHF** — Dump Associated Memory for Analysis

The RHF directive causes the areas of central and/or PP memory that are most frequently analyzed when RHF malfunctions are indicated to be dumped. The areas and type of memory dumped are determined by the list options specified.

Format:

| RHF,ops.  |                                                                                                                                                                                                            |                                                                                                                                                                                                                                     |  |  |  |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Parameter |                                                                                                                                                                                                            | Description                                                                                                                                                                                                                         |  |  |  |
| ops       | List options; a string of characters indicating the areas of memory<br>to be dumped. If no options are specified, all three options (ACP)<br>are selected by default and are processed in order as listed. |                                                                                                                                                                                                                                     |  |  |  |
|           | ops                                                                                                                                                                                                        | Description                                                                                                                                                                                                                         |  |  |  |
|           | Α                                                                                                                                                                                                          | Provides a dump of the RHF dayfile buffer in word format<br>with 6-bit display code character equivalents. This<br>format is the same format as that for the E memory dump<br>directive. This option also dumps a standard dayfile. |  |  |  |
|           | C                                                                                                                                                                                                          | Provides a dump of the RHF field length in byte format                                                                                                                                                                              |  |  |  |

- with 6-bit display code character equivalents. This format is the same format as that for the D memory dump directive.
- P Provides analysis and full memory dump of all active PPs associated with the control point.

## HARDWARE REGISTER DUMP DIRECTIVES

The hardware register dump directives provide the capability to dump specified hardware registers.

#### FMFREG — Dump PP Registers

The FMFREG directive is valid on CYBER 180-class machines only. For each PP register (P, Q, K, A) stored while processing a fatal mainframe error, DSDI prints the PP register contents.

Format:

FMFREG.

#### IOUMR — Dump IOU Maintenance Registers

The IOUMR directive is valid on CYBER 180-class machines only. For each input/output unit (IOU) maintenance register specified, DSDI prints the hexadecimal register number, the register contents, and the register description. For registers containing error indicators, DSDI prints a description of each error.

Format:

| Parameter | Description                                                                                    |
|-----------|------------------------------------------------------------------------------------------------|
| first     | First register (hexadecimal) to be printed. If omitted, printing begins with register 00.      |
| last      | Last register +1 (hexadecimal) to be printed. If omitted, printing ends with register first+1. |

If no parameters are specified, DSDI prints all maintenance registers.

#### **MEMMR** — Dump Memory Maintenance Registers

The MEMMR directive is valid on CYBER 180-class machines only. For each memory maintenance register specified, DSDI prints the hexadecimal register number, the register contents, and the register description. For registers containing error indicators, DSDI prints a description of each error.

Format:

MEMMR, first, last.

IOUMR, first, last.

| Parameter | Description                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------|
| first     | First register (hexadecimal) to be printed. If omitted, printing begins with register 00.     |
| last      | Last register+1 (hexadecimal) to be printed. If omitted, printing ends with register first+1. |

If no parameters are specified, DSDI prints all maintenance registers.

#### PROCW — Dump Processor Controlware Part Number and Revision Level

The PROCW directive is valid on CYBER 180-class machines only. It prints the processor controlware part number and the revision level.

Format:

PROCW.

#### **PROMR** — Dump Processor Maintenance Registers

The PROMR directive is valid on CYBER 180-class machines only. For each processor maintenance register specified, DSDI prints the hexadecimal register number, the register contents, and the register description. For registers containing error indicators, descriptions of each error are printed.

#### Format:

| Parameter | Description                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------|
| first     | First register (hexadecimal) to be printed. If omitted, printing begins with register 00.     |
| last      | Last register+1 (hexadecimal) to be printed. If omitted, printing ends with register first+1. |

If no parameters are specified, all maintenance registers for both processors are printed. If first and last are specified, then the specified registers are dumped for all processors.

#### **PRORF** — Dump Processor Register File

The PRORF directive is valid on CYBER 180-class machines only. It prints the maintenance channel interface port number followed by the hexadecimal register number and contents of each processor register specified.

#### Format:

PRORF, first, last.

PROMR, first, last.

| Parameter | Description                                                                     |  |  |  |  |  |  |
|-----------|---------------------------------------------------------------------------------|--|--|--|--|--|--|
| first     | First register to be printed. If omitted, printing begins with register 00.     |  |  |  |  |  |  |
| last      | Last register+1 to be printed. If omitted, printing ends with register first+1. |  |  |  |  |  |  |

If no parameters are specified, the entire register file for both processors is printed. If first and last are specified, then the specified registers are dumped for all processors.

## PROXP — Dump Processor Exchange Package

The PROXP directive is valid on CYBER 180-class machines only. It prints the maintenance channel interface port number followed by the hexadecimal register number, the contents of each processor register, and (for most registers) a description of the register's contents. The exchange packages for all processors are printed.

Format:

PROXP.

## SC — Dump S/C Register

The SC directive is valid only on CYBER 170 Computer Systems with the exception of models 815, 825, 835, 845, and 855; it causes the S/C registers (maintenance registers for models 865 and 875) to be dumped.

Format:

SC.

#### XP — Dump Deadstart Exchange Package

The XP directive causes the CPU exchange package executing at the time of deadstart to be dumped. If there are two CPUs in the system, both exchange packages in execution at the time of deadstart are dumped.

Format:

XP.

#### **BUFFER CONTROLLER DIRECTIVE**

The buffer controller directive provides the capability to dump specified buffer controllers and list verification information for controlware dump files produced by the LOADBC utility. The BCDUMP directive causes the selected buffer controllers to be dumped.

Format:

BCDUMP/ops.

or

BCDUMP,  $cc_1, cc_2, \dots, cc_n$ .

or

BCDUMP,  $cc_1/ops_1, cc_2/ops_2, \dots, cc_n/ops_n$ .

### Parameter

## Description

 $cc_i$ 

Channel number of buffer controller to be dumped. If no channels are specified, all buffer controllers are dumped.

opsi

List options; a character string indicating the line format, interpretation, and verification of the selected buffer controllers to be dumped. If no options are specified, options H and D are selected by default.

| opsi  | Line Format                                                                                         |
|-------|-----------------------------------------------------------------------------------------------------|
| Н     | Hexadecimal line format (default).                                                                  |
| 0     | Octal line format.                                                                                  |
| ops i | Interpretation                                                                                      |
| A     | 7-bit ASCII code interpretation.                                                                    |
| D     | 6-bit display code interpretation (default).                                                        |
| ops i | Verification                                                                                        |
| V     | List verification information (used with the controlware dump file produced by the LOADBC utility). |

V omitted Do not list verification information.

## INTERACTIVE USE OF DSDI

,

Incorporated within DSDI is an interactive facility that allows several of the directives already described in this section to be entered interactively from a terminal. This interactive facility is designed to provide the following additional capabilities.

- Allows preliminary examination of the EDD file to determine which areas should be listed in detail at a line printer.
- Allows examination of certain areas of the EDD file not listed during normal operational procedures following a system malfunction. Typically, predefined portions of the EDD file are listed following a system malfunction.
- Allows online examination of the EDD file from a remote location.

Refer to Example of DSDI Terminal Use later in this section for an example showing interactive use of DSDI.

When the DSDI command is entered from an interactive terminal, there will be a 10- to 60-second delay before input directives can be entered. During this delay, DSDI is copying the EDD file to a random-access mass storage file. The length of the delay depends on device speed and current system activity. When DSDI is able to accept input directives, it will issue the following prompt to the terminal.

ENTER DIRECTIVES- - ?

Directives are entered following the question mark prompt. Only one directive can be entered at a time, and each directive is restricted to one line. The format is the same as described for batch input (refer to Directive Format earlier in this section).

Generally, any of the DSDI input directives can be entered at an interactive terminal. However, the output produced by many of the directives is formatted for listing only at a line printer (136 columns) and cannot be listed at the terminal (72 columns). The L parameter on the DSDI command initially determines the disposition of the list output. If a file name is not specified, list output is assigned to file OUTPUT by default (that is, the terminal). In this case, entry of directives that produce output that cannot be listed at the terminal results in the message:

DIRECTIVE RESTRICTED TO PRINTER OUTPUT.

If a list output file name is specified on the DSDI command, all input directives can be entered at the terminal. All list output (including error messages) is written to the specified file. These two input directives are provided to further control the disposition of list output:

#### Directive

#### Description

- OUTPUT, filename. Assigns output to alternate file filename (file name OUTPUT is not allowed; that is, alternate list output cannot be assigned to the terminal). If filename is omitted, the system assumes file name ALTRNT. While this directive is active, all input directives can be entered at the terminal. All list output (except error messages) is written to file filename and is formatted for transmission to a line printer. Error messages are written directly to the terminal.
- DISPOSE. Disposes the alternate list file (specified in the OUTPUT directive) to the print queue. Output will be printed at the central site line printer. All subsequent list output resumes on the original output file specified on the DSDI command.

Refer to File Manipulation and Control Directives earlier in this section for additional information concerning use of these directives.

#### **TERMINAL OUTPUT DIRECTIVES**

The following directives produce output formatted for listing at an interactive terminal.

#### C — Dump Memory in Instruction Parcel Format

The C directive causes the specified locations of central memory or extended memory to be dumped in four groups of five octal digits (one word per line) with 6-bit display code character equivalents. No pagination is processed for terminal output. The CM, EC, and UEC directives (refer to Central Memory/Extended Memory Dump Directives earlier in this section) determine the type of memory to be dumped; default is central memory. The RA or RAC directive (refer to Central Memory/Extended Memory Dump Directives earlier in this section) must be entered to dump relative addresses; default is absolute addressing.

Format:

C,fwa,lwa.

#### Parameter

#### Description

fwa

First word address to be dumped (mandatory).

lwa

Last word address, plus one location, to be dumped. If omitted, fwa+l is assumed by default.

Example of terminal output:

? C,6230,6240. 0006230 34240 10100 00012 50036 1TAA. AU 3 0006231 00764 70000 00000 10113 \* AAK 0006232 04154 70000 00000 10113 DM\* AAK 0006233 00004 67446 74000 10005 - - A E 0006234 05153 05700 00000 00000 EMX. 0006235 00000 00000 00000 00000 0006236 00000 00000 00000 00000 0006237 00000 00005 05111 14422 EEII9R

#### **CP** — Dump Active Control Point Areas

The CP directive causes the job sequence name and control point area address for each control point to be dumped.

Format:

CP.

Example of terminal output:

| CP 01<br>IAF<br>0200  | CP 02<br>AALT<br>0400 | CP 03<br>NAM<br>0600  | CP 04<br>1000         | CP 05<br>AAKW<br>1200            | CP 06<br>AAAG<br>1400 | CP 07<br>AAAF<br>1600 | CP 10<br>AAAE<br>2000 |
|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|
| CP 11<br>AAAD<br>2200 | CP 12<br>AAAC<br>2400 | CP 13<br>AAAB<br>2600 | CP 14<br>AALN<br>3000 | CP 15<br>3200                    | CP 16<br>AALU<br>3400 | CP 17<br>3600         | CP 20<br>4000         |
| CP 21<br>4200         | CP 22<br>4400         | CP 23<br>4600         | CP 24                 | CP 25<br>5200                    | CP 26<br>5400         | CP 27<br>5600         | CP 30<br>RBF<br>6000  |
| CP 31<br>Mag<br>6200  | CP 32<br>BIO<br>6400  | CP 33<br>6600         | SYS -                 | ←Control<br>←Job Seq<br>←Control | uence Nam             | e at Cont             | rol Point<br>s        |

#### D — Dump Memory in Byte Format

The D directive causes specified locations of central memory or extended memory to be dumped in five groups of four octal digits (one word per line) with 6-bit display code character equivalents. No pagination is processed for terminal output. The CM, EC, and UEC directives (refer to Central Memory/Extended Memory Dump Directives earlier in this section) determine the type of memory to be dumped; default is central memory. The RA or RAC directive (refer to Central Memory/Extended Memory Dump Directives earlier in this section) must be entered to dump relative addresses; default is absolute addressing.

Format:

D,fwa,1wa.

| -   |    |     |   |
|-----|----|-----|---|
| Par | ລຫ | ete | r |

## Description

fwa

First word address to be dumped (mandatory).

lwa Last word address, plus one location, to be dumped. If omitted, fwa+l is assumed by default.

Example of terminal output:

? D,6230,6240. 0006230 3424 0101 0000 0125 0036 1TAA AU 3 0006231 0076 4700 0000 0001 0113 \* AAK 0006232 0415 4700 0000 0001 0113 DM\* AAK 0006233 0000 4674 4674 0001 0005 \_ \_ ΑE 0006234 0515 3057 0000 0000 0000 EMX. 0006235 0000 0000 0000 0000 0000 0006236 0000 0000 0000 0000 0000 0006237 0000 0000 0505 1111 4422 EEII9R

## PP — Dump PP Communication Areas

The PP directive causes the PP number, executing program name, control point assignment, and input register address for each PP communication area to be dumped.

Format:

PP.

Example of terminal output:

**PP** Number Program in Execution Control Point Assignment PP 04 PP06 PP00 PP 01 PP02 PP03 PP'05 🖌 PP07 PP10 PP11 MTR-34 DSD-34 QAC-16 1R0-05 1SJ-34 1MT-31 QAC-14 7310 7200 7210 7220 7230 7240 7250 7260 7270 7300 PP20 PP 21 PP22 **PP23 PP24** PP 25 **PP26 PP27** PP 30 PP 31 PIP-03 CPD-34 QAC-02 -----110-32 1MA-01 ----7340 7350 7400 7410 7430 7320 7330 7360 7370 7420 PP00 Input Register Address 7440

## Q — Dump PP Memory in Line Format

The Q directive causes the specified locations of PP memory to be dumped in line format. Each line contains 8 bytes (PP words) with 6-bit display code character equivalents. Repetitive lines are suppressed and zero bytes are represented by hyphens (----).

Format:

Q,n,fwa,lwa.

| Parameter | Description                                         |
|-----------|-----------------------------------------------------|
| n         | Number of PP to be dumped.                          |
| fwa       | First word address to be dumped.                    |
| lwa       | Last word address, plus one location, to be dumped. |

## NOTE

fwa and lwa are automatically adjusted so that the dump limits fall within a multiple of 10g words.

This format is valid only for terminal output. If attempted from a job of batch origin or while an alternate list file is active, the fwa and lwa parameters will be interpreted as PP numbers.

Example of terminal output:

| ? Q, | 5,0,100 | •    |      |      |      |      |      |      |                |
|------|---------|------|------|------|------|------|------|------|----------------|
| 0000 | 0003    | 2020 | 3340 |      | 0614 |      | 4334 | 0117 | CPP05 FL 81A0  |
| 0010 | 0064    | 0001 | 7772 | 0100 | 0006 | 1073 | 1401 | 6072 | A A FHLA       |
| 0020 | 2250    | 3225 |      | 0027 | 0012 | 4402 | 5747 | 5751 | R/ZU W J93.*.( |
| 0030 | 0011    | 7646 |      | 0001 | 0141 | 0600 |      |      | I – AA6F       |
| 0040 | 1501    | 1116 | 2014 | 0074 | 0203 |      |      |      | MAINPL BC      |
| 0050 | 3404    | 2330 | 0035 | 6213 | 1707 |      | 4000 | 6675 | 1DSX 2 KOG 5   |
| 0060 |         | 4521 |      | 6101 | 0001 | 0153 | 0001 | 0532 | +Q A AAS AEZ   |
| 0070 | 0001    | 0100 | 1000 | 0003 | 6000 | 6250 | 6251 | 6252 | ААНС/()        |

#### QOA, QOD, QXA, QXD — Dump 16-Bit PP Memory in Line Format

These four directives are valid on CYBER 180-class machines only. Each directive prints specified locations of 16-bit PP memory in line format. Each line contains eight PP words in octal or hexadecimal with 6-bit display code or 7-bit ASCII code character representations. Repetitive lines are suppressed and zero bytes appear as hyphens (----).

----

| Directive Format | Numeric<br>Representation | Character<br>Representation |  |  |
|------------------|---------------------------|-----------------------------|--|--|
| QOA,n,fwa,1wa,R. | Octa1                     | 7-bit ASCII code            |  |  |
| QOD,n,fwa,lwa,R. | Octal                     | 6-bit display code          |  |  |
| QXA,n,fwa,1wa,R. | Hexadecimal               | 7-bit ASCII code            |  |  |
| QXD,n,fwa,1wa,R. | Hexadecimal               | 6-bit display code          |  |  |
| Parameter        | Description               |                             |  |  |

| n   | Number of PP to be printed.                          |
|-----|------------------------------------------------------|
| fwa | First word address to be printed.                    |
| lwa | Last word address, plus one location, to be printed. |
| R   | If specified, the R register is printed.             |

This directive format is valid only for terminal output. If it is used in a job of batch origin or while an alternate list file is active, DSDI interprets the fwa and lwa parameters as PP numbers.

#### PP — Dump PP Communication Areas

The PP directive causes the PP number, executing program name, control point assignment, and input register address for each PP communication area to be dumped.

Format:

PP.

Example of terminal output:

**PP** Number Program in Execution Control Point Assignment PP00 PP01 PP02 PP03 PP04 PP'05 PP06 PP07 PP10 PP11 MTR-34 DSD-34 QAC-16 1R0-05 1SJ-34 1MT-31 QAC-14 \_\_\_\_ 7200 7210 7220 7230 7240 7250 7260 7270 7300 7310 PP 20 **PP21** PP22 **PP23 PP24** PP 25 PP26 **PP27** PP30 PP31 PIP-03 CPD-34 QAC-02 -110-32 1MA-01 \_\_\_\_ 7400 7410 7430 7320 7330 7340 7350 7360 7370 7420 PP00 Input Register Address 7440

## **Q** — Dump PP Memory in Line Format

The Q directive causes the specified locations of PP memory to be dumped in line format. Each line contains 8 bytes (PP words) with 6-bit display code character equivalents. Repetitive lines are suppressed and zero bytes are represented by hyphens (----).

Format:

Q,n,fwa,lwa.

| Parameter | Description                                         |
|-----------|-----------------------------------------------------|
| n         | Number of PP to be dumped.                          |
| fwa       | First word address to be dumped.                    |
| lwa       | Last word address, plus one location, to be dumped. |

## NOTE

fwa and lwa are automatically adjusted so that the dump limits fall within a multiple of  $10_8$  words.

This format is valid only for terminal output. If attempted from a job of batch origin or while an alternate list file is active, the fwa and lwa parameters will be interpreted as PP numbers.

Example of terminal output:

Parameter

| ? Q,5 | 5,0,100 | •    |      |      |      |      |      |      |        |           |
|-------|---------|------|------|------|------|------|------|------|--------|-----------|
| 0000  | 0003    | 2020 | 3340 |      | 0614 |      | 4334 | 0117 | CPP05  | FL 81AO   |
| 0010  | 0064    | 0001 | 7772 | 0100 | 0006 | 1073 | 1401 | 6072 | Α      | A FH LA   |
| 0020  | 2250    | 3225 |      | 0027 | 0012 | 4402 | 5747 | 5751 | R/ZU   | ₩ J93.*.( |
| 0030  | 0011    | 7646 |      | 0001 | 0141 | 0600 |      |      | I -    | AA6F      |
| 0040  | 1501    | 1116 | 2014 | 0074 | 0203 |      |      |      | MAINPL | BC        |
| 0050  | 3404    | 2330 | 0035 | 6213 | 1707 |      | 4000 | 6675 | 1DSX 2 | KOG 5     |
| 0060  |         | 4521 |      | 6101 | 0001 | 0153 | 0001 | 0532 | +Q     | A AAS AEZ |
| 0070  | 0001    | 0100 | 1000 | 0003 | 6000 | 6250 | 6251 | 6252 | AA H   | C / ()    |

#### QOA, QOD, QXA, QXD — Dump 16-Bit PP Memory in Line Format

These four directives are valid on CYBER 180-class machines only. Each directive prints specified locations of 16-bit PP memory in line format. Each line contains eight PP words in octal or hexadecimal with 6-bit display code or 7-bit ASCII code character representations. Repetitive lines are suppressed and zero bytes appear as hyphens (----).

|                  | Numeric        | Character          |
|------------------|----------------|--------------------|
| Directive Format | Representation | Representation     |
| QOA,n,fwa,1wa,R. | 0cta1          | 7-bit ASCII code   |
| QOD,n,fwa,lwa,R. | Octal          | 6-bit display code |
| QXA,n,fwa,lwa,R. | Hexadecimal    | 7-bit ASCII code   |
| QXD,n,fwa,lwa,R. | Hexadecimal    | 6-bit display code |
|                  |                |                    |

Description

| n   | Number of PP to be printed.                          |
|-----|------------------------------------------------------|
| fwa | First word address to be printed.                    |
| lwa | Last word address, plus one location, to be printed. |
| R   | If specified, the R register is printed.             |

This directive format is valid only for terminal output. If it is used in a job of batch origin or while an alternate list file is active, DSDI interprets the fwa and lwa parameters as PP numbers.

## **EXAMPLE OF DSDI TERMINAL USE**

This example illustrates how DSDI might be used following a system malfunction to analyze portions of the EDD file from an interactive terminal. It is assumed that an EDD file was created during normal system recovery procedures. Vertical spacing has been expanded to permit commentary. The example begins after the login sequence has been completed.

| batch<br>RFL,0.                          | Enter Batch Subsystem.                                                                                                                                                                                                                    |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /label,dump,vsn=dump,lb=ku,f=s,mt,d=800  | The LABEL command is entered to<br>assign the EDD dump tape to this job.<br>Use of the vsn parameter allows the job<br>to be rolled out while the tape is mounted<br>and assigned.                                                        |
| /get,altdir                              | Retrieve alternate directives file<br>ALTDIR (refer to the example in figure 6-1).                                                                                                                                                        |
| /dsdi.                                   | Calls DSDI, which copies EDD tape to a random mass storage file.                                                                                                                                                                          |
| ENTER DIRECTIVES                         | Enter terminal output directives (refer<br>to Terminal Output Directives earlier in<br>this section) to list any portion of the EDD<br>file at the terminal. DSDI issues the<br>prompt (?) when it is ready to accept a new<br>directive. |
| ? output,altout.                         | List output produced by subsequent direc-<br>tives is written to local file ALTOUT. This<br>allows entry of directives that produce line<br>printer formatted output.                                                                     |
| ? read,altdir.<br>•<br>•<br>•            | All input directives in alternate direc-<br>tives file ALTDIR are read and processed.<br>List output is written to local file<br>ALTOUT. DSDI does not request terminal<br>input until the last directive on ALTDIR is<br>processed.      |
| ? dispose.                               | Dispose local file ALTOUT to the print<br>queue for listing at the central site line<br>printer. Output produced by subsequent<br>directives is listed at the terminal.                                                                   |
| EXPRESS DUMP COMPLETE (FL USED xxxxxB) / | DSDI is terminated by entering a carriage return in response to the ? prompt.                                                                                                                                                             |

In summary, the following operations were performed by DSDI. First, small areas of the dump file were listed at the terminal for preliminary examination. This was done both to analyze the cause and effect of the system failure, as well as determine the extent of line printer listings required. An appropriate comment may be placed in the list file subtitle at this time via the \*.ccc...ccc directive.

Next, directives were entered to generate the necessary line printer listings. These listings are generally extensive, or contain specially formatted output that cannot be listed at the terminal. Thus, output was written to an alternate list file named ALTOUT.

After all necessary directives had been entered from the terminal, an alternate directives file (ALTDIR) was read. ALTDIR is a permanent file containing input directives necessary to obtain a printer listing of specific areas in the dump file that are frequently examined following a system failure (for example, CMR tables and buffers, PP memory, and so forth). Figure 6-1 illustrates a typical alternate directives file. Comments describing areas of the dump file to be listed appear, along with the directive, in the title line of the output listing.

When DSDI finished processing the last directive in file ALTDIR, it again issued the ? prompt to the terminal requesting further directive input from the keyboard. At this time, the DISPOSE directive was entered causing file ALTOUT to be printed at the central site line printer. Refer to Printer Output Listing Examples later in this section for examples of printer output listings.

| DUMPT     |                                                          |
|-----------|----------------------------------------------------------|
| LC.       | LOW CENTRAL MEMORY POINTERS                              |
| PP.       | PP COMMUNICATION AREA                                    |
| CPO,H.    |                                                          |
| EJOFF.    |                                                          |
| EJ.       |                                                          |
| CP.       | CONTROL POINT AREAS                                      |
| CPO,XTAF. |                                                          |
| DP.       | DAYFILE BUFFER POINTERS                                  |
| EJ.       |                                                          |
| EST.      | EQUIPMENT STATUS TABLE                                   |
| FNT.      | SYSTEM FILE NAME TABLE                                   |
| EJ.       |                                                          |
| MST.      | MASS STORAGE TABLES                                      |
| JC.       | JOB CONTROL PARAMETERS                                   |
| CP,30/T.  | SYSTEM CONTROL POINT AREA                                |
| ACCOUNT   | ACCOUNT FILE BUFFER                                      |
| ERRLOG.   | ERROR LOG BUFFER                                         |
| EJON.     |                                                          |
| AP.       | ACTIVE PPS                                               |
| AF.       | ACTIVE FFS                                               |
|           |                                                          |
| <br>1     | ives file must be in text format; the first word in each |

Figure 6-1. Sample Alternate Directives File

## PRINTER OUTPUT LISTING EXAMPLES

The listings illustrated in this section are samples of the line printer output listings produced by several of the input directives described under Input Directives earlier in this section.

Each page of output listings begins with two header lines: a title line and a subtitle line. The header lines are formatted as follows.

RA = current input directive DUMP nn DSDI yy/mm/dd.hh.mm.ss. PAGE n 0000000 dump type hh.mm.ss. yy/mm/dd.CDC NETWORK OPERATING SYSTEM. NOS 2 comments

| Header                     | Description                                                                                                                                                                                                                |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RA=000000                  | Indicates absolute addressing is in effect. If relative<br>addresses were being dumped (RA or RAC directive entered), a<br>nonzero reference address would appear in this field.                                           |
| current input directive    | Input directive currently being processed, including comments (50-character field).                                                                                                                                        |
| DUMP nn                    | Reflects the EDD tape number currently being used (nn is a 2-digit dump identifier assigned during EDD).                                                                                                                   |
| yy/mm/dd. hh.mm.ss.        | This field reflects the date and time when DSDI was executed.                                                                                                                                                              |
| dump type                  | Indicates type of memory currently being dumped (central<br>memory, extended memory, or a PP number). If the AP<br>directive is processed, the PP number is followed by the<br>name of the program currently being dumped. |
| hh.mm.ss. yy/mm/dd. CDC NE | WORK OPERATING SYSTEM. NOS 2                                                                                                                                                                                               |
|                            | Time of day, date, system title line, and system version name taken from CMR.                                                                                                                                              |
| comments                   | Up to 36 characters of comments specified on a *.cccccc                                                                                                                                                                    |

input directive.

## Example 1:

The following sample illustrates the printer output listing produced by the PP directive (dump PP communication areas).

| RA = PP.<br>0000000 CM   | 16.52.11. 82/01/06. CDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DUMP 01<br>Network operating system.                                                                       | DSDI<br>NOS 2                                                                                                                                                                                                                                                                                                                                                         | 82/01/20. 16.22.05.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | PAGE 1 |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| PPOO MTR<br>CP34         | 1524         2234         0000         0000         0000           0000         0001         0000         0003         5570           0101         1501         0000         0004         0565           0000         0000         0000         0000         0006           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000 | MTR1 PP01<br>A C<br>AAMA G<br>DE<br>Program in Execution<br>Control Point Assignment<br>Channel Assignment | 0 SD 0423 0434<br>0000 0000<br>CP34 3404 1434<br>CH10 0000 0000<br>0000 0000<br>5534 3457<br>5543 3550                                                                                                                                                                                                                                                                | 0000         0000         0000         DSD1           0000         0000         0000         1DL1         H         9A7           0010         0044         0142         1DL1         H         9A7           0000         0000         0000         1000         1001         1401         0613         5400         LAFK=           3737         5733         3357         11.44.00.         3334         5033         4157         82/01/06.           0000         0000         0000         5         5         5         5                      |        |
| PPO2 QAC<br>UTEM<br>CP16 | 2101         0356         0000         0000         0123           1077         0000         0000         0003         3734           0006         0001         4600         0001         0000           0000         0002         0300         0000         0000           0000         0002         0300         0000         0000           0000         0000         0000         0000         0000           0013         0000         1765         0000         2265           0301         6400         0000         0000         0125                                                                    | QAC, AS PPO3<br>H C41<br>F A- A<br>BC<br>K O R<br>CA<br>CX AU                                              | 0000 0000<br>0000 0000<br>0000 0000<br>0000 0000<br>0000 0000<br>0000 0000<br>0004 0000<br>0000 0000<br>0724 0000<br>0000 0000                                                                                                                                                                                                                                        | 0000         0000         0000         3           0000         0000         0000         3           0000         0000         0000         0000           0000         0000         0000         0000           0235         0022         0001         BB2 R A           0000         0000         0000         3314           0000         7325         D         DL         U           2127         1031         1200         GT         QWHYJ           0002         1030         1020         BHXHP                                            |        |
| PP04                     | 0000         0000         0000         0000         7350           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0235         0022         0001           0000         0000         5502         0002         1500           0301         6400         0000         0000         0333                                                                                                                                       | / PP05<br>Monitor Function<br>B2 R A<br>5B B BM<br>CA<br>CX CO                                             | 1R0 3422 1705<br>PIOM 2043 0400<br>CPD5 0154 0011<br>4000 0000<br>0000 0000<br>0003 0000<br>0301 6400<br>0000 0000                                                                                                                                                                                                                                                    | 0000         0000         0000         1R0E           0000         0001         5400         P8b         A=           4440         0000         0400         A=         195         b           0504         2600         0000         5         EDV           0000         0000         0000         0000         0000           1776         0000         2777         C         0         W           0000         0000         0000         CA         1401         0620         3735         LAFP42                                              |        |
| PPO6 1SJ<br>LDAM<br>CP34 | 3423         1234         0003         0000         0000           1055         0001         4472         0305         1073           0000         0001         4472         0305         0000           0000         0002         0237         0005         0007           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0214         4400         0000         0000         0000           0301         6400         0000         0000         0333                                                                    | 1SJ1 C PP07<br>H A9 CEH<br>A9 CE<br>BB4 E G<br>BL9<br>CA<br>CX CO                                          | IMT         3415         2431           LDAM         1055         0001           CP31         0000         0001           0020         0000         0000           0000         0000         0000           3415         2431         0000           0020         0000         0000           3441         4033         5700           3547         3400         3400 | 3170         0000         0000         1MTYY           4472         0230         1073         H         A9         BXH           4472         0230         0000         A9         BX           0000         0000         0000         P           0000         0000         0000         3635         5655         1116         165032, IN           2100         3645         0100         .         Q         3+A           2000         3345         5415         2*1         P         0+=                                                       | l      |
| PP10<br>CP00             | 0000         0000         0000         0000         7370           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0000         0000         2127         1031         1200           0000         0000         0002         1030         1020 | PP11<br>BB2 D L<br>5I E/Y E=Z<br>GT QWHYJ<br>BHXHP                                                         | QAC         2101         0354           UTEM         1077         0000           CP14         0004         0002           0000         0000         0000           0013         0000         0000           0724         0000         0000                                                                                                                            | 0000         0000         0216         QAC=         BN           0003         0003         3734         H         C         C41           4476         0152         0000         D         B9         A)           0237         0004         0010         B4         D           0000         0000         0000         4126         K         6V         9V           2127         1031         1200         GT         QHYJ         0022         1030         1020         BHXHP                                                                    |        |
| РР20 РІР<br>СР03<br>СН05 | 2011         2003         0000         0000         0136           0000         0000         0000         0000         0000           0311         1703         0000         0000         0000           0311         1703         0000         0000         0001           1300         0000         0000         0000         0001           1130         6700         6017         1701         0574           0100         6202         0200         6155         0363           0100         6022         3004         1201         3101           3406         1411         3204         0502         1412 | PIPC A3 PP21<br>CIOC BCY<br>IX OOAE<br>A BB C<br>A RXDJAYA<br>1FLIZDEBLJ                                   | CPD 0320 0434<br>LDAM 1055 0000<br>CP34 0000 0004<br>0000 0005<br>0000 0000<br>0777 1777<br>2000 0045<br>0770 1401                                                                                                                                                                                                                                                    | 0000         0000         0225         CPD1         BU           0000         0000         0000         H         H         H           6123         0131         0000         D         SAY         EDT Q         R           0424         0021         0022         EDT Q         R         0000         0000         0000           3777         0100         7100         G         0 4 A         4001         3003         1013         P         + AXCHK           3411         3412         3077         G         LA111JX         X         X |        |

## Example 2:

The following sample illustrates the printer output listing produced by the AP directive (dump analysis of PP and PP memory in line format).

| RA = AP,3.<br>0000000 PP03 16.52.11.82/01/                                                                                                           | DUMP<br>/06. CDC NETWORK OPERATING SYS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                           | PAGE 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ANALYSIS OF PP03                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| PP 03 0000 0000 0000 000<br>0000 0000 0000                                                                                                           | 00 0000<br>00 0000<br>22 0001 BB2 R A<br>00 0000<br>00 7325 D 0L U<br>31 1200 GT QWHYJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | LAST MAIN PROGRAM LOADED -<br>LAST OVERLAY LOADED - 3ME<br>LAST MASS STORAGE DRIVER - 6DI |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| RESIDENT ENTRY POINTS<br>NAME LOC CALLER NAM                                                                                                         | LOW MEMORY CONSTANTS<br>ME LOC ACTUAL EXPECTED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| FTN 0163 2205 F<br>DFM 0432 2341 F<br>EXR 0471 1477 C<br>SMS 0506 0355 F<br>RDS 0553 0370 T<br>WDS 0556 1740 T<br>EMS 0561 0415 C<br>I<br>000 F<br>M | RA         55         4004            FL         56         0021            ON         70         0001         0001           HN         71         0100         0100           TH         72         1000         1000           TR         73         0003         0003           CP         74         6200            IA         75         7230            MA         77         7232            R-REG         00010000         00000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | *** WARNING ***                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| PPU MEMORY                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$                                                                                                 | X W 5           3101 0006         B D BC \$YA F           0L         0L           0343 0411         B C 8DI           0177 0336         GDP 0AE XHR A C3           0546 3074         OPF X HXHKAE-X           3076 6210         HL A RED81HX H           1455 6010         EH HXHHMGYPEL H           0676 1502         L*VH HXLD+OPF MB               3574 3374         PX (K5HF1 2 0           0163 0326 13P ME1KL B A CV         02077 3076           0163 0326 13P ME1KL B A CV         0200 0553           0200 0553 5C17N/C A10XE B\$           0570 3503         XN9CX0=C AP E 2C           1453 6173         UUCBX S7DP1AL\$           0200 0553         SC1N/C A10XE B\$           0575 3602         1JJ011DH3B5BE 3B           0225 6173         L)B A XLD9PARU           0355 2000         AM GL         A A C P           5200 0107         / AHJ4E,/ AD) AG           0340          A XIHLYJ KE(C5           0773 0370         A DML 1K9 B G C           2116 0532         B F LDB G- FQNEZ           0200 0663 * GEYGS C7DCB F | $ \begin{array}{cccccccccccccccccccccccccccccccccccc$                                     | QP<br>5 CA<br>X5D QCJ<br>AA H C XYZ<br>DWI HFFQHB<br>L. HXHO EKLUCWP<br>NU HTIXK1 XL1,X<br>LWZHF9CJGIXIJ (<br>XHYIE PEL* AIPE<br>2 F L HC,PAU(<br>P ODE X /X/D X<br>0/HFB CQAM EP 3<br>0IHLYJ KQPL B A<br>H4HE3X HXLEBXM<br>1CX DB EFL5 AH<br>GW3GS AFED165C1F<br>.M CE+B E A CMP<br>A SG= D.OA1BH<br>) D.11LF1AX AU<br>L B CQ/D = M F<br>YE HXLHCNF AB<br>DP AG1KL611L B<br>A H,A C CLA OSC1<br>= FF* GEYGS FTDC<br>/ E\$C2= F5H = F0<br>5 DCP I2B G- F<br>IJB G-LA F KEUXK |

## Example 3:

The following sample illustrates the printer output listing produced by the CP directive (dump active control points). The default list options (XTAF) are used to dump the control point. This example consists of six pages. Also, notice that the columns cross page boundaries; that is, the left column is read continuously, from the top of the second page to the middle of the fourth page. The sequence then continues at the top of the right column on the second page.

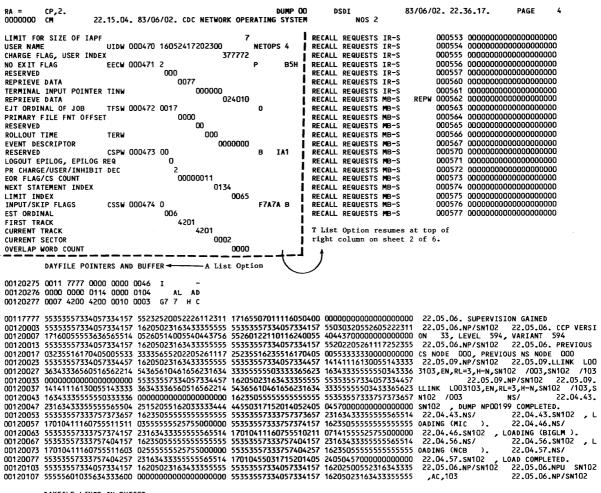
| RA = CP,2.<br>0000000 CM                                                                                                                                                                                                                                                                                                                                                                                       | 22.15.04. 83/06                                                                                  | /02. CDC NETWORK OPER                                                                                           | DUMP OO<br>Ating system.                                                   | DSDI<br>NOS 2                                                                           | 83/06/02. 22.36.17.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | PAGE        | 1             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|
| 0400 - CONTROL POI                                                                                                                                                                                                                                                                                                                                                                                             | NT 02                                                                                            |                                                                                                                 |                                                                            |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| CPO2 EXCH                                                                                                                                                                                                                                                                                                                                                                                                      | IANGE PACKAGE                                                                                    |                                                                                                                 |                                                                            |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                | 26250 B2 31053<br>14424 B3 0<br>33070 B4 43<br>33072 B5 31367<br>1 B6 33646                      | (A1)=0000 0000 0000<br>(A2)=0000 0000 0000<br>(A3)=0000 0000 0000<br>(A4)=0000 0000 0000<br>(A5)=0000 0000 0000 | 0000 0000<br>0000 0024<br>0004 3521<br>0003 3244<br>0003 3273<br>0000 0000 | (B1)=3444<br>T (B2)=0400<br>D2Q (B3)=0000<br>CZ9 (B4)=0000<br>CZ (B5)=0400<br>(B6)=5110 | 0000         0000         0000         0000         1000           4400         0000         0000         0000         11           0320         2500         0000         0000         1000           0000         0000         0000         0000         0000           0000         0000         0000         0000         0000           0320         5100         0000         0000         0           0336         3001         0003         3274         (1)           0004         0435         0204         3715         0 | CPU<br>CP ( |               |
| X0         7777         7707         7707           X1         0000         0000         000           X2         0000         0000         000           X3         0000         0000         000           X4         0000         0000         000           X5         0000         0000         000           X6         2203         1400         000           X6         2000         0000         000 | 00 0000 0000<br>00 0000 0024<br>00 0004 3521<br>00 0003 3243<br>00 0003 3273<br>00 0000 0000 RCL | (X1)=0000 0000<br>T (X2)=0000 0000<br>D2Q (X3)=1000 0150<br>CZ8 (X4)=0400 0321<br>CZ (X5)=0000 0000             | 0000 0000 0000 H<br>6630 2205 0301 D<br>0000 0000 0000<br>0000 0000 0000   | CQ XRECA                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| PARAMETER                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                  |                                                                                                                 |                                                                            |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| USER NAME<br>PRIMARY FILE                                                                                                                                                                                                                                                                                                                                                                                      | NETOPS SENS<br>CCL                                                                               | E SWITCHES<br>R1 O                                                                                              | 00<br>00000                                                                |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | }           | X List Option |
|                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                  | r3 0                                                                                                            | 00000<br>00000<br>00<br>0077<br>SSSC                                       |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| MESSAGE 1<br>MESSAGE 2                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                  | D2 22.05.09.LLINK<br>ST *K* DISPLAY                                                                             | L003103,EN,RL=3,H-                                                         | -N,S                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| CURRENT COMMAND                                                                                                                                                                                                                                                                                                                                                                                                | - NIP(NI                                                                                         | N=199,ISTP=YES,FSTP=Y                                                                                           | ES,MC=500)                                                                 |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| LAST DAYFILE MESS                                                                                                                                                                                                                                                                                                                                                                                              | AGE - 22.05                                                                                      | .09.NP/SN102 22.05.0                                                                                            | 09.LLINK L003103,                                                          | EN,RL=3,H-N,SN1                                                                         | 02 /103,SN102 /003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |               |
| SPECIAL ENTRY POI<br>EJT ENTRY                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                  |                                                                                                                 |                                                                            |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |
| 025000 1601 1555 0<br>025001 0000 0000 4<br>025002 0000 0000 0<br>025003 0700 0000 0                                                                                                                                                                                                                                                                                                                           | 000 0002 7776<br>000 0000 0000                                                                   | MA 44 B<br>5 B<br>3                                                                                             |                                                                            |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |               |

| RA = CP,2.<br>0000000 CM 22               | .15.04. 83/0 | 6/02. CDC NETWORK OPE                        | DUMP D<br>RATING SYSTE |                                                                |
|-------------------------------------------|--------------|----------------------------------------------|------------------------|----------------------------------------------------------------|
|                                           |              | Beginning of T List Op                       | ption                  |                                                                |
| CONTROL POINT                             | AREA /       | !                                            |                        |                                                                |
| CPU STATUS                                | STSW 000420  | 5                                            | /A A                   | RESERVED RFCW 000475 0000000                                   |
| CPU SUB-CP ACTIVE                         |              | 0                                            |                        | CONTROL STATEMENT ADDRESS 000000                               |
| NUMBER PPS ASSIGNED                       |              | 01                                           |                        | DEMAND FILE RANDOM INDEX 000000                                |
| ERROR FLAGS                               |              | 0000                                         |                        | RESERVED ALMW 000476 0077                                      |
| RESERVED<br>SUSPEND ON ROLLOUT FLA        | e            | 0                                            |                        | MAX MAGNETIC TAPES 7<br>MAX REMOVABLE PACKS 7                  |
| ROLLOUT CONTROL                           | 9            | 00                                           |                        | MAX DEFER BATCH JOBS 7                                         |
| RESERVED                                  |              | 0000                                         |                        | RESERVED O                                                     |
| RECALL CONTROL                            |              | 0001                                         |                        | MAX TINE LIMIT 77                                              |
| CPU PRIORITY/RECALL                       | JCIW 000421  |                                              | A JQ                   | MAX SRU LIMIT 77                                               |
| RESERVED                                  |              | 000                                          |                        | MAX FIELD LENGTH 77                                            |
| CPU SELECTION                             |              | 0                                            |                        | MAX ECS FIELD LENGTH 77                                        |
| SUBSYSTEM ID<br>JOB CONTROL/*DIS* FLAG    | e .          | 7770                                         | 4                      | MAX LINES PRINTED 77<br>MAX CARDS PUNCHED 77                   |
| USER PRIVACY, PRESERVE                    |              | 0                                            |                        | MAX CARDS PUNCHED 77 RESERVED ACLW 000477 0000                 |
| *WQ* LINKAGE                              | 200          | 001221                                       |                        | DAYFILE MESSAGES COUNT 7777                                    |
| CPU RECALL CRITERION                      | CRCW 000422  | 00030000033713026422                         | C C4KB R               | CONTROL STATEMENTS CNT 7777                                    |
| JOB TERMINATION OPTION                    |              |                                              |                        | RESERVED 77                                                    |
| QUEUE FILE DISPOSITION                    |              | 0                                            |                        | MS PRUS COUNT 777777                                           |
| RESERVED                                  |              | 00000                                        |                        | ACCOUNT ACCESS WORD AACW 000500 0000000000037777777 C          |
| RSVD/1 STATEMENT FLAG                     |              | 0                                            |                        | MAP III MULT. MPMW 000501 0000002 P                            |
| CHARGE REQ OP/CCL LEVE<br>JOB ORIGIN TYPE | JOTW         | 0000<br>0000                                 |                        | RESERVED 000000<br>MAP III ACCUMULATOR MPAW 0000000            |
| OPER ASSIGNED EQUIP                       | OAEW         | 0000                                         |                        | AUC1/2/3 ACCUMULATORS AU1W 000502 000000000000000000           |
| NEGATIVE FL/100B                          | FLSW 000424  |                                              | D JCD                  | AUC4/5 ACCUMULATORS AU2W 000503 0000000000000                  |
| *SET* RECOVERY NFL                        |              | 0000                                         |                        | RESERVED 000000                                                |
| RA/1008                                   |              | 00001203                                     |                        | LENGTH BUFFER 0 ICAW 000504 0000                               |
| FL/100B                                   |              | 0466                                         | _                      | ADDRESS BUFFER 0 000000                                        |
| ZERO                                      | 000425       |                                              | I 5DD                  | LENGTH BUFFER 1 0000                                           |
| RA/100B - NFL/100B<br>4000B + NFL/100B    |              | 00001177<br>4004                             |                        | ADDRESS BUFFER 1 000000 SPEC ENTRY POINT FLAG SEPW 000505 0    |
| FL/100B                                   |              | 4004                                         |                        | RSVD/LDR=/CLB= EN PT FLAGS 0                                   |
| ZERO                                      | ECSW 000426  |                                              | BU                     | ARG=/DMP=/SDM= EN PT FLAGS 0                                   |
| RESERVED                                  |              | 0000                                         |                        | SSJ=/VAL=/SSM= EN PT FLAGS O                                   |
| ECS RA/1000B                              |              | 00000225                                     |                        | RESERVED 0000                                                  |
| ECS FL/1000B                              |              | 0000                                         |                        | RESTART/SUPPRESS DMP= FLAGS 0                                  |
| PUNCH MODE/OVERRIDE                       | SNSW 000427  |                                              | 1                      | DM* FILE FLAGS 0                                               |
| RESERVED<br>RESERVED-INSTALLATION         |              | 0000000                                      | 1                      | DMP= FL/100 (0 = ENTIRE FL) 0000                               |
| PP PAUSE FLAGS                            |              | 0000                                         |                        | SSJ= PARAMETER BLK ADDRESS 00000000000000000000000000000000000 |
| SENSE SWITCHES                            |              | 00                                           | i                      | CCL - EFF JCDW 000507 00 A                                     |
| RESERVED                                  |              | 00                                           |                        | CCL - R1G 000000                                               |
| MESSAGE 1 AREA                            |              | 16205023163433355555                         |                        | CCL - DATA 0001                                                |
|                                           |              | 55353557334057334457                         | 22.05.09.              | RESERVED 0000000                                               |
|                                           |              | 14141116130055143333                         |                        | CCL - EF JCRW 000510 00                                        |
|                                           |              | 36343336560516562214                         |                        | CCL - R3 000000                                                |
| MESSAGE 2 AREA                            |              | 54365610461656230000<br>53220521250523245547 |                        | CCL - R2 000000<br>  CCL - R1 000000                           |
| HESSAGE C AREA                            |              |                                              | K* DISPLAY             | SEC MEM/K DIS FLAGS DBAW 000511 0 A58A5=A5=                    |
|                                           |              | 000000000000000000000000000000000000000      |                        | ECS AND CM CMM MODE FLAGS 0                                    |
| INSTALLATION WORD 0                       |              | 000000000000000000000000000000000000000      | 1                      | INPUT BUFFER ADDRESS 014043                                    |
| INSTALLATION WORD 1                       |              | 000000000000000000000000000000000000000      |                        | RIGHT SCREEN BFR ADD 014054                                    |
| INSTALLATION WORD 2                       |              | 000000000000000000000000000000000000000      | i                      | LEFT SCREEN BFR ADD 014054                                     |
| INSTALLATION WORD 3                       | IN3W 000443  | 000000000000000000000000000000000000000      | i                      | MAP OPTIONS/LIB FLAG LB1W 000512 00                            |
|                                           |              |                                              |                        |                                                                |

(Continued)

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| RA = CP,2.<br>0000000 CM 22.15.04.83/0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 06/02. CDC NETWORK OPER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DUMP OC<br>ATING SYSTEM |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | /02. 22.36.17. PAGE                                                            | 3                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 000000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                         | REDUCE/LOADER FLAGS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 00                                                                             |                                                                                                                                                                                 |
| INSTALLATION WORD 5 INSW 000445                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 000000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                         | RESERVED FOR LOADER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0000                                                                           |                                                                                                                                                                                 |
| INSTALLATION WORD 6 IN6W 000446                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 000000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                         | INTERACTIVE DEBUG CONTROL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0000                                                                           |                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 000000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                         | GLOBAL LIB INDICATORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0000000                                                                        | 0                                                                                                                                                                               |
| LIMIT FLAGS ACTW 000450                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N (WOR                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000513 000000000000000000000000000000000                                       |                                                                                                                                                                                 |
| OVERFLOW FLAGS SRUW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000514 0000000000000000000                                                     |                                                                                                                                                                                 |
| SRU ACCUMULATOR/OVERFLOW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 00001651271722                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         | FNT ADDR LAST FIL EXEC EOCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                | •                                                                                                                                                                               |
| CP ACCUM (NANOUNITS/4) CPTW 000451                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AG5\$                   | ECS FL FOR DMP= CALL PPDW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                |                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 00314540000000000416                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | FL FOR DMP= CALL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0000                                                                           |                                                                                                                                                                                 |
| M13 = M1 * M3 MP1W 000453                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3 3 B                   | DUMP WORD COUNT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 00                                                                             |                                                                                                                                                                                 |
| M14 = M1 * M4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 000036                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5 5 5                   | EWA OF DUMP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 00000                                                                          | n                                                                                                                                                                               |
| RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                         | RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 000516 0000000000000000                                                        | -<br>Q                                                                                                                                                                          |
| ADDER ACCUMULATOR ADAW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 000002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         | OUTSTANDING CONNECT COUNT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 002                                                                            | 1 -                                                                                                                                                                             |
| M1 * 1000 MP2W 000454                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | B1P 0/                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000517 0000                                                                    | •                                                                                                                                                                               |
| M12 = M1 * M2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 001750                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 011 07                  | CONNECTION/WAIT RESPONSES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 000000000000000000000000000000000000000                                        | n                                                                                                                                                                               |
| RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 00000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000520 37777777777777700000                                                    |                                                                                                                                                                                 |
| DISABLE SRU ACCUM, CPM MP3W 000455                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | в. 7Х                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000521 0000                                                                    | 83                                                                                                                                                                              |
| IOM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000004230                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>D.</b> 1X            | RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 00                                                                             | 00                                                                                                                                                                              |
| SRU ACCOUNT BLOCK LMT STLW 000456                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                         | LIST OF FILES ADDRESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 023655                                                                         |                                                                                                                                                                                 |
| COMPUTED SRU JOB STEP LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 77777777777777777                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                         | RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 000000                                                                         |                                                                                                                                                                                 |
| RESERVED SRU JOB STEP LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DCD                     | APPL ACCESS LEVEL AALW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                | n                                                                                                                                                                               |
| SRU JOB STEP LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 777777                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000522 00400323                                                                | 5CS P                                                                                                                                                                           |
| SRU ACCUM AT JOB STEP START                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000040304                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         | RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0000222 004000220                                                              | , ,                                                                                                                                                                             |
| RESERVED CPJW 000460                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                         | INIT TIME SLICE OCCUR FLAG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0                                                                              |                                                                                                                                                                                 |
| CP TIME JOB STEP LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 777777                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         | CPU TIME SLICE LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 00000200                                                                       | n                                                                                                                                                                               |
| CP ACCUM AT JOB STEP START                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 000000016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         | ADMIN/DIAG/USER PW EXP JSCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                | 0                                                                                                                                                                               |
| CHARGE/ACCOUNTING FLGS FPFW 000461                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                         | PF PW EXP/LOWER JAL/FAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0                                                                              |                                                                                                                                                                                 |
| RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         | WRITE DOWN/UNLABELED TAPES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Ő                                                                              |                                                                                                                                                                                 |
| SRU VALIDATION LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 7777                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | RESERVED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ů<br>n                                                                         |                                                                                                                                                                                 |
| FNT ORDINAL OF PROFILE FILE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | •                                                                              |                                                                                                                                                                                 |
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| IEVEL -3 BLOCK TRACK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | JOB ACCESS LEVEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0                                                                              |                                                                                                                                                                                 |
| LEVEL-3 BLOCK TRACK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | USER ACCESS LEV VALIDATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 000                                                                            |                                                                                                                                                                                 |
| LEVEL-3 BLOCK SECTOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 000<br>0                                                                       | n                                                                                                                                                                               |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0000<br>00000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4 E 4                   | USER ACCESS LEV VALIDATION<br>Job Access Level Limit<br>USER Access Category Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 000<br>0<br>0000000000                                                         | D                                                                                                                                                                               |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0000<br>000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4 F 4                   | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 000<br>0<br>0000000000<br>000524 00000000000000000                             | -                                                                                                                                                                               |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0000<br>000000000000000000000000<br>3765<br>0600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4 F 4                   | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000<br>0<br>0000000000<br>000524 000000000000000<br>00000<br>00000             | D                                                                                                                                                                               |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB                                                                                                                                                                                                                                                                                                                                                                                                                      | 0000<br>000000000000000000000000<br>3765<br>0600<br>3765                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4 F 4                   | USER ACCESS LEV VALIDATION<br>Job Access level limit<br>USER Access category set<br>Default pack name pknw<br>Default pack type<br>Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 000<br>0<br>0000000000<br>000524 000000000000000<br>00000<br>000525 0000000000 | D<br>D                                                                                                                                                                          |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED                                                                                                                                                                                                                                                                                                                                                                                                          | 0000<br>00000000000000000000000<br>3765<br>0600<br>3765<br>00000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                         | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RESERVED<br>RECALL CRITERION RCCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 000<br>0<br>000000000<br>000524 0000000000000<br>000525 000000000000000000     | о<br>О<br>2 в                                                                                                                                                                   |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464                                                                                                                                                                                                                                                                                                                                                                       | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>00000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4 F 4<br>B B            | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION RCCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 000<br>0<br>0000000000<br>000524 000000000000000000000<br>000525 0000000000    | D<br>D<br>2 В<br>3 С                                                                                                                                                            |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)                                                                                                                                                                                                                                                                                                                                             | 0000<br>000000000000000000000000<br>3765<br>0600<br>3765<br>00000000<br>0200<br>0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION RCCW<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 000<br>0<br>000000000<br>000524 00000000000000000<br>000525 00000000000000     | 0<br>2 B<br>3 C<br>4 D                                                                                                                                                          |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL                                                                                                                                                                                                                                                                                                                           | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 000<br>0<br>000000000<br>000524 000000000000000000000000000000000              | D<br>2 B<br>3 C<br>4 D<br>5 E                                                                                                                                                   |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED                                                                                                                                                                                                                                                                                                               | 0000<br>00000000000000000000000<br>3765<br>0600<br>3765<br>000000000<br>0000<br>0200<br>000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000<br>0<br>0000000000<br>0000524 00000000000000000000000000000000             | D<br>2 B<br>3 C<br>4 D<br>5 E<br>5 F                                                                                                                                            |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED<br>EQUIP ASSIGNED COUNT EACW 000465                                                                                                                                                                                                                                                                           | 0000<br>0000000000000000000000<br>3765<br>0600<br>3765<br>00000000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                         | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 000<br>0<br>0000000000<br>000524 0000000000000000<br>000525 000000000000000    | D<br>2 B<br>3 C<br>4 D<br>5 E<br>5 F<br>7 G                                                                                                                                     |
| LEVEL-3 BLOCK SECTOR<br>RESERVED<br>MAX FL FOR JOB STEP<br>MAX FL FOR JOB STEP<br>MAX FL FOR JOB STEP<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED<br>EQUIP ASSIGNED COUNT<br>RESERVED<br>FLIW                                                                                                                                                                                                                                                                          | 0000<br>000000000000000000000000<br>3765<br>0600<br>3765<br>000000000<br>0000<br>0000<br>0000<br>0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 000<br>0<br>00000000000000000000000000000000                                   | D<br>2 B<br>3 C<br>4 D<br>5 E<br>5 F<br>7 G<br>0 H                                                                                                                              |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED<br>EQUIP ASSIGNED COUNT EACW 000465<br>RESERVED FLIW<br>SCHEDULER STATUS                                                                                                                                                                                                                                      | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>00000000<br>0000<br>0000<br>0000<br>0001<br>000<br>0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                                     | 000<br>0<br>000000000<br>000524 00000000000000000<br>000525 00000000000000     | D<br>D<br>2 B<br>3 C<br>4 D<br>5 E<br>5 F<br>7 G<br>0 H<br>1 I                                                                                                                  |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED<br>SERVED COUNT EACW 000465<br>RESERVED FLIW<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN                                                                                                                                                                                                                    | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>000000000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                                                                 | 000<br>0<br>00000000000000000000000000000000                                   | D<br>D<br>2 B<br>3 C<br>4 D<br>5 E<br>5 F<br>7 G<br>0 H<br>1 I<br>2 J                                                                                                           |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL ELCW 000465<br>RESERVED FL RACW 000465<br>RESERVED FL W<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST                                                                                                                                                                                                   | 0000<br>0000000000000000000000<br>3765<br>0600<br>3765<br>00000000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>0000<br>0 | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                                                                                         | 000<br>0<br>00000000000000000000000000000000                                   | D<br>D<br>2 B<br>5 C<br>5 E<br>5 F<br>7 G<br>0 H<br>1 I<br>2 J<br>3 K                                                                                                           |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL ELCW 000464<br>RESERVED<br>EQUIP ASSIGNED COUNT EACW 000465<br>RESERVED FLIW<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST                                                                                                                                                             | 0000<br>000000000000000000000000<br>3765<br>0600<br>3765<br>000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                             | 000<br>0<br>0000000000<br>000522 0000000000000000                              | D<br>2 B<br>5 E<br>5 F<br>7 G<br>1 I<br>2 J<br>5 K                                                                                                                              |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED EQUINT EACW 000465<br>RESERVED FL FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>CM FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466                                                                                                                                                                             | 0000<br>000000000000000000000000<br>3765<br>0600<br>3765<br>000000000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                                                                             | 000<br>0<br>00000000000000000000000000000000                                   | D<br>2 B<br>3 C<br>5 E<br>5 F<br>7 G<br>7 G<br>0 H<br>1 I<br>2 J<br>2 K<br>1 J<br>2 K<br>4 L<br>3 K                                                                             |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED FL<br>RESERVED FL<br>RESERVED FL W<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466                                                                                                                                                             | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>00000000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>0000<br>00 | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                                                                                 | 000<br>0<br>0000000000<br>000522 0000000000000000                              | DD<br>22 B<br>53 C<br>55 F<br>7 G<br>0 H<br>1 I<br>22 J<br>1<br>22 J<br>1<br>24 L<br>55 M                                                                                       |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED<br>EQUIP ASSIGNED COUNT EACW 000465<br>RESERVED FLIW<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466<br>RESERVED<br>TERMINAL NUMBER TTNW                                                                                                       | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>00000000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>0000<br>00 | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION                                                                                                                                                                                     | 000<br>0<br>00000000000000000000000000000000                                   | D<br>22 B<br>33 C<br>55 E<br>7 G<br>7 G<br>7 H<br>1 J<br>22 J<br>23 K<br>1 L<br>23 K<br>1 S<br>55 K<br>1 S<br>55 N<br>55 N                                                      |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL FLCW 000464<br>LAST CARD ECS FL FLCW 000464<br>RESERVED<br>EQUIP ASSIGNED COUNT EACW 000465<br>RESERVED FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>CM FL REQUEST<br>CM FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466<br>RESERVED<br>TERMINAL NUMBER TTNW<br>TERMINAL INT ADDR TIAW                                                            | 0000<br>00000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL CRITERION | 000<br>0<br>00000000000000000000000000000000                                   | D<br>2 B<br>3 C<br>5 E<br>5 F<br>7 G<br>7 G<br>1 I<br>2 J<br>5 K<br>5 K<br>5 N<br>0                                                                                             |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED FL<br>RESERVED FL<br>RESERVED FLW<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466<br>RESERVED<br>TERMINAL INT ADDR TIAW<br>OUTPUT POINTER TIOW                                                                                                 | 0000<br>0000000000000000000000<br>3765<br>0600<br>3765<br>00000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>00000<br>00000<br>000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | B B                     | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME<br>PEFAULT PACK NAME<br>RESERVED<br>RECALL CRITERION<br>RECALL REQUESTS IR-S                                          | 000<br>0<br>0000000000<br>000522 0000000000000000                              | D<br>2 B<br>3 C<br>4 D<br>5 F<br>7 G<br>0 H<br>1 I<br>2 J<br>3 K<br>4 L<br>5 M<br>0 N<br>0 D                                                                                    |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000463<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL ELCW 000465<br>RESERVED EACW 000465<br>RESERVED FLIW<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466<br>RESERVED TINW<br>TERMINAL NUMBER TINW<br>TERMINAL NUMBER TIAW<br>OUTPUT POINTER TIOW<br>RESERVED PFCW 000467                                                        | 0000<br>00000000000000000000000000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ВВ                      | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION<br>RECALL REQUESTS IR-S<br>RECALL REQUESTS IR-S                                                                                                                                                         | 000<br>0<br>00000000000<br>000524 000000000000000000000000000000000            | D<br>22 B<br>33 C<br>55 E<br>56 F<br>7 G<br>7 G<br>7 H<br>1 I<br>2 J<br>55 K<br>L<br>55 N<br>0<br>0<br>0<br>0                                                                   |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL ELCW 000464<br>RESERVED ELCW 000465<br>RESERVED FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>CM FL REQUEST<br>TAXT SUBSYSTEM TXSW 000466<br>RESERVED TERMINAL INT ADDR TIAW<br>OUTPUT POINTER TIAW<br>RESERVED PFCW 000467<br>EST ORD OF FAMILY DEVICE                                                             | 0000<br>00000000000000000000000<br>3765<br>00000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>00000<br>00000<br>00000<br>000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B B                     | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION RCCW<br>RECALL CRITERION<br>RECALL REQUESTS IR-S<br>RECALL REQUESTS IR-S                                                                                        | 000<br>0<br>0000000000<br>000522 0000000000000000                              | D<br>2 B<br>3 C<br>4 D<br>5 E<br>5 F<br>7 G<br>7 G<br>7 G<br>1 I<br>2 J<br>5 K<br>4 L<br>5 N<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0                   |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL<br>RESERVED EACW 000465<br>RESERVED FL W<br>SCHEDULER STATUS<br>NEGATIVE FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>TXOT SUBSYSTEM TXSW 000466<br>RESERVED<br>TERMINAL NUMBER TTNW<br>TERMINAL INT ADDR TIAW<br>OUTPUT POINTER TIOW<br>RESERVED PFCW 000467<br>EST ORD OF FAMILY DEVICE<br>LIMIT FOR SIZE OF DAF | 0000<br>000000000000000000000<br>3765<br>0600<br>3765<br>00000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>00000<br>00000<br>00000<br>00000<br>00000<br>000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | B B                     | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME<br>PEFAULT PACK NAME<br>RESERVED<br>RECALL CRITERION<br>RECALL REQUESTS IR-S<br>RECALL REQUESTS IR-S                                                                                                                      | 000<br>0<br>00000000000<br>000522 000000000000000                              | D<br>2 B<br>2 B<br>5 E<br>5 F<br>7 G<br>0 H<br>1<br>2 J<br>5 K<br>1<br>1<br>2 J<br>5 K<br>1<br>1<br>2 J<br>5 N<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0 |
| LEVEL-3 BLOCK SECTOR<br>RESERVED 000462<br>MAX FL FOR JOB STEP FLCW 000462<br>LAST CARD FL (NFL)<br>MAXIMUM FL FOR ENTIRE JOB<br>RESERVED<br>JOB STEP MAX ECS FL ELCW 000464<br>LAST CARD ECS FL (NFL)<br>JOB MAX ECS FL ELCW 000464<br>RESERVED ELCW 000465<br>RESERVED FL FOR ROLLIN<br>ECS FL REQUEST<br>CM FL REQUEST<br>CM FL REQUEST<br>TAXT SUBSYSTEM TXSW 000466<br>RESERVED TERMINAL INT ADDR TIAW<br>OUTPUT POINTER TIAW<br>RESERVED PFCW 000467<br>EST ORD OF FAMILY DEVICE                                                             | 0000<br>00000000000000000000000<br>3765<br>00000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>00000<br>00000<br>00000<br>00000<br>000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B B                     | USER ACCESS LEV VALIDATION<br>JOB ACCESS LEVEL LIMIT<br>USER ACCESS CATEGORY SET<br>DEFAULT PACK NAME PKNW<br>DEFAULT PACK TYPE<br>RESERVED<br>RECALL CRITERION RCCW<br>RECALL CRITERION<br>RECALL REQUESTS IR-S<br>RECALL REQUESTS IR-S                                                                                        | 000<br>0<br>00000000000000000000000000000000                                   | D<br>22 B<br>33 C<br>55 E<br>56 F<br>7 G<br>7 G<br>7 H<br>1 I<br>2 J<br>55 K<br>1 S<br>55 N<br>55 N<br>50<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00     |



DAYFILE LINES IN BUFFER

NS/ 22.04.43.SN102 , DUMP NP00199 COMPLETED. 22.04.43.NS/ 22.04.43.SN102 , LOADING (MIC ). 22.04.46.NS/ 22.04.46.SN102 , LOADING (BIGLM ).

(Continued)

| RA =<br>0000000                                     |                                                                                                      | 22.                                                         | .15.04.                         | . 83/06                                      | 5/02.                                          | CDC                                                            | NETWO                                                       | RK OP                             | ERAT I                 |                | UMP (<br>Syste |                                           | DSDI       |              |              | 83/06        | 5/02.          | 22.36          | .18.      | Р      | AGE  | 5 |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------|----------------------------------------------|------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------|------------------------|----------------|----------------|-------------------------------------------|------------|--------------|--------------|--------------|----------------|----------------|-----------|--------|------|---|
| 22.05.0<br>22.05.0<br>22.05.0<br>22.05.0<br>22.05.0 | 56.NS/<br>57.NS/<br>36.NP/SN10<br>36.NP/SN10<br>36.NP/SN10<br>36.NP/SN10<br>39.NP/SN10<br>39.NP/SN10 | 12 22<br>12 22<br>12 22<br>12 22<br>12 22<br>12 22<br>12 22 | 2.05.06<br>2.05.09<br>2.05.09   | SN102<br>NPU<br>SUPE<br>CCP<br>PREV<br>LLINK | SN103<br>ERVIS<br>VERS<br>VERS<br>VIOUS<br>CLO | LOAD (<br>2 , A)<br>ION G/<br>ION<br>CS N(<br>03103,<br>03103, | COMPLI<br>C,103<br>A INED<br>33, I<br>ODE<br>EN,RI<br>EN,RI | ETED.<br>LEVEL<br>200, 1<br>L=3,H | 594<br>PREVI<br>-N, SN | 0US<br>102     | NS N<br>/00    | 17 594<br>10de 00<br>13,sn102<br>13,sn102 | /1         |              |              |              |                |                |           |        |      |   |
|                                                     | ATTACHED                                                                                             |                                                             |                                 |                                              |                                                | -                                                              |                                                             |                                   |                        |                |                |                                           |            |              |              |              |                |                |           |        |      |   |
| 0304                                                | INPUT                                                                                                | IN                                                          | FST -                           | 0006<br>Chain                                | 4175                                           | 2400<br>4175                                                   | 0001<br>0002                                                | 1700<br>0005                      | INPU<br>F6             | Г /<br>6 і     | AO<br>3 E      |                                           | FUT<br>EST | 0000<br>7700 | 0000<br>6210 | 0000         | 0000<br>5 1377 | 0000<br>7 0421 | 1277      | н кк   | DØJ  |   |
| 0312                                                | NAM                                                                                                  | LO                                                          |                                 | CHAIN                                        |                                                | 0000<br>4176                                                   | 0000<br>0004                                                | 1500<br>0005                      | NAM<br>F6              | 6 1            | M<br>D E       |                                           | FUT<br>EST | 0000<br>7700 | 0000<br>6210 | 0000<br>0013 | 0000<br>1377   | 0000<br>' 0421 | 1277      | н кк   | DØJ  |   |
| 0315                                                | OUTFIL                                                                                               | L0                                                          |                                 | CHAIN                                        |                                                | 1114<br>4205                                                   | 0000<br>0001                                                | 1500<br>0105                      | OUT F<br>G7E           | IL<br>7E /     | M              |                                           | FUT<br>EST | 0000<br>7702 | 0000<br>6210 | 0000<br>0013 | 0000<br>1377   | 0000<br>0421   | 1302      | нкк    | DQKB |   |
| 0320                                                | ZZZZCO                                                                                               | LI                                                          | FNT –<br>FST –<br>TRACK<br>4175 | CHAIN                                        | 3232<br>4175<br>-                              | 3203<br>4175                                                   | 3301<br>0001                                                | 1007<br>0005                      | ZZZZ<br>FÓ             | 2 C O A<br>5 A | NHG<br>N E     |                                           | FUT<br>EST | 0000<br>7700 | 0000<br>6210 | 0000<br>0013 | 0000<br>1377   | 0000<br>' 0421 | 1277      | нкк    | DQJ  |   |
| 0323                                                | ZZZZZC2                                                                                              | LO                                                          | FST -                           | CHAIN                                        | 4177                                           | 3203<br>4177                                                   | 3500<br>0002                                                | 1507<br>0307                      | ZZZZZ<br>F6 (          | 2C2<br>5 E     | MG<br>BCG      |                                           |            | 0000<br>7700 |              |              |                |                | 1277      | нкк    | DØJ  |   |
| 0326                                                | OUT PUT                                                                                              | PM                                                          | FST -                           | 1725<br>0010<br>CHAIN<br>0001                | 6742                                           | 2524<br>6742                                                   | 0000<br>0001                                                | 1200<br>0005                      | OUTPL<br>H7            | лт<br>7 А      | J              |                                           |            | 0000<br>7704 |              |              |                |                | G<br>1305 | 7HZ VK | DJKE |   |
| 0331                                                | NRF1                                                                                                 | LO                                                          | FST -                           | 1622<br>0007<br>CHAIN<br>0003                | 4210                                           |                                                                |                                                             |                                   |                        |                |                |                                           |            | 0000<br>7702 |              |              |                |                | 1302      | нкк    | DQKB |   |
| 0334                                                | NRF2                                                                                                 | LO                                                          | FST -                           | 1622<br>0006<br>CHAIN<br>0003                | 4200                                           |                                                                |                                                             |                                   |                        |                |                |                                           |            | 0000<br>7700 |              |              |                |                | 1277      | нкк    | DØJ  |   |
| 0337                                                | LIST                                                                                                 | PM                                                          | FST -                           | 1411<br>0010<br>CHAIN<br>0001                | 7052                                           |                                                                |                                                             |                                   |                        |                |                |                                           |            | 0000<br>7704 |              |              |                |                | G<br>1305 | 7HZVK  | DJKE |   |
| 0342                                                | ZZZZZPP                                                                                              | PM                                                          | FNT -                           | 3232                                         | 3232                                           | 3220                                                           | 2000                                                        | 1200                              | 22222                  | PP             | J              |                                           | FUT        | 0000         | 0000         | 0700         | 0000           | 0000           | G         |        |      |   |
| RA =<br>0000000                                     | CP,2.<br>CM                                                                                          | 22.                                                         | 15.04.                          | 83/06                                        | /02.                                           | CDC N                                                          | ETWOR                                                       | K OPE                             | RATIN                  |                | MP O           |                                           | DSDI       | NOS 2        |              | 83/06        | /02.           | 22.36.         | 18.       | P      | AGE  | 6 |
|                                                     |                                                                                                      |                                                             |                                 | 0010<br>CHAIN<br>0001                        |                                                | 7053                                                           | 0001                                                        | 0005                              | н <b>\$</b>            | \$ A           | E              |                                           | EST        | 7704         | 4210         | 3226         | 1377           | 0412           | 1305      | 7HZVK  | DJKE |   |
| 0345                                                | ZZZZDMB                                                                                              | PM                                                          | FST -                           | 3232<br>0010<br>CHAIN<br>0001                | 7054                                           | 0415<br>7054                                                   | 0200<br>0001                                                | 1200<br>0005                      | ZZZZZ<br>H =           | mb<br>= A      | J              |                                           |            | 0000<br>7704 |              |              |                |                | G<br>1305 | 7HZ VK | DJKE |   |
| 0350                                                | ZZZZDN                                                                                               | LO                                                          | FST -                           | CHAIN                                        | 4216                                           | 3204<br>4216                                                   | 1600<br>0022                                                | 1500<br>0703                      | ZZZZZ<br>G7N7          | DN<br>NR       | M<br>GC        |                                           |            | 0000<br>7702 |              |              |                |                | 1302      | нкк    | DQKB |   |

#### Example 4:

The following sample illustrates the printer output listing produced by the MST directive (dump mass storage/track reservation table). The MST is listed in two columns. The left column is read from top to bottom, perhaps across page boundaries, and continues at the top of the right column. The track reservation table is listed in single column following the MST.

| EQUIPMENT 006 - MASS ST                                    | TORAGI   | FTARIE |                                         |     |       |     |                                                                    |       |        |                                                |       |    |
|------------------------------------------------------------|----------|--------|-----------------------------------------|-----|-------|-----|--------------------------------------------------------------------|-------|--------|------------------------------------------------|-------|----|
|                                                            |          |        |                                         |     |       |     |                                                                    |       | +      |                                                |       |    |
| NUMBER OF TRACKS<br>PF INTERLOCK / COUNTS<br>LENGTH OF TRT | TDGL     | 012770 | 3222<br>0000<br>0645                    | ZR  | F+5   | 8XB | ALLOCATION FLAGS<br>CH 2 ACCESS 7154 FLAG<br>CH 1 ACCESS 7154 FLAG | 3     | 013003 | 4001<br>00<br>53                               | 5A \$ | F  |
| FIRST AVAIL TRACK PTR<br>NUM AVAILABLE TRACKS              |          |        | 4043<br>3002                            |     |       |     | *PUT* ORD OF FIRST UN<br>DEVICE FLAGS                              | ιT    |        | 0000                                           |       |    |
| CTI/DS FILE/CT TRK OVF<br>RESERVED                         | ACGL     | 012771 | 0                                       |     | H6    | A   | MEMORY TYPE - 3 BIT (<br>CPU TYPE - 3 BIT )                        |       |        | 0                                              |       |    |
| GLOBAL DOWN STATUS (RM)<br>RESERVED                        | V DV)    |        | 0                                       |     |       |     | PP PATH TYPE - 3 BIT N<br>RESERVED                                 | /ALUE |        | 0<br>00                                        |       |    |
| DA ECS CHAIN FIRST TRAC<br>DIRECT ACCESS FILE CNT          | CK       |        | 0000                                    |     |       |     | ALGORITHM INDEX                                                    |       | 04700/ | 06                                             |       |    |
| FIRST TRACK IGFT                                           |          |        | 0010                                    |     |       |     | UNIT RESERVE COUNT<br>CUMUL TOT UNIT RES COU                       |       | 013004 | 00                                             | 6.    |    |
| REDEFINITION STATUSES                                      |          |        | 01                                      |     |       |     | PF INTERLOCK / COUNTS                                              |       |        | 0000                                           |       |    |
| ALL MF UNLOADED/ERROR                                      | IDLE     |        | 0                                       |     |       |     | RESERVED                                                           |       |        | 00                                             |       |    |
| RESERVED<br>FLAG/MST LINK DEV ADDR                         | SDGL     | 012772 |                                         |     |       |     | MACHINE INDEX - 1<br>CKPT FLG/SYSTEM TABLE                         | TRACK |        | 00<br>4157                                     |       |    |
| MST/TRT UPDATE COUNT                                       |          | 0.21.2 | 000000000                               |     |       |     | FAMILY IDLE STAT/ACT                                               |       |        | 0000                                           |       |    |
| MF INDEX/CPUMTR INTERLO                                    |          |        | 00                                      |     |       |     | LOCAL STATUS FLAGS                                                 | STLL  | 013005 | 000000                                         | 64    | A  |
| FIRST TRACK IAPF                                           | ALGL     | 012773 | 4000                                    | 5   |       |     | ERROR STATUS<br>Machine ID                                         |       |        | 00<br>4137                                     |       |    |
| FIRST TRACK PERMITS                                        |          |        | 4000                                    |     |       |     | CURRENT USER COUNT DAI                                             |       |        | 4137                                           |       |    |
| NUMBER CATALOG TRACKS                                      |          |        | 0000                                    |     |       |     | NEXT EST ORDINAL IN CH                                             |       |        | 000                                            |       |    |
| FIRST TRACK DAT                                            |          |        | 0000                                    |     |       |     | LOCAL STATUS                                                       |       |        | 1                                              |       |    |
| FAMILY OR PACK NAME                                        | PFGL     | 012774 | 23312324413700                          | SYS | T64 I | в   | REDEF IN PROG/NULL EQ                                              | DDLL  | 013006 | 0                                              |       | 5  |
| DEVICE NUMBER                                              |          |        | 02                                      |     |       |     | RESERVED                                                           |       | +      | 0                                              |       |    |
| DEVICE AL LIMIT LOWER/U                                    | JPPER    |        | 00                                      |     |       |     | ORIGINAL NO. OF UNITS                                              |       |        | 0                                              |       |    |
| REL UNIT MULTIUNIT DEV                                     |          | •      | 0                                       |     |       |     | CURRENT NO. OF UNITS -                                             | - 1   |        | 0                                              |       |    |
| NUM UNIT MULTIUNIT DEV                                     |          |        | - 0                                     |     |       |     | EQUIPMENT UNIT LIST                                                |       |        | 00000000000000040                              |       |    |
| USER NAM PRIVATE PACK                                      |          | 012775 |                                         |     |       |     | LOCAL INSTAL AREA                                                  |       |        | 000000000000000000000000000000000000000        |       | -  |
| CONT LBL TRK/DEV RES MA                                    |          | 043774 | 000000                                  |     |       |     | RESERVED                                                           | IRLL  | 013010 | 000000000000000000000000000000000000000        | -     | 12 |
| FLAGS AND DAT INDEX<br>FT-HT FLAG */* SECTOR 1             |          | 012776 |                                         | нJ  | DI    | 1   | FWA OF TRT<br>DISK ERROR COUNT                                     | EC1 1 | 017011 | 013576<br>000000000000000000000000000000000000 |       |    |
| DRIVER NAME                                                | . 1911 1 |        | 1200<br>0411                            |     |       |     | RESERVED                                                           | EVEL  |        | 000000000000000000000000000000000000000        |       |    |
| DEFAULT USER ERR PROCES                                    | STNG     |        | 0000                                    |     |       |     | REJERVED                                                           |       |        | 000000000000000000000000000000000000000        |       |    |
| SECTOR LIMIT                                               |          |        | 1200                                    |     |       |     |                                                                    |       |        | 000000000000000000000000000000000000000        |       |    |
| RESERVED                                                   | NVGL     | 012777 | 000000000000000000000000000000000000000 |     |       |     |                                                                    |       | 013015 | 000000000000000000000000000000000000000        |       |    |
| RESERVED UNIT FLAGS                                        |          |        | 000                                     |     |       |     |                                                                    |       |        | 000000000000000000000000000000000000000        |       |    |
| GLOBAL INSTAL AREA                                         |          |        | 000000000000000000000000000000000000000 |     |       |     |                                                                    |       | 013017 | 000000000000000000000000000000000000000        |       |    |
| ACTIVITY COUNT                                             |          | 013002 |                                         |     | 6(    | к   |                                                                    |       |        |                                                |       |    |
| UNIT INTERLOCKS                                            |          | 1      | 0000                                    |     |       |     |                                                                    |       |        |                                                |       |    |
| CURRENT POSITION                                           |          |        | 4151                                    |     |       |     |                                                                    |       |        |                                                |       |    |
| NEXT BEST POSITION                                         |          | 1      | 7777                                    |     |       |     |                                                                    |       |        |                                                |       |    |
| CHANNEL 2                                                  |          |        | 00                                      |     |       |     |                                                                    |       |        |                                                |       |    |
| CHANNEL 1                                                  |          |        | 13                                      |     |       |     |                                                                    |       |        |                                                |       |    |
| TRACK RESERVAT                                             |          |        |                                         |     |       |     |                                                                    |       |        |                                                |       |    |

/

| 013576 | +0000 | 0010 | 0051 | 0035 | 0003 | (41) | 1111 |   | 1111 | H ( 2 C  | 0  |
|--------|-------|------|------|------|------|------|------|---|------|----------|----|
| 013577 | +0004 | 0001 | 4006 | 4007 | 4010 | 4017 | 1    |   | 1111 | A5F5G5H5 | 50 |
| 013600 | +0010 | 4011 | 4012 | 4013 | 4014 | 0017 |      |   | 1111 | 515J5K5L | 0  |
| 013601 | +0014 | 4015 | 4016 | 4017 | 4020 | 0017 |      |   | 1111 | 5M5N505P | 0  |
| 013602 | +0020 | 4021 | 4022 | 4023 | 4024 | 0017 |      |   | 1111 | 5Q5R5S5T | 0  |
| 013603 | +0024 | 4025 | 4026 | 4027 | 4030 | 0017 |      |   | 1111 | 5U5V5W5X | 0  |
| 013604 | +0030 | 4031 | 4032 | 4033 | 4034 | 0017 |      |   | 1111 | 5Y5Z5051 | 0  |
| 013605 | +0034 | 4035 | 4036 | 4037 | 4040 | 0017 |      |   | 1111 | 52535455 | 0  |
| 013606 | +0040 | 4041 | 4042 | 4043 | 4044 | 0017 |      |   | 1111 | 56575859 | 0  |
| •      |       |      |      |      |      | -    |      | ~ |      |          |    |
|        |       |      |      |      |      |      |      |   |      |          |    |

Track Link Byte Ordinal

Status Bits

## Example 5:

The following sample illustrates the printer output listing produced by the C, D, and E memory dump directives (instruction parcel, byte, and word format, respectively). The same portions of central memory are dumped in each format. Auto page eject has been disabled using the EJOFF directive to allow listing the output from all three memory dump directives on one page.

| RA = C,50,110. C - FORMAT DUMP.            |                                       | 82/01/20. 16.22.27.           | PAGE 17            |
|--------------------------------------------|---------------------------------------|-------------------------------|--------------------|
| 0000000 CM 16.52.11. 82/01/06. CDC         | NETWORK OPERATING SYSTEM. NOS 2       |                               |                    |
| 0000050 00000 00000 00000 00000            | 0000061 77770 00000 00000 00000       | 0000072 74647 56475 12000 (   | 00000 J            |
|                                            | 0000062 00000 00000 01065 34137 AF\$6 | 4 0000073 00033 36401 00007 3 | 30005 COAE         |
| 0000052 00000 00000 00000 07240 5          | 0000063 00000 00000 00000 00000       | 0000074 00033 56404 00035 (   | 00025 C2 D C/ U    |
| 0000053 30766 01030 10057 43001 X HXHE XA  | 0000064 00000 00000 00000 51426 EL    | v 0000075 00035 56406 00057 5 | 50002 C FE B       |
| 0000054 34131 44234 12147 30200 1KL71JL B  | 0000065 00042 71100 00000 00000 DWI   | 0000076 00000 00000 00000 0   | 00000              |
| 0000055 01633 01401 00034 17761 A XLA C6   | 0000066 00000 00000 00000 00000       |                               | 07200 = 5          |
| 0000056 00000 00000 00000 07164            |                                       | - 0000100 00000 00000 00000 0 | 00000              |
| 0000057 77775 12230 00320 00000 (RX Z      | 0000070 00000 03300 24040 40000 O TDD |                               |                    |
| 0000060 00751 10000 00000 00000 I          | 0000071 74500 00122 25000 07421 / ARU | Q 0000107 00054 13700 01065 3 | 34117 E64 AF\$60   |
|                                            |                                       |                               |                    |
| CM D,50,110. D - FORMAT                    | DUMP.                                 |                               |                    |
| 0000050 0000 0000 0000 0000 0000           | 0000061 7777 0000 0000 0000 0000      | 0000072 7464 7564 7512 00     | 1. 0000 00         |
|                                            |                                       |                               |                    |
| 0000052 0000 0000 0000 0000 7240 5         |                                       | 0000074 0003 3564 0400 03     |                    |
| 0000053 3076 6010 3010 0574 3001 X HXHE XA |                                       | ELV 0000075 0003 5564 0600 05 |                    |
| 0000054 3413 1442 3412 1473 0200 1KL71JL B |                                       |                               |                    |
| 0000055 0163 3014 0100 0341 7761 A XLA C6  | 0000066 0000 0000 0000 0000 0000      |                               |                    |
| 0000056 0000 0000 0000 0000 7164           |                                       |                               |                    |
| 0000057 7777 5122 3000 3200 0000 (RX Z     |                                       |                               |                    |
| 0000060 0075 1100 0000 0000 0000 I         |                                       |                               | 53 4117 E64 AF\$60 |
|                                            |                                       |                               |                    |
| CM E,50,110. E - FORMAT                    | DUMP.                                 |                               |                    |

| 0000050 0000000000000000000000000000000 | 000000000000000000000000000000000000000 | 0000000000000007240                     | 30766010301005743001                    |                    | 5 <b>X</b> | HXHE      | XA |
|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|--------------------|------------|-----------|----|
| 0000054 34131442341214730200            | 01633014010003417761                    | 00000000000000007164                    | 77775122300032000000                    | 1KL71JL B A XLA CO |            | (RX Z     |    |
| 0000060 007511000000000000000           | 7777000000000000000000                  | 0000000000106534137                     | 000000000000000000000000000000000000000 | I                  | AF\$64     |           |    |
| 0000064 0000000000000051426             | 000427110000000000000                   | 000000000000000000000000000000000000000 | 000000000000000000000000000000000000000 | ELV DWI            |            |           |    |
| 0000070 00000033002404040000            | 74500001222500007421                    | 74647564751200000000                    | 00033364010000730005                    | OTDD / ARU Q       | J 🥠        | CO A      | E  |
| 0000074 00033564040003500025            | 00035564060005750002                    | 000000000000000000000000000000000000000 | 00007754000040007200                    | C2DC/UCFEB         |            | = 5       |    |
| 0000100 0060000000000000000000000000000 | 000000000000000000000000000000000000000 | 000000000000000000000000000000000000000 | 000000000000000000000000000000000000000 |                    |            |           |    |
| 0000104 0000000000000000000000000000000 | 000000000000000000000000000000000000000 | 000000000000000000000000000000000000000 | 00054137000106534117                    |                    | ſ          | E64 AF\$6 | 60 |

## Example 6:

The following sample illustrates the printer output listing of the system file name table produced by the FNT CMR dump directive. This table is printed in the same format as that produced by the D memory dump option (refer to example 5).

| RA =<br>0000000 | FNT.<br>CM |       | 12.  | 31.31  | . 83/0 | D6/12. C | DC I | NETWORK OP | ERATI |      | P OO<br>Stem | I    | DSDI<br>N( | DS 2 | 8 | 3/06/12. | 12.33 | .11. | I    | PAGE | 1    |   |   |
|-----------------|------------|-------|------|--------|--------|----------|------|------------|-------|------|--------------|------|------------|------|---|----------|-------|------|------|------|------|---|---|
|                 | SYST       | EM FI |      | ME TAI | BLE    |          |      |            |       |      |              |      |            |      |   |          |       |      |      |      |      |   |   |
| 00024706        | 2331       | 2324  | 0515 | 0000   | 1000   | SYSTEM   | н    | 00024723   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   | 00024740 | 0000  | 0000 | 0000 | 0000 | 0016 |   | N |
| 00024707        | 0006       | 4005  | 0000 | 0000   | 0000   | F5E      |      | 00024724   | 0000  | 0000 | 0000         | 0000 | 0010       |      | н | 00024741 | 0000  | 0000 | 0000 | 0000 | 0000 |   |   |
| 00024710        | 2223       | 3004  | 4137 | 0000   | 1300   | RSXD64   | к    | 00024725   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   | 00024742 | 0000  | 0000 | 0000 | 0000 | 0017 | * | 0 |
| 00024711        | 0010       | 4463  | 0000 | 0000   | 0000   | H9       |      | 00024726   | 0000  | 0000 | 0000         | 0000 | 0011       |      | I | 00024743 | 0000  | 0000 | 0000 | 0000 | 0000 |   |   |
| 00024712        | 2223       | 3026  | 4137 | 0000   | 1300   | RSXV64   | κ    | 00024727   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   | 00024744 | 0000  | 0000 | 0000 | 0000 | 0020 |   | Р |
| 00024713        | 0010       | 4201  | 0000 | 0000   | 0000   | H7A      |      | 00024730   | 0000  | 0000 | 0000         | 0000 | 0012       |      | J | 00024745 | 0000  | 0000 | 0000 | 0000 | 0000 |   |   |
| 00024714        | 2022       | 1706  | 1114 | 0300   | 1300   | PROFILC  | ĸ    | 00024731   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   | 00024746 | 0000  | 0000 | 0000 | 0000 | 0021 |   | Q |
| 00024715        | 0010       | 5410  | 0000 | 0000   | 0000   | H≕H      |      | 00024732   | 0000  | 0000 | 0000         | 0000 | 0013       |      | κ | 00024747 | 0000  | 0000 | 0000 | 0000 | 0000 |   |   |
| 00024716        | 2601       | 1411  | 0425 | 2300   | 1300   | VALIDUS  | к    | 00024733   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   | 00024750 | 0000  | 0000 | 0000 | 0000 | 0022 |   | R |
| 00024717        | 0010       | 6504  | 0000 | 0000   | 0000   | НD       |      | 00024734   | 0000  | 0000 | 0000         | 0000 | 0014       |      | L | 00024751 | 0000  | 0000 | 0000 | 0000 | 0000 |   |   |
| 00024720        | 2601       | 1411  | 0425 | 2300   | 1300   | VALIDUS  | ĸ    | 00024735   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   |          |       |      |      |      |      |   |   |
| 00024721        | 0005       | 4215  | 0000 | 0000   | 0000   | E7M      |      | 00024736   | 0000  | 0000 | 0000         | 0000 | 0015       |      | Μ |          |       |      |      |      |      |   |   |
| 00024722        | 0000       | 0000  | 0000 | 0000   | 0007   |          | G    | 00024737   | 0000  | 0000 | 0000         | 0000 | 0000       |      |   |          |       |      |      |      |      |   |   |

## **INSTALL COMMAND**

NOS allows multiple copies of the running system to reside on several disk devices of the same type. The system deadstart file (SDF) is defined to be a copy of the deadstart tape that resides on a deadstart disk. When you deadstart the system from this disk, the SDF is read to generate copies of the running system.

The INSTALL command installs a copy of the running system or a deadstart file you specify to a deadstart disk. The disk selected must be on, available, a single-unit device such as an 844 or 885-11/12,† and must have the Common Test and Initialization (CTI) software. (For more information about CTI, refer to the CIP User's Handbook.) If the deadstart disk is a shared device in a multimainframe evnvironment, a full INITIALIZE must have been previously done. The calling job must be of system origin or you must be validated for system origin privileges and the system must be in debug mode. In addition, in a secured system, INSTALL is allowed only from jobs with security administrator privileges.

The format of the command is:

INSTALL, filename, EQest.

Parameter

#### Description

filename Disk file (assigned to the job) to be installed as an SDF. Default is SYSTEM, which must be assigned to the job. SDF is a reserved file name and cannot be specified for filename.

If the deadstart file to be installed is on tape, it must first be copied to disk before INSTALL can be used.

est

EST ordinal of the deadstart disk on which file filename is to be installed.

7

<sup>†</sup>SDF cannot be installed to an 819 or 885-42 device.

# **K-DISPLAY UTILITIES**

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# **K-DISPLAY UTILITIES**

This section documents the K displays listed next, along with the utilities used to present them. Other K-display utilities described elswhere in this manual include the permanent file utilities, queue file utilities, and the status/control register simulator.

| K Display                                 | Description                                      |
|-------------------------------------------|--------------------------------------------------|
| CYBERLOG                                  | Gathers information on the system's performance. |
| Flaw                                      | Disk flaw mapping.                               |
| Initialize                                | Disk initialization.                             |
| Machine Recovery (MREC)                   | Multimainframe device recovery.                  |
| Mass Storage Archival<br>Subsystem (MSAS) | K display of the MSAS.                           |
| Mass Storage Subsystem (MSS)              | K display of the MSS.                            |
| Network Access Method (NAM)               | Operator interface to NAM.                       |
| Queue File Transfer Facility (QTF)        | K display of the QTF application.                |
| Redefine                                  | Online reconfiguration display.                  |
| Remote Batch Facility (RBF)               | K display of the RBF Subsystem.                  |
| Remote Host Facility (RHF)                | K display of the RHF Subsystem.                  |
| SCOPE 2 Station Facility (SSF)            | K display of the SSF Subsystem.                  |
| Transaction Facility (TAF)                | K display of the TAF Subsystem.                  |

By using the K display, a job can place information on the console screen and receive information from the keyboard. The information is passed to the job by DSD. Normally, these displays are used for utility programs.

The job first issues a request message on the B,0 display, asking you to bring up the K display.

When this happens, enter:

K,jsn.

jsn Job sequence name of the requesting job.

Once the display is assigned to a job, you can enter data by typing K. followed by data. The data is transferred to a specified area of the job's field length when you terminate the entry. If more than 50 characters are entered as data, the message

LINE TOO LONG.

appears on the screen. DSD does not accept the entry until the data string is shortened.

60459300 D

8

K displays are job oriented. The job sequence name associated with each K display appears at the top of the screen next to the display designator and name.

All parameter entries must be prefixed by K period (K.). However, after pressing CR or NEXT for the first parameter entry, everything but the K. is erased. This allows another parameter to be entered without entering K. first. All examples in this section show K. although you may not have to enter it. If you have to enter a DSD command during parameter entry, backspace to erase the K., enter the command, and then continue parameter entry by entering K. and the parameter.

# CYBERLOG K DISPLAY

The CYBERLOG utility gathers information on system performance. CYBERLOG gathers the information from operator responses after deadstart is complete. The information gathered contains the number and type of service interruptions, the elapsed and lost time from the interruption, and the level of severity or impact of each interruption.

Initiate CYBERLOG by entering:

X.CYBRLOG.

When CYBERLOG appears at a control point, a request message on the B,O display asks you to assign the K display to the CYBERLOG job. Enter:

K,jsn.

jsn Job sequence name of CYBRLOG.

# **RESPONDING TO CYBERLOG DISPLAYS**

The CYBERLOG displays request data about the event that causes the system to be down or degraded. Your selection of the event type, scheduled or unscheduled, determines the path through the displays. The data requested for the two event types are:

| Event Type  | Data Requested |
|-------------|----------------|
| Scheduled   | Reason         |
|             | Elapsed time   |
|             |                |
| Unscheduled | Reason         |
|             | Component      |
|             | Elapsed time   |
|             | Lost time      |
|             | Impact         |
|             |                |

### **EVENT TYPE**

The initial display (figure 8-1) requests the type of event being recorded. Enter 0 for a scheduled event and 1 for an unscheduled event.

|         | CYBERLOG                      |  |
|---------|-------------------------------|--|
| ENTER T | HE CODE FOR THE TYPE OF EVENT |  |
| CODE    | DESCRIPTION                   |  |
| 0<br>1  | SCHEDULED<br>UNSCHEDULED      |  |

Figure 8-1. CYBERLOG Display for Type of Event

In the resulting reason display, the item you select appears on the line labeled EVENT TYPE, and the next list of options appears on the bottom.

### REASON

After you identify the type of event that occurred, a display appears that asks you to identify the reason for the event. The specific display depends on the type of event (figure 8-2 or 8-3).

For a scheduled event, enter the code that corresponds to the reason. On the resulting elapsed-time request display, the item you select appears on the line labeled REASON.

For an unscheduled event, select the most likely reason. In the resulting display, the item you select appears on the line labeled REASON. Selecting 0, 1, 2, or 3 leads to a display that requests the component causing the failure. Selecting 4 (UNKNOWN) causes a branch to the elapsed time request display.

## NOTE

Exact information is required. If you do not know the reason for the event, enter the code for unknown.

|              | a a parte da anti- | CYBERLOG                             |  |
|--------------|--------------------|--------------------------------------|--|
|              | EVENT T            | YPE: SCHEDULED                       |  |
|              | ENTER T            | HE CODE FOR THE REASON FOR THE EVENT |  |
|              | CODE               | DESCRIPTION                          |  |
|              | 0                  | BEGINNING OF NORMAL DAY              |  |
|              | 1                  | HARDWARE RECONFIGURATION             |  |
|              | 2                  | SOFTWARE RECONFIGURATION             |  |
|              | 3                  | MAINTENANCE                          |  |
| $\mathbf{n}$ | 4                  | OTHER                                |  |



|       | CYBERLOG                      |  |
|-------|-------------------------------|--|
| EVENT | TYPE: UNSCHEDULED             |  |
| ENTER | THE CODE FOR REASON FOR EVENT |  |
| CODE  | DESCRIPTION                   |  |
| 0     | OTHER                         |  |
| 1     | HARDWARE                      |  |
| 2     | SOFTWARE                      |  |
| 3     | COMMUNICATIONS                |  |
| 4     | UNKNOWN                       |  |

Figure 8-3. CYBERLOG Reason for Unscheduled Event Display

## COMPONENT

After you enter the reason for an unscheduled event, a display appears that asks you to identify the component that caused the event. The specific display that appears depends on the reason you've entered (figure 8-4, 8-5, 8-6, or 8-7). Enter the code of the component that caused the failure. The component you select appears on the line labeled COMPONENT on the resulting elapsed-time request display.

# NOTE

Exact information is required. If you do not know the component causing the failure, enter the code for UNKNOWN.

| CYBERLOG                                                                                    |
|---------------------------------------------------------------------------------------------|
| EVENT TYPE: UNSCHEDULED                                                                     |
| REASON: OTHER                                                                               |
| ENTER THE CODE FOR THE COMPONENT CAUSING FAILURE                                            |
| CODE DESCRIPTION                                                                            |
| 0 OTHER<br>1 TEMP - HUMIDITY<br>2 ELECTRICAL<br>3 POWER SUPPLY<br>4 PROCEDURAL<br>5 UNKNOWN |

Figure 8-4. CYBERLOG Component Request Display (Reason OTHER)

#### CYBERLOG

EVENT TYPE: UNSCHEDULED REASON: HARDWARE ENTER THE CODE FOR THE COMPONENT CAUSING FAILURE CODE DESCRIPTION 0 OTHER 1 CPU 2 3 4 **PPU/CHANNEL** MEMORY EXTENDED MEMORY 5 TAPE SUBSYSTEM 6 DISK SUBSYSTEM 7 MASS STORAGE SUBSYSTEM 8 UNKNOWN

Figure 8-5. CYBERLOG Component Request Display (Reason HARDWARE)

|          | CYBERLOG                                  |
|----------|-------------------------------------------|
| EVENT T  | YPE: UNSCHEDULED                          |
| REASON:  | SOFTWARE                                  |
| ENTER TI | HE CODE FOR THE COMPONENT CAUSING FAILURE |
| CODE     | DESCRIPTION                               |
| 0        | OTHER                                     |
| 1        | OPERATING SYSTEM                          |
| 2        | COMPILER/ASSEMBLER                        |
| 3        | APPLICATION PROGRAMS                      |
| 4        | DATA MANAGEMENT                           |
| 5        | UNKNOWN                                   |

Figure 8-6. CYBERLOG Component Request Display (Reason SOFTWARE)

|   |           | CYBERLOG                               |   |
|---|-----------|----------------------------------------|---|
|   | EVENT TYP | E: UNSCHEDULED                         |   |
|   | REASON:   | COMMUNICATIONS                         |   |
|   | ENTER THE | CODE FOR THE COMPONENT CAUSING FAILURE |   |
|   | CODE      | DESCRIPTION                            |   |
|   | 0         | OTHER                                  |   |
|   | 1         | SUBSYSTEM HARDWARE                     |   |
|   | 2         | HOST SOFTWARE                          |   |
|   | 3         | LINE ADAPTER                           |   |
|   | 4         | MODEM                                  |   |
|   | 5         | SUBSYSTEM SOFTWARE                     |   |
| < | 6         | UNKNOWN                                | / |

Figure 8-7. CYBERLOG Component Request Display (Reason COMMUNICATIONS)

#### **ELAPSED TIME**

After you either enter the reason for a scheduled event or enter the component causing the failure for an unscheduled event, a display appears that asks you to record the amount of time that has elapsed since the event occurred (figure 8-8).

Enter the elapsed time in hours and minutes in the format shown. The range of values for hours is from 0 to 99 and the range of values for minutes is from 00 to 59. A leading zero is not required for hours, but is required for minutes. A period is required to delimit the hours from the minutes. The time you enter appears on the line labeled ELAPSED TIME in the resulting display.

| CYBERLOG                                                                     |  |
|------------------------------------------------------------------------------|--|
| EVENT TYPE: UNSCHEDULED                                                      |  |
| REASON: HARDWARE                                                             |  |
| COMPONENT: DISK SUBSYSTEM                                                    |  |
| ENTER THE ELAPSED TIME SINCE THE SYSTEM WAS FULLY OPERATIONAL<br>IN THE FORM |  |
| HH.MM                                                                        |  |

Figure 8-8. CYBERLOG Elapsed-Time Request Display

## LOST TIME

After you enter the elapsed time for an unscheduled event, a display appears that asks you to enter the length of time during which the system or part of the system was down or degraded (figure 8-9). For scheduled events the field is set to 00.00.

Enter the lost time in hours and minutes in the format shown. The same restrictions in format apply as in the elapsed-time entry.

| (            | CYBERLOG               |
|--------------|------------------------|
| (            |                        |
| EVENT TYPE:  | UNSCHEDULED            |
| REASON:      | HARDWARE               |
| COMPONENT:   | DISK SUBSYSTEM         |
| ELAPSED TIME | : 03.15                |
| ENTER THE TI | ME LOST IN THE FORMAT: |
| нн.мм        |                        |

Figure 8-9. CYBERLOG Lost-Time Request Display

# IMPACT

After you enter the lost time for an unscheduled event, a display appears that asks you to identify the impact of the event (figure 8-10). Enter the code for degraded if the system resources were reduced; enter the code for down if the system resources were unavailable. The item you select appears on the line labeled IMPACT on the resulting edit display.

|                | CYBERLOG                    |
|----------------|-----------------------------|
|                |                             |
| EVENT TYPE:    | UNSCHEDULED                 |
| REASON:        | HARDWARE                    |
| COMPONENT:     | DISK SUBSYSTEM              |
| ELAPSED TIME:  | 03.15                       |
| LOST TIME:     | 03.15                       |
| ENTER THE CODE | FOR THE IMPACT OF THE EVENT |
| CODE DE        | ESCRIPTION                  |
|                | EGRADED<br>DWN              |

Figure 8-10. CYBERLOG Request for Impact Display

### EDIT

After you make all the entries, you have an opportunity to change any of your responses (figure 8-11). By entering the number that now precedes each line with an entry, that line is blanked; subsequent lines that depend on the blanked line are removed from the display. Those choices are then presented again.

To add a comment to an entry, enter:

CYB, comment.

The maximum length of the comment (excluding CYB, and the period) is 35 characters. The system inserts the word COMMENT on the display before the comment (figure 8-11).

After completing edit entries, enter NEXT or END to transfer the data to the error log. If you enter NEXT, the CYBERLOG program transfers the data to the error log and restarts from the beginning to allow a different event to be recorded. If you enter END, the CYBERLOG program terminates after the message is written to the error log.

**CYBERLOG** EVENT TYPE: UNSCHEDULED 0 1 **REASON:** HARDWARE DISK SUBSYSTEM 2 COMPONENT: 3 ELAPSED TIME: 03.15 LOST TIME: 03.15 4 5 IMPACT: DEGRADED COMMENT CYB, THIS IS A SAMPLE COMMENT LINE. TO CHANGE ANY LINE, ENTER THE LINE NUMBER TO WRITE CURRENT MESSAGE AND REPEAT FOR NEW MESSAGE, ENTER "NEXT" TO EXIT, ENTER END TO WRITE A COMMENT, ENTER \*CYB,\* FOLLOWED BY NO MORE THAN 35 CHARACTERS, TERMINATED BY A PERIOD.

Figure 8-11. Sample Completed CYBERLOG Entry

# FLAW K DISPLAY

The FLAW utility reserves (flaws) tracks on any mass storage device during normal system operation. Each entry identifies an area of mass storage that is unusable (flawed area) and prevents the system from accessing it. Since 881 and 883 disk packs normally contain flaw information in the utility sector, the FLAW utility should be used on an 881 or 883 only to specify additional areas not currently in the utility sector. Obtain flaw addresses from the customer engineer.

```
Flawing tracks on mass storage devices is accomplished using the FLAW K displays (figures 8-12 and 8-13).
```

| K. FLAW. AAAM                                                                      |  |
|------------------------------------------------------------------------------------|--|
| CURRENT SLF, CLF, SPF, AND CPF ENTRIES                                             |  |
| EQ = 0 EST ORDINAL OF DEVICE.<br>NUM VALUES ENTERED TRT OCTAL VALUES * = DUPLICATE |  |
| 1<br>2<br>3<br>4                                                                   |  |
| 5<br>6<br>7<br>8<br>9                                                              |  |
| 10<br>11<br>12<br>13<br>14                                                         |  |
| 14<br>ENTER EST ORDINAL.                                                           |  |

Figure 8-12. FLAW K Display (Left Screen)

K. FLAW. AAAM MASS STORAGE DEVICE FLAWING SLF, CLF, SPF AND CPF ENTRIES SLF = NNNN SET LOGICAL TRACK FLAW. CLF = NNNNCLEAR LOGICAL TRACK FLAW. SPF = XXSET PHYSICAL TRACK FLAW. CPF = XXCLEAR PHYSICAL TRACK FLAW. WHERE NNNN = VALID LOGICAL TRACK NUMBER. XX = COOO,TOO,SOO (CYLINDER,TRACK,SECTOR.) = A0000000 (ADDR/10B, FOR DE/DP ONLY.) NUMERIC VALUES ARE CONSIDERED OCTAL UNLESS THE DIGITS 8 OR 9 APPEAR IN THE NUMBER, OR A \*D\* IS APPENDED TO THE NUMBER. SEE LEFT SCREEN FOR CURRENT ENTRIES, UP TO 14 ENTRIES ALLOWED

Figure 8-13. FLAW K Display (Right Screen)

All console entry is performed under DSD control. The sequence is:

1. Call the FLAW utility by entering:

X.FLAW.

2. Bring the K display to the left console screen by entering:

K,jsn.

jsn Job sequence name of the job requesting the K display (the message REQUEST\*K\*DISPLAY appears on the B,O display).

- 3. You can bring the flawing instructions up on the right screen by entering KK.
- 4. Specify the mass storage device on which tracks are to be flawed. Enter:

K.EQ=est.

est EST ordinal of the mass storage device.

5. Enter flaws. A maximum of 14 flaw entries is allowed for each call to the FLAW utility. In addition, there are four types of flaw entries that may be specified. The general format for the K display entry is:

K.xtk=ta.

- xtk Specifies one of the following types of flaw entries.
  - Description Entry SPF Sets the track reservation table (TRT) entry for the specified physical block (track) address(es) in extended memory or disk to indicate that the block is unavailable for use. CPF Clears that TRT flaw entry for the specified physical block address(es) in extended memory or disk to indicate that the block is available for use. SLF Sets the TRT flaw entry for the specified logical track to indicate that the track is unavailable for use. Clears the TRT flaw entry for the specified logical CLF track to indicate that the track is available for use.
- ta Specifies the track address to be reserved. ta can be one of the following.
  - taDescriptiontrkLogical track address for a disk or extended<br/>memory. (Use with SLF and CLF.) The variable trk<br/>can be any octal number in the specified range for<br/>the particular type of disk drive or extended<br/>memory. Refer to table 8-1.AaddrPhysical block (track) address for extended memory.
    - (Use with SPF or CPF.) addr is the extended memory address divided by 108. Refer to table 8-1.
  - Aaddr-Range of physical block addresses for extendedAaddrmemory. (Use with SPF or CPF.) Refer to table 8-1.
  - Ccyl,Physical track address for the disk. (Use with SPFTtrk,or CPF.) The variables cyl, trk, and sec can be anySsecoctal number in the specified range for the<br/>particular type of disk drive. Refer to table 8-1.
- 6. Initiate flawing of the specified device by entering:

K.GO.

The FLAW utility provides two messages in the system dayfile that indicate the results of the flawing operation. The first message is:

nn TRACKS FLAWED.

nn Octal number of tracks that were successfully flawed.

The second message appears only if some of the flaws specified were not processed. This occurs when the track specified for flawing is already reserved by the system (but not as a flawed track). In this case, the following message also appears in the system dayfile.

nn FLAWS NOT PROCESSED, list.

nn Octal number of flaws not processed.

list List of the logical tracks that were not flawed.

The entries described here are similar to those entered in the APRDECK (refer to section 3, Deadstart Decks) for flawing a device at deadstart time. However, the flaw entries specified using the FLAW utility or DSD command INITIALIZE are not recovered if the device is initialized at deadstart time. Only the flaw entries specified in the APRDECK will be recovered. If a device is initialized during normal system operation (INITIALIZE command), all flaws specified in the devices TRT, including those entered using the FLAW utility or INITIALIZE command, will be recovered providing the device has a good label at the time of initialization. If the label is bad, or cannot be recognized, all current flaws are cleared. The left console screen (figure 8-14) shows all flaw entries made through the FLAW utility and INITIALIZE command. It lists the flaw entry and its logical track equivalent. If the same logical track is referenced by more than one flaw entry, an asterisk appears to the right of those entries, so that you are aware that only the last entry takes effect.

| CURRENT SLF,                            | CLF, SPF, AND CPF ENTRIES                          |  |
|-----------------------------------------|----------------------------------------------------|--|
| EQ = 14 EST ORD<br>NUM VALUES ENTERED T | DINAL OF DEVICE.<br>FRT OCTAL VALUES * = DUPLICATE |  |
| 1 SLF=4000.                             | 4000 *                                             |  |
| 2 SLF=4000B.                            | 4000 *                                             |  |
| 3 SLF=4001.                             | 4001                                               |  |
| 4                                       |                                                    |  |
| 5                                       |                                                    |  |
| 6                                       |                                                    |  |
| 7                                       |                                                    |  |
| 8<br>9                                  |                                                    |  |
|                                         |                                                    |  |
| 10                                      |                                                    |  |
| 11                                      |                                                    |  |
| 12                                      |                                                    |  |
| 13                                      |                                                    |  |
| 14                                      |                                                    |  |
| SLF=4001.                               |                                                    |  |

Figure 8-14. FLAW Utility K Display (Left Screen)

| Device Type            | MNE     | Logical<br>Track<br>Range † | Cylinders/<br>Device † | Tracks/<br>Cylinder† | Sectors/<br>Track † |
|------------------------|---------|-----------------------------|------------------------|----------------------|---------------------|
| 844-2X, half track     | DI      | 4000-7137                   | 630                    | 22                   | 30                  |
| 844-4X, half track     | DJ      | 4000-7147                   | 1464                   | 23                   | 30                  |
| 844-2X, full track     | DK      | 4000-7137                   | 630                    | 23                   | 30                  |
| 844-4X, full track     | DL      | 4000-7147                   | 1464                   | 23                   | 30                  |
| 885, half track        | DM      | 4000-7221                   | 1511                   | 50                   | 40                  |
| 885, full track        | DQ      | 4000-7221                   | 1511                   | 50                   | 40                  |
| 834                    | DD      | 4000-7133                   | 1456                   | 12                   | 40                  |
| 819, single density    | DV      | 4000-5465                   | 633                    | 12                   | 24                  |
| 819, double density    | DW      | 4000-7153                   | 1466                   | 12                   | 24                  |
| 885-42                 | DB      | 4000-7221                   | 1511                   | 12                   | 40                  |
| 2048K, extended memory | DE / DP | 4000-7620                   |                        |                      |                     |

Table 8-1. Flawing Information for Disks and Extended Memory

# **INITIALIZE K DISPLAY**

The INITIALIZE command can be used to reconfigure certain removable devices (844-21 and 844-41/44) to suit your needs. For example, if you currently have two single-unit 844 packs (DK-ls), both packs can be initialized and linked together to form a multispindle device (DK-2). However, this can be done only if the devices to be linked meet the following requirements.

- Same device type.
- Same channels.
- Same share status (shared or nonshared).
- Removable.
- Not currently in use.

The INITIALIZE command must be entered to set the initialize status for each device to be chained. Current multispindle devices can also be initialized providing all packs that form the device are mounted in a logical order as determined by the unit numbers list on the E,C display. It is only necessary to enter the INITIALIZE command for the first unit of a current multispindle device. The format of the INITIALIZE command is described in section 5, DSD Commands.

## NOTE

Examine the FAMC and DAFC fields in the family status display (E,F) before entering the INITIALIZE command. The user count for the device must be zero before this command is valid. The following steps describe the procedures to initialize and (if necessary) flaw tracks on a mass storage device.

1. Enter the INITIALIZE command for the device(s) to be initialized. Examine the B,O display for the following message.

REQUEST\*K\*DISPLAY.

Note the job sequence name of the job displaying the message is CMS.

2. Activate the K display for that job by entering:

K,CMS.

The INITIALIZE K display (figure 8-15) appears on the left console screen. All parameters required to initialize and (if necessary) flaw the specified device are entered through the K display.

| K. INITIALIZ         | E. CMS                                                                  |  |
|----------------------|-------------------------------------------------------------------------|--|
| MASS STORAGE         | DEVICE INITIALIZATION                                                   |  |
| INITIALIZE EQ<br>014 | UIPMENT                                                                 |  |
| INITIALIZE RE        | QUEST *TOTAL*                                                           |  |
| OPTION               | DESCRIPTION                                                             |  |
| EQ = 014             | EST ORDINAL OF DEVICE (5-777).                                          |  |
| FM = 0               | FAMILY NAME OR PACK NAME IF TY=X (1-7 CHAR).                            |  |
| DN = 0               | DEVICE NUMBER (1-77).<br>PRIVATE AUXILIARY DEVICE USER NAME (1-7 CHAR). |  |
| UN = 0<br>TY = 0     | ACCESS TYPE (F OR X ).                                                  |  |
| LA = 0               | LOWER ACCESS LEVEL (1-7 CHAR).                                          |  |
| UA = 0               | UPPER ACCESS LEVEL (1-7 CHAR).                                          |  |
| DM = 0               | DEVICE MASK (0-377).                                                    |  |
| SM = 0               | SECONDARY MASK (0-377).                                                 |  |
| NC = 0               | CATALOG TRACKS (0-200).                                                 |  |
| NP = 0               | NUMBER OF PACKS (1-7).                                                  |  |
| ENTED A              | LD FAMILY NAME.                                                         |  |

Figure 8-15. INITIALIZE Command K Display

The K display lists the options used to initialize a device (under the OPTION column as shown in figure 8-15). Refer to table 8-2 for a description of each option. Refer to table 8-3 for additional information. The EST ordinal of the device to be initialized is listed under the INITIALIZE EQUIPMENT heading (see figure 8-15).

| Table 8-2. | Device | Initialization | Options | (Sheet | l of | 2) 1 | ŧ |
|------------|--------|----------------|---------|--------|------|------|---|
|------------|--------|----------------|---------|--------|------|------|---|

| <b>D</b> ption | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EQ             | EST ordinal of the device to be initialized. For multispindle devices, this ordinal must be the first of the consecutive units in the multispindle chain.                                                                                                                                                                                                                                                                                                                                                                               |
| FM             | The 1- to 7-character family name. Specifies the permanent file family in which<br>the initialized device is to be included. All devices must have a family name or<br>pack name. The name 0 (single character zero) is reserved and cannot be used.<br>This option cannot be used to change the family name of the link device in a<br>multimainframe environment. If you specify TY=X, this option specifies a 1- to<br>7-character packname to be associated with an auxiliary device. To clear an<br>existing entry, enter FM=NULL. |
| DN             | The 2-digit (octal) logical device number (from 1 to 778) that uniquely identifies the device in its permanent file family. This option cannot be entered if you specify TY=X.                                                                                                                                                                                                                                                                                                                                                          |
| UN             | The 1- to 7-character user name. This option is specified only when initializing<br>an auxiliary device (TY=X). If specified, the device is considered to be a<br>private auxiliary device. Only the user name specified will be allowed to create<br>files on the device (use SAVE, REPLACE, or DEFINE commands). To clear an<br>existing entry, enter UN=NULL.                                                                                                                                                                        |
| TY=F           | Initialized device may contain direct and indirect access permanent files.<br>However, if you specify DM=0, only direct access files can reside on the device.<br>If you specify SM=0 and DM=0, the device can contain only special system<br>permanent files. Indirect access files can reside only on a master device (that<br>is, DM≠0).                                                                                                                                                                                             |
| ТҮ=Х           | Initialized device is an auxiliary device. This is a mass storage device that is<br>not part of a permanent file family. An auxiliary device is a supplementary<br>permanent file storage device that may be privately owned (UN option specified)<br>or can be shared by many users (UN not specified). Auxiliary devices can contain<br>direct or indirect access permanent files.                                                                                                                                                    |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Table 8-2. | Device Initialization | Options (Sheet | : 2 of 2)† |
|------------|-----------------------|----------------|------------|

| Option | Description                                                                                                                                                                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LA     | Lower limit for the access level of the device. This establishes the lowest<br>access level of files that can be stored on the device (must not be less than the<br>lower limit for the access level of the device as given in its EST entry).                           |
| UA     | Upper limit for the access level of the device. This establishes the highest<br>access level of files that can be stored on the device (must not be greater than<br>the upper limit for the access level of the device as given in its EST entry).                       |
| DM     | The 3-digit (octal) device mask (from 0 to 3778). This option is required<br>whenever a permanent file master device is being initialized. It defines which<br>users will have this device as their master device. This option cannot be<br>entered if you specify TY=X. |
| SM     | The 3-digit (octal) secondary device mask (from 0 to 377 <sub>8</sub> ) used to control the residence of direct access files. This option cannot be entered if you specify TY=X.                                                                                         |
| NC     | Octal number of catalog tracks (from 0 to 200 <sub>8</sub> ; must be a power of 2). This<br>option is used only if the number of catalog tracks specified as the system<br>default for the device type is not satisfactory.                                              |
| NP     | Number of physical units to be included in a multispindle device. The default<br>value is l. Each unit to be included in the multispindle chain must be defined<br>as removable in the current disk status display (E,M).                                                |
|        |                                                                                                                                                                                                                                                                          |
|        |                                                                                                                                                                                                                                                                          |
|        |                                                                                                                                                                                                                                                                          |
|        |                                                                                                                                                                                                                                                                          |
|        |                                                                                                                                                                                                                                                                          |
|        |                                                                                                                                                                                                                                                                          |
|        |                                                                                                                                                                                                                                                                          |

•

#### Table 8-3. Track Flawing Options †

| Option †† | Description                                                                                                                                                                                                       |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPF       | Sets the track reservation table (TRT) entry for the specified physical block (track) address(es) in extended memory or disk to indicate that the block is unavailable for use.                                   |
| CPF       | Clears the TRT flaw entry for the specified physical address(es) in extended memory or disk to indicate that the block is available for use.                                                                      |
| SLF       | Sets the TRT flaw entry for the specified logical track to indicate that the track is unavailable for use.                                                                                                        |
| CLF       | Clears the TRT flaw entry for the specified logical track to indicate that the track is available for use.                                                                                                        |
| informa   | of 881 and 883 disk packs is automatic; only flaws additional to the current flaw<br>tion in the utility sector should be entered.<br>o the APRDECK description in section 3, Deadstart Decks, for entry formats. |

3. Enter the INITIALIZE command for each additional device to be initialized. This can also be done before activating the K display. In either case, only the first device specified will be listed (by EST ordinal) in the K display. Thus, to update the K display to show additional devices, enter the following command.

K.RERUN.

If more than one device is listed, they are initialized one at a time as they appear in the list from left to right. Multispindle devices (more than one EST ordinal) are considered one device.

4. The system has already checked the label on each mass storage device. If the label was found to be good, it is necessary to enter device initialization options (requested in messages that appear in the K display) to identify the device. This is to ensure that the device selected is indeed the correct device to be initialized. The messages appear automatically and are displayed until the correct options are entered. If an incorrect option is entered, it is ignored. Refer to table 8-2 for a description of each option.

Examine the family status display (E,F) to determine the current option values.

The following messages may be displayed and the appropriate response should be entered. If none of these messages appears, the device label was not recognized or was found to be bad. In this event, proceed to step 5.

#### Message

#### Description

ENTER OLD DEVICE NUMBER

This message appears if the device to be initialized is a permanent file family device. Enter the following response.

K.DN=devicenumber.

#### Message

### Description

ENTER OLD FAMILY NAME This message appears only if more than one family of permanent file devices is currently active in the system. Enter the following response.

K.FM=familyname.

This message appears only if the device to be initialized is an auxiliary device. Enter the following response.

K.PN=packname.

ENTER OLD USER NAME

ENTER OLD PACK NAME

This message appears only if the auxiliary device to be initialized is a private auxiliary device (associated with a specific user name). Enter the following response.

K.UN=username.

The user name is written to the account dayfile when the device is mounted.

If you discover that the wrong device was specified in the INITIALIZE command, you can clear the initialize status for that device by entering:

K.CLEAR.

The device to be processed by the clear entry must be a valid device. That is, the device cannot have a device number that conflicts with another device in its family name or a pack name that duplicates one already in the system. Its mask bits must meet standard requirements. The leftmost device in the list of devices to be initialized is cleared. One of the preceding messages will then be displayed for the next device to be initialized (if any) providing the label on that device is good.

5. When the following message appears on the K display, enter the parameters that specify the new characteristics to be associated with the device when it is initialized (refer to tables 8-2 and 8-3).

ENTER PARAMETERS

The new parameters can be entered as a string or one at a time. For example:

K.option<sub>1</sub>=value<sub>1</sub>,...,option<sub>n</sub>=value<sub>n</sub>.

or

K.option1=value1.

K.option2=value2.

K.option<sub>n</sub>=value<sub>n</sub>.

If flaw entries are to be specified (refer to table 8-3), they must be entered singly, as shown in the last example. If the label on the device being initialized was good, all current flaws on that device are normally recovered. However, if the label was not recognized or was bad, the flaw entries cannot be recovered and must be entered (if necessary) using this mechanism. A maximum of 14 flaw entries are permitted. In addition to the SLF, CLF, SPF, and CPF entries, the flaw information recorded in the utility sector on an 881, 883, or 885 disk pack is read during initialization of 844 equipment, and the appropriate areas are reserved by the system automatically.

If the NP option is specified (NP > 1), the device is to be initialized as a multispindle device. In this case, the number of packs specified by NP indicates the number of spindles to be linked. This is the next n number of devices waiting to be initialized. Each device must be defined as removable and mounted on consecutive physical unit numbers. To determine if a device is defined as removable, examine the disk status display (E,M). If the units are configured correctly, the label on each unit is checked. If any label is not recognized or is bad, that unit is free for initialization and chaining. However, if the label is good, the message

ENTER IDENTITY OF EQest

appears in the K display (est is the EST ordinal of the device). Enter one of the following responses.

K.DN=devicenumber.

K.FM=familyname,DN=devicenumber.

K.PN=packname.

K.PN=packname,UN=username.

This is a precautionary measure to ensure that the devices specified are the correct devices to be chained.

6. After all the necessary parameters have been entered for a specific device, enter the following command to proceed with the initialization.

K.GO.

If more devices are waiting to be initialized, repeat steps 4 through 6 of this procedure for each device.

# MACHINE RECOVERY (MREC) UTILITY K DISPLAY

When a machine that has been in a multimainframe configuration has a malfunction that requires a level 0 deadstart, before you can begin the deadstart, the machine recovery utility program (MREC) must be run on every machine that shares devices with the machine that is not working properly. MREC releases local mass storage space on the shared devices and clears interlocks set before the malfunction occurred.

For example, assume that machines A and B share disk unit 12 and machines B and C share disk unit 13 as shown in figure 8-16.

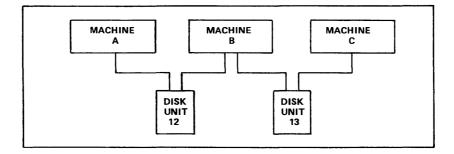


Figure 8-16. Machine Configurations

If machine A must be deadstarted using a level 0 deadstart, MREC must be run on machine B to recover disk unit 12. Machine C need not be involved since it is not aware of the existence of disk unit 12. However, if machine B must be deadstarted using a level 0 deadstart, MREC must be run on machine A to recover disk unit 12 and on machine C to recover disk unit 13.

## NOTE

Once MREC has been run for an inoperative machine, any level of deadstart on the machine other than 0 is not possible.

# **MREC PROCEDURES**

The MREC utility can be used through keyboard entry to a K display or by direct keyboard entry under DSD or DIS control without using the K display.

### USING MREC WITH THE K DISPLAY

The following procedure describes K-display usage for MREC operations.

1. Call the MREC utility by entering this DSD command:

X.MREC.

2. Examine the DSD system status display (B,0). When MREC is scheduled to a control point, it is indicated on the B,0 display. The message

**REQUEST \*K\* DISPLAY** 

appears in the message field for that control point.

<sup>&</sup>lt;sup>†</sup>Under DIS control, the command MREC calls the MREC utility.

3. Activate the K display for that control point by entering:

K,jsn.

jsn MREC job sequence name.

The K display for MREC (figure 8-17) appears on the left console screen.

|    |       |        | **   | * MACHINE | RECOVER | RY UTILIT | Y ***        |  |
|----|-------|--------|------|-----------|---------|-----------|--------------|--|
|    | SHAR  | RED D  | EVIC | ES MID =  | 42.     |           |              |  |
| EQ | TYPE  | UN     | DN   | FM/PN     | MID(S)  | SHARING   | DEVICE       |  |
| 5  | DE    | 0      | 5    | LINK      |         |           |              |  |
| 12 | DQ    | 40     | 40   | NOSCLSH   |         |           |              |  |
| 14 | DQ    | 42     | 42   | NOSCLSH   |         |           |              |  |
| 16 | DQ    | 44     | - 44 | NOSCLSH   |         |           |              |  |
| 20 | DQ    | 46     | 46   | NOSCLSH   |         |           |              |  |
| 21 | DQ    | 47     | 47   | NOSCLSH   |         |           |              |  |
| 22 | DJ    | 4      | 0    | DEVCTR    |         |           |              |  |
| 23 | DJ    | 3<br>2 | 0    |           |         |           |              |  |
| 24 | DJ    | 2      | 0    | THETA     | н       |           |              |  |
| 25 | DJ    | 1      | 0    | THEZ00    |         |           |              |  |
| 26 | DJ    | 0      | 0    | KILLER    |         |           |              |  |
| 27 | DJ    | 5      | 0    | SYSDUMP   |         |           |              |  |
| 30 | DJ    | 5<br>3 | 0    | MSE       |         |           |              |  |
| 31 | DJ    | 3      | 0    | SYSPACK   |         |           |              |  |
| 32 | DJ    | 1      | 0    | TASPAK    |         |           |              |  |
| 33 | DJ    | 0      | 1    | FILES     |         |           |              |  |
| 34 | DI    | 7      | 0    |           |         |           |              |  |
| 35 | DI    | 17     | 0    |           |         |           |              |  |
| 36 | DI    | 27     | 0    |           |         |           |              |  |
| 37 | DI    | 36     | 0    |           |         |           |              |  |
| ID | =     |        |      |           |         | MID OF D  | WNED MACHINE |  |
| EQ | = ALL |        |      |           |         | EQ(S) TO  | RECOVER      |  |

Figure 8-17. MREC K Display (Left Screen)

The MREC left screen K display lists all of the devices that are shared by the machine on which MREC is being run. The machine identifier (MID) of this machine is also given. Information describing the shared devices is given in the following format.

eq type un dn fm/pn mid(s)

Header

Description

eq EST ordinal of the shared device.

type Device type.

un Unit number of the device.

- dn Device number.
- fm/pn Family name/pack name.
- mid(s) Machine identifiers of other machines that are currently accessing the device. If there is an \* by the machine identifier, the machine is determined to be down.
- 4. The MREC right screen K display contains the parameters and commands that may be selected. Refer to table 8-4 (MREC parameters) and table 8-5 (MREC commands) for more information. To activate the MREC right screen K display (figure 8-18), enter:

KK.

5. Enter the MREC parameters in the following format.

K.param<sub>1</sub>=value<sub>1</sub>,param<sub>2</sub>=value<sub>2</sub>,...,
param<sub>n</sub>=value<sub>n</sub>.

The parameters entered (and error messages, if any) are displayed on the lower portion of the MREC left screen K display.

6. If you want to reset the parameters to their default values or refresh the device descriptions on the MREC left screen K display, enter:

K.RERUN.

The parameters can then be reentered.

7. Enter the desired parameters and initiate MREC processing by entering:

K.GO.

When processing is complete, the message

PROCESSING COMPLETE

appears at the bottom of the left screen.

 After all MREC operations are complete, end the MREC utility by entering: K.STOP.

| ( | *** MACHINE RECOVERY UTILITY ***                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | DESCRIPTION OF TABLE ENTRIES.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|   | EQ - EST ORDINAL OF EQUIPMENT.<br>UN - UNIT NUMBER.<br>DN - DEVICE NUMBER.<br>FM/PN - FAMILY OR PACK NAME (IF ANY)<br>MID(S) SHARING DEVICE - MACHINE ID(S) OF OTHER<br>MACHINES CURRENTLY SHARING DEVICE.<br>(* BY MID INDICATES MACHINE HAS<br>BEEN DETERMINED TO BE DOWN.)                                                                                                                                                                                                                                                                                                                  |
|   | DESCRIPTION OF PARAMETERS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|   | <ul> <li>ID - MID OF DOWNED MACHINE TO PROCESS.</li> <li>EQ - EST ORDINALS OF DEVICES SHARED BETWEEN THIS<br/>MACHINE AND DOWNED MACHINE TO PROCESS. I.E.<br/>EQ=XXX,XXX,,XXX. DEFAULT = ALL. I.E. EQ=ALL.</li> <li>OP=I AND OP=R ARE PARAMETERS WHICH MAY BE ENTERED IF<br/>844 RESERVE SITUATIONS OCCUR. OP=I WILL CAUSE THE<br/>DEVICE TO BE IGNORED. OP=R WILL CAUSE ALL UNIT<br/>RESERVES ON THAT CONTROLLER TO BE CLEARED. THESE<br/>PARAMETERS ARE ONLY VALID FOR THE CURRENT RESERVED<br/>844 UNIT AND MUST BE REENTERED UPON REOCCURENCE OF<br/>ANOTHER RESERVE SITUATION.</li> </ul> |
|   | DESCRIPTION OF K DISPLAY COMMANDS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|   | GO - INITIATE PROCESSING OF DEVICES SPECIFIED.<br>RERUN - REINITIALIZE K DISPLAY AND RERUN PROGRAM.<br>STOP - TERMINATE PROGRAM.<br>+ - PAGE RIGHT DISPLAY IF .GT. 24D SHARED DEVICES.                                                                                                                                                                                                                                                                                                                                                                                                         |

Figure 8-18. MREC K Display (Right Screen)

## USING MREC WITHOUT THE K DISPLAY

You can also call the MREC utility and specify the appropriate parameters without using the K display. You can do this by making a single keyboard entry (under DSD or DIS control) in the following format.

X.MREC(param1=value1, param2=value2,..., paramn=valuen)

param<sub>i</sub>=value<sub>i</sub> Parameters described in table 8-4.

The ID=id parameter must be entered.

When the MREC command is entered with parameters, the K display is not activated and processing occurs automatically. If an error occurs using this procedure, the message

REQUEST \*K\* DISPLAY

appears on the DSD B,O display. Activate the K display and continue as described under Using MREC With the K Display earlier in this section.

Table 8-4. MREC Parameters

| Parameter | Description                                                                                                                                                                                                                                                                                                               |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID=id     | The 1- or 2-character machine identifier of the inoperative machine that is to be processed. This parameter must be entered before processing can take place.                                                                                                                                                             |
| EQ=est    | EST ordinals of the devices to be processed. Only devices shared between<br>the machine that is down and the machine on which MREC is running are<br>processed. The form of the entry is:                                                                                                                                 |
|           | EQ=est <sub>l</sub> ,est <sub>2</sub> ,,est <sub>n</sub> .                                                                                                                                                                                                                                                                |
|           | If you omit this parameter, EQ=ALL is assumed. In this case, all devices shared between this machine and the inoperative machine are processed.                                                                                                                                                                           |
| OP=x      | You can enter this parameter only when using the K display (that is, it<br>cannot be used if the MREC utility is called by a command) and then, use it<br>only if a unit or controller cannot be accessed by MREC due to physical<br>hardware reservations. Its use is invalid if a unit reservation is not in<br>effect. |
|           | x Description                                                                                                                                                                                                                                                                                                             |
|           | R Directs the MREC utility to release all unit reservations (using the GRENADE function; refer to section 2, Deadstart) for 834, 844-41/44, or 885-11/12 equipment.                                                                                                                                                       |
|           | I Directs the MREC utility to ignore certain functions on the<br>equipment for which the reservation message was issued.<br>Functions that do not require the unit to be accessed are still<br>performed.                                                                                                                 |

| Command | Description                                                                                                                                                              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GO .    | Directs the MREC utility to proceed with processing the entered parameters.                                                                                              |
| RERUN.  | Reinitializes the device descriptions and parameters on the K display and reruns the MREC utility.                                                                       |
| STOP.   | Terminates the MREC utility and ends the K-display interaction.                                                                                                          |
| +       | Toggles the right screen K display between the K-display instructions and<br>the second page of device descriptions if there is more than one page of<br>shared devices. |
|         |                                                                                                                                                                          |

# **MREC UNIT AND CONTROLLER RESERVATIONS**

When attempting to access a device, MREC may find the controller access or unit reserved by another machine. When this occurs, the following message appears on the left screen K display.

EQest, CHcc, CONTROLLER RESERVED.

or

EQest, UNuu, UNIT RESERVED.

est EST ordinal of the device.

cc Channel number.

uu Physical unit number (from 0 to  $77_8$ ).

Assuming the inoperative machine is the machine holding the reservation, you can clear the reservation or direct MREC to clear it by using the following procedures.

To clear a controller reservation, activate the deadstart switch on the machine that is down.

To clear a unit reservation, perform one of the following procedures.

- On a device that is connected to a 7155 controller, activate the deadstart switch on the machine that is down.
- On a device that is not connected to a 7155 controller, toggle the OFF LINE/ON LINE switch on the back of the drive to OFF LINE and then back to ON LINE.
- If none of the preceding procedures can be performed, select the OP=R parameter to clear an 834, 844, or 885 device reservation.

NOTE

Do not select the OP=R parameter unless the other reservation clearing procedures cannot be performed. It is recommended that all machines in a multimainframe environment be put in IDLE status or put in STEP mode when you select the OP=R parameter.

Once the correct action has been taken, enter

K.GO.

to continue processing. If the reservation is still not cleared, the appropriate reserved message reappears on the left screen K display. Repeat one of the reservation clearing procedures described above or enter:

K.OP=I.

This directs the MREC utility to ignore certain functions on the device. Processing may then continue.

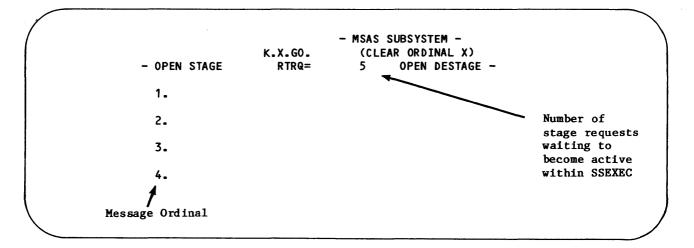
If a device or controller in an independent shared device multimainframe environment is reserved by a down machine, the previously mentioned messages appear on the system status display (B,0) instead of on the K display. Use the procedures already described to clear the reservation.

# MASS STORAGE ARCHIVAL SUBSYSTEM (MSAS) K DISPLAY

MSAS uses the K display to present messages that require your action. You can use the MSAS K display to reply to these messages and to open and close staging/destaging operations.

When MSAS enters messages into the K display, a request for the K display appears on the B,0 display. Enter K,MAS to activate the display for MSAS. After you have responded to all K-display messages, the request for the K display terminates.

The MSAS K display provides space for four messages with up to three lines per message. Figure 8-19 shows a sample MSAS K display.



### Figure 8-19. MSAS K Display

Valid MSAS commands are:

Command

#### Description

K.m.GO.Enters a GO response to the message at message ordinal m.K.STAGE.Toggles staging operations between open and close. Staging is<br/>normally open (permitted).

K.DESTAGE. Toggles destaging operations between open and close. Destaging is normally open (permitted).

MSAS clears a message when an acceptable action is taken. Usually this action is entering a GO response to the message at message ordinal m. However, for actions such as emptying the exit tray on a storage module, the message is cleared when the hardware status indicates the action has occurred and you enter the GO response. Refer to appendix B of the NOS 2 Operations Handbook for the appropriate action for each message.

# MASS STORAGE SUBSYSTEM (MSS) K DISPLAY

MSS uses the K display to present messages that require your action. You can use the MSS K display to reply to these messages and to control the rate that files are staged/destaged between the MSF hardware and a disk.

When MSS enters messages into the K display, a request for the K display appears on the B,O display. Enter K,MSS to activate the K display for MSS. After you have responded to all K-display messages, the request for the K display terminates.

The MSS K display provides space for four messages with up to three lines per message. If you enter an incorrect command, the incorrect command appears under a line containing \*\*\* REJECT \*\*\*. Figure 8-20 shows a sample MSS K display.

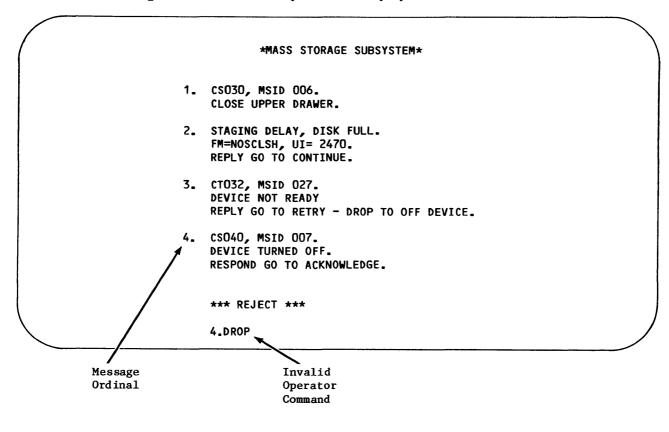


Figure 8-20. MSS K Display

Valid MSS commands are:

| Command    | Description                                                                                                                                                                                                                                                                                                                                                        |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.FILES,x. | Controls the rate that files are staged/destaged by changing the number, x, of concurrent files to be staged/destaged between the MSF and a disk. Increasing or decreasing the number of concurrent files by one results in a corresponding increase or decrease in field length of approximately 65008 central memory words. The number x must be a single digit. |
| K.m.GO.    | Enters a GO response to the message at message ordinal m.                                                                                                                                                                                                                                                                                                          |
| K.m.DROP.  | Enters a DROP response to the message at message ordinal m.                                                                                                                                                                                                                                                                                                        |
| K.         | Clears the previously entered incorrect command and the *** REJECT ***                                                                                                                                                                                                                                                                                             |

MSS clears a message when an acceptable action is taken. Usually this action is entering the K.m.GO or K.m.DROP command. However, for actions such as closing or emptying the input or output drawers on a cartridge storage unit, the message is cleared automatically when the hardware status indicates the action has occurred.

If you enter an invalid command, the \*\*\* REJECT \*\*\* line and the command are both displayed. Valid commands are those described previously. However, the K.m.GO and K.m.DROP commands are invalid if there is no message displayed at message ordinal m or if the GO or DROP response is not appropriate. Clear the \*\*\* REJECT \*\*\* line by entering a valid command. Refer to appendix B of the NOS 2 Operations Handbook for the appropriate action for each message.

# NETWORK ACCESS METHOD (NAM) K DISPLAY

line.

The NAM K display provides a common, centralized interface by which network applications (CS, NS, NVF) can communicate with the host operator (HOP).

Figure 8-21 shows the format of the NAM K display. Table 8-6 explains the fields that appear on the NAM K display.

|                                |               | data area                          |                |  |
|--------------------------------|---------------|------------------------------------|----------------|--|
|                                | message       |                                    |                |  |
| Alert Line<br>HOP Message Line | ALERTS<br>HOP | app1 app2 app3<br>hop message line | app4 app5      |  |
| Response Line                  | appname       | operator entry                     | repeat message |  |

Figure 8-21. NAM K-Display Format

#### Table 8-6. NAM K-Display Fields

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data area        | The portion of the screen that receives the output or diagnostic<br>message as a result of a command that you entered. This portion<br>of the NAM K display is operated as a scrollable paged device.<br>Each line of data enters the display at the bottom of the data<br>area and forces the previous lines to shift up by one line. The<br>previous top line is lost. However, whenever you turn the<br>page-wait status on and more than a screen full of information<br>is written to the data area, the prompt MORE DATA is displayed<br>on the bottom line of the data area. The display remains fixed<br>until you enter the + character to display the next page of<br>information (refer to Display Control Characters later in this<br>sction). |
| message          | The system prompt READY indicates that you can make additional<br>keyboard entries. The system prompt MORE DATA indicates that<br>you can enter + to see more data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| app1app5         | The alert line is a list of applications requesting your attention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| hop message line | This field contains a message received from another host.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| appname          | The name of the application (CS, NS, NAM, or NVF) with which you are currently interacting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| operator entry   | This field contains up to 40 characters of the last command that you entered. Commands of more than 40 characters are truncated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| repeat message   | Whenever a command cannot be accepted because the system was not<br>done processing a previous command, you get the system prompt<br>REPEAT in this field. Repeat the command.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

NAM supports both the right and left screen K displays. The right K display provides help information.

The NAM K display is available at all times during NAM execution, the message REQUEST K DISPLAY appears on the B,O display when the K display is not assigned to NAM and some application has requested operator intervention. You must assign the K display to NAM to interact with NAM or an application.

You assign the K display to NAM by entering:

K,NAM.

Figure 8-22 shows the NAM K display as it appears when you initially assign it.

READY.. ALERTS NAM

Figure 8-22. NAM K Display

The NAM K display has two operating modes: NAM mode and application mode. Initially, the display is in NAM mode. The appearance of NAM indicates that you are interacting directly with NAM.

### **DISPLAY CONTROL CHARACTERS**

You can use the following four characters to control the NAM K display. They are valid in both NAM mode and application mode. Each of the following characters must be entered in the first character position after K.

#### Character

#### Description

- \* When in application mode, the \* character causes the display to revert to NAM mode. The last command is aborted and any information generated by the application, after the asterisk is entered, is discarded by NAM. The page-wait status is automatically turned on. The \* character is ignored if the display is already in NAM mode.
- / When in application mode, the / character aborts the last command without altering the assignment of the NAM K display. The / character always results in a READY.. prompt.

When in NAM mode, the / character is ignored.

- + When in application mode, the + character turns the page-wait status on, if the current page-wait status is off. If the current page-wait status is on, then the command K.+ displays the next available page of information. The page-wait status is always on in NAM mode. The page-wait status is initialized to off each time you enter application mode. Therefore, whenever you select an application, the page-wait status automatically changes from on to off and you can set it as desired.
- The character turns off the page-wait status. The character is ignored if entered in application mode while the page-wait status is off.

Any attempt to turn the page-wait status off while in NAM mode is ignored without sending any diagnostic message.

### NAM K-DISPLAY OPERATION

Initially, the display is in NAM mode. The application mode is invoked by a NAM mode command that indicates the application with which you wish to interact. The application mode is indicated by the appearance of the name of that application in the appname portion of the response line (refer to figure 8-21). In application mode, all entries except the asterisk are passed by NAM to a previously designated application. An asterisk character returns the display to NAM mode.

Entering any command (processed either by NAM or by an application) immediately causes the command to appear in the operator entry field. When processing of the command completes, the prompt READY.. appears in the bottom line of the data area. If you key something in, other than one of the display control characters \*, /, +, or - before the prompt READY.. appears, the character is displayed in your entry field but the command is not acted upon and the message REPEAT.. appears to the right of your entry.

Table 8-7 describes the commands for assigning the K display to one of the applications CS, NS, or NVF, and other frequently used commands. If appname or the remote host number are invalid or the application is not currently active, you will receive a diagnostic message. These commands are available in NAM mode only.

| Command      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.AP=appname | Assigns the NAM K display to the specified application. The<br>application name appears in the appname portion of the response line<br>(refer to figure 8-21). appname is one of the supervisory programs<br>CS, NS, or NVF. The command satisfies any alert request posted by<br>the application. When you type the application name, that<br>application name is removed from the alert line, the page-wait<br>status is turned off, and the last page of the application's recent<br>history buffer appears in the data area of the display (refer to<br>Recent History Command in section 15, Network Operations. |
| К.АР         | Assigns the NAM K display to the application whose name appears in<br>the leftmost position of the alert line. The page-wait status is<br>turned off and the last page of the application's recent history<br>buffer appears in the data area of the display.                                                                                                                                                                                                                                                                                                                                                         |
| K.HELP       | Displays information about the NAM mode commands on the right K display.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| K.IG=appname | Causes NAM to ignore all alert requests from the specified<br>application. If the application had an alert request pending, its<br>name is removed from the alert list. NAM informs the application<br>that its alert request was acknowledged and ignored. The rest of<br>the display remains unaltered. This command is cancelled<br>automatically when you enter the AP=appname command. The assignment<br>of the NAM K display is not altered by the IG=appname command.                                                                                                                                          |

Table 8-7. NAM Mode Commands (Sheet 1 of 2)

# Table 8-7. NAM Mode Commands (Sheet 2 of 2)

| Command              | Description                                                                                                                                                                                                                                                                                                                               |  |  |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| K.IG                 | Causes NAM to ignore all alert requests from the application who<br>name appears in the leftmost position of the alert line. NAM<br>informs the application that its alert request was acknowledged<br>ignored. The rest of the display remains unaltered. This comma<br>is cancelled automatically when you enter the AP=appname command |  |  |
| K.END                | Clears the NAM K display. It causes the data area of the displa<br>go blank but leaves the alert line and response line unaltered.<br>END command is used to stop the generation of the status display<br>(figure 8-23). Otherwise, if the K display is dropped, NAM<br>automatically ends after 60 to 90 seconds.                        |  |  |
| K.SEND, rrr, string. | Causes NAM to send the message text if a logical link exists bet<br>the specified remote host and this host. Use the NAM ST command<br>determine which hosts are connected.                                                                                                                                                               |  |  |
|                      | Parameter Description                                                                                                                                                                                                                                                                                                                     |  |  |
|                      | rrr Host node number of the remote host (from 1 to 2                                                                                                                                                                                                                                                                                      |  |  |
|                      | string Message text of no more than 40 characters.                                                                                                                                                                                                                                                                                        |  |  |
|                      | The message                                                                                                                                                                                                                                                                                                                               |  |  |
|                      | hh.mm.ss. FROM sss string                                                                                                                                                                                                                                                                                                                 |  |  |
|                      | is displayed on the specified remote host's NAM K display follow.<br>the alert line.                                                                                                                                                                                                                                                      |  |  |
|                      | hh.mm.ss Time the message is received.                                                                                                                                                                                                                                                                                                    |  |  |
|                      | sss Host node number of the sending host (from 1 to 2                                                                                                                                                                                                                                                                                     |  |  |
|                      | string Message text of no more than 40 characters.                                                                                                                                                                                                                                                                                        |  |  |
| K.ST                 | Causes the NAM status display to appear on the K-display screen.                                                                                                                                                                                                                                                                          |  |  |
|                      |                                                                                                                                                                                                                                                                                                                                           |  |  |

### NAM MODE MAINTENANCE COMMANDS

While in NAM mode, the HOP can enter the following network maintenance commands. The commands are sent to NAM or to applications to determine the status of the network and aid in the debugging of network problems. The HOP may select NAM or a single supervisory application or NAM and all applications using the following commands.

| Command | Description                                                                                                                      |
|---------|----------------------------------------------------------------------------------------------------------------------------------|
| DB      | Activates the online debugging code.                                                                                             |
| DE      | Deactivates the online debugging code.                                                                                           |
| DU      | Causes NAM to dump its field length and/or request an application to dump its field length.                                      |
| FL      | Changes NAM's maximum field length.                                                                                              |
| LB      | Begins the logging of network traffic in the debug log file.                                                                     |
| LE      | Ends the logging of network traffic in the debug log file.                                                                       |
| LR      | Releases the debug log file.                                                                                                     |
| RS      | Dumps the statistics data to a permanent file, resets the statistics counters to $0$ (zero), and continues gathering statistics. |
| ST      | Causes the NAM status display to appear on the K-display screen (refer<br>to figure 8-23).                                       |

### **DB Command**

The debug begin (DB) command causes NAM to turn on its online debugging code and/or request an application to turn on its online debugging code.

The command format is:

DB=mode.

| DL | -mode. |                                                                                                                                                                                |
|----|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ē  | ode    | Description                                                                                                                                                                    |
| AI | L      | NAM turns on its online debugging code and requests all applications to turn on their online debugging code.                                                                   |
| aŗ | opname | NAM requests the specified application to turn on its online debugging code. The specified application must be accessing the network or you will receive a diagnostic message. |
| NA | м      | NAM turns on its online debugging code.                                                                                                                                        |

### **DE Command**

The debug end (DE) command causes NAM to turn off its online debugging code and/or request an application to turn off its online debugging code.

The command format is:

DE=mode.

| mode    | Description                                                                                                                                                                     |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALL     | NAM turns off its online debugging code and requests all applications to turn off their online debugging code.                                                                  |
| appname | NAM requests the specified application to turn off its online debugging code. The specified application must be accessing the network or you will receive a diagnostic message. |
| NAM     | NAM turns off its online debugging code.                                                                                                                                        |

# **DU Command**

The dump (DU) command causes NAM to dump its field length and/or request an application to dump its field length.

The command format is:

DU=mode.

mode

Description

- ALL NAM dumps its field length and requests all applications to dump their field length.
- appname NAM requests the specified application to dump its field length. The specified application must be accessing the network or you will receive a diagnostic message.

NAM NAM dumps its field length.

### FL Command

The field length (FL) command changes NAM's maximum field length to the specified value. If the field length specified is less than NAM's current maximum field length or NAM's running field length plus 10008, you will receive a diagnostic message.

If NAM reaches its maximum field length, use the FL command to increase NAM's maximum field length. If the K display is in application mode when NAM reaches its maximum field length, NAM automatically switches the K display to the NAM mode.

Until you enter the FL command, all other NAM commands are rejected and NAM stops servicing the network. Frequent need for this command indicates that the initial field length for NAM is inadequate and should be increased by changing the MAXNIP build parameter described in the NOS 2 Installation Handbook.

The command format is:

FL=f1.

#### Parameter

### Description

f1

Specified maximum field length in octal.

### **LB Command**

The log begin (LB) command causes NAM to begin logging network traffic in its debug log file and/or request an application to begin logging network traffic in its debug log file (refer to the NAM/CCP Host Application Programming Reference Manual for information on creating the application's log file).

The command format is:

LB=mode.

| mode    | Description                                                                                                                                                                                                    |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALL     | NAM begins logging network traffic in its debug log file 'and requests all applications to begin logging network traffic in their debug log files.                                                             |
| appname | NAM requests the specified application to begin logging network traffic in<br>its debug log file. The specified application must be accessing the network<br>or you will receive a diagnostic message.         |
| NAM     | NAM begins logging network traffic in its debug log file. NAM must be<br>installed with the network trace option or this command is ignored. Refer<br>to the NOS 2 Installation Handbook for more information. |

To release the debug log file, enter the log release (LR) command.

#### LE Command

The log end (LE) command causes NAM to end logging network traffic in its debug log file and/or request an application to end logging network traffic in its debug log file.

The command format is:

LE=mode.

modeDescriptionALLNAM ends logging network traffic in its debug log file and requests all<br/>applications to end logging network traffic in their debug log files.appnameNAM requests the specified application to end logging network traffic in its<br/>debug log file. The specified application must be accessing the network or<br/>you will receive a diagnostic message.NAMNAM ends logging network traffic in its debug log file.

To release the debug log file, enter the log release (LR) command.

#### LR Command

The log release (LR) command causes NAM to release its debug log file (if one exists) and/or request an application to release its debug log file. When the local debug log file is released, its contents are copied to a permanent file. Logging continues on a new local debug log file.

The command format is:

LR=mode.

modeDescriptionALLNAM releases its debug log file and/or requests all applications to release<br/>their debug log files.appnameNAM requests the specified application to release its log debug file. The<br/>specified application must be accessing the network or you will receive a<br/>diagnostic message.

NAM NAM releases its debug log file.

## **RS Command**

The reset statistics (RS) command causes NAM to dump its statistics to a permanent file and restart gathering statistics and/or request an application to dump its statistics to a permanent file and restart gathering statistics (refer to the NAM/CCP reference manuals for descriptions of the network statistics). You can use this command to help anaylze NAM and/or application performance.

The command format is:

| RS=mode. |
|----------|
|----------|

| mode    | Description                                                                                                                                                                                                                                                                                         |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALL     | NAM dumps its statistics to a permanent file, resets the statistics counters<br>to 0 (zero), and continues gathering statistics and/or requests all<br>applications to dump their statistics to permanent files, reset their<br>statistics counters to 0 (zero), and continue gathering statistics. |
| appname | NAM requests the specified application to dump its statistics to a permanent<br>file, reset its statistics counters to 0 (zero), and continue gathering<br>statistics. The specified application must be accessing the network or you<br>will receive a diagnostic message.                         |
| NAM     | NAM dumps its statistics to a permanent file, resets the statistics counters to $0$ (zero), and continues gathering statistics.                                                                                                                                                                     |

## ST Command

The status (ST) command causes the NAM status display (figure 8-23) to appear on the K-display screen.

The command format is:

ST.

The NAM status display provides status information regarding all applications, couplers, and logical links currently active in the host. This display is refreshed periodically to display the current conditions of the applications and logical links.

The first line of the NAM status display contains the network invocation number (NIN), host regulation level (REG LVL), the number of applications accessing the network, and the maximum field length of NAM.

|          | = 014 |      | LVL = |     |     | OF APPL |      |      | _ = 100 |          |
|----------|-------|------|-------|-----|-----|---------|------|------|---------|----------|
| APP      | JSN   | STAT |       | I   | NCN | AC      | NSM  | NDM  | TIME    | -        |
| IAF      | AAAC  | 0000 |       |     | 30  |         | 5    | 2    | 07.54   | -        |
| RBF      | AABC  | 0000 |       |     | 3   |         | 8    | 4    | 08.10   | -        |
| TAF      | AABY  | 0000 |       |     | 10  |         | 1    | 0    | 08.25   |          |
| TVF      | AABA  | 0010 |       |     | 1   |         | 0    | 0    | 08.04   |          |
| NVF      | MAAA  | 0000 | 00    | N   | 2   |         | 5    | 2    | 09.09   | 9.45     |
| EST      | HN    | NSM  | NHM   | NLM | IVT | STAT    | PRU  | ST   | NPUR    | EJ       |
| 054      | 01    | 5    |       |     | 0   | 000     | 4612 | 5    | 5       |          |
| LOG-LINK | HN    | TN   | Н     | N   | s - | F NCN   | AC   | NHDQ | NLDQ    | TIME UP  |
|          | 01    | 01   | 0     | 0   | S   | 44      |      |      |         | 08,01,30 |

Figure 8-23. NAM Status Display

The NAM status display shows the application status entries in the following format.

ncn ac nsm ndm timeup

status i

| Header            | Description                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| app               | Name of the application.                                                                                                                                                                                                                                                                                                                                         |
| j sn              | Job sequence name of the executing job table entry.                                                                                                                                                                                                                                                                                                              |
| status            | Status of the application in octal. Each of the 18 bits (numbered left to right) represents the following condition.                                                                                                                                                                                                                                             |
|                   | Bit Number Description                                                                                                                                                                                                                                                                                                                                           |
|                   | 0 Force flag.<br>1 Wait flag.<br>2 Rollout flag.<br>3 ON flag.<br>4-5 Swap flag.<br>6 IN flag.<br>7-14 Reserved.<br>15-17 NVF response flags.                                                                                                                                                                                                                    |
| i                 | Ignore alert flag. If set to Y, NAM ignores an alert request from the application. If set to N, NAM accepts an alert request from the application. This field is blank if the application is not allowed to use the NAM K display.                                                                                                                               |
| ncn               | Number of current connections to the application.                                                                                                                                                                                                                                                                                                                |
| ac                | Reserved.                                                                                                                                                                                                                                                                                                                                                        |
| nsm               | Number of asynchronous supervisory messages currently queued for the application.                                                                                                                                                                                                                                                                                |
| ndm               | Number of data messages and synchronous supervisory messages queued for the application.                                                                                                                                                                                                                                                                         |
| timeup            | Time, in the format hh.m.ss, that the application became active.                                                                                                                                                                                                                                                                                                 |
| e following appli | ictions are also available as part of NAM.                                                                                                                                                                                                                                                                                                                       |
| Application       | Description                                                                                                                                                                                                                                                                                                                                                      |
| PTF, PTFS         | Permament File Transfer Facility (PTF) and Permanent File Transfer<br>Facility Sevicer (PTFS). PTF and PTFS provide access to remote<br>permanent files. A local user activates PTF with the MFLINK command<br>(refer to the NOS 2 Reference Set, Volume 3). When a remote user enters<br>the MFLINK command, NAM activates a PTFS application on the local host |

QTF, QTFS Queue File Transfer Facility (QTF) and Queue File Transfer Facility Servicer (QTFS). QTF and QTFS transfer input and output files to a remote system. When NAM is initiated, the system automatically activates QTF. When a remote host QTF application has a file to transfer, NAM initiates QTFS on the local host to service the remote request.

to service the remote request.

The

app

jsn

After initiation, QTF periodically rolls in to check for files to transfer. You can change the time interval between periodic executions of QTF. For information on changing this time interval, refer to the NOS 2 Installation Handbook.

The NAM status display shows the coupler status entries in the following format.

| est     | hn                             | nsm   | nhm                                                                  | nlm                                                                                             | ivtstat                                                                               | prust                                                                                               | npurej                                                                                                                                                                                                                                                    |
|---------|--------------------------------|-------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Header                         |       |                                                                      |                                                                                                 |                                                                                       |                                                                                                     | Description                                                                                                                                                                                                                                               |
|         | est                            |       | Equip                                                                | nent st                                                                                         | atus tabl                                                                             | e ordinal                                                                                           | l of the front end NPU.                                                                                                                                                                                                                                   |
|         | hn                             |       | Host n                                                               | node nu                                                                                         | mber of t                                                                             | he couple                                                                                           | er.                                                                                                                                                                                                                                                       |
|         | nsm                            |       | Number<br>couple                                                     |                                                                                                 | ynchronou                                                                             | s supervi                                                                                           | isory messages currently queued for the                                                                                                                                                                                                                   |
|         | nhm                            |       | Reserv                                                               | ved.                                                                                            |                                                                                       |                                                                                                     |                                                                                                                                                                                                                                                           |
|         | nlm                            |       | Reserv                                                               | ved.                                                                                            |                                                                                       |                                                                                                     |                                                                                                                                                                                                                                                           |
|         | ivtstal                        | t     |                                                                      |                                                                                                 | aracters<br>seconds.                                                                  | transferi                                                                                           | red downline on interactive connections in                                                                                                                                                                                                                |
|         | prust                          |       | Number<br>30 sec                                                     |                                                                                                 | aracters                                                                              | transferi                                                                                           | red downline on PRU connections in the last                                                                                                                                                                                                               |
|         | npurej                         |       | Number                                                               | of ti                                                                                           | mes data                                                                              | was rejeo                                                                                           | cted by the NPU.                                                                                                                                                                                                                                          |
| The NAM | status                         | disp. | lay sho                                                              | ows the                                                                                         | logical                                                                               | link ent                                                                                            | ries in the following format.                                                                                                                                                                                                                             |
|         |                                |       |                                                                      |                                                                                                 |                                                                                       |                                                                                                     |                                                                                                                                                                                                                                                           |
| hn      | tn 1                           | h n   | s                                                                    | t nc                                                                                            | n ac                                                                                  | nhdq n]                                                                                             | ldq timeup                                                                                                                                                                                                                                                |
| hn      | tn l<br>Header                 | h n   | S                                                                    | t nc                                                                                            | an ac                                                                                 | nhdq n]                                                                                             | ldq timeup<br>Description                                                                                                                                                                                                                                 |
| hn      |                                | h n   | -                                                                    |                                                                                                 | m ac<br>mber of t                                                                     | •                                                                                                   | Description                                                                                                                                                                                                                                               |
| hn      | Header                         | h n   | Host r<br>Termin                                                     | node nu<br>nal nod                                                                              | umber of t<br>le number                                                               | he couple<br>of the NI                                                                              | Description                                                                                                                                                                                                                                               |
| hn      | <u>Header</u><br>hn            | h n   | Host r<br>Termir<br>node r                                           | node nu<br>nal nod<br>number                                                                    | mber of t<br>e number<br>of the re                                                    | he couple<br>of the NI<br>mote host                                                                 | <u>Description</u><br>er.<br>PU on NPU-to-host logical links, or host                                                                                                                                                                                     |
| hn      | <u>Header</u><br>hn<br>tn      | h n   | Host r<br>Termir<br>node r<br>Logica                                 | node nu<br>nal nod<br>number<br>al link<br>egulati                                              | mber of t<br>e number<br>of the re<br>regulati                                        | he couple<br>of the NI<br>mote host<br>on level                                                     | Description<br>er.<br>PU on NPU-to-host logical links, or host<br>t on host-to-host logical links.                                                                                                                                                        |
| hn      | <u>Header</u><br>hn<br>tn<br>h | h n   | Host r<br>Termir<br>node r<br>Logica<br>NPU re                       | node nu<br>nal nod<br>number<br>al link<br>egulati                                              | mber of t<br>e number<br>of the re<br>regulati                                        | he couple<br>of the NI<br>mote host<br>on level<br>as report                                        | <u>Description</u><br>er.<br>PU on NPU-to-host logical links, or host<br>t on host-to-host logical links.<br>as reported by the host.                                                                                                                     |
| hn      | <u>Header</u><br>hn<br>tn<br>h | h n   | Host r<br>Termir<br>node r<br>Logica<br>NPU re<br>values             | node nu<br>nal nod<br>number<br>al link<br>egulati<br>s:                                        | mber of t<br>e number<br>of the re<br>regulati<br>on level                            | he couple<br>of the NI<br>mote host<br>on level<br>as report<br><u>Desc</u>                         | <u>Description</u><br>er.<br>PU on NPU-to-host logical links, or host<br>t on host-to-host logical links.<br>as reported by the host.<br>ted by the NPU. n can have the following                                                                         |
| hn      | <u>Header</u><br>hn<br>tn<br>h | h n   | Host r<br>Termir<br>node r<br>Logica<br>NPU re<br>values             | node nu<br>nal nod<br>number<br>al link<br>egulati<br>s:<br><u>n</u><br>) Log                   | mber of t<br>e number<br>of the re<br>regulati<br>on level<br>cical link              | he couple<br>of the NI<br>mote host<br>on level<br>as report<br><u>Desc</u><br>is down              | <u>Description</u><br>er.<br>PU on NPU-to-host logical links, or host<br>t on host-to-host logical links.<br>as reported by the host.<br>ted by the NPU. n can have the following<br>cription                                                             |
| hn      | <u>Header</u><br>hn<br>tn<br>h | h n   | Host r<br>Termir<br>node r<br>Logica<br>NPU re<br>values<br><u>r</u> | node nu<br>nal nod<br>number<br>al link<br>egulati<br>s:<br><u>n</u><br>D Log<br>L Onl<br>2 Onl | mber of t<br>e number<br>of the re<br>regulati<br>on level<br>tical link<br>y asynchr | he couple<br>of the NI<br>mote host<br>on level<br>as report<br><u>Desc</u><br>is down<br>onous sup | <u>Description</u><br>er.<br>PU on NPU-to-host logical links, or host<br>t on host-to-host logical links.<br>as reported by the host.<br>ted by the NPU. n can have the following<br>cription<br>or disabled for data.<br>pervisory messages are allowed. |

| Header | Description                                                                                                                          |
|--------|--------------------------------------------------------------------------------------------------------------------------------------|
| S      | Supervision indicator. If CS is using this logical link to send supervisory messages, the field is set to S; otherwise, it is blank. |
| t      | Host-to-host logical link indicator. If this logical link is between<br>two hosts, the field is set to H; otherwise, it is blank.    |
| ncn    | Number of current connections on the logical link.                                                                                   |
| ac     | Reserved.                                                                                                                            |
| nhđq   | Reserved.                                                                                                                            |
| nldq   | Reserved.                                                                                                                            |
| timeup | Time, in the format hh.mm.ss., that the logical link became active.                                                                  |

# QUEUE FILE TRANSFER FACILITY (QTF) K DISPLAY

The following procedure describes K-display usage for QTF operations under DSD control. QTF is used by both the RHF and NAM Subsystems.

1. When RHF or NAM is initiated, QTF is reinitiated automatically. If QTF is no longer running and must be restarted, either bring up the RHF application table display (described later in this section) and enter

ENABLE, ord.

ord QTF ordinal in the application table display.

or use the NAMI utility (described in section 16, Network Utilities).

2. Examine the DSD system status display (B,0). When QTF is scheduled to a control point, it is indicated on the B,0 display. The message

REQUEST \*K\* DISPLAY

appears on the B,O display.

3. Activate the K display for that control point by entering:

K,jsn

jsn QTF job sequence name.

The QTF K display (figure 8-24) appears on the left screen.

| * QUEUE FILE  | TRANSFER F  | ACILITY * |    | . \ |
|---------------|-------------|-----------|----|-----|
| NUMBER OF FIL | ES TRANSFEI | RRED XXXX |    |     |
| ACTIVE TRANSF | ERS         |           |    |     |
| FILE NAME     | LID         | PID       | DC |     |
| ABCD          | LD9         | M90       | LP |     |
| ABCG          | LD1         | M90       | IN |     |
| ACCC          | LD1         | M90       | PU |     |
| ADBA          | LD9         | M90       | SB |     |

Figure 8-24. QTF K Display

Each entry in the QTF K display has the following form.

| filename | lid pid dc           |
|----------|----------------------|
| Header   | Description          |
| filename | Name of the file.    |
| lid      | Logical identifier.  |
| pid      | Physical identifier. |
| dc       | Disposition code.    |

PIDs must be defined in the LID configuration file. Also LIDs should be defined in the LID configuration file, but can be added or deleted using the LIDOU utility (refer to section 9, L-Display Utilities).

## **REDEFINE K DISPLAY**

Use the REDEFINE utility to reconfigure 844 and 885-11/12<sup>†</sup> disk drives online and thereby logically eliminate a unit that is malfunctioning without performing a level 0 initial deadstart. A single unit or multiunit device <sup>††</sup> that fails can be replaced with an unused unit. Unused units must be available or made available across channels or on the same channel as the failing unit by physically moving the disk pack from the failing unit to the replacement unit. Table 8-8 gives the equipment requirements for reconfiguration.

<sup>†</sup>When reconfiguring an 885-11/12 disk drive, a customer engineer must be present.

the reconfiguring a multiunit device, all units of the device must be on the same controller(s).

| Operation<br>To Be<br>Performed | Current Equipment                                                        | Replacemen        | t Equipment                       | Special Considerations                                                                                                                                                                                                                                                                                             |
|---------------------------------|--------------------------------------------------------------------------|-------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | Must be unloaded, removable                                              | Must be<br>in EST | Must be<br>unloaded,<br>removable |                                                                                                                                                                                                                                                                                                                    |
| Add or<br>Return a Unit         | Yes                                                                      | No                | Yes                               | Equipment must have less<br>than eight units.                                                                                                                                                                                                                                                                      |
| Delete a Unit                   | Must be removable;<br>if not unloaded,<br>the unit must be<br>in the EST | NA                | NA                                | Equipment must have at<br>least one unit.                                                                                                                                                                                                                                                                          |
| Replace a<br>Unit               | No                                                                       | Not<br>necessary  | Yes, if<br>in EST                 | The system does not perform<br>perform label verification<br>on packs that are unloaded<br>before the failing unit is<br>replaced. If the unloaded<br>pack is not moved from the<br>failing unit or the wrong<br>pack is moved, the system<br>issues an error message<br>when the replacement unit<br>is accessed. |
| Recable a<br>Unit               | No                                                                       | NA                | No                                | None.                                                                                                                                                                                                                                                                                                              |

## Table 8-8. Equipment Requirements for Reconfiguration

## NOTE

There are special cases when you cannot perform an online reconfiguration. In these cases, you must perform a level 0 deadstart and define the failing device to another drive. The special cases are:

- Reconfiguring an 885-11/12 disk drive that is the only system device defined.
- Reconfiguring an 844 or 885-11/12 disk drive that is the only temporary device defined.
- Reconfiguring a device designated as an independent shared device.
- The reconfiguration sequence follows:
  - 1. Request the reconfiguration of the disk device defined by EST ordinal est by entering:

REDEFINE, est.

The message REQUEST \*K\* DISPLAY appears at the appropriate control point on the system status display (B,O). You can reenter the REDEFINE command as many times as there are devices to be reconfigured. Multispindle devices that include two or more units are considered to be one device.

If an INITIALIZE command is being processed, the REDEFINE entry is not processed until the initialization is complete.

2. Bring the REDEFINE K display (see figure 8-25) to the left console screen by entering:

K,jsn.

jsn Job sequence name of the job requesting the K display.

As shown in figure 8-25, the current EST description of the device being reconfigured appears under the heading CURRENT EQUIPMENT CONFIGURATION. The EST description of the device as changes are made appears under the heading REQUESTED EQUIPMENT CONFIGURATION. Any devices listed under IDLED EQUIPMENTS are devices that have been previously selected by your REDEFINE command but have yet to be processed in the reconfiguration run.

The K display may not list all relevant devices. If more than one device is listed, they are processed one at a time as they appear in the list with one exception: all shared devices are processed prior to nonshared devices.

You are guided through the reconfiguration process in two ways. First, by the list of commands and parameters shown on the K display, and second, by the system responses and error messages.

\*\*\*\* MASS STORAGE FAILURE RECOVERY \*\*\*\* K DISPLAY COMMANDS CLEAR CLEARS IDLE AND SUSPEND ON CURRENT EQUIPMENT. CLEAR ALL DEVICE IDLES, AND END \*CONFIG\*. INITIATES PROCESSING OF ENTERED CONFIGURATION. END GO RERUN **RESTARTS \*CONFIG\* UTILITY PROCESSING.** RESETS CURRENT EQUIPMENT TO DEFAULT PARAMETERS. RESET SUSPEND SUSPEND ALL SYSTEM OPERATION ON CURRENT EQUIPMENT. PARAMETER DEFINITIONS C1 AND OPTIONALLY C2 ARE NEW CHANNELS FOR ACCESS. CH=C1,C2 EQ=EEE SET EST ORDINAL EEE TO BE PROCESSED. UL=U1,U2 ...UN SET UNIT LIST AS SPECIFIED. UR=UU UNIT UU IS TO BE RECABLED WITH A NEW DRIVE. CURRENT EQUIPMENT CONFIGURATION. 034. DJ-1 CH05,07 UL=05 ST T REQUESTED EQUIPMENT CONFIGURATION. CH05,07 034. DJ-1 UL=05 --ST T - - -CHANGED UNITS IDLED EQUIPMENTS 027. DJ-1 CH26,32 UL=07 ST I

Figure 8-25. REDEFINE K Display (Left Screen)

3. Enter all of the valid parameters (refer to table 8-9) that define the reconfiguration characteristics for the specified device. Parameters are entered singly. Parameters are processed left to right; no terminator is necessary.

If you enter an incorrect parameter (for example, the wrong channel number), the error can be corrected by entering the correct parameter.

4. Enter

K.GO

to initiate processing of the parameters when all parameters and commands (refer to table 8-10) have been entered for the specific device. Enter this command after each set of parameters to signal the system to go ahead with the reconfiguration you have defined. If more devices remain to be reconfigured, repeat steps 3 and 4.

5. Enter

K.END

to end a reconfiguration run when there are no more devices to be processed.

Table 8-9. Reconfiguration Parameters

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CH=c1,c2                | Specifies the channel numbers ( $c_1$ and, optionally, $c_2$ ) to be used under the new device definition.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                         | Use this parameter when the entire device is to be redefined to alternate channel number(s). You can also use it to add or delete channels from an equipment definition. New channels can be added by specifying new channel numbers for a defined equipment. Channels can be deleted by specifying CH=. when deleting a unit. Acceptable values for $c_1$ and $c_2$ are from 0 to 13g for systems having 10 or less PPs; from 0 to 13g and from 20g to 33g for systems having more than 10 PPs. Leading zeros can be omitted.                   |
| EQ=est                  | Specifies the equipment with EST ordinal est is to be<br>processed. Enter this parameter when the processing of<br>equipments is order dependent; for example, when a device must<br>first be made available before it can replace a failing device.<br>The system ignores all parameters not processed before you ente<br>the EQ=est parameter. Parameters entered after EQ=est refer to<br>the specified equipment until you enter another EQ=est or a<br>command that causes the next equipment in the list to be<br>selected for processing. |
| $UL=u_1,u_2,\ldots,u_n$ | Specifies the unit list for the new configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                         | When a unit is to be replaced, added, or deleted, the entire<br>unit configuration must be entered with this parameter. The<br>equipment must be unloaded (multimainframe mode) or otherwise<br>have an unavailable status if a unit is to be added or deleted.<br>Any number of units can be changed. By specifying UL=. the<br>current unit configuration is deleted.                                                                                                                                                                          |
|                         | NOTE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                         | If the unit number specified in the UL=<br>parameter represents a unit that is not<br>defined in the EST, the unit number is<br>accepted without validation. Ensure that<br>the unit number entered represents a valid<br>device.                                                                                                                                                                                                                                                                                                                |
| UR=un                   | Specifies that the device with unit number un is to be<br>recabled. This parameter is used when a device is to be<br>physically replaced by a new device with the same unit number.<br>More than one device can be specified for recabling at the same<br>time.                                                                                                                                                                                                                                                                                  |

## Table 8-10. Reconfiguration Commands

| Command | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ABORT   | Discontinues processing of the current command. It is entered only<br>in response to a detected error condition and is used to initiate<br>error recovery procedures. This command cannot be followed<br>immediately by an END command.                                                                                                                                                                                                                                                                                                                              |
| CLEAR   | Clears the suspend and redefinition request status for the current<br>equipment. Label and read/write verification of the device is<br>performed. This command should be entered only when no further<br>processing is desired for the current equipment.                                                                                                                                                                                                                                                                                                            |
| END     | Terminates the reconfiguration processing. The K-display parameters<br>are set to the default values as control is returned. This command<br>cannot be entered immediately after an ABORT command.                                                                                                                                                                                                                                                                                                                                                                   |
| GO      | Initiates the processing of specified reconfiguration parameters previously entered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| IGNORE  | Informs the system on which the command was entered to ignore<br>processing on this device (multimainframe mode only). This command<br>should be entered during an add or delete unit reconfiguration run<br>on the machine(s) within the multimainframe complex which, for<br>control reasons, cannot add to or delete from the specified<br>equipment. Also, you can use this command to ignore an error<br>message pertaining to a marginally unacceptable servo timing check,<br>which is performed automatically when reconfiguring an 885-11/12<br>disk drive. |
| NEXT    | Enter this command in response to an 885-11/12 disk drive servo<br>timing check that meets requirements. This command causes<br>processing to continue with the next device or the next step of<br>processing. This command is valid only when reconfiguring 885-11/12<br>disk drives.                                                                                                                                                                                                                                                                               |
| RECHECK | Retries a verification/diagnostic process that previously gave an error. Only the commands RECHECK, ABORT, and IGNORE are accepted by the system when an error message is issued.                                                                                                                                                                                                                                                                                                                                                                                    |
| RERUN   | Sets the parameters to default values and updates the list of equipment to be reconfigured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| RESET   | Resets the parameters to default values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| SUSPEND | Causes system processing on the specified device to be suspended<br>indefinitely while the device is in a not ready state. Only<br>diagnostic access to the device is allowed. All other jobs<br>accessing the device will be unable to continue until the device is<br>returned to a ready state. More than one equipment can be suspended<br>at the same time.                                                                                                                                                                                                     |

You can stop the reconfiguration procedure by entering either the K.ABORT command or the K.CLEAR command (depending on which command is posted in the list of valid commands on the K display). In either case, processing advances to the next device in the list of devices under IDLED EQUIPMENTS (see figure 8-25).

If the device specified is a shared device in a multimainframe environment and reconfiguration is not desirable on one or more of the mainframes, use the following procedure.

1. Enter

REDEFINE, est.

est EST ordinal of the shared device.

at the console of each mainframe for which reconfiguration of the shared device is not desired.

2. Enter

K,jsn.

jsn Job sequence name of the job requesting the K display.

3. Enter

K.IGNORE

and processing on the shared device in the list is ignored by that mainframe. The machine must wait until the shared device is done with its processing.

4. Enter

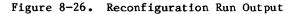
K.END

to end the reconfiguration procedure.

Enter either the RERUN or RESET command to clear the IGNORE command.

Figure 8-26 shows the output for a sample reconfiguration run.

| ORD | TYPE | CHANNELS | UNITS | STATUS |
|-----|------|----------|-------|--------|
| 06  | DJ-1 | CH26,32  | UL=06 | ST =   |
| 07  | DJ-1 | CH26,32  | UL=07 | ST =   |
| 10  | DJ-1 | CH32     | UL=01 | ST =   |
| 11  | DJ-1 | CH13     | UL=02 | ST =   |
| 12  | DI-1 | CH26     | UL=03 | ST =   |
| 13  | DI-1 | CH32     | UL=11 | ST =   |
| 14  | DI-1 | CH26,32  | UL=04 | ST = I |
|     |      | •        |       |        |



Following are examples of the reconfiguration of disk devices and how their status changes in the REDEFINE K display.

Example 1, returning a unit to the system:

Assume the unit of est ordinal 7, the system's spare disk drive, was used to replace a failing disk drive. Now that the defective unit has been repaired, it is to be returned as the unit of the spare disk drive.

Disk configuration before the REDEFINE:

| EST     | Equipment | Channel   | Unit          | Status |
|---------|-----------|-----------|---------------|--------|
| Ordinal | Type      | Number(s) | <u>Number</u> |        |
| 7       | DJ-0      | 00        |               | I      |

Enter the following commands:

| Command     | Description                                                                            |
|-------------|----------------------------------------------------------------------------------------|
| REDEFINE,7. | 7 is the EST ordinal of the shared device.                                             |
| K,jsn.      | jsn is the job sequence name of the job requesting the K display.                      |
| K.CH=32,26  | 32 and 26 are the channel numbers to be used by est ordinal 7.                         |
| K.UL=7      | 7 is the unit number of the device being returned.                                     |
| K.GO        | Initiates the processing of all the parameters and commands entered for EST ordinal 7. |

The system responds with the message:

EQ 7 PROCESSING COMPLETE.

To end the reconfiguration, enter:

K.END

Disk configuration after the REDEFINE:

| EST            | Equipment | Channe 1  | Unit   |        |
|----------------|-----------|-----------|--------|--------|
| <u>Ordinal</u> | Туре      | Number(s) | Number | Status |
| 7              | DJ-1      | 32, 26    | 7      |        |

Example 2, reconfiguring a failing unit:

Assume EST ordinal 10 and EST ordinal 11 are defined in the EST display. Equipment 10 is a spare unit currently not being used. Equipment 11 has a pack mounted and is the failing device. Before the failing device can be reconfigured, the spare unit must be removed from the EST. The following stipulations apply when deleting a unit from the EST:

- If the EST ordinal is defined in a single mainframe environment or if it is not shared in a multimainframe environment, then having device unavailable status (U status in the E,M display) for that EST ordinal is sufficient.
- If the EST ordinal is shared in a linked shared device multimainframe environment, then that EST ordinal must have device unavailable status and be globally unloaded (U and N status in the E,M display) before a reconfiguration can be performed.

Disk configuration before the REDEFINE:

| EST<br>Ordinal | Equipment<br>Type | Channel<br>Number(s) | Unit<br>Number | Status |
|----------------|-------------------|----------------------|----------------|--------|
| 10             | DJ-1              | 32                   | 1              | I      |
| 11             | DJ-1              | 13                   | 2              |        |

To perform the reconfiguration, enter the following commands:

| Command      | Description                                                                             |
|--------------|-----------------------------------------------------------------------------------------|
| REDEFINE,10. | 10 is the EST ordinal of the spare device.                                              |
| REDEFINE,11. | ll is the EST ordinal of the failing device.                                            |
| K,jsn.       | jsn is the job sequence name of the job requesting the K display.                       |
| K•CH=•       | Deletes the channel number(s) assigned to EST ordinal 10 from the EST.                  |
| K.UL=.       | Deletes the unit number of EST ordinal 10 from the EST.                                 |
| K.GO         | Initiates the processing of all the parameters and commands entered for EST ordinal 10. |

The system responds with:

EQ 10 PROCESSING COMPLETE.

Enter the reconfiguration commands for the failing device as follows:

| Command | Description                                                                             |
|---------|-----------------------------------------------------------------------------------------|
| K.CH=32 | 32 is the channel number that was assigned to EST ordinal 10.                           |
| K.UL=1  | l is the unit number that was assigned to EST ordinal 10.                               |
| K.GO    | Initiates the processing of all the parameters and commands entered for EST ordinal 11. |

The system responds with:

SPIN DOWN UNIT 02. 02 is the unit number of EST ordinal 11.

After the unit is spun down, the system responds with:

MOVE PACK FROM UNIT 02 TO UNIT 01 AND SPIN UP.

After the pack is moved and the new unit is spun up, the system responds with:

EQ 11 PROCESSING COMPLETE.

To end the reconfiguration, enter:

K.END

Disk configuration after the REDEFINE:

| EST            | Equipment | Channel   | Unit   | Status |
|----------------|-----------|-----------|--------|--------|
| <u>Ordinal</u> | Type      | Number(s) | Number |        |
| 10             | DJ-0      | 00        |        |        |
| 11             | DJ-1      | 32        | 1      |        |

#### Example 3, reconfiguring devices across channels:

Units may be reconfigured across channels with the REDEFINE command. Assume that EST ordinal 12 is the failing unit (or possibly the failing channel) and is on channel 26. EST ordinal 13 is the spare unit on channel 32. The following commands illustrate a reconfiguration across channels.

Disk configuration before the REDEFINE:

| EST<br>Ordinal | Equipment<br>Type | Channel<br>Number(s) | Unit<br><u>Number</u> | Status |
|----------------|-------------------|----------------------|-----------------------|--------|
| 12             | DI-1              | 26                   | 3                     |        |
| 13             | DI-1              | 32                   | 11                    |        |

Enter the following commands:

Command

## Description

REDEFINE, 12. 12 is the EST ordinal of the failing device.

REDEFINE, 13. 13 is the EST ordinal of the spare device.

K, jsn. jsn is the job sequence name of the job requesting the K display.

K.EQ=13 Selects the spare unit to be processed first.

K.SUSPEND Suspends the spare unit to clear it from the EST.

The system responds with:

SYSTEM USAGE OF EQ 13 SUSPENDED.

To continue with the reconfiguration on EST ordinal 12, enter:

| K.EQ=12 | Selects the failing unit for processing.                                                |
|---------|-----------------------------------------------------------------------------------------|
| K.CH=32 | Assigns the old channel number of EST ordinal 13 to EST ordinal 12.                     |
| K.UL=11 | Assigns the old unit number of EST ordinal 13 to EST ordinal 12.                        |
| K.GO    | Initiates the processing of all the parameters and commands entered for EST ordinal 12. |

The system responds with:

EQ 12 PROCESSING COMPLETE.

Disk configuration at this point in example 3.

| EST<br>Ordinal | Equipment<br>Type | Channel<br>Number(s) | Unit<br><u>Number</u> | <u>Status</u> |
|----------------|-------------------|----------------------|-----------------------|---------------|
| 12             | DI-1              | 32                   | 11                    | I             |
| 13             | DI-1              | 32                   | 11                    | IS            |

All SUSPEND status flags must be cleared before a reconfiguration run can be ended. The system therefore automatically selects EST ordinal 13 again for the next EST ordinal to be processed.

To continue with the reconfiguration, enter:

| Command | Description                                                                             |  |  |
|---------|-----------------------------------------------------------------------------------------|--|--|
| K.CH=26 | Assigns the old channel number of EST ordinal 12 to EST ordinal 13.                     |  |  |
| K.UL=3  | Assigns the old unit number of EST ordinal 12 to EST ordinal 13.                        |  |  |
| K.GO    | Initiates the processing of all the parameters and commands entered for EST ordinal 13. |  |  |

The system responds with:

EQ 13 PROCESSING COMPLETE.

To end the reconfiguration, enter:

K.END

Disk configuration after the REDEFINE:

| EST<br>Ordinal | Equipment<br>Type | Channel<br>Number(s) | Unit<br><u>Number</u> | Status |
|----------------|-------------------|----------------------|-----------------------|--------|
| 12             | DI-1              | 32                   | 11                    |        |
| 13             | DI-1              | 26                   | 3                     |        |

## **REMOTE BATCH FACILITY (RBF) K DISPLAY**

Whenever RBF is in operation, user connections and activity are shown in the RBF K display (refer to figure 8-27).

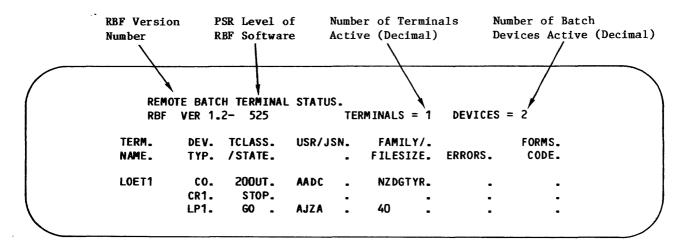


Figure 8-27. RBF K Display

Select the RBF K display with this DSD command:

K,RBF.

Data on the RBF display is updated periodically to reflect the current status of batch terminals connected to RBF.

Terminals are identified by termname, a unique name defined by the site. Terminals are displayed in alphabetical order. There are multiple lines on the K display per terminal; one line for the terminal console, and one line for each batch device (card reader, line printer, card punch, or plotter).

If there are more terminals and devices active than can be displayed on one screen, the message

MORE LINES FOLLOW.

appears at the lower left corner of the display. You can display additional screens by entering:

K.+

The K.+ command advances the display page-by-page and end-around from the last page to the first. All screens are displayed in a forward direction. Use of the console input K.- does not move the screen back to the previous display.

Entries in the display have the following format.

Header

| term | dev | tclass | usr/jsn | family/  |        | forms |
|------|-----|--------|---------|----------|--------|-------|
| name | typ | /state |         | filesize | errors | code  |

| term | Name of the terminal. A unique name, termname, assigned by the installation |
|------|-----------------------------------------------------------------------------|
| name | during network startup. This field is used for console devices only.        |

Description

dev Device type. The device type code is one of the following: typ

CodeDescriptionCOConsole device.CPiCard punch.CRiCard reader.LPiLine printer.PLiPlotter.

The ordinal number, i, of the device can range from 1 to 7.

tclass If this field is in the same line as the termname, the contents of the
/state field is the terminal class mnemonic (refer to the Remote Batch Facility
Reference Manual). If this field occurs in a line not containing a termname,
the device status code is one of the following:

#### Description Code ABRT File in transmission is to be discarded. CONN Device is connected (initial state). END Device stops transmission at EOI. ENDA File being aborted; device will stop at EOI. ENDC End connection. ENDI Device will stop at EOI; idle down requested. GO Device is ready for input.

| He | ade | r |
|----|-----|---|
|    |     |   |

## Description

|                     | Code                                                                                                                                                                                                                                                                                                                            | Description                                                                                                                             |  |  |  |  |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
|                     | NULL                                                                                                                                                                                                                                                                                                                            | Console is not connected, but RBF devices are. This code appears only when the device type is a console (device type code CO).          |  |  |  |  |
|                     | PREC                                                                                                                                                                                                                                                                                                                            | Preconnect status (device connection not complete).                                                                                     |  |  |  |  |
|                     | STOP                                                                                                                                                                                                                                                                                                                            | Device is not ready for transmission of data.                                                                                           |  |  |  |  |
|                     | STPA                                                                                                                                                                                                                                                                                                                            | Device is stopped; current file to be aborted.                                                                                          |  |  |  |  |
|                     | STPE                                                                                                                                                                                                                                                                                                                            | Device is stopped.                                                                                                                      |  |  |  |  |
|                     | STPI                                                                                                                                                                                                                                                                                                                            | Device is stopped due to idle down request.                                                                                             |  |  |  |  |
| usr/jsn             |                                                                                                                                                                                                                                                                                                                                 | ansfer is in progress, jsn is displayed in this field. If no<br>g transferred, then the user name appears in this field.                |  |  |  |  |
| family/<br>filesize | If this field is in the same line as the termname, the content of this field<br>is the family associated with the username. The user index and family<br>combination determine the terminal identifier used by the system for routing<br>jobs. Otherwise, the contents of this field is the size of the output file<br>in PRUs. |                                                                                                                                         |  |  |  |  |
| errors              | Contents of t                                                                                                                                                                                                                                                                                                                   | this field, if present, is one of the following error messages:                                                                         |  |  |  |  |
|                     | Message                                                                                                                                                                                                                                                                                                                         | Description                                                                                                                             |  |  |  |  |
|                     | DISK ERRO                                                                                                                                                                                                                                                                                                                       | OR Data has been lost due to an unrecoverable disk failure.                                                                             |  |  |  |  |
|                     | DISK FULI                                                                                                                                                                                                                                                                                                                       | A disk-full indication was received while RBF was attempting to write to disk.                                                          |  |  |  |  |
|                     | NOT READY                                                                                                                                                                                                                                                                                                                       | The device the user specified is not available (for example,<br>the line printer is out of paper or the card reader has a<br>card jam). |  |  |  |  |

The system input queue has reached its limit of jobs waiting to begin execution. QUEUE FULL

forms Forms code for output devices as specified by the user and defined by the code site.

## **REMOTE HOST FACILITY (RHF) K DISPLAY**

The Remote Host Facility (RHF) links NOS to a loosely coupled network (LCN) providing transfer of permanent files, queued files, and maintenance facilities for the LCN hardware. Each system in an LCN configuration is connected to one or more LCN trunks by network access devices (NADs). Several types of NADs are available, allowing the connection of various types of computer systems to an LCN. Each system has an RHF that provides some or all of the following capabilities.

RHF runs at a control point and contains an operator interface package, control tables, network application code, and the PP routines that drive the RHF network hardware.

The following applications are also available as part of RHF:

#### Application

#### Description

- PTF, PTFS Permanent File Transfer Facility (PTF) and Permanent File Transfer Facility Servicer (PTFS). PTF and PTFS provide users access to remote permanent files. A local user activates PTF with the MFLINK command (refer to the NOS 2 Reference Set, Volume 3). When a remote user enters the MFLINK command, RHF activates a PTFS application on the local host to service the remote request.
- MLTF Maintenance Logging Transfer Facility (MLTF). MLTF provides maintenance logging capabilities for local and remote mainframe NADs. All local NAD errors are logged to the binary maintenance log (BML). All remote mainframes that have error logging enabled (refer to the network path table display described later in this section) log errors. This application starts automatically when RHF is initiated.
- QTF, QTFS Queue File Transfer Facility (QTF) and Queue File Transfer Facility Servicer (QTFS). QTF and QTFS allow you to transfer input and output files to a remote system. When RHF is initiated, the system automatically activates QTF. When a remote host QTF application has a file to transfer, RHF initiates QTFS on the local host to service the remote request.

After initiation, both QTF and MLTF periodically roll in to check for files to transfer or to log NAD errors. You can change the time interval between periodic executions of either QTF or MLTF. For information on changing this time interval, refer to the NOS 2 Installation Handbook.

The following subsections describe the initiation, operation, control, and termination of the RHF.

## **RHF INITIATION**

Before network operation can begin, you must initiate RHF using the DSD RHFffff command (refer to section 5, DSD Commands).

When RHF is initiated, RHF generates jobs for loading NAD controlware for all local NADs that are defined in RHF's configuration and have an EST status of ON.

When RHF is initiated, it starts all enabled applications defined by the network configuration as autostart applications (refer to RHF - Configuration File Generation in the NOS 2 Installation Handbook). These applications are typically QTF and MLTF.

## **OPERATOR INTERFACE**

The operator interface for RHF consists of using the following displays.

| Display | Description |
|---------|-------------|
|         |             |

application table Lists all active applications.

network path table Shows how the remote hosts are connected to the local host.

An example of each display is shown later in this section. To understand how to use the information provided in the displays it is helpful to understand the sample LCN network shown in figure 8-28.

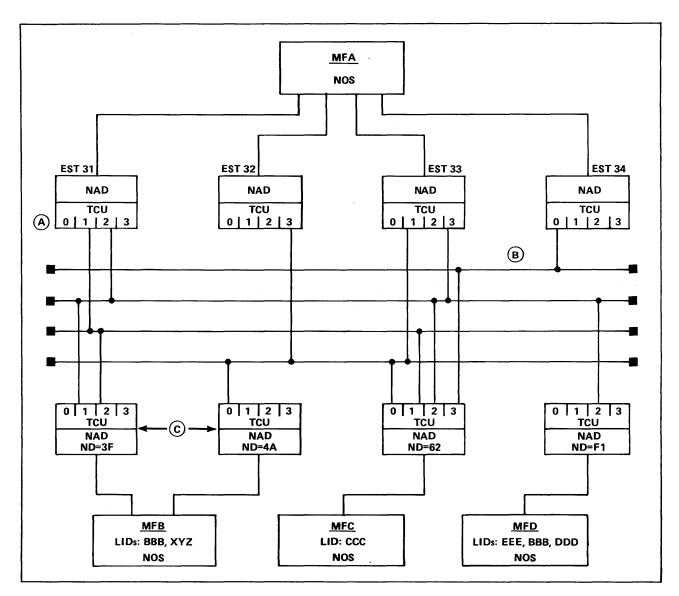


Figure 8-28. Sample LCN

MFA is the local NOS host and MFB, MFC, and MFD are the remote NOS hosts. MFA has four EST ordinals set up during installation (EST 31, 32, 33, and 34) to be used with the three remote hosts. Each NAD can connect to a maximum of four channels that can be used to communicate with NADs. These trunk control units (TCUs) are represented by the numbers 0, 1, 2, and 3 in the diagram (refer to A in figure 8-28).

The horizontal lines between the NADs of the local mainframe (MFA) and the NADs of the remote mainframes (MFB, MFC, and MFD) depict the connections between the NADs. For example, the top horizontal line shows the connections between the channels starting at TCU 0 of the local host and TCU 3 of the remote host (refer to B in figure 8-28).

Also during the installation process, each remote NAD is given a remote NAD address to uniquely identify that particular NAD. For example, the remote host MFB has two NADs associated with it. Their remote NAD addresses are 3F and 4A (refer to C in figure 8-28).

### **RHF Commands Under K Display**

Use the RHF K display to communicate with RHF. Bring up this display with this DSD command:

K,RHF.

Two K displays are available under RHF, the application table display (see figure 8-29) and the network path table display (see figure 8-30). When you first enter K,RHF, the application table display appears. The next time and subsequent times you enter K,RHF, the display that appears will be either the application table or the network path table, whichever was displayed last.

The following commands are available under the RHF K display:

| Command                                                     | Function                                                                     |
|-------------------------------------------------------------|------------------------------------------------------------------------------|
| APPL                                                        | Displays the application table (see figure 8-29).                            |
| IDLE                                                        | Begins the idle-down process of RHF and all its associated applications.     |
| PATH                                                        | Displays the network path table (see figure 8-30).                           |
| ord,ND=rna,AC=rnac,<br>DD=dd,RT=rteb,<br>LT=1teb,LOG=status | Modifies entries associated with the network path table display ordinal ord. |
| +                                                           | Pages the current display forward.                                           |
| -                                                           | Pages the current display backward.                                          |

## **Application Table Display**

:

The application table display (see figure 8-29) lists all active applications.

| ORD    | APPL      | ENABLED        | MAX<br>COPIES | ACTIVE<br>COPIES |        | MAX<br>NNECTS |
|--------|-----------|----------------|---------------|------------------|--------|---------------|
| OND    |           | LINDELD        | 001120        | 001 120          |        |               |
| 1      | QTF       | YES            | 1             | 1                |        | 4             |
| 2      | QTFS      | YES            | 4             | 3                |        | 1             |
| 2<br>3 | PTF       | YES            | 4             | 0                |        | 1             |
| 4      | PTFS      | YES            | 4             | 0                |        | 1             |
| 5      | USRAP †   | YES            | 1             | 1                |        | 6             |
| 6      | MLTF      | YES            | 1             | 0                |        | 0             |
|        | ACTIVE AF | PPLICATIONS (N | ETON PERFORME | D)               |        |               |
| JOB    |           |                | JOB           |                  |        |               |
| NAME   | JOBORD    | CONNECT        | S NAME        |                  | JOBORD | CONNECTS      |
| ABCA   | 26        | 3              | AARM          |                  | 22     | 1             |
| AAQT   | 31        | 1              | ACAL          |                  | 33     | 2             |
| ACXQ   | 24        | 0              |               |                  |        |               |

 $\ensuremath{^\dagger}\xspace$  USRAP represents an application written by the site.

Figure 8-29. Application Table Display

Each entry in the display appears in the following format.

| ord appl en  | nabled maxcopies activecopies maxconnects                                                 |
|--------------|-------------------------------------------------------------------------------------------|
| jobname jobo | ord connects                                                                              |
| Header       | Description                                                                               |
| ord          | Application table display ordinal.                                                        |
| appl         | Name of the application.                                                                  |
| enabled      | Specifies whether the application communicates with RHF.                                  |
| maxcopies    | Maximum number of copies of the application that can simultaneously communicate with RHF. |
| activecopies | Number of copies of the application that are currently communicating with RHF.            |
| maxconnects  | Maximum number of network connections allowed by each copy of the application.            |
| jobname      | Job sequence name of the application.                                                     |
| jobord       | Excecuting job table ordinal of the application.                                          |
| connects     | Number of network connections currently used by this copy of the application.             |

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## **Network Path Table Display**

The network path table display (see figure 8-30) shows how the remote hosts are connected to the local host.

| ORD | PID | EST | сн | ENABLED | LOCAL<br>TRUNK<br>ENABLES† | REMOTE<br>TRUNK<br>Enables† | REMOTE<br>NAD<br>Addr | DEST | ACCESS<br>CODE | CON<br>COUNT | LOG<br>ERRS |
|-----|-----|-----|----|---------|----------------------------|-----------------------------|-----------------------|------|----------------|--------------|-------------|
| 1   | MFB | 031 | 6  | YES     | 0110                       | 0110                        | 3f                    | 0    | FOFO           | 2            | NO          |
| 2   |     | 032 | 7  | YES     | 0001                       | 1000                        | 4A                    | 0    | FOFO           | 1            | NO          |
| 3   |     | 033 | 10 | NO      | 0001                       | 0100                        | 3F                    | 0    | FOFO           | 0            | NO          |
| 4   |     | 033 |    | YES     | 0100                       | 1000                        | 4A                    | 0    | FOFO           | 0            | NO          |
| 5   | MFC | 031 | 6  | NO      | 0110                       | 0110                        | 62                    | 0    | FOFO           | 0            | NO          |
| 6   |     | 032 | 7  | NO      | 0001                       | 1000                        | 62                    | 0    | FOFO           | 0            | NO          |
| 7   |     | 033 | 10 | ) YES   | 0101                       | 1010                        | 62                    | 0    | FOFO           | 2            | NO          |
| 8   |     | 034 | 11 | YES     | 1000                       | 0001                        | 62                    | 0    | FOFO           | 0            | NO          |
| 9   | MFD | 031 | 6  | YES     | 0010                       | 0010                        | F1                    | 0    | FOFO           | 0            | NO          |
| 10  | _   | 033 | 10 | ) YES   | 0001                       | 0010                        | F1                    | 0    | FOFO           | 0            | NO          |

<sup>†</sup>A 1 means that a TCU is enabled. A 0 means that a TCU is not enabled. The leftmost digit of these entries corresponds with TCU 0, the next with TCU 1, and so forth. For example, if a NAD has TCUs 1 and 2 enabled, the corresponding entry should be 0110. Refer to figure 8-28.

Figure 8-30. Network Path Table Display

Each entry in the display appears in the following format.

| ord  | pid | est | ch | enabled | trunk | remote<br>trunk<br>enables | nad      | dest | _ | con<br>count | log<br>errs |  |
|------|-----|-----|----|---------|-------|----------------------------|----------|------|---|--------------|-------------|--|
| Head | er  |     |    |         |       | I                          | escripti | lon  |   |              |             |  |

ord Network path table display ordinal.

| pid | Physical | identifier | of | the | remote | mainframe | for | which | the | path | is |
|-----|----------|------------|----|-----|--------|-----------|-----|-------|-----|------|----|
|     | defined. |            |    |     |        |           |     |       |     |      |    |

est EST ordinal of the NAD that defines the local end of the path.

ch Channel number of the NAD that defines the local end of the path.

enabled Specifies whether RHF uses the path for starting new connections. For example, if a customer engineer wants to run diagnostics on a trunk connecting two NADs (local and remote), you would disable the appropriate path. When the connection count on that path falls to zero, the customer engineer can run concurrent diagnostics on that trunk without disturbing the operation of RHF.

| Header                     | Description                                                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| local trunk<br>enables     | Bit pattern specifying which TCUs to use on the local NAD for communica-<br>tions with the remote NAD.                                                     |
| remote<br>trunk<br>enables | Bit pattern specifying which TCUs the remote NAD uses in returning communications to the local NAD.                                                        |
| remote nad<br>addr         | Hardware address (hexadecimal) of the remote NAD.                                                                                                          |
| dest                       | Destination device address (hexadecimal).                                                                                                                  |
| access code                | Access code of the remote NAD; the software access code is the two<br>leftmost characters and the hardware access code is the two rightmost<br>characters. |
| con count                  | Number of connections currently using this path.                                                                                                           |
| log errs                   | Specifies whether the MLTF application logs trunk errors (detected by the remote NAD) into the binary maintenance log (BML).                               |

When the network path table is displayed, you can enter the following command to make changes.

ord,ND=rna,AC=rnac,DD=dd,RT=rteb,LT=1teb,LOG=status.

| Parameter | Description                                                                                                                                                                                                                                            |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ord       | Network path table display ordinal.                                                                                                                                                                                                                    |
| rna       | New remote NAD address in hexadecimal.                                                                                                                                                                                                                 |
| rnac      | New remote NAD access code in hexadecimal.                                                                                                                                                                                                             |
| dd        | New remote NAD destination device address in hexadecimal.                                                                                                                                                                                              |
| rteb      | New remote trunk enable bit pattern (nonzero 4-bit binary number with the leftmost bit representing TCU 0).                                                                                                                                            |
| lteb      | New local trunk enable bit pattern (nonzero 4-bit binary number with the<br>leftmost bit representing TCU 0). The same number of bits must be set<br>for both RT and LT or the command will be rejected.                                               |
| status    | Status of error logging for the specified remote NAD. Enter YES to have<br>MLTF periodically copy the trunk errors occurring on the specified<br>remote NAD to the binary maintenance log (BML). MLTF does not copy<br>trunk errors when you enter NO. |

ord is the only required parameter and it must come first. All other parameters are optional and can appear in any order, but at least one, besides ord, must be present.

## NOTE

Any change to rna, dd, or status for a given path results in an equivalent change for all paths using that remote NAD. This is because rna, dd, and status are associated with the remote NAD rather than the path to the remote NAD. When RHF determines a NAD or a NAD trunk control unit (TCU) on a path is bad, it turns off the NAD or path and notifies you with a message on the B,O display. It displays either

RHF, NAD ON EST est HAS BEEN TURNED OFF.

or

RHF, BAD TCU ON PATH xxx, PATH TURNED OFF.

## **RHF** Commands Available Under Application or Network Path Display

When the application table or network path table is displayed, you can enter the following commands to enable or disable the application or network path.

ENABLE, ord.

or

DISABLE, ord.

Parameter

ord

Ordinal of the application or network path on the current display.

Description

For example, if the application table display is up, ENABLE,ord enables the application specified by the display ordinal ord.

If an application is being enabled (whether currently enabled or disabled) and that application is defined as an autostart application, RHF initiates a copy of that application. This feature may be used, for example, if the MLTF application is normally disabled and you want to start logging NAD errors. It may also be used if the copy of the QTF application has been dropped accidentally and a new copy of the QTF application must be started.

## **RHF TERMINATION**

You can terminate an RHF operation using the IDLE command.

The command format is:

IDLE.

When you enter the IDLE command the system waits for applications to stop and the message IDLE-DOWN IN PROGRESS appears on the system status display. When activity stops, the system drops RHF and the message RHF ENDED appears. The IDLE command allows a gradual shutdown of RHF activities. No new connections are allowed.

## SCOPE 2 STATION FACILITY (SSF) K DISPLAYS

The following commands control operation of the SSF Subsystem.<sup>†</sup> Initiate the SSF Subsystem before issuing any commands. SSF can be initiated automatically when the system is brought up, either manually by entering an SSFffff command, or by entering the ENABLE,SSF command.

## **OPERATOR INTERFACE**

The SSF uses the K display for operator communications; therefore, the K display must be assigned to SSF before any other SSF Subsystem commands can be entered. Use the following command to assign the K display to SSF.

K,SSF.

### STATION LOGIN

After SSF is assigned to a control point, SSF searches the equipment status table (EST) for a SCOPE 2 communication coupler. If SSF finds an available coupler, it asks the SCOPE 2 mainframe to establish communications. If no coupler is found, a message appears at the console indicating that SSF is ready to log in to a SCOPE 2 mainframe. To log in, first enter an ON,est command (refer to section 5, DSD Commands, for a description of the ON,est command), then enter the following command.

K.LOGIN.

#### **ENABLING AND DISABLING FILE TRANSFERS**

File transfers between NOS and SCOPE 2 must be enabled before actual file transfers can begin; however, this occurs automatically when the SSF Subsystem is logged in. You can disable file transfers by entering the following command.

K.OFFSTAT,x.

Parameter

#### Description

x Specifies the SCOPE 2 mainframe PID.

When you enter a K.OFFSTAT command, file transfers in progress are completed, but no new file transfers are initiated. This command does not affect command, display, or message processing.

File transfers can be reenabled using the following command.

K.ONSTAT,x.

Parameter

Description

x

Specifies the SCOPE 2 mainframe PID.

<sup>&</sup>lt;sup>†</sup>Refer to appendix C for more information on the SSF Subsystem.

## STATION RECOVERY

If NOS fails, follow the SSF initiation procedure as described in section 5, DSD Commands, to recover the station. SSF does not require reinitiation if SCOPE 2 fails or if there is an FLPP failure that results in a reload of the FLPP.

## STATION DISCONNECTION AND LOGOUT

Station disconnection refers to the termination of communications between SSF and SCOPE 2 as a result of a hardware or software error or as a result of an operator command. When the disconnection occurs, all pending requests to the SCOPE 2 mainframe (such as screen refreshes, messages, and acknowledgements) are dropped.

Before entering an operator command to disconnect SCOPE 2, you should perform the following steps.

- 1. Idle down the file transfers by entering the K.OFFSTAT command. The station is idle when all staging SPOT jobs are finished and the spooling SPOT job has been swapped out.
- 2. If the system is in restricted or privileged mode, enter the CLROP command to relinquish operator control of SCOPE 2. Refer to the SCOPE 2.1 Operator's Guide for a description of the CLROP command.

To disconnect the SCOPE 2 mainframe, you can either drop the station control point by issuing a STOP or IDLE Subsystem command as described in section 5, DSD Commands, or you can log out of a specific SCOPE 2 mainframe by using the following command.

K.LOGOUT.

or

K.LOGOUT, pid.

#### Parameter

pid

## Description

PID of the mainframe you want to disconnect (required only in a multimainframe environment).

## FILE TRANSFER LIMIT COMMANDS

The following commands allow you to set limits on the number of file transfers that can be in progress concurrently for various types of file operations. The system default value for each of the following commands is 2; however, the default values can be changed, as an installation option, when SSF is installed. Refer to the NOS 2 Installation Handbook for more information on the default values for file transfer limit commands.

## **STAGED FILE TRANSFER COMMANDS**

The following commands control the number of concurrent SPOT jobs performing staged file operations:

| Command          | Description                                                                                                                                                                                                                                       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.PURGE,pid,n.   | Specifies the maximum number of concurrent SPOT jobs allowed to purge files from a NOS permanent file device. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of purge operations $(0 \le n \le 7)$ .                            |
| K.READTP,pid,n.  | Specifies the maximum number of concurrent SPOT jobs allowed to read tape files from NOS to SCOPE 2. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of read operations ( $0 \le n \le 7$ ).                                     |
| K.WRITETP,pid,n. | Specifies the maximum number of concurrent SPOT jobs allowed to write tape files from SCOPE 2 to NOS. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of write operations ( $0 \le n \le 7$ ).                                   |
| K.GETPF,pid,n.   | Specifies the maximum number of concurrent SPOT jobs allowed to read permanent files from NOS to SCOPE 2. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of permanent file read operations ( $0 \le n \le 7$ ).                 |
| K.SAVEPF,pid,n.  | Specifies the maximum number of concurrent SPOT jobs allowed to write files from SCOPE 2 to a NOS permanent file device. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of permanent file write operations ( $0 \le n \le 7$ ). |

## SPOOLED FILE TRANSFER COMMANDS

The following commands control the number of I/O files that the spooling SPOT job xSTA can transfer concurrently. Separate limits can be defined for both input and output files; however, the system limits the combined total of input and output files to four concurrent transfers.

| Command         | Description                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.INPUT,pid,n.  | Specifies the maximum number of concurrent input file transfers from NOS terminals to SCOPE 2. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of input files (0 $\leq$ n $\leq$ 4). |
| K.OUTPUT,pid,n. | Specifies the maximum number of concurrent output file transfers from SCOPE 2 to NOS terminals. pid is the PID of the SCOPE 2 mainframe. n is the maximum number of output files ( $0 \le n \le 4$ ). |

## TRANSACTION FACILITY (TAF) K DISPLAYS

The following commands control operation of the TAF Subsystem. Initiate the TAF Subsystem by using the TAFffff command before issuing these commands.

## **INITIATING TAF K DISPLAY**

When the transaction executive is brought to a control point, the message REQUEST \*K\* DISPLAY appears at the control point if a DISPLAY,ON command is specified in the TAF configuration file. Respond with the entry:

K, TAF.

Any of the following initialization commands can then be entered. If no values are to be changed, enter the command:

K.END.

Values are decimal unless otherwise indicated.

| Command  | Description                                                                                                                                         |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| K.BFL=n. | Changes the starting and minimum field length allocated by TAF to CRM (200008 $\leq$ n $\leq$ 1000008). Default is 700008.                          |
| K.CMB=n. | Changes the maximum number of communication blocks allowed to the TAF Subsystem (7 $\leq$ n $\leq$ 40). Default is 40.                              |
| K.ECS=n. | Sets the extended memory field length to be used by the transaction executive; n is octal thousands of words. Default is $0$ .                      |
| K.EFL=n. | Changes the maximum additional central memory field length made available to CRM for buffers and capsules ( $0 \le n \le 100000_8$ ). Default is 0. |
| K.END.   | Ends input of the transaction executive initialization parameters.<br>Initialization is completed when the TAF K display appears.                   |

| Command           | Description                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.ERO=CRF,op.     | Specifies whether to override certain I/O and logic errors when processing the communication recovery files (CRF).                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                |
|                   | op                                                                                                                                                                                                                                                                                                                                                 | Description                                                                                                                                                                                                                    |
|                   | NO                                                                                                                                                                                                                                                                                                                                                 | Aborts if $I/0$ or logic errors are encountered while processing the communication recovery files. This is the default setting.                                                                                                |
|                   | YES                                                                                                                                                                                                                                                                                                                                                | I/O or logic errors encountered on a run unit header<br>record result in the loss of that run unit with no<br>indication to the terminal user. The loss is noted on<br>the recovery report.                                    |
|                   |                                                                                                                                                                                                                                                                                                                                                    | I/O or logic errors encountered on a message record<br>within a run unit result in a loss of that run unit. A<br>status field is set in the run unit header, allowing TAF<br>to inform the terminal user of the run unit loss. |
|                   |                                                                                                                                                                                                                                                                                                                                                    | I/O or logic errors encountered on the CRF header record result in an unconditional abort of the TAF Subsystem.                                                                                                                |
| K.GO.             | -                                                                                                                                                                                                                                                                                                                                                  | of the transaction executive initialization parameters.<br>tion is complete when the TAF K display appears.                                                                                                                    |
| K.INT=typ,fileid. | Specifies which communication recovery files (CRF) are to be<br>initialized. This is the only way to initialize a CRF. Files<br>specified on a RECOVER command in the TAF configuration file and<br>specified in this command are initialized. Files specified on a<br>RECOVER command but not specified in this command are used for<br>recovery. |                                                                                                                                                                                                                                |
|                   | base recove                                                                                                                                                                                                                                                                                                                                        | nd also specifies whether CYBER record manager (CRM) data<br>ery files are initialized or recovered. For CRM recovery<br>s command is valid regardless of TAF assembly parameters.                                             |
|                   | typ                                                                                                                                                                                                                                                                                                                                                | Description                                                                                                                                                                                                                    |

- CRF Communication recovery files. This parameter is valid only if the installation parameter IPTAR equals 1.
- CRM CYBER Record Manager after-image and before-image recovery files.

Command

## Description

fileid

## Description

- n A digit from 1 to 7 that defines a CRF to be initialized. The digit corresponds to the ID parameter on the RECOVER command in the TAF configuration file. This parameter is not valid for CRM recovery files.
- ALL If typ is CRF, all communication recovery files defined by RECOVER commands in the TAF configuration file are initialized. If typ is CRM, all CRM recovery files are initialized.

This parameter must be used with caution when typ is CRM since the CRM update history currently on the after-image recovery files is lost.

NOTE

- NONE If typ is CRF, communication recovery files are initialized; all communication recovery files specified in RECOVER commands in the TAF configuration file are recovered. If typ is CRM, all CRM data bases are recovered based on information in the existing recovery files. No CRM recovery files are initialized. This fileid is the default for both typ=CRF and typ=CRM.
- K.MFL=n. Sets the maximum field length to be used by the transaction executive ( $40000 \le n \le 376600$ ). Default is 376600.
- K.REC=a. Specifies whether to set the recovery bit in the user area of each terminal status table entry (YES or NO). If YES, the user recovery bit is set. If NO, the value of the user recovery bit is not changed from what it was before the command was issued. Default is NO.
- K.SCP=n. Changes the number of subcontrol points  $(2 \le n \le 31)$ . Default is 31.
- K.STOP. Aborts the TAF Subsystem initialization unconditionally.
- K.TFL=n. Changes the value used as the upper bound for TARGET. This is the amount of memory CRM uses for data and index blocks  $(10000_8 \le n \le 100000_8)$ . Default is 300008. For more information, refer to the CYBER Record Manager Advanced Access Methods Version 2 Reference Manual.

# K.TLF=filename. Changes the name of the system task library file (any valid file name). Default is TASKLIB.

## **RESTARTING TAF K DISPLAY**

On a level 3 recovery deadstart, or if the TAF Subsystem aborts, the TAF procedure file automatically restarts TAF by transferring control to the TAF automatic recovery program. The TAF automatic recovery program recovers the central memory pointers and variables defined during TAF initiation.

If a DISPLAY,ON command is in the TAF configuration file, the automatic recovery program brings up the K display on the left console screen. This display is identical to the initial K display, except that values specified in the TAF initiation replace any default values that were in the initial display.

## TAF K DISPLAY

When the TAF Subsystem is executing, the TAF K display indicates the:

- Latest transaction sequence number.
- Number of words of unused memory.
- Maximum field length.
- Global task dump limit.
- Subsystem default values for memory dump parameters.

The TAF K display appears on the system console as shown in figure 8-31.

The subsystem default values are used to control memory dumps when parameters are not included in the CMDUMP or DSDUMP command. Any of these default values can be changed by specifying the corresponding parameter in the K.DSDUMP command.

| TRANSACTION EXECUTIVE STATUS           | DISPLAY        | $\setminus$ |
|----------------------------------------|----------------|-------------|
| SEQUENCE NUMBER                        | 1              |             |
| UNUSED FL 3000                         | · · · · ·      |             |
| MAXIMUM FL 377700                      |                |             |
| GLOBAL TASK DUMP LIMIT                 | 0              |             |
| FW= 0 LW= 100000<br>0Q= BC QD= USER123 | EP= 1<br>DB= 0 |             |

Figure 8-31. TAF K Display

The default parameter values for the CMDUMP and DSDUMP commands are given on the TAF K display shown in figure 8-31.

| Parameter | Description                                                                                 |
|-----------|---------------------------------------------------------------------------------------------|
| DB        | This parameter is not used. It is retained for compatibility with previous releases of NOS. |
| EP        | Exchange package:                                                                           |
|           | 0 Do not dump the exchange package.                                                         |
|           | 1 Dump the exchange package.                                                                |
| FW        | First word address of the task memory to be dumped.                                         |
| LW        | Last word address of the task memory to be dumped.                                          |
| OQ        | Output queue:                                                                               |
|           | BC Local batch.                                                                             |
|           | RB Remote batch.                                                                            |
|           | PF Permanent file.                                                                          |
| QD        | Queue destination:                                                                          |
|           | User name (if OQ=BC).                                                                       |
|           | Equipment identifier (if OQ=RB).                                                            |
|           | Permanent file name (if OQ=PF).                                                             |

## TAF K-DISPLAY COMMANDS

When the transaction executive is at its control point, the following commands can be entered from the system console or submitted from tasks using the KPOINT request. Any task can issue the K.DUMP command. Only tasks that reside on the system task library can issue the other K-display commands. (Refer to the TAF Reference Manual for additional information on the KPOINT request and the system task library.)

| Command            | Description                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.ASSIGN,est.      | Assigns a magnetic tape unit to be used for a journal file. est is the EST ordinal of the tape unit. The first form of the command                                                |
| or                 | makes unit est available for the transaction executive to assign to<br>the next tape journal file that encounters end of reel. Two tape                                           |
| K.ASSIGN,est,db,n. | units may be preassigned. If a tape has not been preassigned in<br>this manner, an end-of-reel on a journal file causes subsequent<br>entries for that file to be placed on disk. |

## Description Command The second form of the command forces journal file n (n=1, 2, or 3) for data base db, defined as a tape file, from disk to tape. The transaction executive copies the data from the disk journal file to tape est and places all subsequent entries for that file on the tape. This command is necessary after the transaction executive initialization to assign tape units to the tape journal files or after an end-of-reel on a tape journal file when no tape had been preassigned to the transaction executive. All data residing on the disk for the tape journal file must fit on the tape assigned by this command or the transaction executive will unload the tape and issue the message \*UNABLE TO USE TAPE\*. K.DEBUG. Turns on the application interface program (AIP) debug option, which logs all messages on trace file ZZZZZDN. Use this command only when TAF is installed with the DEBUG option. K.DROP.n. Drops an executing task at subcontrol point n. K.DSDUMP,FW=addr, Allows you to modify the standard system default parameters LW=addr,EP=pkg, controlling memory dumps. The command does not directly cause a OQ=outg,QD=qdest, dump. Rather, it sets default values to be used when a subsequent DB=db. CMDUMP request is received or when abort conditions occur. Refer to TAF K Display, earlier in this section, for explanations of the parameters. K.DUMP,fwa,1wa. Dumps all or part of the field length of the Transaction Facility from the first word address (fwa) to the last word address (1wa) of the area to be dumped. The default value for fwa is 0 and for lwa is 3777778. The default base is octal. If no parameters are specified, the entire field length is dumped. The output is routed to a printer that has an ID of 0. Unlike other K-display commands, the K.DUMP command can be issued from any task. Other K-display commands can be issued by tasks only if they are on the system task library (refer to the TAF Reference Manual). Since secure information may be contained in a dump of the Transaction Facility, the following safeguards have been set up to protect dumped information; however, the installation must take the ultimate responsibility for the protection of dumped information. The global task dump limit (GTDL) can be set by the K.DUMPLIM command to limit the number of times the K.DUMP command can be issued from tasks. The initial value of the GTDL is 0 (zero), so the K.DUMP command is disabled from use by a task by default. For all dumps of the Transaction Facility, whether you • initiated it or a task did, a one-page header precedes the dump. This header page indicates the output is secure and should be given only to the TAF central site systems analyst. When the Transaction Facility is dumped, the message TAF FIELD LENGTH DUMP RELEASED is issued to the system dayfile, the Transaction Facility dayfile, and line one of the

control point.

| Command                     | Description                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.DUMPLIM,n.                | Sets GTDL to value n (0 $\leq$ n $\leq$ 99999999). If n is not specified, the GTDL is set to 0.                                                                                                                                                                                                                                            |
|                             | The GTDL is the number of times the K.DUMP command can be issued<br>from tasks. This value is displayed on the TAF K display shown in<br>figure 8-31. The initial value of the GTDL is 0. When the GTDL is<br>0, no dumps of the Transaction Facility can occur from tasks. Thus,<br>the K.DUMP command is disabled from tasks by default. |
|                             | To enable the K.DUMP command for tasks, issue the K.DUMPLIM command<br>to set the GTDL to a value greater than zero. Each time a task<br>issues a K.DUMP command, the GTDL is decreased by one until it<br>equals zero. When the first K.DUMP command is issued from a task<br>with the GTDL equal to zero, the message                    |
|                             | GLOBAL TASK DUMP LIMIT EXHAUSTED                                                                                                                                                                                                                                                                                                           |
|                             | is issued to the Transaction Facility dayfile, the system dayfile, and line one of the control point. Also, the message                                                                                                                                                                                                                    |
|                             | DUMPS LOST                                                                                                                                                                                                                                                                                                                                 |
|                             | is displayed on the K display in place of the value of the GTDL.<br>This message remains until the value of GTDL is set to a value<br>greater than or equal to zero. The K.DUMPLIM command should be used<br>with care in system tasks, since this might allow unauthorized users<br>to alter the GTDL.                                    |
| K.IDLE.                     | Idles down the transaction control point. Once idle down has been initiated, no new transactions will be permitted but currently executing transactions will be allowed to finish.                                                                                                                                                         |
| K.JEND,db,n.                | Forces end-of-reel processing (writes an EOI and rewinds the file)<br>on tape journal file n of data base db. If n is not a tape journal<br>file, the command is ignored.                                                                                                                                                                  |
| K.MAXFL,n.                  | Alters the transaction executive maximum field length. The<br>transaction executive does not attempt to obtain more than n words<br>of storage. This command is rejected if the value for n is more<br>than 3766008 or less than the field length currently required for<br>TAF.                                                           |
| K.MESSAGE,TN=b.<br>message. | Directs the transaction executive to send message to a terminal specified by terminal name b.                                                                                                                                                                                                                                              |
| K.NODEBUG.                  | Turns off the application interface program (AIP) debug option,<br>which logs all messages on trace file ZZZZZDN. Use this command<br>only when TAF is installed with the DEBUG option.                                                                                                                                                    |
|                             |                                                                                                                                                                                                                                                                                                                                            |

| Command                                       | Description                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.OFFTASK,a,db.                               | Disables the use of task a, where a is the task name in the data<br>base db task library directory (dbTASKL). The data base name db is<br>not specified for tasks in the system task library.                                                                                                                                                   |
| K.ONTASK.a,db.                                | Reverses the effect of a previous OFFTASK command for the specified<br>task a in the data base db task library directory (dbTASKL). The<br>data base name db is not specified for tasks in the system task<br>library (TASKLIB).                                                                                                                |
| K.ROLLTIM, nnnnnn.                            | Changes the amount of time that TAF will retain its field length<br>between communication input messages; nnnnnn is specified in units<br>of milliseconds. Refer to the installation parameter ITRTL in the<br>NOS 2 Installation Handbook.                                                                                                     |
| K.SWITCH.                                     | Causes the console K display to change to a display listing all<br>allowable console commands. When K.SWITCH is entered a second time,<br>the normal display returns. This command activates task KDIS and<br>forces TAF to remain rolled in.                                                                                                   |
| K.TBCON,nn.                                   | Changes the number of TAF/CRM batch concurrency users; nn is less<br>than or equal to the value specified on the TBCON command in TAF's<br>configuration file (TCF).                                                                                                                                                                            |
| K.TST,TN=a,DB=db,<br>U=nnnn,UL=mmmm,<br>NN=b. | Changes entries in the terminal status table for terminal a. The<br>following entries can be changed: data base name db, user area<br>upper 12 bits (nnnn), user area lower 12 bits (mmmm), and new<br>terminal name b. The changes do not affect the network and<br>simulation files. Do not use this command if the terminal is logged<br>in. |

# TAF/ CRM STATUS K DISPLAYS AND COMMANDS

You can use the K display to monitor the status of CRM, CRM data bases, or CRM data base permanent files while TAF/CRM is running if CRMTASK is present on the system task library. To get the CRM status K display enter:

#### K.DIS, CRMTASK.

After the K display is assigned to the task, the display in figure 8-32 is brought to the left screen.

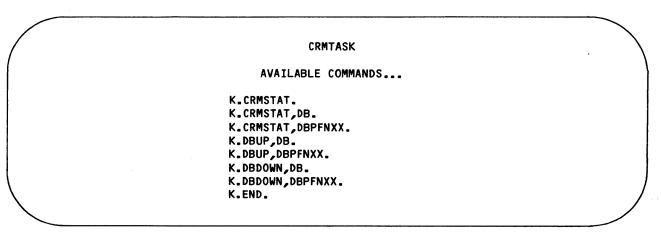


Figure 8-32. CRMTASK K Display

The following commands are available under CRMTASK.

| Command           | Description                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.CRMSTAT.        | Selects the CRM status K display (see figure 8-33). This display shows the status of all CRM data bases.                                                                                                        |
| K.CRMSTAT,db.     | Selects the CRM data base status K display (see figure 8-34). This display shows the status of the specific CRM data base with identifier db. It also shows the file name and status of the before-image files. |
| K.CRMSTAT,dbfile. | Selects the CRM file status K display (see figure 8-35). This<br>display shows the status of the specific permanent file in a CRM<br>data base with file name dbfile.                                           |
| K.DBDOWN,db.      | Makes a specific CRM data base with identifier db unavailable for processing. When this command executes, the CRMTASK command directory appears on the K display.                                               |

| Command          | Description                                                                                                                                                                                    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.DBDOWN,dbfile. | Makes a specific permanent file in a CRM data base with file name<br>dbfile unavailable for processing. When this command executes, the<br>CRMTASK command directory appears on the K display. |
| K.DBUP,db.       | Makes a specific CRM data base with identifier db available for processing. When this command executes, the CRMTASK command directory appears on the K display.                                |
| K.DBUP,dbfile.   | Makes a specific permanent file in a CRM data base with file name<br>dbfile available for processing. When this command executes, the<br>CRMTASK command directory appears on the K display.   |

\*\* CRM STATUS \*\*

nnn TRANSACTIONS IN INPUT QUEUE. nn ACTIVE TRANSACTIONS. nnn TRANSACTIONS IN OUTPUT QUEUE.

#### CRM DATA BASES

| DB             | STATUS           | DB       | STATUS       | DB       | STATUS     |
|----------------|------------------|----------|--------------|----------|------------|
| AA<br>DD<br>GG | UP<br>DOWN<br>UP | BB<br>EE | IDEL<br>DOWN | CC<br>FF | DOWN<br>UP |

VALID COMMANDS ARE -

CRMSTAT. CRMSTAT, DB. CRMSTAT, DBPFN. END. +. -. DBUP, DB. DBUP, DBPFN. DBDOWN, DB. DBDOWN, DBPFN.

Figure 8-33. CRM Status K Display

.

\*\* CRM DATA BASE STATUS \*\*

DATA BASE = dbDATA BASE STATUS = UP AFTER IMAGE FILE = arfname PRU-S REMAINING = nnn BEFORE IMAGE FILES AND STATUSES ZZAAB01-U ZZAAB02-U ZZAAB03-U ZZAAB04-D ZZAAB05-U ZZAABO6-U ZZAABO7-D FILE STATUS FILE STATUS FILE STATUS AAPENO1 UP AAPFNO2 DOWN AAPFNO3 DOWN AAPFNO4 IDLE AAPENO5 UP AAPFN06 UP AAPFN07 UP VALID COMMANDS ARE -CRMSTAT. CRMSTAT, DB. CRMSTAT, DBPFN. END. +. -. DBUP, DB. DBUP, DBPFN. DBDOWN, DB. DBDOWN, DBPFN.

Figure 8-34. CRM Data Base Status K Display

\*\* CRM FILE STATUS \*\*
FILE NAME = AAPFN01
FILE STATUS = UP
RECOVERABLE = YES
PACK NAME = PACKNAM
DEVICE TYPE = DJ3
ATTACH MODE = RM
SIZE OF PRIMARY KEY = 80
NUMBER OF ALTERNATE KEYS = 3
ACTIVE USERS = 4
ACTIVE LOCKS = 8
VALID COMMANDS ARE CRMSTAT. CRMSTAT,DB. CRMSTAT,DBPFN. END.
DBUP,DB. DBUP,DBPFN. DBDOWN,DB. DBDOWN,DBPFN.

Figure 8-35. CRM File Status K Display

For the CRM status and CRM data base status displays, if all the information does not fit on one screen, you can bring up additional pages by entering the following command.

К.+.

To return to the first page of the display, enter the following command.

K.-.

At any time you can return to the initial CRMTASK K display (figure 8-32) by entering the following command.

K.MENU.

To end CRM status K-display processing, enter the following command.

K.END.

.

# L-DISPLAY UTILITIES

| FOTD L Display    | 9-2  |
|-------------------|------|
| LIDOU L Display   | 9–3  |
| QDSPLAY L Display | 9-6  |
| SCTD L Display    | 9-8  |
| SUBSYST L Display | 9-10 |

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# **L-DISPLAY UTILITIES**

This section documents the following L displays and the utilities used to present them.

Description

| I dieplay i | s like the K display in that you must start the program by entering the pa                                            |
|-------------|-----------------------------------------------------------------------------------------------------------------------|
| SUBSYST     | Displays subsystem information.                                                                                       |
| SCTD        | Displays the contents of the service class control table, which shows the valid service classes for each origin type. |
| QDSPLAY     | Displays the contents of a file in the queued file table (QFT).                                                       |
| LIDOU       | Displays logical identifier table (LID).                                                                              |
| FOTD        | Displays family ordinal table (FOT).                                                                                  |

The L display is like the K display in that you must start the program by entering the name of the utility. When the L display is ready for use, DSD assigns it to the left screen automatically. Only one L-display program is active at a time. The program need not occupy a control point or memory while you are looking at the display.

Using the L display, you can run any utility program you have created. The L display is an interface between your program and DSD. This interface allows the site analyst to write CPU programs that show displays on the system console.

All entries must be prefixed by L period (L.). However, when pressing CR or NEXT after the first entry, everything but the L. is erased. This allows another command to be entered without entering L. first. All examples in this section show L., although you may not have to type it. If it becomes necessary to enter a DSD command during parameter entry, simply backspace to erase the L., enter the command, and then continue by typing L. and the entry.

After you call a specific utility, enter the first command in the following format.

L.commandstring.

Parameter

Utility

#### Description

commandstring

Any input (command, data, or parameter) that is defined by the job as valid input.

Execute your own L-display utility by entering the following command.

LDISopt.

Parameter

opt

One to three characters defining your utility.

Description

# FOTD L DISPLAY

The FOTD L-display utility displays all the family names known to the system and the corresponding family ordinal. To initiate the FOTD utility enter one of the following commands.

FOTD,L=outfile,LO=option.

or

FOTD, outfile, option.

#### Parameter

## Description

outfile Output file name. This parameter is valid only if a list option is specified. The default outfile is file OUTPUT.

option List option. Enter one or more of the following.

- D Formats the data for the DSD L display. This is the default list option if the parameters outfile and option are not specified.
- L Formats the data for a line printer.

If you do not specify outfile and option, the data is written to the L-display buffer once and the utility ends.

Figure 9-1 shows the FOTD L display.

FAMILY ORDINAL TABLE DISPLAY AVAILABLE ENTRIES = 638. DEFAULT FAMILY = FAMILY1 ORD. FAMILY ORD. FAMILY ORD. FAMILY ORD. FAMILY 1. FAMILY1 2. FAMILY2 3. FAMILY3 4. FAMILY4 7. FAMILY7 10. FAMILY8 5. FAMILY5 6. FAMILY6 11. FAMILY9 13. FAMIL11 14. FAMIL12 12. FAMIL10

Figure 9-1. FOTD L Display

The first line of the FOTD L display contains the default family name and the octal number of FOT entries that remain available for assignment. The rest of the display shows each family name and its corresponding family ordinal.

# LIDOU L DISPLAY

The LIDOU utility displays the LID table configuration and allows you to add or delete LIDs, LID attributes, and PID attributes in the LID table configuration. This modified configuration is retained across a level 1, 2, or 3 recovery deadstart. A level 0 deadstart causes a return to the configuration defined by the LID configuration file.

To initiate the LIDOU utility, enter one of the following commands.

LIDOU.

or

LID, I=infile, L=outfile.

The first command format can be entered only from the console under DSD control; also, all input and output is processed using the LIDOU L display. Figure 9-2 shows the initial LIDOU L display (LID display). From this display you can select the HELP display shown in figure 9-3. You can toggle between these two L displays as described at the bottom of each display.

The second command format can be entered under DIS control or by a system origin batch job. In either case, the I and L parameters must be specified.

#### Parameter

#### Description

I=infile

LIDOU reads input directives from file infile. Valid input directives are the same as the commands shown in the HELP L display (figure 9-3) without the L. prefix and without the BACK, HELP, +, or - commands.

L=outfile

LIDOU writes output to file outfile.

| PID | LID | ENABLED | ATTRIBUTE   | MFTYPE | NETWORK              |
|-----|-----|---------|-------------|--------|----------------------|
| MFB |     | YES     | HV          | NOS V2 | RHF - IN SERVICE     |
|     | MFB | YES     | ک جا و در ت |        | NAM - OUT OF SERVICE |
|     | BBB | YES     | s           |        | SSF - DISABLED       |
|     | XYZ | YES     | s           |        |                      |
|     |     |         |             |        |                      |
| MFC |     | YES     | L           | NOS V2 | RHF - IN SERVICE     |
|     | MFC | YES     |             |        | NAM - IN SERVICE     |
|     | ccc | YES     | SN          |        |                      |
|     |     |         |             |        |                      |
| MFD |     | YES     | LVN         | NOS V2 | NAM - DISABLED       |
|     | MFD | YES     |             |        | SSF - IN SERVICE     |
|     | DDD | NO      | s           |        |                      |
|     | EEE | NO      | S           |        |                      |
|     | BBB | YES     | s           |        |                      |
|     |     |         |             |        |                      |

Figure 9-2. LIDOU L Display (LID)

The information shown in figure 9-2 corresponds to the sample LCN shown in figure 8-28.

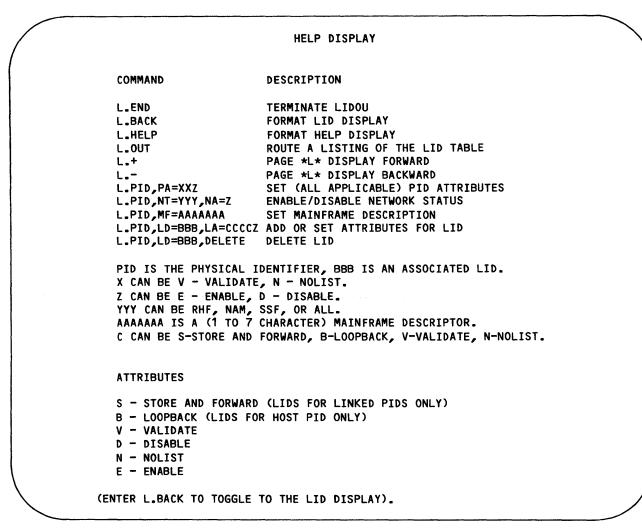


Figure 9-3. LIDOU L Display (HELP)

Although not shown in the HELP L display, some or all PID characteristics can be changed with one command by including all of the appropriate parameters on that command. For example, all PID characteristics for a given PID can be changed with the following command.

L.pid, PA=xxz, MF=aaaaaaaa, NT=yyy, NA=z.

# **QDSPLAY L DISPLAY**

The DSD utility QDSPLAY displays the content of a queued file listed in the queued file table (QFT).

# NOTE

On a secured system, the console must be in security unlock status to accept this command (refer to the UNLOCK,username,password command in section 5).

To bring the QDSPLAY L display to the left console screen, enter the following command.

QDSPLAY, jsn.

Parameter

Description

jsn

Job sequence name of the queued file you want to examine.

Figure 9-4 shows the initial QDSPLAY L display.

| THE FOLLOW | VING ARE VALID QUEUE DISPLAY COMMANDS -                                                           |  |
|------------|---------------------------------------------------------------------------------------------------|--|
| COMMAND    | FUNCTION                                                                                          |  |
| L.HELP.    | LIST L DISPLAY COMMANDS FOR QDSPLAY UTILITY.                                                      |  |
| L.DROP.    | DROP FILE FROM QUEUE AND TERMINATE.                                                               |  |
| L.END.     | RETURN FILE TO QUEUE AND TERMINATE.                                                               |  |
|            | SET FILE DISPLAY MODE TO LINE FORMAT.                                                             |  |
|            | SET FILE DISPLAY MODE TO OCTAL FORMAT.                                                            |  |
| L.SS.      | DISPLAY IN OCTAL FROM BEGINNING OF SYSTEM SECTOR.                                                 |  |
| L.*.       | RETURN FROM HELP/SS TO PREVIOUS FILE DISPLAY.                                                     |  |
| L.+.       | ADVANCE DISPLAY FORWARD (CIRCULAR FOR SS).                                                        |  |
|            | POSITION FILE TO BOI AND DISPLAY DATA.                                                            |  |
|            | POSITION PRINT FILE TO DAYFILE AND DISPLAY DATA.                                                  |  |
|            | SKIP 1 LINE FORWARD IN FILE AND DISPLAY DATA.                                                     |  |
|            | SKIP N LINES FORWARD IN FILE AND DISPLAY DATA.                                                    |  |
|            | SKIP 1 PAGE FORWARD IN FILE AND DISPLAY DATA.                                                     |  |
|            | SKIP N PAGES FORWARD IN FILE AND DISPLAY DATA.<br>SKIP 1 RECORD FORWARD IN FILE AND DISPLAY DATA. |  |
|            | SKIP I RECORD FORWARD IN FILE AND DISPLAY DATA.                                                   |  |
| i SP +     | SKIP TO EOI IN FILE.                                                                              |  |
|            | SKIP 1 RECORD BACKWARD IN FILE AND DISPLAY DATA.                                                  |  |
|            | SKIP N RECORDS BACKWARD IN FILE AND DISPLAY DATA.                                                 |  |
| LICKATE    | CALL IN RECORDO CROMMAND IN TILL AND DIGLET DATA.                                                 |  |
| SKIP COMMA | NDS ARE NOT ALLOWED UNDER HELP/SS DISPLAY.                                                        |  |
| SKIP LINE/ | PAGE COMMANDS ARE NOT ALLOWED FROM OCTAL DISPLAY.                                                 |  |

Figure 9-4. Initial QDSPLAY L Display

Valid QDSPLAY commands are:

| Command  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L.BOI.   | Positions the file to the beginning-of-information (BOI) and then displays the data from that point.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| L.BR,r.  | Skips backward r records in the file and displays the data from the beginning of that record. If r is not specified, the default is one record. The record count, r, is decimal unless a B postradix is specified to make the number octal. The maximum skip count is 3777778. A BOI terminates the skip regardless of the number of records specified or skipped. This command is not allowed when the HELP display or system sector is being displayed.                                                                                                                                                            |
| L.DAY.   | Positions the print file to the beginning of the dayfile record and displays the data from that point.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| L.DROP.  | Drops the file from the queue and terminates the QDSPLAY utility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| L.END.   | Returns the file to the queue and terminates the QDSPLAY utility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| L.HELP.  | Lists the L display commands for the QDSPLAY utility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| L.LINE.  | Sets the file display mode to line format (not allowed when displaying the system sector).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| L.OCTAL. | Sets the file display mode to octal format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| L.SL,n.  | Skips n lines forward in the file and displays the data from the beginning of that line. If n is not specified, the default is one line. The line count, n, is decimal unless a B postradix is specified to make the number octal. The maximum skip count allowed is $377777_8$ . A line can be up to 14 words. An EOR, EOF, or EOI ends the skip regardless of the number of lines specified or skipped. This command is allowed only when displaying data in line format and is not allowed when the HELP display or system sector is being displayed.                                                             |
| L.SP,p.  | Skips forward p pages in the file and displays the data from the beginning<br>of that page. If p is not specified, the default is one page. The page<br>count, p, is decimal unless a B postradix is specified to make the number<br>octal. The maximum skip count allowed is 3777778. A page is based on a<br>carriage control l as the first character in a line. An EOR, EOF, or EOI<br>ends the skip regardless of the number of pages specified or skipped. The<br>command is allowed only when displaying data in line format and is not<br>allowed when the HELP display or system sector is being displayed. |
| L.SR,r.  | Skips forward r records in the file and displays the data from the beginning<br>of that record. If r is not specified, the default is one record. If an<br>asterisk (*) is specified for the record count, r, a skip forward to the EOI<br>occurs. The record count, r, is decimal unless a B postradix is specified<br>making the number octal. The maximum skip count allowed is 3777778. An<br>EOI ends the skip regardless of the number of records specified or skipped.                                                                                                                                        |

This command is not allowed when the HELP display or system sector is being

displayed.

| L.*.                      | Returns from the L.SS or L.HELP command displays and displays the contents<br>of the file at the current position. This command is ignored if you are<br>already displaying the contents of the file.                                                                               |  |  |  |  |  |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| L.+.                      | Advances the display forward to the next screen of data. This command is<br>ignored under the L.HELP command where all information is presented on one<br>screen. For the L.SS command, after the last screen of data, the first<br>screen of the system sector is displayed again. |  |  |  |  |  |
| SCTD L DISPL              | SCTD L DISPLAY                                                                                                                                                                                                                                                                      |  |  |  |  |  |
|                           | ess control table L-display (SCTD) utility displays the contents of the control table (SCT). To begin the SCTD utility, enter one of the following                                                                                                                                  |  |  |  |  |  |
| SCTD,L=outfile,L0=option. |                                                                                                                                                                                                                                                                                     |  |  |  |  |  |
| or                        |                                                                                                                                                                                                                                                                                     |  |  |  |  |  |
| SCTD,outfil               | e,option.                                                                                                                                                                                                                                                                           |  |  |  |  |  |
| Parameter                 | Description                                                                                                                                                                                                                                                                         |  |  |  |  |  |
| outfile                   | Output file name. This parameter is valid only if a list option is specified. The default outfile is file OUTPUT.                                                                                                                                                                   |  |  |  |  |  |

Description

Displays the data from the beginning of the system sector in octal display

option List option. Enter one or more of the following.

- D Formats the data for the DSD L display. This is the default list option if the parameters outfile and option are not specified.
- L Formats the data for a line printer.

If you do not specify outfile and option, the data is written to the L-display buffer once and the utility ends.

•

Command

code format.

L.SS.

Figure 9-4 shows the SCTD L display.

SERVICE CLASS CONTROL TABLE DISPLAY. VALIDATED SERVICE CLASSES FOR EACH ORIGIN TYPE. SYSTEM ORIGIN SERVICE CLASS(ES). SY BC RB TS DI NS SS MA CT 10 11 12 13 LOCAL BATCH ORIGIN SERVICE CLASS(ES). BC REMOTE BATCH ORIGIN SERVICE CLASS(ES). RB INTERACTIVE ORIGIN SERVICE CLASS(ES). TS DI PRIORITY ORDERED SERVICE CLASSES. P0 P1 P2 Р3 P4 P5 P6 P7 12 10 TS 11 DI 13

Figure 9-4. SCTD L Display

The SCTD L display shows the various origin types along with the service classes valid for each origin type.

At the bottom of the screen, the display shows how the service classes are prioritized. The priority levels are PO through P7.

When entering the DSD CLASS or PCLASS command, use this utility to see the service classes for each origin type or the priority level. Refer to the DSD CLASS or PCLASS command in section 5 for further information.

# SUBSYST L DISPLAY

The SUBSYST L-display utility displays information about all the subsystems supported by NOS. To begin the SUBSYST utility enter one of the following commands.

SUBSYST,L=outfile,LO=option.

or

SUBSYST, outfile, option.

Parameter

outfile Output file name. This parameter is valid only if a list option is specified. The default outfile is file OUTPUT.

option List option. Enter one or more of the following.

D Formats the data for the DSD L display. This is the default list option if the parameters outfile and option are not specified.

Description

2

L Formats the data for a line printer.

If you do not specify outfile and option, the data is written to the L display.

Refer to the NOS 2 Operations Handbook for further information regarding the SUBSYST L display.

| LID | Configuration File                        | 10-1         |  |
|-----|-------------------------------------------|--------------|--|
|     | Creating the LIDCMid File                 | 10-1         |  |
|     | NPID Statement                            | 10-2         |  |
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This section contains information about LID configuration files and RHF configuration files.

# LID CONFIGURATION FILE

You create a LID configuration file to define the physical and logical machines available for your system. After a level 0 deadstart, the system program CLDT searches for the LID configuration file on user index  $37777_8$ . It will use the information in this file to generate a logical identifier table (LDT) in central memory.

This section describes how to create and maintain the LID configuration file (LIDCMid). Specifically, how to:

- Create the LIDCMid file using NPID and NLID configuration statements.
- Specify the size of the LID table using the CMRDECK LDT entry.
- Build or rebuild the LID table using the X.CLDT command.
- List the current LID table using the LISTLID command.
- Change LIDs and LID attributes using the LIDOU display.

#### **CREATING THE LIDCMid FILE**

The first line of the LIDCMid file should be a 1- to 7-character name for the LID configuration file. Use this format for naming the file:

LIDCMid

id is a 2-character machine identifier for the mainframe.

You can place comment lines in the file by putting an asterisk in column 1 or by putting the word COMMENT beginning in column one. For example:

LIDCM64 \*LIDCMID FILE FOR MAINFRAME 64.

You should define each PID (physical identifier) and all the LIDs (logical identifiers) associated with the PID by using NPID and NLID statements.

# **NPID Statement**

Use one NPID statement to define each physical mainframe available to your system. Use this format for the NPID statement:

NPID,PID=pid,ENABLED=status,MFTYPE=type,AT=at,NETDIS=sub.

| Parameter      |                                                                                                                                                                                                                      | Description                                                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PID=pid        | -                                                                                                                                                                                                                    | ifier; pid is the 3-character physical identifier ame. Required.                                                                                                                               |
| ENABLED=status |                                                                                                                                                                                                                      | her the mainframe identified by PID is available.<br>YES or NO. Default is YES.                                                                                                                |
| MFTYPE=type    | the mainframe (                                                                                                                                                                                                      | ; type is any l- to 7-character string specifying<br>type or mainframe identifier (for example, NOSBE,<br>SMF2, CLSH1). Required.                                                              |
| AT=at          | Specifies the attribute associated with the mainframe identified<br>by PID. You can specify multiple attributes by using a slant<br>separator (AT=VALID/NLIST) or by repeating the parameter<br>(AT=VALID,AT=NLIST). |                                                                                                                                                                                                |
|                | at                                                                                                                                                                                                                   | Description                                                                                                                                                                                    |
|                | VALID                                                                                                                                                                                                                | Specifies that USER command prevalidation is required.                                                                                                                                         |
|                | NVALID                                                                                                                                                                                                               | Specifies that USER command prevalidation is not required.                                                                                                                                     |
|                | NLIST                                                                                                                                                                                                                | Specifies that this PID is not available to the end user through the LISTLID command.                                                                                                          |
|                |                                                                                                                                                                                                                      | ributes are: USER command prevalidation is not<br>D is listable using the LISTLID command.                                                                                                     |
| NETDIS=sub     | PID are disable<br>enabled. You s                                                                                                                                                                                    | n network accesses to the mainframe identified by<br>ed. By default, all network accesses are<br>should not specify NETDIS for the host PID. Any<br>network accesses may be used (for example, |
|                | sub                                                                                                                                                                                                                  | Description                                                                                                                                                                                    |
|                | NAM                                                                                                                                                                                                                  | Network Access Method.                                                                                                                                                                         |
|                | RHF                                                                                                                                                                                                                  | Remote Host Facility.                                                                                                                                                                          |
|                | SSF                                                                                                                                                                                                                  | SCOPE Station Facility.                                                                                                                                                                        |

# **NLID Statement**

Use NLID statements after each NPID statement to define the relationship between each PID and its associated LIDs and the attributes of the LIDs. Use this format for the NLID statement:

NLID,LID=1id,ENABLED=status,AT=at.

| Parameter      |                 | Description                                                                                                                                                                                       |
|----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LID=1id        | for the mainfra | fier; lid is the 3-character logical identifier<br>ame identified by the last NPID statement. lid<br>e as the last pid. Required.                                                                 |
| ENABLED=status |                 | ner the mainframe identified by LID is available.<br>YES or NO. Default is YES.                                                                                                                   |
| AT=at          | by LID. You ca  | attribute associated with the mainframe identified<br>an specify multiple attributes by using a slant<br>STOREF/VALID) or by repeating the parameter<br>VALID).                                   |
|                | at              | Description                                                                                                                                                                                       |
|                | LOOPB           | Loopback capability for RHF testing. This<br>testing can be performed on one mainframe with<br>one NAD. The attribute of LOOPB is valid only<br>for LIDs defined for the host (local) mainframe.  |
|                |                 | You should not specify the LOOPB attribute if the STOREF attribute is specified.                                                                                                                  |
|                | STOREF          | Store and forward capability indicating that the<br>specified mainframe will act as part of the<br>network in store and forward mode. Data will<br>pass through the machine and into the network. |
|                |                 | You should not specify the STOREF attribute if the LOOPB attribute is specified.                                                                                                                  |
|                | VALID           | Specifies that USER command prevalidation is<br>required and can be specified only if the STOREF<br>attribute is specified.                                                                       |
|                | NVALID          | Specifies that USER command prevalidation is not<br>required and can be specified only if the STOREF<br>attribute is specified.                                                                   |
|                | NLIST           | Specifies that this LID is not available to the<br>end user through the LISTLID command. LIDs with<br>this attribute might be reserved for onsite<br>maintenance purposes.                        |

## Example

Figure 10-1 shows an equipment configuration consisting of six mainframes. Following the figure are the LIDCMid files for the three NOS mainframes in the configuration: LIDCM64, LIDCM42, and LIDCM05.

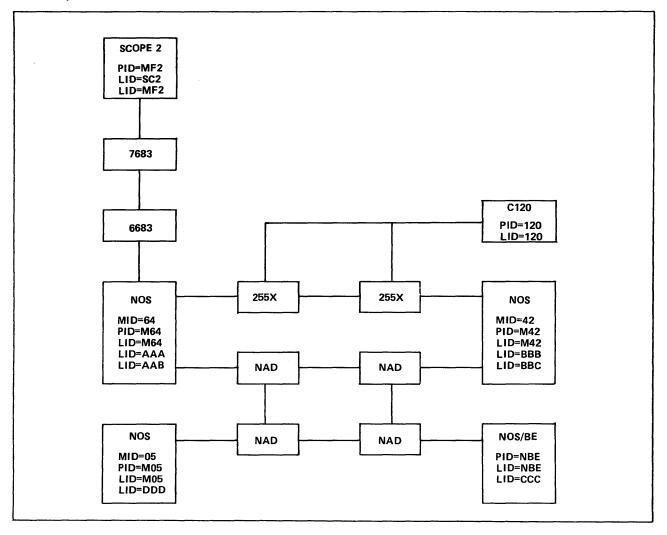


Figure 10-1. Equipment Configuration

LIDCM64 LIDCMID FILE FOR MAINFRAME 64. NOTE THAT LID=LBK IS \*LIDCM64 DEFINED AS A LOOPBACK LID AND THAT THE NAM NETWORK IS \* \* DISABLED TO NOS PID=M42. NPID,PID=M64,MFTYPE=NOSHOST,AT=VALID. NLID,LID=M64. NLID, LID=AAA. NLID,LID=AAB. NLID,LID=LBK,AT=LOOPB. NPID,PID=M42,MFTYPE=NOS42,NETDIS=NAM. NLID,LID=M42. NLID, LID=BBB. NLID,LID=BBC. NLID,LID=NBE,AT=STOREF/NLIST. NLID,LID=CCC,AT=STOREF. NPID,PID=MF2,MFTYPE=SCOPE2,AT=NVALID. NLID,LID=MF2. NLID,LID=SC2. NPID,PID=120,MFTYPE=C120,AT=NVALID. NLID,LID=120. NPID, PID=M05, MFTYPE=N0S05. NLID,LID=DDD. NLID,LID=NBE,AT=STOREF. NLID,LID=CCC,AT=STOREF. LIDCM42 LIDCMID FILE FOR MAINFRAME 42. NOTE THAT LID=NBE IS \*LIDCM42 DEFINED AS A STORE AND FORWARD LID FOR THE NOS/BE MAINFRAME. + NPID,PID=M42,MFTYPE=NOSHOST. NLID, LID=M42. NLID,LID=BBB. NLID,LID=BBC. NLID,LID=M64,AT=STOREF. NLID,LID=CCC,AT=STOREF. NLID,LID=NBE,AT=STOREF. NLID,LID=LBK,AT=LOOPB. NPID,PID=M64,MFTYPE=NOS64,NETDIS=NAM. NLID,LID=M64. NLID, LID=AAA. NLID, LID=AAB. NPID,PID=NBE,MFTYPE=NOSBE,AT=NVALID. NLID, LID=NBE. NLID,LID=CCC. NPID,PID=120,MFTYPE=C120,AT=NVALID. NLID,LID=120.

(Continued)

(Continued)

LIDCM05 LIDCMID FILE FOR MAINFRAME O5. AGAIN, NOTE THAT \*LIDCMO5 LID=NBE IS DEFINED AS A STORE AND FORWARD LID FOR THE NOS/BE MAINFRAME. NPID,PID=M05,MFTYPE=M05. NLID,LID=M05. NLID,LID=LBK,AT=LOOPB. NLID, LID=M64, AT=STOREF. NLID,LID=CCC,AT=STOREF. NLID,LID=NBE,AT=STOREF. NPID, PID=NBE, MFTYPE=NOSBE, AT=NVALID. NLID,LID=CCC. NLID, LID=NBE. NPID, PID=M64, MFTYPE=NOS64. NLID, LID=M64.

#### SPECIFYING THE SIZE OF THE LID TABLE

You should specify the size of the LID table (LDT) in central memory with this CMRDECK entry:

LDT=nnnn.

nnnn is the number of central memory words allocated to the LDT (default=1, minimum=0, maximum=11008). You can calculate the value for nnnn by using this formula:

(3+lid)\*pid

lid is the maximum number of LIDs allowed per PID. pid is the total number of PIDs in all networks.

#### **BUILDING OR REBUILDING THE LID TABLE**

When you deadstart the system, the system program CDLT automatically looks for the LIDCMid file under user index 3777778. It will use the file to automatically create the LID table in central memory.

If the system cannot find the file, or if there are errors in the file, an error message will be displayed in the dayfile. You can then create or correct your LIDCMid file and execute the X.CLDT command to build or rebuild the LID table in central memory.

To build or rebuild the LID table in central memory, follow these steps:

- 1. Create or correct your LIDCMid file and ensure that the file is stored as an indirect access file on user index  $377777_8$ .
- 2. Ensure that all subsystems that access the LID table (NAM, RHF, and SSF) are not active.
- 3. Enter this command:

X.CLDT

The system will build or rebuild the LID table in central memory.

LIDCM64 LIDCMID FILE FOR MAINFRAME 64. NOTE THAT LID=LBK IS \*LIDCM64 DEFINED AS A LOOPBACK LID AND THAT THE NAM NETWORK IS \* DISABLED TO NOS PID=M42. \* NPID,PID=M64,MFTYPE=NOSHOST,AT=VALID. NLID,LID=M64. NLID, LID=AAA. NLID,LID=AAB. NLID,LID=LBK,AT=LOOPB. NPID,PID=M42,MFTYPE=NOS42,NETDIS=NAM. NLID,LID=M42. NLID,LID=BBB. NLID,LID=BBC. NLID,LID=NBE,AT=STOREF/NLIST. NLID,LID=CCC,AT=STOREF. NPID,PID=MF2,MFTYPE=SCOPE2,AT=NVALID. NLID\_LID=MF2. NLID,LID=SC2. NPID,PID=120,MFTYPE=C120,AT=NVALID. NLID, LID=120. NPID,PID=M05,MFTYPE=NOS05. NLID, LID=DDD. NLID,LID=NBE,AT=STOREF. NLID,LID=CCC,AT=STOREF. LIDCM42 LIDCMID FILE FOR MAINFRAME 42. NOTE THAT LID=NBE IS \*LIDCM42 DEFINED AS A STORE AND FORWARD LID FOR THE NOS/BE MAINFRAME. \* NPID,PID=M42,MFTYPE=NOSHOST. NLID,LID=M42. NLID,LID=BBB. NLID,LID=BBC. NLID,LID=M64,AT=STOREF. NLID,LID=CCC,AT=STOREF. NLID,LID=NBE,AT=STOREF. NLID, LID=LBK, AT=LOOPB. NPID,PID=M64,MFTYPE=NOS64,NETDIS=NAM. NLID,LID=M64. NLID, LID=AAA. NLID, LID=AAB. NPID,PID=NBE,MFTYPE=NOSBE,AT=NVALID. NLID, LID=NBE. NLID,LID=CCC. NPID, PID=120, MFTYPE=C120, AT=NVALID. NLID, LID=120.

(Continued)

(Continued)

LIDCM05 LIDCMID FILE FOR MAINFRAME 05. AGAIN, NOTE THAT \*LIDCM05 LID=NBE IS DEFINED AS A STORE AND FORWARD LID FOR THE NOS/BE MAINFRAME. NPID,PID=M05,MFTYPE=M05. NLID,LID=M05. NLID, LID=LBK, AT=LOOPB. NLID, LID=M64, AT=STOREF. NLID,LID=CCC,AT=STOREF. NLID, LID=NBE, AT=STOREF. NPID,PID=NBE,MFTYPE=NOSBE,AT=NVALID. NLID,LID=CCC. NLID, LID=NBE. NPID,PID=M64,MFTYPE=N0S64. NLID,LID=M64.

## SPECIFYING THE SIZE OF THE LID TABLE

You should specify the size of the LID table (LDT) in central memory with this CMRDECK entry:

LDT=nnnn.

nnnn is the number of central memory words allocated to the LDT (default=1, minimum=0, maximum=11008). You can calculate the value for nnnn by using this formula:

(3+1id)\*pid

lid is the maximum number of LIDs allowed per PID. pid is the total number of PIDs in all networks.

#### **BUILDING OR REBUILDING THE LID TABLE**

When you deadstart the system, the system program CDLT automatically looks for the LIDCMid file under user index 3777778. It will use the file to automatically create the LID table in central memory.

If the system cannot find the file, or if there are errors in the file, an error message will be displayed in the dayfile. You can then create or correct your LIDCMid file and execute the X.CLDT command to build or rebuild the LID table in central memory.

To build or rebuild the LID table in central memory, follow these steps:

- Create or correct your LIDCMid file and ensure that the file is stored as an indirect access file on user index 3777778.
- 2. Ensure that all subsystems that access the LID table (NAM, RHF, and SSF) are not active.
- 3. Enter this command:

X.CLDT

The system will build or rebuild the LID table in central memory.

# LISTING THE LID TABLE

You can use the LISTLID command to list the configuration of the LID table. The LISTLID command can be executed through an interactive or batch environment. Use this format for the command:

LISTLID,LID=1id,PID=pid,L=1ist.

| Parameter | Description                                                                                                                                                                                                                                                            |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LID=lid   | List the attributes of PIDs in which LID lid exists. LID lid must<br>be enabled and it must be a listable LID. If the LID keyword is<br>specified, a LID value lid must also be specified. If the LID<br>keyword is omitted, the default is to list all listable LIDs. |
| PID       | List the attributes of a given LID (LID=1id specified) or all LIDs                                                                                                                                                                                                     |
| or        | (LID omitted) under a given PID (PID=pid specified) or all PIDs<br>(PID specified). If the PID keyword is omitted, the default is to                                                                                                                                   |
| PID=pid   | list all listable LIDs specified by the LID parameter.                                                                                                                                                                                                                 |
| L=list    | Specifies the local file to which all listable output is to be written. If the L keyword is omitted, the default is file OUTPUT.                                                                                                                                       |

# CHANGING THE LIDS USING THE LIDOU DISPLAY

You can change LIDs by using the LIDOU display. Refer to section 9, L-Display Utilities, for information about the LIDOU display.

# **RHF CONFIGURATION FILES**

You must define the RHF configurations including all NADs, applications, and physical identifiers (PIDs) to be used by or accessible to RHF. You may define multiple configurations. Each RHF in the network must have its own definition of the configuration; each definition will be different from the definition of the configuration for other RHFs in the network. Use the RCFGEN utility to define these configurations.

The RCFGEN utility reads network configuration statements to create a direct access permanent file under user name SYSTEMX. RHF then uses the permanent file as the network description and can properly access the network.

When RHF is started, it expects to find a local configuration file named RCFILE. If it does not find this file, RHF will attach the RHF configuration file using file name RCFMid, where id is the machine identifier.

The following command calls the RCFGEN utility.

RCFGEN, I=input, L=list, O=output.

The parameters are order independent and optional; if omitted, the defaults are used.

| Parameter | Description                                                                                                         |
|-----------|---------------------------------------------------------------------------------------------------------------------|
| I=input   | Specifies the local file from which the network configuration statements are to be read. The default is file INPUT. |
| L=list    | Specifies the local file to which all listable output is to be written. The default is file OUTPUT.                 |
| 0=output  | Specifies the local file to which the configuration tables are to be written. The default is file RCFILE.           |

The input to RCFGEN consists of network configuration statements. The syntax of these statements conforms to COMPASS statements. Configuration statements (except LNAD and RNAD statements) must not start before character position 3.

Use the following network configuration statements.

| Statement | Description                                                                            |
|-----------|----------------------------------------------------------------------------------------|
| LNDR      | Defines the maximum number of local NAD drivers (NDRs) allowed to execute at one time. |
| APPL      | Defines application programs that are allowed to access RHF.                           |
| NPID      | Defines the physical identifier of a remote mainframe.                                 |
| PATH      | Defines the paths to a remote mainframe through the LCN network.                       |
| LNAD      | Defines information necessary to address local NADs.                                   |
| RNAD      | Defines the addressing information necessary to access a remote NAD.                   |
| DEBUG     | Defines debug parameters.                                                              |
| CHARGE    | Defines the charge that is transferred to a user control point for each RHF call.      |

Network configuration statements must be specified in the following order to properly define a network.

- 1. LNDR statement (if necessary).
- 2. APPL statement to define application programs.
- 3. Sets of NPID and PATH statements that define all portions of the network. The PATH statement must be associated with a given physical mainframe (NPID statement). The following structure is required of these statements when defining a network:
  - NPID statement.
  - All paths (PATH statement) associated with the preceding NPID.
- 4. LNAD statements to define local NADs.
- 5. RNAD statements to define hardware addressing of remote NADs.
- 6. DEBUG and CHARGE statements (order independent).

At least one of each configuration statement is required in the configuration file with the exceptions of the LNDR, DEBUG, and CHARGE statements. Defaults are specified in the individual statement descriptions.

#### **NETWORK CONFIGURATION STATEMENTS**

The network configuration statements are described in the order that they must be specified to define a network.

### **LNDR** Statement

The maximum number of NAD drivers is the maximum number of PPs that may contain a NAD driver at one time, regardless of the number of NADs and the number of drivers allowed per NAD.

To define the maximum NDRs allowed for all NADs, enter:

LNDR MAXNDRS=nn

Parameter

#### Description

MAXNDRS=nn Maximum number of PPs that may contain NDRs at any one time. Default is 4. The maximum value is the number of PPs available for NAD drivers. nn must not be less than the largest value specified for MAXNDRS on any LNAD statement.

#### **APPL Statement**

Each application definition uses additional RHF field length. This additional field length is equal to mxcopys\*(5+3\*mxcons) central memory words (mxcopys and mxcons are defined below). To define an RHF application, enter:

APPL NAME=name, ENABLED=status, MXCONS=mxcons, MXCOPYS=mxcopys, SVR=status, ASTART=status

| Parameter       | Description                                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NAME=name       | Application name; name is 1- to 7-alphanumeric characters, where the first character must be alphabetic. Required.                                                                                                                                                                                                                  |
| ENABLED=status  | Availability of the application when RHF is initiated. status may be YES or NO. Default is YES.                                                                                                                                                                                                                                     |
| MXCONS=mxcons   | Maximum simultaneous connections that are allowed for this application. The maximum value for mxcons is 127. Default is 1.                                                                                                                                                                                                          |
| MXCOPYS=mxcopys | Maximum number of simultaneously active copies of this application that are allowed. The maximum value for mxcopys is 127. Default is 1.                                                                                                                                                                                            |
| SVR=status      | Servicer program status; specifi'es if the application is a servicer,<br>that is, an application program that is started automatically by RHF<br>upon request of an application program on another host. status may<br>be YES or NO. Default is NO.                                                                                 |
| ASTART=status   | Application startup status; specifies whether the application is<br>started when RHF is initiated or when the operator enables the<br>application. status may be YES or NO. If NO is specified, the<br>application is started by the user, or for a servicer application,<br>by a request from a remote application. Default is NO. |

In determining the number of allowed connections and copies of an application, note that each NAD has a maximum of 127 active connections. This number is restricted to 35 during NAD controlware loading but may be increased by modifying the appropriate NAD controlware load parameters in LOADBC.

When defining the APPL statements you must follow certain restrictions for system-supplied applications QTF, QTFS, PTF, PTFS, ITF, and MLTF. The maximum simultaneous connections should be set to one (default) for QTFS, PTF, PTFS, and MLTF. The maximum number of simultaneously active copies should be set to one (default) for QTF, ITF, and MLTF. The maximum simultaneous connections for QTF should be set to four unless installation parameters ACNMAXC for QTF and MAXFILEXFR for FIP are changed. The SVR=YES parameter must be specified for QTFS and PTFS and must not be specified for QTF, PTF, ITF, or MLTF. ASTART=YES should be specified for both QTF and MLTF.

For ITF, the maximum simultaneous connections should be equal to the value of the PI parameter on the ITF command in the JOBITF record on the NAMI startup master file. The released default is 2.

# **NPID Statement**

Each remote mainframe definition requires three words in RHF's field length. To define a remote mainframe, enter:

NPID PID=pid, ENABLED=status, MFTYPE=type

| Parameter      | Description                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PID=pid        | Physical identifier of the remote mainframe; pid must be a unique<br>3-character physical identifier. Required.                                                                |
| ENABLED=status | Availability of the mainframe identified by PID. status may be YES or NO. Default is YES.                                                                                      |
| MFTYPE=type    | Mainframe type; type is any l- to 7-character string specifying the mainframe type or mainframe identifier. For example, you could use NOS1, NOS2, NOS/BE, or CY200. Required. |

### **PATH Statement**

Every path defined for a remote mainframe requires two words in RHF's field length. To define a path for a remote mainframe, enter:

PATH ENABLED=status,LT=tttt,RT=rrrr,RNAD=raddr,LNAD=laddr,AC=aaaa

| Parameter      | Description                                                                                                                                                   |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ENABLED=status | Availability of the path when RHF is initialized. status may be YES or NO. Default is YES.                                                                    |
| LT=tttt        | Local trunk control units (TCUs) enabled; tttt is a 4-digit nonzero<br>binary number indicating the network trunk connections for the local<br>NAD. Required. |
| RT=rrrr        | Remote TCUs enabled; rrrr is a 4-digit nonzero binary number<br>indicating the network trunk connections for the remote NAD.<br>Required.                     |
| RNAD=raddr     | Symbolic address of the remote NAD entry for this path referenced in the RNAD statement. Required.                                                            |
| LNAD=1addr     | Symbolic address of the local NAD entry for this path referenced in the LNAD statement. Required.                                                             |
| AC=aaaa        | Access code; aaaa is a 4-digit hexadecimal access code for the remote NAD. Default is 0.                                                                      |

At least one PATH statement is required for each PID defined.

## **LNAD Statement**

Each local NAD definition requires two words in RHF's field length. To define a local NAD, enter:

| laddr LNAD             | CH=ch,MAXNDRS=n,DEDICATE=status,CMPATHS=nn,CMBUFFS=nn.                                                                                                                                                                                                                                                          |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameter              | Description                                                                                                                                                                                                                                                                                                     |
| laddr                  | Symbolic address referenced in a preceding PATH statement. This parameter is required and must begin in character position 1 or 2.                                                                                                                                                                              |
| CH=ch                  | Channel number; ch is a 2-digit octal number of the channel to which the NAD is connected.                                                                                                                                                                                                                      |
| MAXNDRS=n              | Maximum number of NAD drivers that may be assigned at one time to this NAD. $n$ can be from 1 to 3. Default is 1.                                                                                                                                                                                               |
| <b>DEDICATE=status</b> | Dedicated channel status; specifies whether the driver will<br>always hold the NAD channel reservation between consecutive<br>blocks of one I/O request. status may be YES or NO. Default is<br>YES. YES should be specified unless some non-CDC driver<br>requires high-performance access to the NAD channel. |
| CMPATHS=nn             | Maximum number of convert mode paths. You can specify a number<br>from 0 to 63. The default is 0. If nn is 0, then code<br>conversion is done in the CPU. Refer to table 10-1 for<br>additional information.                                                                                                    |
| CMBUFFS=nn             | Maximum number of convert mode buffers. You can specify a number from 0 to 63. The default is 0. Refer to table 10-1 for                                                                                                                                                                                        |

The software relies on the NAD to determine the actual number of paths and buffers reserved for code and conversion. The algorithm used by the NAM is Buffers Reserved = (the smaller of paths requested) or (buffers reserved  $\frac{2}{3}$ ).

The code conversion parameters should be adjusted according to the average number of concurrently active connections doing code conversion and the average size of the files being converted. Table 10-1 gives some suggested values for the code conversion parameters. In this table, the term average connection implies four conversion connections. The term average file size is a file approximately 500 PRUs long.

additional information.

|                                                       | 96K-Byte NAD         | 128K-Byte NAD         |
|-------------------------------------------------------|----------------------|-----------------------|
| Less than average connections, average file size      | 2 paths<br>3 buffers | 2 paths<br>3 buffers  |
| Less than average connections,<br>large file sizes    | 2 paths<br>5 buffers | 2 paths<br>5 buffers  |
| Average connections, average file sizes               | 4 paths<br>6 buffers | 5 paths<br>8 buffers  |
| Greater than average connections, average file sizes  | 6 paths<br>9 buffers | 7 paths<br>11 buffers |
| Greater than average connections,<br>large file sizes | 5 paths<br>9 buffers | 6 paths<br>13 buffers |

Table 10-1. Suggested Code Conversion Parameters

# **RNAD Statement**

Every remote NAD defined requires one word in RHF's field length. To define a remote NAD, enter:

| raddr      | RNAD | ND=nn,DD=d,LOG=status                                                                                                                                             |
|------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameter  |      | Description                                                                                                                                                       |
| raddr      |      | Symbolic address referenced in a preceding PATH statement. This parameter is required and must begin in character position 1 or 2.                                |
| ND=nn      |      | Remote NAD address; nn is a 2-digit hexadecimal address of the remote NAD. Default is 0.                                                                          |
| DD=d       |      | Remote NAD exit port; d is a l-digit hexadecimal address of the exit port of the remote NAD. Default is 0.                                                        |
| LOG=statu: | S    | Error logging status; specifies if remote NAD trunk errors are<br>to be recorded by MLTF in the mainframe´s error log. status may<br>be YES or NO. Default is NO. |

#### **DEBUG Statement**

The DEBUG statement controls the manner in which RHF uses queue entries.

DEBUG TRACE=status

Description Parameter RHF trace status; specifies whether the RHF trace is on or off. TRACE=status status may be YES or NO. Default is NO. NO specifies that RHF trace is off and queue entries freed by RHF are placed at the top of the empty queue and reused immediately. RHF uses a slightly smaller amount of processing time when the RHF trace is off. Default is NO. YES specifies that RHF trace is on and a queue entry is reused only after all queue entries ahead of it have been used. Also, when the RHF trace is on, you can use it for analysis of an RHF dump and resolution of the associated RHF problem.

## **CHARGE** Statement

The CHARGE statement specifies the amount of system resources a user control point is charged for an RHF call. RHF distinguishes two different types of calls; those that require a large amount of processing time and those that require a small amount of processing time.

| CHARGE TYPE=type,CPA=cpa,CPB=cpb,IO=io,CMFL=cm,PP=pp |                                                                                                                                                            |  |  |  |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Parameter                                            | Description                                                                                                                                                |  |  |  |
| TYPE=type                                            | Type of call for which the charge is being specified.                                                                                                      |  |  |  |
|                                                      | type Description                                                                                                                                           |  |  |  |
|                                                      | l Requires small amount of RHF processing time.                                                                                                            |  |  |  |
|                                                      | 2 Requires large amount of RHF processing time.                                                                                                            |  |  |  |
| CPA=cpa                                              | Time to be charged for central processor cpa (decimal<br>milliseconds). Default is 2 milliseconds for a type 1 call; 10<br>milliseconds for a type 2 call. |  |  |  |
| СРВ=срЪ                                              | Time to be charged for central processor cpb (decimal milliseconds). Default is 0.                                                                         |  |  |  |
| 10=io                                                | Input/output time to be charged (decimal milliseconds). Default is 0.                                                                                      |  |  |  |
| CMFL=cm                                              | Central memory field length to be charged. cm is the field length in octal divided by $100_8$ . Default is 108.                                            |  |  |  |
| PP=pp                                                | PP time to be charged (decimal milliseconds). Default is 0.                                                                                                |  |  |  |

A CHARGE statement is not required. You may, however, enter two CHARGE statements: one for type 1 calls, a second for type 2 calls.

# Examples

Figure 10-2 illustrates a sample LCN network and is the basis of the network configuration statements in examples 1 and 2.

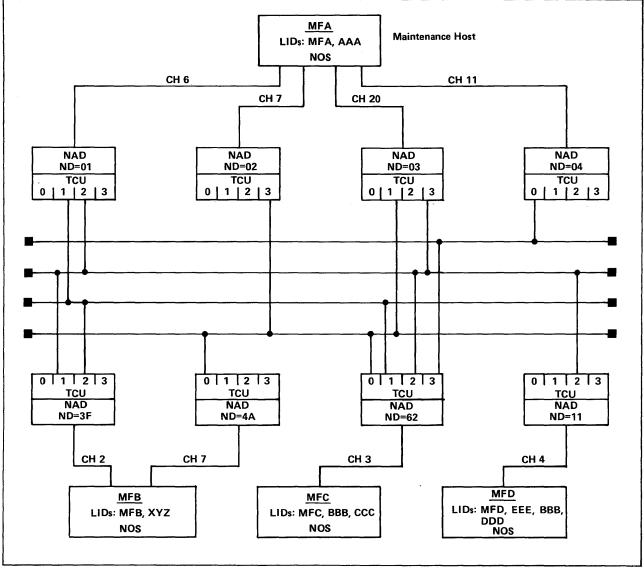


Figure 10-2. Sample LCN Network

# Example 1.

Following are the network configuration statements for the RHF on mainframe MFA in figure 10-2.

|                          | LNDR<br>APPL<br>APPL<br>APPL<br>APPL<br>APPL<br>APPL<br>APPL | MAXNDRS=3<br>NAME=QTF,MXCONS=4,ASTART=YES<br>NAME=QTFS,MXCONS=1,MXCOPYS=8,ASTART=NO,SVR=YES<br>NAME=PTF,MXCONS=1,MXCOPYS=8,ASTART=NO<br>NAME=PTFS,MXCOPYS=8,SVR=YES<br>NAME=USRAP,MXCONS=6,ENABLED=NO<br>NAME=MLTF,ASTART=YES<br>NAME=ITF,MXCONS=2,MXCOPYS=1,ASTART=NO,SVR=NO |
|--------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | NPID<br>PATH<br>PATH<br>PATH<br>PATH                         | PID=MFB,ENABLED=YES,MFTYPE=NOS2<br>ENABLED=YES,LT=0110,RT=0110,RNAD=RN2,LNAD=LN1,AC=F0F0<br>ENABLED=YES,LT=0001,RT=1000,RNAD=RN1,LNAD=LN2,AC=F0F0<br>ENABLED=N0,LT=0001,RT=0100,RNAD=RN2,LNAD=LN3,AC=F0F0<br>ENABLED=YES,LT=0100,RT=1000,RNAD=RN1,LNAD=LN3,AC=F0F0            |
|                          | NPID<br>PATH<br>PATH<br>PATH<br>PATH                         | PID=MFC,MFTYPE=NOS2<br>ENABLED=NO,LT=0110,RT=0110,RNAD=RN3,LNAD=LN1,AC=F0F0<br>ENABLED=N0,LT=0001,RT=1000,RNAD=RN3,LNAD=LN2,AC=F0F0<br>LT=0101,RT=1010,RNAD=RN3,LNAD=LN3,AC=F0F0<br>LT=1000,RT=0001,RNAD=RN3,LNAD=LN4,AC=F0F0                                                 |
|                          | NPID<br>Path<br>Path                                         | PID=MFD,MFTYPE=NOS2<br>LT=0010,RT=0010,RNAD=RN4,LNAD=LN1,AC=F0F0<br>LT=0001,RT=0010,RNAD=RN4,LNAD=LN3,AC=F0F0                                                                                                                                                                 |
| LN1<br>LN2<br>LN3<br>LN4 | LNAD<br>LNAD<br>LNAD<br>LNAD                                 | CH=6<br>CH=7<br>CH=20<br>CH=11                                                                                                                                                                                                                                                |
| RN1<br>RN2<br>RN3<br>RN4 | RNAD<br>RNAD<br>RNAD<br>RNAD                                 | DD=0,ND=4A,LOG=YES<br>DD=0,ND=3F,LOG=YES<br>DD=0,ND=62,LOG=YES<br>DD=0,ND=11,LOG=YES                                                                                                                                                                                          |

Example 2.

Following are the network configuration statements for the RHF on mainframe MFD in figure 10-2.

- NAME=QTF,ASTART=YES,MXCONS=4 APPL NAME=QTFS,MXCOPYS=4,SVR=YES NAME=PTF,MXCOPYS=6 APPL APPL APPL NAME=PTFS,MXCOPYS=6,SVR=YES APPL NAME=MLTF,ASTART=YES APPL NAME=ITF, MXCONS=2, MXCOPYS=1, ASTART=NO, SVR=NO NPID PID=MFA,MFTYPE=NOS2 RNAD=RNO1,LNAD=LN1,LT=0010,RT=0010,AC=F0F0 PATH PATH RNAD=RNO3,LNAD=LN1,LT=0010,RT=0001,AC=F0F0 NPID PID=MFB,MFTYPE=NOS2 RNAD=RN3F,LNAD=LN1,LT=0010,RT=0100,AC=F0F0 PATH PID=MFC,MFTYPE=NOS2 NPID PATH RNAD=RN62,LNAD=LN1,LT=0010,RT=0010,AC=F0F0 LN1 LNAD CH=4 RN01 ND=01,LOG=NO RNAD ND=03,LOG=NO ND=3F,LOG=NO RN03 RNAD RNAD
- RN3F RN62 RNAD ND=62,LOG=NO

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# INTRODUCTION

The Mass Storage Archival Subsystem (MSAS) is the product consisting of the 7990 hardware, the channel interface, the diagnostics, and the operational software.

The 7990 hardware is a large-capacity online mass storage device, which is a cost-effective extension to the disk file storage system and an alternative to conventional magnetic tape storage. Storing files on the 7990 retains the security, data integrity, and online access capabilities provided by disk and reduces the operational and data integrity problems caused by storing, retrieving, and mounting tape volumes. You can use both the 7990 and magnetic tapes to protect files from hardware and system failures.

The 7990 hardware is composed of the following components.

| Component                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Cartridge                   | A plastic housing that encloses magnetic tape on which data is<br>stored under program control. This cartridge is compatible with an<br>IBM 3850 cartridge.                                                                                                                                                                                                                                                                                           |  |  |  |
| 7991 Storage<br>Module (SM) | The hardware unit that houses up to $312$ usable data cartridges. The SM also consists of the cartridge accessor unit, which picks cartridges from and puts cartridges in their cubicles, and one or two data recording drives (DRD), which read data from and write data to the cartridges. The cubicles are assigned coordinate locations that are identified by the ordered pair (y,z), where the z axis is horizontal and the y axis is vertical. |  |  |  |
| 7990 Control<br>Unit (CU)   | The hardware unit that is the controller for up to four 7991 SMs.<br>The CU acts like a tape controller for up to four IBM channel<br>interfaces and includes one or two data recording controllers<br>(DRCs). The MSAS software supports up to two IBM channel interfaces<br>per CYBER mainframe.                                                                                                                                                    |  |  |  |

The basic function of MSAS is to store data on the 7990 and move it to disk upon request for access by an authorized user. Control of file movement between a disk and a 7990 is transparent to the applications programmer; however, there are operational changes and additions that site personnel should note. These include modifications to operational procedures in the areas of permanent file backup, permanent file recovery, and disk space management. In addition, new MSAS utilities are introduced. Detailed information about the call and operation of each MSAS utility, listed next, is included in this section.

| Utility | Description                                                                           |  |  |
|---------|---------------------------------------------------------------------------------------|--|--|
| SSDEF   | Creates the system files (SM maps and 7990 catalogs) necessary for MSAS processing.   |  |  |
| SSLABEL | Manages allocation of cubicles and assignment of cartridges in the SM.                |  |  |
| SSMOVE  | Controls the destaging of files (creating 7990 images) and the release of disk space. |  |  |

| Utility | Description                                                                                                                                                   |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SSVAL   | Controls the release of 7990 space and analyzes the SM maps, 7990 catalogs, and PFC entries to identify and flag discrepancies within these three components. |
| SSUSE   | Provides reports on the assignment and availability of cartridges and cubicles within an SM.                                                                  |
| SSDEBUG | Corrects error conditions detected by SSVAL and recovers data from 7990 cartridges.                                                                           |
| SSBLD   | Builds the unit device table (UDT) for SSEXEC. The UDT describes the 7990 hardware configuration.                                                             |
| SSALTER | Provides dynamic modification of the 7990 hardware configuration.                                                                                             |

## UTILITY DESCRIPTION TERMINOLOGY

Review the following terms; they are defined as used in the descriptions of the MSAS utilities later in this section.

## Cartridge

A cartridge is the 7990 storage component consisting of magnetic tape. The 7990 hardware always writes or reads 6652 8-bit byte records, called stripes, to or from the magnetic tape. Each cartridge has 27,087 stripes. The first 20 stripes contain a manufacturer's label. The second 20 stripes contain a 7990 cartridge label written by the SSLABEL utility. The remaining 27,047 stripes are organized into software-defined allocation units (AUs) of 14 stripes each for a total of 1931 AUs per cartridge.

An allocation unit is the smallest allocatable portion of a cartridge. One or more AUs may be allocated to contain data for a single file. The allocated AUs for each file are organized into volumes (definition follows), which are chained together in the 7990 catalog to identify the sequence of AUs that must be accessed in order to read a file. A head-ofchain (HOC) flag identifies the first volume in the chain, a link field identifies the next volume in the chain, and an end-of-chain (EOC) flag identifies the last volume in the chain.

The addition, removal, and reassignment of cartridges are managed by the MSAS utilities. The cartridge labels, and also the 7990 catalogs and SM maps (definitions following), contain information concerning the location and content of the cartridges. The descriptions of the MSAS utilities later in this section contain further information on cartridge management.

#### SM Map

An SM map is a direct access permanent file that contains information indicating how cubicles in an SM are assigned to a family and identifying the cartridges that reside in the SM. There is one SM map for each SM in the configuration. The permanent file name of the SM map is SMMAPi, where i is the SM identifier (a letter from A to H); its user index is 377760<sub>8</sub>; and its family is the default family on the mainframe on which SSEXEC executes (refer to the definition of SSEXEC later in this section).

An SM map contains an entry for each possible coordinate pair (y,z) that identifies a cubicle in the SM, from (0,0), which is bottom left, to (21,15), which is upper right. Certain coordinate pairs are reserved for customer engineering use, system use, and diagnostic purposes.

Each entry in an SM map has this format:

| 59   | 53             | 47  | 41  |            | 0 |
|------|----------------|-----|-----|------------|---|
| code |                | ord |     | familyname |   |
| 2/// | sub-<br>family | id  |     | unused     |   |
| cm   |                |     | csn |            |   |

**Field** 

code

Number from 0 to 6 indicating how the cubicle is assigned.

Description

|            | code                               | Description                                                                                                                                                                           |
|------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | 0                                  | Unassigned.                                                                                                                                                                           |
|            | 1                                  | Reserved for customer engineer.                                                                                                                                                       |
|            | 2                                  | Reserved for system use.                                                                                                                                                              |
|            | 3                                  | Reserved for a different SM map.                                                                                                                                                      |
|            | 4                                  | Assigned to the cartridge scratch pool. $\dagger$                                                                                                                                     |
|            | 5                                  | Assigned to a subfamily.                                                                                                                                                              |
|            | 6                                  | No cubicle exists at these coordinates.                                                                                                                                               |
| ord        | which the cubic<br>FCT ordinal (re | s cubicle in the 7990 catalog of the subfamily to<br>le is assigned. This ordinal is referred to as the<br>fer to the definition of 7990 catalog, next). This<br>gful only if code=5. |
| familyname |                                    | name, in 6-bit display code, of the family to which<br>assigned. This field is meaningful only if code=5.                                                                             |
| ٤          |                                    | lag that is set by the SSVAL utility when an SM map<br>cle assigned to a family has no corresponding entry<br>alog.                                                                   |
| subfamily  |                                    | o 7 identifying the subfamily to which the cubicle is field is meaningful only if code=5.                                                                                             |
| id         | Letter from A t                    | o H identifying the SM.                                                                                                                                                               |

<sup>&</sup>lt;sup>†</sup>The pool is an area of the SM that stores scratch cartridges managed by the SSLABEL utility.

#### Description

<u>Field</u> cm

Cartridge manufacturer code.

 $\mathbf{cm}$ 

#### Description

A- Cartridge manufacturer is IBM.

B- Reserved for future cartridge manufacturer.

csn

The 8-character cartridge serial number of the cartridge assigned to the cubicle. If no cartridge is assigned, this field contains spaces.

The zero entry in the SM map is the map header entry. In this entry the code field is 6, the leftmost 6 bits of the second word contain the SM identifier, and the remaining bits contain the permanent file name of the SM map.

The SM map is updated whenever the SSLABEL, SSVAL, or SSDEBUG utility causes a change in cubicle or cartridge assignment. It is recommended that the SM map be backed up after every update to avoid problems such as:

- Mismatches between SM map and 7990 catalog entries
- Lost SM maps because of a disk failure or other problem
- Attempts to access cartridges that are no longer available
- Attempts to store cartridges in cubicles that are no longer empty

Thus, you should make a copy of the SM map on tape or another device or family in order to retain the latest version of the SM map. If a device containing SM maps is reloaded, the latest version of the SM maps should be recovered from the backup copy after the reload is completed. After recovering the SM maps, you should run the SSVAL utility to check that the entries in the SM maps and 7990 catalogs match. If there are inconsistencies, corrective action should be taken as described under Error Conditions and Corrective Actions later in this section.

#### 7990 Catalog

A 7990 catalog is a disk-resident direct access permanent file that contains information describing which allocation units of each cartridge assigned to a particular subfamily are allocated to 7990 files and which AUs are available for allocation. There is one 7990 catalog for each subfamily of a family that can have 7990-resident files, and it resides on the master device for the subfamily. The permanent file name of the 7990 catalog file is SFMCATi and its user index is 37776i<sub>8</sub>, where i is the subfamily identifier (a number from 0 to 7). For example, file SFMCAT3 and user index 377763<sub>8</sub> identify the 7990 catalog for subfamily 3.

A 7990 catalog is partitioned into subcatalogs, one subcatalog for each SM used by the subfamily. The maximum number of subcatalogs in a 7990 catalog is eight (the maximum number of SMs in a configuration). Each subcatalog consists of two parts, the file and cartridge table (FCT) and the allocation summary table (AST). The FCT has an entry for each cartridge assigned to the subfamily from the given SM. The maximum number of FCT entries in a subcatalog is 312 (the maximum number of cartridges in an SM). The AST contains information used by the allocation algorithm to select the cartridges on which a file will reside.

The first part of the 7990 catalog contains a header and at most eight subcatalog entries. The header identifies the family and subfamily of the 7990 catalog. Each subcatalog entry contains the length and location of its FCT and AST, the SM identifier, unallocated AUs available for small and large files, and the date and time of the last SSVAL run that resulted in the release of 7990 space assigned to orphan files. The format of the header is:

| 59 |            | 17             | 11    | 20 |
|----|------------|----------------|-------|----|
|    | familyname | sub-<br>family | .V/// | id |
|    | unused     |                |       |    |
|    | unused     |                |       |    |

FieldDescriptionfamilynameThe 7-character name, in 6-bit display code, of the family for this<br/>7990 catalog.subfamilyNumber from 0 to 7 identifying the subfamily for this 7990 catalog.idNumber identifying this file as a 7990 catalog file. id is set to 1.

The format of the subcatalog entry is:

| 59    | 53            | 47                                          | 41                                                                | 35                                                                               | 26       | 17      | 11         | 0                             |  |
|-------|---------------|---------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------|----------|---------|------------|-------------------------------|--|
| id    | 6             | ength                                       | th FCT loc                                                        |                                                                                  | AST      | AST loc |            |                               |  |
|       | unused        |                                             |                                                                   |                                                                                  | date tin |         |            |                               |  |
| AU    | AUs small AUs |                                             | large                                                             | AUs g                                                                            | roup     |         | unused     |                               |  |
| Field |               |                                             |                                                                   |                                                                                  |          |         | Descriptio | <u>on</u>                     |  |
| id    |               |                                             | SM i                                                              | SM identifier for the subcatalog (a letter from A to H).                         |          |         |            |                               |  |
| lengt | h             |                                             | Number of FCT (and AST) entries in the subcatalog.                |                                                                                  |          |         |            |                               |  |
| FCT 1 | oc            |                                             | Location (beginning PRU number) of the FCT.                       |                                                                                  |          |         |            |                               |  |
| AST 1 | AST loc       |                                             |                                                                   | Location (beginning PRU number) of the AST.                                      |          |         |            |                               |  |
| date  | ate time      |                                             |                                                                   | Date and time of the last releasing of orphan files on the SM identified by id.  |          |         |            |                               |  |
| AUs s | mall          |                                             |                                                                   | Total number of free AUs available for small files on all cartridges in this SM. |          |         |            |                               |  |
| AUs 1 | arge          | Total number of free AUs ava<br>in this SM. |                                                                   |                                                                                  |          | Us ava  | ilable for | large files on all cartridges |  |
| AUs g | roup          |                                             | Maximum number of free AUs available within one group in this SM. |                                                                                  |          |         |            |                               |  |

Each cubicle from the given SM assigned to the subfamily has an entry in the FCT of the subcatalog. This entry contains the coordinates (y,z) of the assigned cubicle. If a cartridge has been assigned to the cubicle, the FCT entry also contains the csn of the cartridge, usage information, status flags, and information about each of the AUs of the assigned cartridge. The format of each FCT entry is:

| <del>59</del>    | 55                                                                  | 53   | 51      | 47        | 41      | 35          | 32             | 29               | 17            | 11    | 20   |
|------------------|---------------------------------------------------------------------|------|---------|-----------|---------|-------------|----------------|------------------|---------------|-------|------|
|                  |                                                                     |      |         |           |         | csn         |                |                  |               | c     | m    |
| y                | y z first AU large                                                  |      |         |           |         |             | first AU small | flags            | 0             | rd    |      |
| ocl <sub>3</sub> | ocl <sub>3</sub> ocl <sub>2</sub> ocl <sub>1</sub> first stripe pru |      |         |           | max AUs |             | cdp            | oclu             |               |       |      |
|                  |                                                                     |      |         |           |         |             | un             | used             |               |       |      |
|                  |                                                                     |      |         |           | L       | inused      |                |                  |               | flawe | d AU |
|                  |                                                                     |      | read    | stripe c  | ount    |             |                | wr               | ite stripe o  | ount  |      |
|                  |                                                                     |      | soft    | t read e  | ror     |             |                | soft write error |               |       |      |
| ha               | ard                                                                 | reac | l error |           | demar   | ked stri    | pe             | load cour        | nt load error |       |      |
| cartridge link   |                                                                     |      |         |           |         | artridge li | nk             |                  |               |       |      |
|                  |                                                                     |      |         |           |         |             |                | •                |               |       |      |
|                  |                                                                     |      |         |           |         |             |                | •                |               |       |      |
|                  |                                                                     |      |         |           |         |             |                | •                |               |       |      |
|                  |                                                                     |      | car     | rtridge l | ink     |             |                |                  | artridge li   | nk    |      |

| Field          |                                                                                                                                                                           | Description                                                                                                                                                                                             |  |  |  |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| c sn           | The 8-character cartridge serial number, in 6-bit display code, of<br>the cartridge assigned to this cubicle. If no cartridge is<br>assigned, this field contains spaces. |                                                                                                                                                                                                         |  |  |  |
| cm             | Cartridge man                                                                                                                                                             | ufacturer code.                                                                                                                                                                                         |  |  |  |
|                | <u>cm</u>                                                                                                                                                                 | Description                                                                                                                                                                                             |  |  |  |
|                | A                                                                                                                                                                         | Cartridge manufacturer is IBM.                                                                                                                                                                          |  |  |  |
|                | В-                                                                                                                                                                        | Reserved for future cartridge manufacturer.                                                                                                                                                             |  |  |  |
| у              | y coordinate                                                                                                                                                              | of this cubicle.                                                                                                                                                                                        |  |  |  |
| z              | z coordinate                                                                                                                                                              | of this cubicle.                                                                                                                                                                                        |  |  |  |
| first AU large | First free AU                                                                                                                                                             | available for large files in this cartridge.                                                                                                                                                            |  |  |  |
| first AU small | First free AU                                                                                                                                                             | available for small files in this cartridge.                                                                                                                                                            |  |  |  |
| flags          | One of the fo                                                                                                                                                             | llowing flags.                                                                                                                                                                                          |  |  |  |
|                | Bit                                                                                                                                                                       | Description                                                                                                                                                                                             |  |  |  |
|                | 17                                                                                                                                                                        | Inhibit allocation flag indicating that space from the<br>cartridge assigned to this cubicle is not to be<br>allocated to a file. This flag is set or cleared by a<br>directive to the SSLABEL utility. |  |  |  |

#### Description

#### Description

- 16 Lost cartridge flag indicating that the cartridge assigned to this cubicle was not there the last time SSEXEC tried to pick it. This flag can be cleared by a directive to the SSLABEL utility.
- 15 Excessive write parity error flag set by SSEXEC when an error threshold has been passed. Space from this cartridge is not to be allocated. This flag can be cleared by a directive to the SSDEBUG utility.
- 14 Linkage error flag indicating that the SM map entry for the location (y,z) is inconsistent with the FCT entry. This flag is set by the SSVAL utility and cleared by the SSDEBUG utility.
- 13 Free cartridge flag. When this flag is set, SSEXEC inhibits further allocation. Files can be removed by running the SSVAL utility. This flag is set or cleared by a directive to the SSLABEL utility.

12 Reserved.

Bit

ord

Ordinal of the FCT entry in the subcatalog.

ocli

Off-cartridge link specifying the ordinal of the FCT entry for the cubicle containing the next cartridge on which the file on the cartridge assigned to this cubicle resides. If a file does reside on multiple cartridges, the entire file must be contained within a l6-cartridge group. Also, since there are only three off-cartridge link fields, if a cartridge contains several files, only three can be contained on other cartridges.

first stripe First usable stripe following the cartridge label. This field is set to 40.

stripe Number of stripes in each AU. This field is set to 14.

pru Number of PRUs that can be written on each stripe. This field is set to 13.

max AUs Maximum number of AUs in a cartridge. This field is set to 1931.

cdp Cartridge division point between small and large files kept on the same cartridge. The cartridge division point is defined with the B=n parameter to an SSLABEL directive. The default is B=600, specifying that the first 600 AUs of a cartridge are available for small files.

# Description

| oclu                  | corresponding bit                       | hk usage field. When an $ocl_i$ field is used, a<br>is set in this field. Bit 0 is set for $ocl_1$ ,<br>$ocl_2$ , and bit 2 is set for $ocl_3$ .                                                                           |
|-----------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| flawed AU             | Number of flawed                        | AUs on this cartridge.                                                                                                                                                                                                     |
| read stripe<br>count  | Accumulated numbe                       | er of stripes read from this cartridge.                                                                                                                                                                                    |
| write stripe<br>count | Accumulated number                      | er of stripes written to this cartridge.                                                                                                                                                                                   |
| soft read<br>error    | Accumulated number                      | er of soft read errors detected on this cartridge.                                                                                                                                                                         |
| soft write<br>error   | Accumulated number                      | er of soft write errors detected on this cartridge.                                                                                                                                                                        |
| hard read<br>error    | Accumulated number                      | er of hard read errors detected on this cartridge.                                                                                                                                                                         |
| demarked<br>stripe    | Accumulated numbe                       | er of stripes demarked on this cartridge.                                                                                                                                                                                  |
| load count            | Accumulated number read/write operation | er of times this cartridge has been loaded for a tion.                                                                                                                                                                     |
| load error            | Accumulated numbe cartridge.            | er of cartridge load errors detected using this                                                                                                                                                                            |
| cartridge<br>link     |                                         | c cartridge link field for each AU in the cartridge.<br>Ided into the same fields and represent the same<br>each AU.                                                                                                       |
|                       | Bit(s)                                  | Description                                                                                                                                                                                                                |
|                       | 29                                      | Free/busy flag indicating whether or not this AU is currently allocated to a file.                                                                                                                                         |
|                       | 28                                      | Unused.                                                                                                                                                                                                                    |
|                       | 27                                      | AU conflict flag indicating an allocation conflict<br>involving this AU. This flag is set by the SSVAL<br>utility or by SSEXEC.                                                                                            |
|                       | 26                                      | Frozen chain flag indicating a problem with this<br>allocation chain. This flag is set by the SSVAL<br>utility or by SSEXEC. This AU is not reused until<br>this flag is cleared by a directive to the SSDEBUG<br>utility. |

Field

| Bit(s) | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 25     | Start of fragment flag indicating this AU is the beginning of a chain fragment.                                                                                                                                                                                                                                                                                                                                                                                             |
| 24     | Flawed AU flag indicating this AU is not to be allocated to a file.                                                                                                                                                                                                                                                                                                                                                                                                         |
| 23     | Continuation AU flag indicating whether or not this<br>AU is the first AU of a volume. If this flag is<br>clear, the AU is the first AU of the volume; if<br>set, the AU is not the first AU of the volume.                                                                                                                                                                                                                                                                 |
| 22-21  | Off-cartridge link field indicating that the next volume of the file is on another cartridge. The next cartridge is identified by one of the $ocl_i$ fields. The value of the off-cartridge link flag (1, 2, or 3) specifies which $ocl_i$ field to use. The link field specifies the number of the first AU on the next volume of the file. This field is meaningful only if the chain control field indicates that this volume is the first or middle volume of the file. |
| 20-19  | Chain control field indicating whether this volume<br>is the first (1), last (2), only (3), or middle (0)<br>volume of the file.                                                                                                                                                                                                                                                                                                                                            |
| 18-12  | File length field indicating the number of AUs in the file following the first accessed AU.                                                                                                                                                                                                                                                                                                                                                                                 |
| 11-0   | Link field indicating the first AU on the next                                                                                                                                                                                                                                                                                                                                                                                                                              |

volume of the file. If the continuation AU flag is clear, this field contains the ordinal of the first AU of the volume. If the continuation AU flag is set, this field contains the ordinal of the first AU within the volume.

The 7990 catalog is updated whenever the SSLABEL, SSMOVE, SSVAL, or SSDEBUG utility causes a change in cartridge or cubicle assignment that affects the subfamily. Because the 7990 catalog for a subfamily resides on its master device, it will be backed up by PFDUMP whenever the master device for the subfamily is dumped. Consequently, when PFLOAD reloads all files, the 7990 catalogs are automatically recovered and all 7990-resident files as indicated in a recovered PFC will also have entries in the recovered 7990 catalog. Thus, no special operational procedures are needed to back up a 7990 catalog. It is possible, however, that the 7990 catalog will be inconsistent with the SM maps or cartridge labels. If such inconsistencies do exist, corrective action will have to be taken as described under Error Conditions and Corrective Actions later in this section.

Field

## 7990 Files

In an MSAS environment, permanent files can be categorized according to whether or not they reside on 7990. A disk file is a permanent file that resides on disk but not on 7990. A 7990 file is a permanent file that resides on 7990 and may or may not also reside on disk, depending on how the disk space is managed (refer to Disk Space Management later in this section). Depending on backup requirements (BR parameters), both disk and 7990 files can also have backup images on tape (refer to the NOS 2 Reference Set, Volume 3).

When a user defines a direct access file, initially it is a disk file. A disk file becomes a 7990 file when it is destaged to 7990; that is, an image of the file is created on 7990. Files are destaged through use of the SSMOVE utility, which is run periodically to manage disk space. When SSMOVE is run, files are destaged to 7990 and/or their disk space released depending on certain file characteristics (refer to SSMOVE later in this section). Thus, after an SSMOVE run a file can reside on disk, on 7990, or on both. If the file does have a 7990 image, the asa field in the PFC entry for the file indicates the location of the 7990 copy.

When a user attaches a 7990 file, it is staged to disk from 7990 (that is, a disk image is created) if the file is not on disk. If a direct access file is attached in write mode, the AFOBS flag is set in the PFC entry for that file. The current version of the file resides on disk only. If an indirect access file is replaced or appended to, the asa field is cleared in the PFC entry for that file. Setting the AFOBS flag or clearing the asa in the PFC ensures that the current version of the file will be copied to 7990 when that file is again selected for being released from disk.

If the file is purged, its disk space, but not its 7990 space, is immediately released. The SSVAL utility must be run to release 7990 space allocated to purged files. Thus, because a purged file has no PFC entry linking to its 7990 catalog entry, the 7990 image that still exists before SSVAL is run is called an orphan file. However, a user can never access an orphan file.

When a file is destaged to 7990, control information is written on each stripe to which the file data is written. This information is sufficient to identify the file.

#### SSEXEC

SSEXEC is the main processing program that is responsible for controlling MSAS activities. The MSAS utilities issue requests to SSEXEC to destage files from disk to 7990, purge unneeded 7990 files, label or relabel cartridges, update SM maps and 7990 catalogs, and so forth. In a multimainframe environment, two versions of this program exist: the mainframe to which the 7990 device is physically connected (the master mainframe) has a program called SSEXEC, and all other mainframes (the slave mainframes) have a program called SSSLV. Refer to section 13, Multimainframe Operations, for more information.

#### Subfamily

Each permanent file family consists of eight subfamilies, subfamily 0 through subfamily 7. The lower 3 bits of the user index identify the subfamily to which a user belongs. For example, a user whose index ends in 3 (or 011 in bit notation) belongs to subfamily 3. When the SSDEF utility is run to create MSAS system files, the SM maps are created on the master device under user index  $377760_8$  (subfamily 0) and one 7990 catalog is created under each user index  $377761_8$  (subfamily i), i=0,1,2,...,7. When the SSLABEL utility is used to assign an SM, cubicle, or cartridge to a family, it is possible to specify assignment to particular subfamilies of the family.

#### Group

A group is a software-defined structure for allocating cartridges within a subfamily. A group of cartridges is a number of cartridges (up to 16) in which files belonging to a subfamily can reside. Any file can overflow from one cartridge in a group to any other cartridge in the same group. However, no file can overflow from a cartridge in one group to any cartridge in another group. Cartridges are placed in or removed from specific groups by using the SSLABEL utility. The SSVAL utility compares the 7990 catalogs (for each subfamily) with the same information obtained from the PFC entries.

#### Volume

A volume is a software-defined structure used to simplify the allocation and access of large 7990 files. Up to 128 consecutive AUs in a cartridge that have the same status (either allocated or not allocated) are considered to belong to the same volume. These consecutive AUs are composed of stripes that all have the same volume serial number (a physical identifier that is written to the tape on the cartridge). The MSAS software fills cartridges (unallocated volumes) from the beginning to the end with no rewinding. This action minimizes repositioning of the tape in a cartridge for multivolume files.

When a file is staged back to disk, the control information on each stripe is verified. If a discrepancy is detected, an error message is issued, the file stage is aborted, an error flag is set in the PFC entry to indicate that the 7990 file could not be accessed, and the AU conflict flag is set in the 7990 catalog entry for the particular cartridge(s) and AU(s).

# **MSAS UTILITIES**

MSAS utilities are described next. All of these utilities must be run from system origin jobs. In a multimainframe environment, the SSDEF, SSUSE, and SSBLD utilities can be run on any mainframe that has access to the family being processed. However, the remaining utilities must be run on the mainframe on which SSEXEC executes.

# SSDEF

SSDEF creates the system files (SM maps and 7990 catalogs) that are necessary for MSAS processing. If an SM is added to the 7990 hardware configuration, SSDEF is used to create the SM map for that SM. If a family is to be permitted to have 7990-resident files, SSDEF is used to create the eight 7990 catalogs for that family (one catalog for each subfamily).

# NOTE

If the SM parameter is specified, SSDEF will create an SM map for the specified SM (refer to the definition of SM map earlier in this section). It is recommended that the SM map be copied on tape or on another device or family immediately after it is created.

The format of the SSDEF command is:

SSDEF, p1, p2.

| <u>p</u> i    | Description                                                                               |
|---------------|-------------------------------------------------------------------------------------------|
| FM=familyname | Family for which 7990 catalogs are to be created, one catalog for each subfamily.         |
| FM            | Same as FM=system default family.                                                         |
| FM omitted    | No 7990 catalogs are to be created. SM=id or SM must be specified.                        |
| SM=id         | SM identifier of the SM for which an SM map is to be created; id is a letter from A to H. |
| SM            | Same as SM=A.                                                                             |
| SM omitted    | No SM map is to be created. FM=familyname or FM must be specified.                        |

## Example:

SSDEF,SM=B.

SMMAPB, the SM map for SM B, is created, and its entries are as described in the definition of SM map earlier in this section. However, since SSDEF does not assign cubicles, the entries for cubicles available for use initially indicate that the cubicles are unassigned.

## SSLABEL

SSLABEL manages cartridge assignment and cubicle allocation in an SM. The following functions are performed through use of directives to SSLABEL.

- Add an SM to a subfamily (AS directive).
- Remove an SM from a subfamily (RS directive).
- Add cubicles to a subfamily, the pool, or the reserved area (AB directive).
- Remove cubicles from a subfamily, the pool, or the reserved area (RB directive).
- Add cartridges to a subfamily or the pool (AM directive).
- Remove cartridges from a subfamily or the pool (RM directive).
- Restore an abnormally removed cartridge (RC directive).
- Repair a cartridge label or overwrite a family label (FX directive).
- Inhibit or allow further allocation of files to a cartridge (IB directive).
- Initiate freeing all files from an existing cartridge (FC directive).

Input to SSLABEL is via a directive file. SSLABEL reads the appropriate SM maps and 7990 catalogs to determine how to process each directive and then issues requests to SSEXEC to read and/or write cartridge labels and to update the SM maps and 7990 catalogs. SSLABEL generates a report detailing the action taken for each input directive. If the assignment information or cartridge label is not appropriate or conflicts with data in the SM map or 7990 catalog, the cartridge label information is included on this report and the cartridge is put into the exit tray. It may be possible to restore such a cartridge, as described under Cartridge Restoration and Reuse later in this section.

# NOTE

SSLABEL updates the SM map for the specified SM (refer to the definition of SM map earlier in this section). It is recommended that the SM map be copied on tape or on another device or family immediately after each update.

Decemintion

The format of the SSLABEL command is:

SSLABEL, p1, p2.

\_

| $\frac{\mathbf{p_i}}{\mathbf{i}}$ | Description                                |
|-----------------------------------|--------------------------------------------|
| I=filename                        | File containing the directives to SSLABEL. |
| I                                 | Same as I=INPUT.                           |
| I omitted                         | Same as I=INPUT.                           |

# Description

| L=filename | File on which listable output is to be written.                              |
|------------|------------------------------------------------------------------------------|
| L          | Same as L=OUTPUT.                                                            |
| L=0        | No output file is to be generated.                                           |
| L omitted  | Same as L=OUTPUT.                                                            |
| Z          | Directives are contained on the SSLABEL command. The I parameter is ignored. |
| Z omitted  | Directives are contained on the file specified by the I parameter.           |

# **SSLABEL** Directives

Pi

The directives to SSLABEL can be specified on a separate file (specified by the I parameter) or after the SSLABEL command (Z specified). If on the input file, each directive must be specified on a separate line using the OP=directive option. Parameters for a directive are on the same line, are separated by commas, and end with a period:

OP=directive,  $p_1, p_2, \ldots, p_n$ .

Example:

SSLABEL, I=DIRFILE.

DIRFILE is the directive file; it contains the following directives.

OP=AM, N=4, PK=D. OP=RM, CN=44455566, FM, SB=1, PK=F.

Two directives to SSLABEL are specified. OP=AM adds four cartridges to the pool of SM A (SM parameter not specified). OP=RM removes the cartridge whose csn is 44455566 from subfamily l of the default family. (Refer to the following descriptions of directives and parameters.)

If the directives are contained on the command, they follow the command terminator. The first character following the terminator is the separator. Any character that does not appear in any of the directives can be used as the separator character. Each directive must be preceded by the separator and terminated by a period.

Example:

SSLABEL,Z./OP=AM, N=4, PK=D./OP=RM, CN=44455566, FM, SB=1, PK=F.

The slant is used as the separator. This command performs the same functions as those in the preceding example.

The following directives are available with SSLABEL. Some of these directives cause cartridges to be physically moved to and from cubicles and the input or exit tray (refer to OP=AM, OP=RM, OP=RC, and OP=FX in the following paragraphs). The remaining directives cause only logical operations to occur, updating the MSAS system files. Descriptions of the parameters for these directives follow the directives.

## OP=AS - Add SMs

OP=AS adds an SM to a subfamily. The 7990 catalog for the specified subfamily is updated to reflect that cartridges and permanent files for the subfamily can reside on the specified SM. This directive, however, does not manipulate cartridges or cubicles.

## OP=RS - Remove SMs

OP=RS removes an SM from a subfamily. The 7990 catalog for the specified subfamily is updated to reflect that cartridges and permanent files for the subfamily cannot reside on the specified SM. Before OP=RS can be specified, all cubicles in the specified SM must have been removed previously from the family (refer to the OP=RB directive). This directive, however, does not manipulate cartridges or cubicles.

#### OP=AB - Add Cubicles

OP=AB adds an unassigned cubicle within an SM to a subfamily (PT=F), the pool (PT=P), or the reserved area of the SM (PT=R). More than one cubicle (N=n) can be added at a time. Specific cubicles (YI and ZI parameters) can be added, but they must be currently unassigned. For PT=R, YI and ZI must be used to add multiple cubicles; N=n is not valid. The SM map is updated to reflect the new assignment of cubicles. When PT=R is specified, the cubicle is reserved to a different SM map. Cubicles reserved for system use, storage module maintenance, or customer engineering use are reserved at compile time. Cubicles assigned to the pool are not assigned to a family or subfamily.

## OP=RB - Remove Cubicles

OP=RB removes an assigned empty cubicle from a subfamily (PK=F), the pool (PK=P), or the reserved area of the SM (PK=R). More than one cubicle (N=n) can be removed at a time. SSLABEL reads the SM map and selects the first empty cubicle assigned to the subfamily, pool, or reserved area to be removed. Specific cubicles (YI and ZI parameters) can be removed, but they must be empty. The SM map is updated to reflect that the cubicles are unassigned.

## OP=AM - Add Cartridges

OP=AM adds a cartridge to either a specific subfamily (PT=F) or the pool (PT=P). SSLABEL selects the first empty cubicle assigned to the subfamily or pool as the new location for the cartridge. More than one cartridge (N=n) can be added at a time or a specific cartridge (CN=csn) from the pool can be added to a subfamily. The SM map, 7990 catalog, and cartridge label are updated to reflect the new assignment of the cartridge. Cartridges added to a subfamily may be added to a specific group using the GR=n parameter. If cartridges are added to the pool, the GR=n parameter is not valid. The small and large boundaries for file size are specified by the B=n parameter with the OP=AM option. Default is B=600, implying that the first 600 AUs of the cartridge are available for small files. Cartridges added to the pool are not assigned to a family or subfamily. A customer engineer cartridge can be stored into location (0,0) or (0,15) by using the CC=loc parameter.

## OP=RM - Remove Cartridges

OP=RM either removes an empty cartridge from a subfamily (PK=F) and moves the cartridge to the pool (PT=P) or the exit tray (PT=D), or it removes any cartridge from the pool (PK=P) and moves it to the exit tray (PT=D). Any cartridge currently assigned to a subfamily cannot be removed unless it is empty; that is, all AUs must be unallocated. To remove a cartridge that is not empty, first use the OP=FC directive to free up the cartridge.

If the cartridge specified by the CN=csn parameter is lost (does not reside in its assigned cubicle) and if the cartridge is assigned to a family, the LT parameter should be specified. This allows the appropriate entries in the SM map and 7990 catalog to be deleted even though the cartridge is not available to have its label updated. If LT is not specified, an error message is issued and SSLABEL aborts. SSLABEL will not update the SM map and 7990 catalog with the LT parameter unless the lost cartridge flag is set in the 7990 catalog. SSLABEL will set the lost cartridge flag if SSLABEL is run to remove a cartridge that is not present.

If the cartridge specified by the CN=csn parameter is lost and it is in the pool, then the LT parameter should not be used. Rather, SSDEBUG must be run to remove the SM map entry and SSLABEL must be run to reassign the cartridge to the pool.

A specified number (N=n) of cartridges may be removed from a group of a subfamily by using the GR=n parameter.

#### OP=RC - Restore Lost Cartridges

OP=RC restores to its proper cubicle a cartridge that was inadvertently removed from an SM. If restoration is successful, the lost flag in the 7990 catalog is cleared. If data recorded on the cartridge label does not agree with the information in the 7990 catalog and the SM map entry for the cubicle to which the cartridge is to be restored, the cartridge label information is reported and the cartridge is put into the exit tray for use in further processing of the cartridge.



Not more than one lost cartridge can be restored at a time using the OP=RC directive. Also, since customer engineer cartridges do not exist in the SM map, OP=RC will not restore a cartridge to a customer engineer cartridge cubicle.

## OP=FX - Fix Cartridge Labels

OP=FX writes a scratch label on a cartridge identified by the CN=csn parameter and adds the cartridge to the pool. This directive is intended for use when a cartridge label has been destroyed, but the cartridge itself is not physically damaged and can be reused. It can also be used when a cartridge with a family label is to be assigned to a different subfamily using the OP=AM directive, but it is not feasible to first remove the cartridge normally using the OP=RM directive. For example, if SSLABEL is run to add a cartridge to a subfamily, and a system failure occurs before the 7990 catalog and SM map are updated but after the cartridge is relabeled, then the cartridge label does not match the corresponding entries in the 7990 catalog and SM map. Hence, OP=RM cannot be used to remove the cartridge from the subfamily, but OP=FX can be used to rewrite the cartridge label and then OP=AM can be used to add the cartridge to a subfamily. However, if a family label is to be overwritten, the FM=familyname and SB=subfamily parameters must identify the family and subfamily to which the cartridge was assigned. The SM map and 7990 catalog are updated to reflect the new cartridge label.

OP=RM cannot be used with the LT parameter to remove pool cartridges. SSLABEL sets the SM map error flag because no 7990 catalog entries exist for pool cartridges. Use SSDEBUG to remove pool cartridges.

#### OP=IB - Control Cartridge Allocation

OP=IB sets or clears the inhibit allocation flag in the 7990 catalog entry for the specific cartridge (CN=csn). If the flag is set (ON), SSEXEC does not allocate new 7990 files to this cartridge. If the flag is cleared (OF), allocation of files to this cartridge is enabled.

## OP=FC - Free Cartridge Files

OP=FC sets or clears the free cartridge flag in the 7990 catalog entry for the specified cartridge (CN=csn). If the flag is set (ON), SSEXEC will inhibit further allocation. Files can be removed by running the SSVAL utility. Refer to the free cartridge discussion under SSVAL later in this section. If the SM map entry is missing, SSDEBUG must be used to set the free cartridge flag. Refer to the discussion under SSDEBUG later in this section.

## Parameters for SSLABEL Directives

The descriptions of the parameters to the SSLABEL directives follow. Not all parameters are valid with all directives, as indicated.

# P<sub>i</sub>

Description

B≃n

Number of AUs on this cartridge to be used to store small files. The remaining AUs (1931-n) are reserved for large files. The distinction between small and large files is controlled by an assembly parameter. B=n is valid only with OP=AM.

B omitted

Same as B=600.

# Description

| <sup>p</sup> i | Description                                                                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CC=loc         | Location into which the cartridge is to be stored.                                                                                                                                       |
|                | loc Description                                                                                                                                                                          |
|                | A Store cartridge into location (0,0).                                                                                                                                                   |
|                | B Store cartridge into location (0,15).                                                                                                                                                  |
|                | Any value of CC other than A or B is not accepted.                                                                                                                                       |
| CM=A-          | Cartridge manufacturer code is A-, indicating IBM.                                                                                                                                       |
| CM             | Same as CM=A                                                                                                                                                                             |
| CM omitted     | Same as CM=A                                                                                                                                                                             |
| CN=csn         | Cartridge serial number of the cartridge to be added, removed, or<br>repaired; not valid if PK=pkloc is specified. If CN=csn is<br>specified, n must be l if N=n is specified.           |
| CN             | Cartridge serial number of the cartridge is not specified.                                                                                                                               |
| CN omitted     | Same as CN.                                                                                                                                                                              |
| FM=familyname  | Family to which SSLABEL adds or from which it removes a cartridge or SM. With OP=FX, this parameter specifies the family to which the cartridge was assigned.                            |
| FM             | Same as FM=system default family.                                                                                                                                                        |
| FM omitted     | Same as FM=system default family.                                                                                                                                                        |
| GR=n           | Group to which SSLABEL adds or from which it removes a cartridge; $1 \le n \le 20$ . With OP=AM, this parameter is ignored if PT=P is specified. GR=n is valid only with OP=AM or OP=RM. |
| GR             | Not permitted.                                                                                                                                                                           |
| GR omitted     | Default groups are chosen sequentially. SSVAL runs most efficiently if SSLABEL chooses the default groups.                                                                               |
| LT             | SM map and 7990 catalog entries are to be updated, even though the cartridge is lost and its label cannot be updated; valid only with OP=RM.                                             |
| LT omitted     | If the cartridge is lost and OP=RM is specified, an error message is issued and SSLABEL aborts.                                                                                          |
| N=n            | Number of cartridges or cubicles to be added, removed, or repaired; $l \leq n \leq 100$ ; not valid if PT=R is specified. If CN=csn is specified, n must be l.                           |
| N              | Same as N=1.                                                                                                                                                                             |
| N omitted      | Same as N=1.                                                                                                                                                                             |

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| ₽ <sub>i</sub> |              | Description                                                                                                                                             |
|----------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| OF             |              | allocation flag or free cartridge flag in the 7990<br>to be cleared; valid only with OP=IB or OP=FC.                                                    |
| ON             |              | allocation flag or free cartridge flag in the 7990<br>to be set; valid only with OP=IB or OP=FC.                                                        |
| PK=pkloc       |              | om which the cartridge or cubicle is to be picked; not<br>=csn is specified.                                                                            |
|                | pkloc        | Description                                                                                                                                             |
|                | D            | Cartridge is to be picked from the input tray. PK=D is valid only with OP=AM, OP=RC, or OP=FX.                                                          |
|                | F            | Cartridge or cubicle is to be picked from the specified family (FM=familyname) and subfamily (SB=subfamily).<br>PK=F is valid only with OP=RM or OP=RB. |
|                | P            | Cartridge or cubicle is to be picked from the pool.<br>PK=P is valid only with OP=AM, OP=RM, or OP=RB. PK=P<br>is not valid if PT=P is specified.       |
| ·              | R            | Cubicle is to be picked from the reserved area of the SM. PK=R is valid only with OP=RB.                                                                |
| РК             | Same as PK=1 | P.                                                                                                                                                      |
| PK omitted     | Same as PK=1 | Ρ.                                                                                                                                                      |
| PT=ptloc       | Location in  | to which the cartridge or cubicle is to be put.                                                                                                         |
|                | ptloc_       | Description                                                                                                                                             |
|                | D            | Cartridge is to be put into the exit tray. PT=D is valid only with OP=RM.                                                                               |
|                | F            | Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily (SB=subfamily).<br>PT=F is valid only with OP=AM or OP=AB. |
|                | Р            | Cartridge or cubicle is to be put into the pool. PT=P<br>is valid only with OP=AM, OP=RM, or OP=AB. PT=P is not<br>valid if PK=P is specified.          |
|                | R            | Cubicle is to be put into the reserved area of the SM.<br>PT=R is valid only with OP=AB.                                                                |
| PT             | Same as PT=1 | P.                                                                                                                                                      |
| PT omitted     | Same as PT=1 | Ρ.                                                                                                                                                      |

| P <sub>i</sub>                                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>SB=subfamily                                                               | Subfamily to which SSLABEL adds or from which it removes a cartridge or SM; $0 \le \text{sub} \le 7$ . With OP=FX, this parameter specifies the subfamily to which the cartridge was assigned.                                                                                                                                                                                                                                                                                                                                                                    |
| SB                                                                             | Same as SB=0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| SB omitted                                                                     | Same as SB=0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| SM=id                                                                          | SM identifier of the SM to be used by SSLABEL; id is a letter from A to H.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| SM                                                                             | Same as SM=A.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| SM omitted                                                                     | Same as SM=A.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| YI=y <sub>1</sub>                                                              | Row of the SM to be added or removed; $0 \le y_1 \le 21$ ; valid only with OP=AB or OP=RB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| ZI=z <sub>1</sub>                                                              | Column of the SM to be added or removed; $0 \le z_1 \le 15$ ; valid only with OP=AB or OP=RB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| YI=y <sub>1</sub> ,ZI=z <sub>1</sub>                                           | y and z coordinates of the cubicle to be added or removed;<br>$0 \leq y_1 \leq 21, 0 \leq z_1 \leq 15$ ; valid only with OP=AB or OP=RB. The<br>following coordinates (y,z) are reserved for customer engineering<br>and/or diagnostic programming purposes: (0,0), (0,6), (0,15),<br>(11,0), (11,1), (11,15), (15,0), (15,1), (21,6), and (21,15). The<br>following coordinates are reserved for system use: (0,1), (0,14),<br>(21,0), and (21,14).                                                                                                              |
| YI=y <sub>1</sub> ,ZI=z <sub>1</sub> ,<br>YF=y <sub>2</sub> ,ZF=z <sub>2</sub> | Rectangle of cubicles to be added or removed; cubicles with y coordinates between $y_1$ and $y_2$ and z coordinates between $z_1$ and $z_2$ are included; valid only with OP=AB or OP=RB. At most, 100 cubicles can be included in the rectangle. YF and ZF must both be specified, if either is specified. YF and ZF cannot be specified unless both YI and ZI are specified. If a reserved cubicle is included in the rectangle, the directive will be accepted even though the reserved cubicle cannot be added or removed. $z_1=6$ and $z_2=6$ are not valid. |
| YI and ZI omitted                                                              | With OP=AB, the next available cubicle closest to the top (for<br>assignment to a family) or the bottom (for assignment to the pool)<br>is to be selected. With OP=RB, the first empty assigned cubicle is<br>to be selected.                                                                                                                                                                                                                                                                                                                                     |
|                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## SSLABEL Update Sequence

Each directive to SSLABEL updates SM maps, 7990 catalogs, and cartridge labels, whichever are appropriate, to reflect the changes in cartridge, cubicle, or SM assignment. Because the 7990 catalog is a disk-resident permanent file, it will be backed up on a dump tape whenever PFDUMP dumps the master device for its particular subfamily. Thus, it is not necessary for the analyst to back up the 7990 catalogs immediately after an SSLABEL run. However, the backup and recovery of SM maps do require special operational procedures, which should be performed immediately after an SSLABEL run (refer to the definition of SM map earlier in this section).

When SSLABEL is run to change the assignment of a cartridge, the update sequence consists of a series of steps to delete the old assignment information from the MSAS system files, relabel the cartridge, and add the new assignment information to the MSAS system files. If an interruption such as a system failure, SSLABEL abort, or SSEXEC abort prevents SSLABEL from completing the update sequence, the location of the affected cartridge and the status of the SM maps and 7990 catalogs depend on the point of interruption, as follows:

- If the cartridge label, 7990 catalog, and SM map do not all match, then the cartridge is put into the exit tray. The OP=RC directive cannot be used to restore the cartridge because of the inconsistency. However, OP=FX can be used to overwrite the cartridge label and add the cartridge to the pool, if the FM and SB parameters specify the family and the subfamily on the cartridge label.
- If the cartridge label, 7990 catalog, and SM map do match, then the cartridge may be returned to its original location, the new location, or the exit tray, depending on the exact point of interruption. If the cartridge is in the input tray, OP=RC can be used to restore the cartridge to the location indicated on the cartridge label.

Cartridge Restoration and Reuse, later in this section, describes the procedure for restoring cartridges found in the exit tray.

#### **Restrictions to SSLABEL**

The following restrictions apply to the SSLABEL utility.

- SSEXEC must be running when SSLABEL is run.
- Only one copy of SSLABEL can be run at a time.
- SSLABEL, SSVAL, and SSDEBUG cannot be run at the same time.

#### Example

The following output shows the format of an SSLABEL report. The cartridge label information is included on the report because of a mismatch with the SM map. An error message is issued for the first directive on the command (in this case, the only directive).

SSLABEL REPORT FILE

SSLABEL,Z./OP=RC,PK=D,SM=B.

- 1 OP=RC,PK=D,SM=B.
- 1 OP=RC,PK=D,SM=B.

```
CM=A-

CSN = 66157234

FAMILY = SYSTST

SUBFAMILY = 0

SM = B

Y = 2

Z = 6

*** ERROR 8 DIRECTIVE 1

UNEXPECTED SM, Y, Z, FAMILY OR SUBFAM.***
```

# SSMOVE

SSMOVE manages disk and 7990 residence. That is, SSMOVE determines which files should be left on disk, which files should be released from disk and moved to 7990, and which files should be resident both on disk and on 7990.

The selection process includes algorithms that weigh certain file characteristics, as follows:

- Files are selected for destaging to 7990 based on file length, time since the last update, and the preferred residence specified by the user.
- Files are selected for release from disk based on time since the last access and the backup requirement specified by the user.

SSMOVE reads the PFC entries for a particular family and calculates release and destage values (refer to Selection Algorithms later in this section) for each file to determine its residence. If a file has both disk and 7990 images but is to reside only on 7990, SSMOVE releases the disk space for the file. For files that do not have a 7990 image, SSMOVE creates entries on the SSMOVE/SSEXEC communication file, MV0COM, to identify the files to be destaged and to specify whether or not the file's disk space is to be released upon completion of the destage. SSEXEC then processes each destage and destage/release request on MV0COM.

SSMOVE generates an output report that includes a list of input directives to SSMOVE, site-defined values used in the destage/release decision-making process, files selected for processing, and a summary of the number of files expected to reside on each device after destage/release processing. The format of the SSMOVE command is:

 $ssmove, p_1, p_2, \ldots, p_n$ .

| <sup>p</sup> i | Description                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------------------|
| DN=device      | Device number of the only disk from which files are to be destaged/released.                                 |
| DN             | SSMOVE destages and releases files from all devices in a specified family.                                   |
| DN omitted     | Same as DN.                                                                                                  |
| FM=familyname  | Family to be used by SSMOVE.                                                                                 |
| FM             | Same as FM=system default family.                                                                            |
| FM omitted     | Same as FM=system default family.                                                                            |
| I=filename     | File containing the directives to SSMOVE.                                                                    |
| I              | Same as I=INPUT.                                                                                             |
| I=0            | No input directives file exists. SSMOVE uses the default parameters.                                         |
| I omitted      | Same as I=INPUT.                                                                                             |
| L=filename     | File on which listable output is to be written.                                                              |
| L              | Same as L=OUTPUT.                                                                                            |
| L=0            | No output file is to be generated.                                                                           |
| L omitted      | Same as L=OUTPUT.                                                                                            |
| LB=n           | Large file boundary is used when sorting files for destaging. All files smaller than n PRUs are small files. |
| LB             | Same as LB=365.                                                                                              |
| LB omitted     | Same as LB=365.                                                                                              |
| LO=F           | All files selected for staging, destaging, or releasing are to be included in the report file.               |
| LO=P           | Only files actually processed are listed in the report file. Refer to the PX parameter.                      |
| LO             | Individual files are not to be listed in the report file.                                                    |
| LO omitted     | Same as LO.                                                                                                  |

| <sup>p</sup> i | Description                                                                                   |                                                                                                                                                             |  |
|----------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| NW             | No wait. SSM<br>processing by                                                                 | OVE will not wait for completion of destage and release SSEXEC.                                                                                             |  |
| NW omitted     | SSMOVE will was ssexec.                                                                       | ait for completion of destage and release processing by                                                                                                     |  |
| PX=xxx         | xxx is a character string that specifies which types of SSMOVE processing should not be done. |                                                                                                                                                             |  |
|                | xxx                                                                                           | Description                                                                                                                                                 |  |
|                | Α                                                                                             | Exclude file archiving or releasing disk space.                                                                                                             |  |
|                | В                                                                                             | Exclude creating a backup copy by destaging a file from disk to the 7990.                                                                                   |  |
|                | D                                                                                             | Exclude direct access files.                                                                                                                                |  |
|                | F                                                                                             | Exclude freeing a file from the 7990 by clearing its asa value from the file's PFC entry.                                                                   |  |
|                | I                                                                                             | Exclude indirect access files.                                                                                                                              |  |
|                | S                                                                                             | Exclude staging a file from the 7990 to disk.                                                                                                               |  |
|                | of the results                                                                                | the PX=ABFS parameter could be used to obtain a report<br>s of an SSMOVE run using a given set of parameters<br>lly performing any of the selected actions. |  |
| РХ             | All selected                                                                                  | SSMOVE processing is to be done.                                                                                                                            |  |
| PX omitted     | Same as PX.                                                                                   |                                                                                                                                                             |  |
| UI=userindex   | Destage and re<br>index userinde                                                              | elease processing is restricted to files having user ex.                                                                                                    |  |
| UI             | All user inde:                                                                                | xes are processed.                                                                                                                                          |  |
| U I=0          | All user inde:                                                                                | xes are processed.                                                                                                                                          |  |
| UI omitted     | All user inde:                                                                                | xes are processed.                                                                                                                                          |  |

# **SSMOVE** Directives

The directives to SSMOVE are specified on a separate file. Each directive must be specified on a separate line. Three types of input directives can be included in an SSMOVE directive file. They are: comment directives, specific file directives, and value specifier directives.

Comment directives have an asterisk (\*) in the first column followed by any message or comment the user wishes to enter.

The specific file and value specifier directives are described in the following paragraphs.

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## Specific File (SF) Directives

SSMOVE uses SF directives to select a given file or set of files on which to perform the specified processing action. The format of the SF directive is:

SF,FN=filename,UI=userindex,PO=process.

| Parameter           |                                                                                         | Description                                                                               |  |  |
|---------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--|--|
| FN=filename         |                                                                                         | cters that specify a permanent file or set of<br>Asterisks in the file name are wild card |  |  |
| <b>UI=userindex</b> | User index of the file specified by the FN=filename parameter.                          |                                                                                           |  |  |
| P0=process          | Processing action to be performed on the file specified by the $FN=filename$ parameter. |                                                                                           |  |  |
|                     | process                                                                                 | Description                                                                               |  |  |
|                     | A                                                                                       | Archive the specified file.                                                               |  |  |
|                     | В                                                                                       | Create a backup copy by destaging the specified file from disk to the 7990.               |  |  |
|                     | F                                                                                       | Free the specified file from the 7990 by clearing its asa value in the file's PFC entry.  |  |  |
|                     | S                                                                                       | Stage the specified file from the 7990 to disk.                                           |  |  |

For example, the following SF directive selects all permanent files with a 2-character permanent filename beginning with Z from user index 0026228 to be staged to disk.

SF,FN=Z\*,UI=2622,PO=S.

The SF directive can be used without specifying the FN parameter to establish default values for the UI and/or PO parameters. These default values will be used for subsequent SF, FN=filename directives that are missing UI and/or PO parameters. Default values for UI and/or PO parameters can be redefined by using another SF directive without specifying the FN parameter.

## Value Specifier Directives

SSMOVE uses the value specifier directives to redefine the values of the weight factors or thresholds (installation parameters) used in the algorithms that select files to be destaged or released. The site analyst uses these value specifiers to increase or decrease the importance of certain file characteristics used to determine which files are to be destaged and/or released. For example, specifying a large MN parameter prohibits SSMOVE from selecting small files for destage/release processing.

# The general format of a value specifier directive statement is:

directive,qualifier(s),parameter(s).

| directive | Description                                            |  |  |  |  |
|-----------|--------------------------------------------------------|--|--|--|--|
|           | Enter a 2-character value specifier directive keyword. |  |  |  |  |
| BR        | Keyword for backup requirement directive.              |  |  |  |  |
| FR        | Keyword for file requirement directive.                |  |  |  |  |
| PR        | Keyword for preferred residence directive.             |  |  |  |  |
| SM        | Keyword for site management directive.                 |  |  |  |  |
| WA        | Keyword for weight adder directive.                    |  |  |  |  |
| WM        | Keyword for weight multiplier directive.               |  |  |  |  |

#### qualifier(s)

## Description

Enter one or more qualifier keywords that specify the file type (direct/indirect access) and decision type (destage/release) to be used in the selection process. If all qualifier keywords are omitted, all four combinations of file types and decision types are used in the selection process.

IA Keyword for indirect access files.

DA Keyword for direct access files.

DS Keyword for destage decisions.

RL Keyword for release decisions.

#### parameter(s)

#### Description

Enter a parameter keyword and a value (positive integer) for the specified directive keyword. Multiple parameter=value combinations can be entered in the same value specifier directive statement.

#### BR Directive Parameters

| τ. | aı | a | шç | • | C. | L | Э |
|----|----|---|----|---|----|---|---|
| _  | _  | _ | _  | _ | -  | - |   |

| N=wf  | wf is the weight factor to be used as the backup requirement value for decisions involving files with a BR=N attribute (no backup).†            |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Y=wf  | wf is the weight factor to be used as the backup requirement value for decisions involving files with a BR=Y attribute (tape backup). $\dagger$ |
| MD=wf | wf is the weight factor to be used as the backup requirement value                                                                              |

for decisions involving files with a BR=MD attribute (media dependent, tape, or 7990 backup).†

<sup>†</sup>The file owner specifies the backup requirement attribute using the BR parameter on the DEFINE or CHANGE command (refer to the NOS 2 Reference Set, Volume 3).

:

parameter(s)

# Description

| parameter (8)              |                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FR Directive<br>Parameters |                                                                                                                                                                                                                                                                                                                                                              |
| MN=min                     | min is the minimum file size in PRUs.                                                                                                                                                                                                                                                                                                                        |
| MX=max                     | max is the maximum file size in PRUs.                                                                                                                                                                                                                                                                                                                        |
| DD=dd                      | dd is the number of days since the file was last accessed or updated.                                                                                                                                                                                                                                                                                        |
| TH=th                      | th is the destage or release threshold. If a file's calculated value<br>is less than the specified threshold, the file is not a candidate for<br>destage or release processing. TH=0 allows all files to be candi-<br>dates for destage and release processing unless they are excluded by<br>FR directive parameters or by other run-time parameter values. |
| PR Directive<br>Parameters |                                                                                                                                                                                                                                                                                                                                                              |
| L=wf                       | wf is the weight factor to be used as the preferred residence value<br>for decisions involving files with a PR=L attribute (locked to disk<br>preference).†                                                                                                                                                                                                  |
| D=wf                       | wf is the weight factor to be used as the preferred residence value<br>for decisions involving files with a PR=D attribute (disk<br>preference).†                                                                                                                                                                                                            |
| M=wf                       | wf is the weight factor to be used as the preferred residence value<br>for decisions involving files with a PR=M attribute (7990<br>preference).†                                                                                                                                                                                                            |
| N=wf                       | wf is the weight factor to be used as the preferred residence value for decisions involving files with a PR=N attribute (no preference).†                                                                                                                                                                                                                    |
| SM Directive<br>Parameters |                                                                                                                                                                                                                                                                                                                                                              |
| MG=mg                      | mg is the master goal specifying the percent of master device disk space not to be exceeded.                                                                                                                                                                                                                                                                 |
| SG=sg                      | sg is the secondary goal specifying the percent of secondary device disk space not to be exceeded.                                                                                                                                                                                                                                                           |
| P1                         | Available for site use.                                                                                                                                                                                                                                                                                                                                      |
| P2                         | Available for site use.                                                                                                                                                                                                                                                                                                                                      |
| WA Directive<br>Parameters |                                                                                                                                                                                                                                                                                                                                                              |
| AG=wa                      | wa is the weight adder to be added to the weighted file age.                                                                                                                                                                                                                                                                                                 |
| LN=wa                      | wa is the weight adder to be added to the weighted file length.                                                                                                                                                                                                                                                                                              |
| AC=wa                      | wa is the weight adder to be added to the weighted file access count.                                                                                                                                                                                                                                                                                        |
| DV=sf                      | sf is the scaling factor given to the divisor when calculating destage and release values.                                                                                                                                                                                                                                                                   |
|                            |                                                                                                                                                                                                                                                                                                                                                              |

<sup>&</sup>lt;sup>†</sup>The file owner specifies the preferred residence attribute using the PR parameter on the DEFINE or CHANGE command (refer to the NOS 2 Reference Set, Volume 3).

## parameter(s)

#### Description

WM Directive Parameters

AG=wf wf is the weight factor given to the file age (days since the file was last accessed or updated).

LN=wf wf is the weight factor given to the file length.

AC=wf wf is the weight factor given to the file access count.

For example, the following value specifier directive specifies that the minimum size for an indirect access file to be destaged is three disk PRUs.

FR, IA, DS, MN=3.

The following value specifier directive requires that all files to be destaged or released must be less than 98765 PRUs long.

FR, MX=98765.

If a directive error is detected on the directive input file, SSMOVE ignores the incorrect directive and continues to run in report mode. A message is issued to the job dayfile and no processing is done.

#### Excluding Destage/Release Processing

SSMOVE uses FR directives to select candidates for destage and release processing. After selecting the candidates and making the final processing decisions, SSMOVE checks the PX parameter to determine if any processing should be excluded.

If FR,RL,MN=99999999 is specified, all files less than 9999999 PRUs will be given a negative release value. Any file less than 9999999 PRUs will not be released unless the file has been specifically selected for releasing with an SF directive.

IF PX=A is specified, SSMOVE selects files for processing without considering that release processing is prohibited. When the final processing decisions have been made, any files selected for releasing will not be processed. That is, files selected for releasing only will not be processed; and files selected for both destaging and releasing will not be processed.

If PX=B is specified, destage processing is excluded just as release processing was in the previous description.

Destaging cannot be excluded with an FR,DS,MN=99999999 directive as releasing can. Even though all files less than 9999999 PRUs will be given a negative destage value and not selected for destaging, they will be made candidates for destaging in case any of them are selected for releasing. When the final processing decisions are made, any file that is a candidate for destaging and has been selected for releasing will be destaged and released. However, any destaging candidate not selected for releasing will not be destaged.

#### **Selection Algorithms**

SSMOVE determines which files to destage and/or release according to the following algorithms. Files that reside only on 7990 are not considered because they have been destaged and released previously. For all other files, SSMOVE checks the file length and excludes from further consideration any file whose length in PRUs is less than the minimum length threshold (refer back to the MN parameter) or greater than the maximum length threshold (refer back to the MX parameter).

If the current image of the file resides on both disk and 7990, SSMOVE uses the release algorithm to determine whether or not to release disk space; the destage algorithm is not used. If the current file resides on disk only, SSMOVE uses the destage algorithm to determine whether or not to destage the file. If the file is to be destaged to 7990, SSMOVE also determines via the release algorithm whether or not to release the file's disk space.

# Destage and Release Algorithms

An analyst uses the FR directive to establish file requirements on files that are to be eligible for destage and/or release processing. These requirements include file length (minimum and maximum) and file age. A file's age is the number of days since the file was last updated (for destaging) or accessed (for releasing). Separate requirements can be established for the various combinations of file types (direct/indirect) and decision types (destage/release).

Files that meet the eligibility requirements are assigned separate destage and release values. SSMOVE calculates these values for each eligible file according to the following equation, which considers various file attributes from the file's PFC entry (length, age, access count, preferred residence, and backup requirements). These file attributes are weighted according to site-defined values (refer to Value Specifier Directives earlier in this section).

| value = $\frac{(a_1+a_2*1e_1)}{(a_1+a_2*1e_1)}$ | ngth)*(b1+b2*age)*(res)*(bkup)                                                                                                                                                    |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | $(c_1+c_2*access)*sf$                                                                                                                                                             |
| Variable                                        | Description                                                                                                                                                                       |
| al                                              | Site-defined length weight adder specified by the LN parameter of the WA directive.                                                                                               |
| a2                                              | Site-defined length weight factor specified by the LN parameter of the WM directive.                                                                                              |
| length                                          | Length of the file in PRUs.                                                                                                                                                       |
| ъ1                                              | Site-defined age weight adder specified by the AG parameter of the WA directive.                                                                                                  |
| b2                                              | Site-defined age weight factor specified by the AG parameter of the WM directive.                                                                                                 |
| age                                             | Number of days since the file was last updated (for destage) or accessed (for release).                                                                                           |
| res                                             | Site-defined preferred residence weight factor specified by the PR directive. The PR directive parameter depends on which preferred residence attribute the file owner specified. |

| Variable       | Description                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bkup           | Site-defined backup requirement weight factor specified by the BR<br>directive. The BR directive parameter depends on which backup<br>requirement attribute the file owner specified. |
| cl             | Site-defined access count weight adder specified by the AC parameter of the WA directive.                                                                                             |
| c <sub>2</sub> | Site-defined access count weight factor specified by the AC parameter of the WM directive.                                                                                            |
| access         | Number of times the file was accessed.                                                                                                                                                |
| sf             | Site-defined scaling factor specified by the DV parameter of the WA directive.                                                                                                        |

If a file's destage/release value exceeds a site-defined threshold (TH parameter of the FR directive), the file is selected for destage/release processing. Conversely, if the file's destage/release value does not exceed the threshold, the file is not considered for destage/release processing.

Files eligible for releasing are sorted according to their release values. The files on each disk with the greatest release values are selected to be released. When enough files have been selected and released, the site-defined disk space availability goals will be achieved.

#### Decision Algorithm Hierarchy

Several different functions of SSMOVE can lead to apparent contradictory processing decisions. The decisions are made using the following rules, which are listed in order of precedence.

- SSMOVE does not consider any files for processing if they are excluded by the PX=I, PX=D, or UI parameters to SSMOVE or if the file has a PR=L attribute.
- Files identified for specific processing using the SF directive are selected for the specified processing regardless of the file requirements controlled by the FR directive.
- 3. If DN=0, all files that meet the destage requirements are selected to be destaged. Otherwise, only files on the specified device are destaged.
- 4. No file with a BR=Y attribute will be selected to be released (including files specified for processing with an SF directive) if the file data has not been included in a full or incremental dump using PFDUMP.
- 5. If DN=0, all files that meet the release requirements are selected to be released, if needed, to meet the disk space availability goals. Otherwise, only files on the specified device are released.
- 6. If a file is selected for a specific processing action (such as destage) and the corresponding action is precluded by a PX parameter (in this case, PX=B), then the selected action is not performed. In all cases, however, the SSMOVE device status report is based on which files were selected for processing rather than whether the PX parameter actually allowed the selected processing to occur.

#### **Disk Space/Dump Tape Management**

As more disk-resident files are created and more 7990-resident files are staged to disk, it will be necessary to monitor the availability of disk space. It is recommended that SSMOVE be used as a periodic disk space management procedure to avoid frequent disk-full conditions (refer to Disk Space Management later in this section). SSMOVE can also be used to reduce the amount of data written on dump tapes and thereby avoid maintaining large numbers of dump tapes. This is accomplished by destaging to 7990 and/or releasing disk space of files that need not be on the dump tape (refer to Dump Tape Management later in this section).

An analyst can specify what percent of disk space is to contain indirect access files and what percent is to contain direct access files. For direct access files, the analyst can further specify the percent of master device and/or secondary device disk space. These percent values are applied to all devices in the family on which SSMOVE is run or a specific device can be managed by using the DN parameter to SSMOVE. The specified percentages of disk space are considered to be goals in that other site-defined constraints and file-busy conditions may make it impossible to achieve these goals.

# **Restrictions to SSMOVE**

Only one copy of SSMOVE per family can be run at a time. A second SSMOVE aborts if the first one has not completed.

SSMOVE and PFDUMP should not be run at the same time. The concurrent execution of PFDUMP and SSMOVE to destage files may result in errors in the PFC entries.

#### **Output Example**

The SSMOVE report consists of the following five sections.

- A list of directives from the input directive file plus any diagnostic messages.
- A list of run-time parameter values used in the release and destage decision-making process. These values consist of the site-defined, assembly-time values as modified by the value specifier directives.
- An optional list of the files selected for processing. This list shows the file name, file type, user index, length, date, access count, processing action, and destage and release values.
- A device status report that includes a summary of the number of files and total file length expected to reside on each device as a result of release processing. Also, a subfamily report that includes a summary (for each subfamily) of the number of files and file length for files to be destaged, files that reside only on 7990, and files that reside on 7990 and disk.
- A destage abandonment report that is not produced if the NW parameter is specified. This report provides a list of the number of files not destaged and an optional list of the abandoned files. It also provides an updated device status report reflecting only the files that were destaged.

yy/mm/dd. hh.mm.ss. PAGE 1

SSMOVE REPORT.

SSMOVE, I=BIGO, LO=F, FM=MTST.

1 FR,MN=0,DD=0. 2 SM,MG=0,SG=0.

(Continued)

|                | yy/mm/dd. | hh.mm.ss. | PAGE | 2 |
|----------------|-----------|-----------|------|---|
| SSMOVE REPORT. |           |           |      |   |

# RUN-TIME PARAMETER VALUES

.

| * D E S | TAGE*    | * R E L | E A S E * |
|---------|----------|---------|-----------|
| DIRECT  | INDIRECT | DIRECT  | INDIRECT  |

FILE REQUIREMENTS

| FR        | MN<br>MX<br>DD<br>TH | 0<br>99999999<br>0<br>1 | 0<br>99999999<br>0<br>1 | 0<br>99999999<br>0<br>1 | 0<br>9999999<br>0<br>1 |
|-----------|----------------------|-------------------------|-------------------------|-------------------------|------------------------|
| WEIGHT M  | ULTI                 | PLIER                   |                         |                         |                        |
| <b>WM</b> | AG<br>LN<br>AC       | 1<br>1<br>1             | 1<br>1<br>1             | 100<br>1<br>1           | 100<br>1<br>1          |
| WEIGHT A  | DDER                 |                         |                         |                         |                        |
| WA        | AG<br>LN<br>AC<br>DV | 1<br>1<br>1             | 1<br>1<br>1             | 1<br>1000<br>1<br>1000  | 1<br>1000<br>1<br>1000 |
| PREFERRE  | DRE                  | SIDENCE                 |                         |                         |                        |
| PR        | L<br>D<br>M          | 0<br>1<br>1<br>1        | 0<br>1<br>1<br>1        | 0<br>1<br>100<br>10     | 0<br>1<br>100<br>10    |
| BACKUP R  | EQUI                 | REMENT                  |                         |                         | •                      |
| BR        | N<br>Y<br>MD         | 1<br>1<br>5             | 1<br>1<br>5             | 1<br>1<br>1             | 1<br>1<br>1            |
| SITE MAN  | AGEMI                | ENT                     |                         |                         |                        |
| SM        | MG<br>SG<br>P1<br>P2 | 0<br>0<br>0             | 0<br>0<br>0<br>0        | 0<br>0<br>0<br>0        | 0<br>0<br>0<br>0       |

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SSMOVE REPORT.

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| NAME     | TYPE | UI | LENGTH | DATE     | ACC-CT | ACTION(* = NOT DONE PER *PX* OPTION) | DES-VAL | REL-VAL |
|----------|------|----|--------|----------|--------|--------------------------------------|---------|---------|
| DIR301   | DIR. | 30 | 1200   | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR305   | DIR. | 30 | 1200   | 84.09.11 | ō      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR302   | DIR. | 30 | 1200   | 84.09.11 | ō      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR303   | DIR. | 30 | 1200   | 84.09.11 | ō      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR304   | DIR. | 30 | 1200   | 84.09.11 | ō      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| IND3020  |      | 30 | 619    | 84.09.11 | ŏ      | DESTAGE AND RELEASE.                 | 3100    | 16190   |
| IND 3019 |      | 30 | 618    | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 3095    | 16180   |
| IND3018  |      | 30 | 617    | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 3090    | 16170   |
| IND3017  |      | 30 | 616    | 84.09.11 | Ó      | DESTAGE AND RELEASE.                 | 3085    | 16160   |
| IND3016  |      | 30 | 615    | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 3080    | 16150   |
| IND3015  |      | 30 | 614    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3075    | 16140   |
| IND3014  |      | 30 | 613    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3070    | 16130   |
| IND3013  |      | 30 | 612    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3065    | 16120   |
| IND3012  |      | 30 | 611    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3060    | 16110   |
| IND3011  | IND. | 30 | 610    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3055    | 16100   |
| IND3010  |      | 30 | 609    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3050    | 16090   |
| IND309   | IND. | 30 | 608    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3045    | 16080   |
| IND308   | IND. | 30 | 607    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3040    | 16070   |
| IND307   | IND. | 30 | 606    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3035    | 16060   |
| IND306   | IND. | 30 | 605    | 84.09.11 | ō      | DESTAGE AND RELEASE.                 | 3030    | 16050   |
| IND305   | IND. | 30 | 604    | 84.09.11 | ō      | DESTAGE AND RELEASE.                 | 3025    | 16040   |
| IND304   | IND. | 30 | 603    | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 3020    | 16030   |
| IND303   | IND. | 30 | 602    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3015    | 16020   |
| IND302   | IND. | 30 | 601    | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 3010    | 16010   |
| IND301   | IND. | 30 | 600    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3005    | 16000   |
| DIR313   | DIR. | 31 | 1200   | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR314   | DIR. | 31 | 1200   | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR312   | DIR. | 31 | 1200   | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR315   | DIR. | 31 | 1200   | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| DIR311   | DIR. | 31 | 1200   | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 6005    | 22000   |
| IND3120  | IND. | 31 | 619    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3100    | 16190   |
| IND3119  |      | 31 | 618    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3095    | 16180   |
| IND3118  | IND. | 31 | 617    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3090    | 16170   |
| IND3117  |      | 31 | 616    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3085    | 16160   |
| IND3116  |      | 31 | 615    | 84.09.11 | Ō      | DESTAGE AND RELEASE.                 | 3080    | 16150   |
| IND3115  |      | 31 | 614    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3075    | 16140   |
| IND3114  |      | 31 | 613    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3070    | 16130   |
| IND3113  |      | 31 | 612    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3065    | 16120   |
| IND3112  |      | 31 | 611    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3060    | 16110   |
| IND3111  |      | 31 | 610    | 84.09.11 | 0      | DESTAGE AND RELEASE.                 | 3055    | 16100   |
|          |      |    |        |          |        |                                      |         |         |

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| SSM | OVE | REPORT | •    |          | y:     | /mm/dd. | hh.mm.ss. | PAGE | 6     |       |
|-----|-----|--------|------|----------|--------|---------|-----------|------|-------|-------|
|     |     |        |      | (BEFORE) | DEVICE | STATUS  | (AFTER)   | PER  | CENTS |       |
| E0  | DN  | DT-N   | TYPE | FILES /  | PRU    | FILES   | / PRU     | EXP. | GOAL  | FLAG. |
| 2   | 7   | DK-1   | IND. | 62       | 36952  | 0       | 0         | 0    | 0     |       |
| S   | 7   | DK-1   | DIR. | 23       | 25424  | 9       | 1008      | 1    | 0     | **    |

\*\* - DEVICE SPACE GOAL NOT MET

# SUBFAMILY REPORT

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|        |        | FILES TO | DESTAGE |       | FILES ONLY ON 7990 |       |        |       | FILES ON 7990 |       |        |       |
|--------|--------|----------|---------|-------|--------------------|-------|--------|-------|---------------|-------|--------|-------|
| SUB    | DIRE   | CT       | INDIF   | ECT   | DIF                | RECT  | INDIR  | RECT  | DIR           | RECT  | INDIR  | ECT   |
| FAMILY | NUMBER | PRU      | NUMBER  | PRU   | NUMBER             | PRU   | NUMBER | PRU   | NUMBER        | PRU   | NUMBER | PRU   |
| 0      | 5      | 6000     | 20      | 12190 | 38                 | 6363  | 20     | 12190 | 38            | 6363  | 20     | 12190 |
| 1      | 5      | 6000     | 20      | 12190 | 37                 | 6352  | 20     | 12190 | 37            | 6352  | 20     | 12190 |
| 2      | 0      | 0        | 2       | 1201  | 37                 | 10357 | 2      | 1201  | 37            | 10357 | 2      | 1201  |
| 3      | 0      | 0        | 0       | 0     | 42                 | 12362 | 5      | 3010  | 42            | 12362 | 5      | 3010  |
| 4      | 0      | 0        | 0       | 0     | 37                 | 6357  | 5      | 3010  | 37            | 6357  | 5      | 3010  |
| 5      | 0      | 0        | 0       | 0     | 37                 | 6357  | 5      | 3010  | 37            | 6357  | 5      | 3010  |
| 6      | 0      | 0        | 1       | 3050  | 19                 | 27915 | 69     | 56298 | 19            | 27919 | 69     | 56298 |
| 7      | 0      | 0        | 0       | 0     | 0                  | 0     | 0      | 0     | 0             | 0     | 0      | 0     |

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FILENAME

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|-----------|-----------|------|
|-----------|-----------|------|

7

# DESTAGE ABANDONMENT REPORT

UI

CODE

|    |    | CODE | F    | ILES              | R                       | EASON     |         |     |          |      |       |       |
|----|----|------|------|-------------------|-------------------------|-----------|---------|-----|----------|------|-------|-------|
|    |    | 1    |      | 0                 | NO                      | SPACE     |         |     |          |      |       |       |
|    |    | 2    |      | 0                 | NO                      | STORAGE I | ODULE A | VA: | LABLE    |      |       |       |
|    |    | 3    |      | 0                 | NO                      | CARTRIDG  | OR GRO  | UP  | AVAILABL | E    |       |       |
|    |    | 4    |      | Ō                 | FIL                     | E ALREAD  | DESTAG  | ED  |          |      |       |       |
|    |    | 5    |      | Ō                 | FILE BUSY / PFM PROBLEM |           |         |     |          |      |       |       |
|    |    | 6    |      | õ                 | CATALOG ACCESS ERROR    |           |         |     |          |      |       |       |
|    |    | 7    |      | 0                 | OVERFLOW NOT LEGAL      |           |         |     |          |      |       |       |
|    |    | 8    |      | ō                 |                         |           |         |     |          |      |       |       |
|    |    | 9    |      | 0 DISK READ ERROR |                         |           |         |     |          |      |       |       |
|    |    | 10   |      | 0 CARTRIDGE LOST  |                         |           |         |     |          |      |       |       |
|    |    | 11   |      | Ó                 |                         | SED DEST  |         |     |          |      |       |       |
|    |    |      |      | (BEFOF            |                         | DEVICE    |         |     | (AFTER)  | PER  | CENTS |       |
|    |    |      |      |                   |                         |           |         |     |          |      |       |       |
| E0 | DN | DT-N | TYPE | FILES             | 1                       | PRU       | FILES   | 1   | PRU      | EXP. | GOAL  | FLAG. |
| 2  | 7  | DK-1 | IND. | 62                |                         | 36952     | 0       |     | 0        | 0    | 0     |       |
| 2  | 7  | DK-1 | DIR. | 23                |                         | 25424     | 9       |     | 1008     | 1    | 0     | **    |

\*\* - DEVICE SPACE GOAL NOT MET

## SUBFAMILY REPORT

| FILES NOT DESTAGED |        |     |        |     | FILES ONLY ON 7990 |       |        |       | FILES ON 7990   |       |        |       |
|--------------------|--------|-----|--------|-----|--------------------|-------|--------|-------|-----------------|-------|--------|-------|
| SUB                | DIREC  | т   | INDIRE | ст  | DIR                | ECT   | INDIR  | ECT   | DIRECT INDIRECT |       |        |       |
| FAMILY             | NUMBER | PRU | NUMBER | PRU | NUMBER             | PRU   | NUMBER | PRU   | NUMBER          | PRU   | NUMBER | PRU   |
| 0                  | 0      | 0   | 0      | 0   | 38                 | 6363  | 20     | 12190 | 38              | 6363  | 20     | 12190 |
| 1                  | 0      | 0   | 0      | 0   | 37                 | 6352  | 20     | 12190 | 37              | 6352  | 20     | 12190 |
| 2                  | 0      | 0   | 0      | 0   | 37                 | 10357 | 2      | 1201  | 37              | 10357 | 2      | 1201  |
| 3                  | 0      | 0   | 0      | 0   | 42                 | 12362 | 5      | 3010  | 42              | 12362 | 5      | 3010  |
| 4                  | 0      | 0   | 0      | 0   | 37                 | 6357  | 5      | 3010  | 37              | 6357  | 5      | 3010  |
| 5                  | 0      | 0   | 0      | 0   | 37                 | 6357  | 5      | 3010  | 37              | 6357  | 5      | 3010  |
| 6                  | 0      | 0   | 0      | 0   | 19                 | 27915 | 69     | 56298 | 19              | 27919 | 69     | 56298 |
| 7                  | 0      | 0   | 0      | 0   | 0                  | 0     | 0      | 0     | 0               | 0     | 0      | 0     |

#### SSVAL

SSVAL either performs release processing or reports on problems with the current MSAS system files. When release processing, SSVAL makes 7990 space available that is presently allocated to files that are no longer needed, or flags files to be staged to disk in order to free up cartridges. When problem reporting, SSVAL reports on irregularities or discrepancies found in the current 7990 catalogs and PFC entries for the specified family and, optionally, in certain SM maps. The function to be performed is determined by whether or not the RF parameter is specified, as described next.

# NOTE

SSVAL updates the SM map for the specified SM. (Refer to the definition of SM map earlier in this section.) It is recommended that the SM map be copied on tape or on another device or family immediately after every update of the SM map.

The format of the SSVAL command is:

 $SSVAL, p_1, p_2, \ldots, p_n$ .

| P <sub>i</sub> | Description                                                                                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AM             | The SM map for the SM specified by the SM=id parameter is to be analyzed in addition to the 7990 catalogs; not valid if RF=filename or RF is specified.    |
| AM omitted     | SM maps are not to be analyzed.                                                                                                                            |
| FM=familyname  | Family to be analyzed; not valid if the RF parameter is specified.                                                                                         |
| FM             | Same as FM=system default family; not valid if the RF parameter is specified.                                                                              |
| FM omitted     | Same as FM=system default family if the RF parameter is not<br>specified. The family on the release data file is used if the RF<br>parameter is specified. |
| FX=n           | Error threshold. If the total error count is greater than n, neither release processing nor problem fixing is performed.                                   |
| FX             | Same as FX=0.                                                                                                                                              |
| FX omitted     | Same as $FX=0$ .                                                                                                                                           |
| L=filename     | File on which listable output is to be written.                                                                                                            |
| L              | Same as L=OUTPUT.                                                                                                                                          |
| L=0            | No output file is to be generated.                                                                                                                         |
| L omitted      | Same as L=OUTPUT.                                                                                                                                          |

## Description

| <sup>p</sup> i | Description                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF=filename    | File that contains the release data file.                                                                                                                      |
| RF             | Same as RF=ZZZZRDF.                                                                                                                                            |
| RF omitted     | Current versions of the 7990 catalogs are to be analyzed.                                                                                                      |
| RL             | Release processing is to be performed; valid only if the RF parameter is specified.                                                                            |
| RL omitted     | No release processing is to be performed.                                                                                                                      |
| SB=subfamily   | Subfamily to be processed. Up to eight subfamilies can be selected<br>by the numbers 0 through 7. For example, SB=723 selects subfamilies<br>2, 3, and 7.      |
| SB             | Same as SB=01234567.                                                                                                                                           |
| SB omitted     | Same as SB=01234567.                                                                                                                                           |
| SM=id          | SM identifier of the SM to be used. Up to 8 SMs can be selected by the letters A through H. For example, SM=ACG selects SM A, C, and G.                        |
| SM             | Same as SM=ABCDEFGH.                                                                                                                                           |
| SM omitted     | Same as SM=ABCDEFGH.                                                                                                                                           |
| ST=n           | Scattered file criterion. Files are indicated as scattered if they are contained on at least n more cartridges than the minimum number needed to contain them. |
| ST             | Same as ST=1. That is, files are scattered if they are contained on more than the minimum number of cartridges needed to contain them.                         |
| ST omitted     | Same as ST=1.                                                                                                                                                  |

#### **Release Processing**

If RF=filename or RF is specified, SSVAL determines which 7990 files are no longer needed and issues a request to SSEXEC to purge these files so their 7990 space can be reused. The procedure is for SSVAL to analyze copies of the 7990 catalogs and PFC entries for the specified family that are contained on the release data file (RDF) specified by the RF parameter. Those 7990 files described in a 7990 catalog but not having a PFC entry (that is, orphans) can be purged. During the analysis (refer to both 7990 Catalog Analysis and PFC Analysis later in this section), SSVAL keeps track of the error conditions it discovers, and if the error count is less than or equal to the threshold specified by the FX parameter, release processing is performed if RL is specified. That is, trouble-free orphans are purged and their 7990 space is made available for reuse. The current 7990 catalog is updated to reflect that these files no longer exist. A validation report is issued that lists the errors encountered, the number of trouble-free orphans, and the amount of released 7990 space. If RL is not specified, no release processing is performed but the validation report is issued, which lists the errors encountered, the number of trouble-free orphans, and the amount of releasable 7990 space.

The RDF used for this analysis is a file produced during a previous PFDUMP run and it contains versions of the 7990 catalogs and PFC entries that were current at the time of the dump. The site analyst chooses which RDF to use depending on how long after a file was purged he/she wants to wait before releasing 7990 space. For example, the site analyst might run SSVAL every week for release processing purposes and use the RDF from the previous week's full dump. There are some restrictions as to which RDFs can be used (refer to 7990 Space Management later in this section).

Unlike the purging of disk-only files, where the file space on disk is immediately made available for reassignment, the MSAS software will not immediately free up a permanent file's 7990 space following a purge of the associated disk copy of the permanent file (assuming both a 7990 and a disk permanent file image). The reason for not freeing up the subject 7990 space is that a subsequent PFLOAD, following a disk failure, could reload the PFC entry for the associated permanent file. Therefore, 7990 space for purged permanent files that were resident on the 7990 must not be made available for reuse until the possibility of such a recovery action cannot occur.

The site analyst determines which dump tapes can and cannot be used for reloading files and PFC entries following a disk failure. When a PFDUMP is taken, two files are normally produced: the actual dump file used with PFLOAD to perform a recovery, and the RDF file to be used with SSVAL to make 7990 space available after purging files.

Using an RDF file allows the corresponding dump tape to be used (later dump tapes are also allowable), but earlier dump tapes are not allowed. Because the MSAS software cannot control which dump tapes actually are used in reloading, it is the site analyst's responsibility to observe the above restriction.

The concurrent execution of PFDUMP with OP=S not specified and SSVAL with RL specified causes SSVAL to run very slowly. PFDUMP acquires and keeps the PF utility interlock for its duration, and this gives the appearance that SSVAL is hung, when it is actually just waiting. Therefore, operations personnel should not attempt to run both of these utilities with the above options at the same time.

If the RF parameter is not specified, SSVAL will set the free file flag for all files that totally or partially reside on all cartridges on which the free cartridge flag is set.

#### **Problem Reporting**

If RF=filename or RF is not specified, SSVAL reports on problems with the current 7990 catalogs and PFC entries for the specified family. If AM is specified, problems with SM maps are also included in the report. SSVAL examines the MSAS system files and PFC entries and searches for problem chains and fragments, problem asa values, and SM map/7990 catalog mismatches. The procedures SSVAL uses to detect and classify inconsistencies and discrepancies are described next, under Error Detection and Classification. SSVAL keeps track of the error conditions, if any, and if the error count is less than or equal to the threshold specified by the FX parameter, problem fixing is performed. That is, SSVAL sets flags in the appropriate entries of the SM map, 7990 catalog, and/or PFC entries to prevent propagation of errors due to the inconsistencies or discrepancies found and to permit error recovery by the SSDEBUG utility. A count of the errors is recorded in the job dayfile. A validation report is issued, which lists the errors encountered, the number of trouble-free orphans, and the amount of releasable 7990 space.

# NOTE

For release processing or problem fixing, SSVAL predicts what it expects to happen (if no problems occur) prior to doing the releasing or fixing. If SSVAL encounters problems, the reports may not reflect the actual status of the cartridges. In this case, run SSVAL in report mode following the release processing or problem fixing to verify the actual status of the 7990 catalogs and cartridges.

# **Error Detection and Classification**

SSVAL detects and classifies errors according to the following procedures. During the SM map analysis, SSVAL detects and classifies errors in the SM map. During the 7990 catalog analysis, SSVAL detects errors with chains of AUs; during the PFC analysis, SSVAL classifies these errors. Whenever an error is encountered, the total error count is increased by 1. The action taken for each type of error is discussed under Release Processing and Problem Fixing later in this section.

#### SM Map Analysis

If the AM option is specified, SSVAL attempts to locate problems with SM map entries by comparing the 7990 catalogs and the SM map. For each coordinate pair (y,z) in a 7990 catalog entry, SSVAL locates the corresponding SM map entry. A type l error exists if the code field in the SM map entry is not 5 (assigned to a subfamily), or if the family, subfamily, or csn fields in the SM map entry do not match those in the corresponding 7990 catalog entry. SSVAL also scans the SM map for all other entries assigned to the subfamily and reports as a type 2 error any of these entries that does not have a corresponding 7990 catalog entry.

## 7990 Catalog Analysis

The 7990 catalog analysis locates problems with chains of AUs (refer to the definition of cartridge earlier in this section) and identifies on each HOC whether any of the following problems exist or whether any part of the 7990 files resides on a cartridge that is lost or has excessive write parity errors.

SSVAL scans the 7990 catalog for HOC entries that are allocated and follows each chain until it terminates. Normal termination occurs with an EOC entry. Abnormal termination occurs when no EOC is found, an AU links to an unallocated AU, or an AU links to an AU previously found in the chain being followed (looping chain). During the chain scans, the following types of chains can be encountered; they are linkage problems that are identified on the HOC entry.

Chain

# Description

Intersecting More than one chain links to the same AU.

Scattered file The number of cartridges used for the file exceeds the value specified by the ST parameter.

SSVAL also locates any AUs that are allocated but were not on any chain being followed. Such AUs are linked together to form partial chains without an HOC. These partial chains are called fragments and the first AU in a fragment is designated as the start of fragment. Each fragment chain is followed until it terminates. The abnormal termination conditions previously listed can also occur with fragments. Intersections can occur, but a fragment chain that intersects the start of another fragment chain is not an intersection; rather, one is the tail end of the other.

#### PFC Analysis

The PFC analysis is performed to classify the errors encountered on chains during the 7990 catalog analysis. For each PFC entry with  $asa\neq 0$  (the file has a 7990 image and the asa value identifies the first AU in the chain containing the file), SSVAL classifies the following errors. Error type 3 exists if the asa value is invalid. Error type 4 exists for any of the following reasons.

- The AU specified by the asa value is not allocated or is not an HOC entry.
- The chain does not terminate normally.
- The chain intersects with another chain or fragment.
- More than one PFC entry points to the chain.
- The chain includes a cartridge for which the lost or excessive parity error flag is set.

SSVAL also classifies the following error conditions.

- Error type 5 exists if an orphan chain terminates abnormally or intersects with other chains or fragments. Trouble-free orphans (chains without a PFC entry pointing to them and without linkage problems) are not classified as errors.
- Error type 6 exists if an orphan is a fragment.
- Error type 7 exists if a chain or fragment points to an unallocated AU.

SSVAL generates informational report messages if either of the following conditions is true.

- The system error flag is set in the PFC.
- The read error flag is set in the PFC.

#### **Release Processing and Problem Fixing**

If the total error count calculated during the analyses described previously exceeds the value specified by the FX parameter, then neither release processing nor action to flag or fix the detected error conditions is performed. The validation report, however, is produced. Otherwise, action taken depends on the parameter specified and the type of errors found, as follows.

If SSVAL was run for release processing purposes (RF=filename or RF specified), SSVAL issues a request to SSEXEC to release trouble-free orphans if RL was specified. If RL was not specified, no release processing is performed. If SSVAL was run for problem reporting purposes (RF omitted and FX=n, where n is greater than the number of validation errors), the following action is taken.

- For error type 1, the linkage error flag is set in the 7990 catalog entry.
- For error type 2, the linkage error flag is set in the SM map entry.
- For error type 3, there are three alternatives:
  - If the file also has a disk image, the asa field in the PFC entry is cleared. Thus, the good disk image will not be released and the file is accessible even if the 7990 image cannot be retrieved.
  - If the file does not have a disk image, no action is taken.
  - However, if the disk image can be reloaded from tape, it is recommended that the file be reloaded using PFLOAD with OP=Z so that the asa field will be cleared.
- For error type 4, the action taken is both that taken for error type 3 and that taken for error type 5, 6, or 7.
- For error type 5, 6, or 7, the frozen flag is set in the 7990 catalog entry for the initial AU on the problem chain or fragment. This enables the problem chain/fragment/AU to be made available to the SSDEBUG utility, but prevents these AUs from being overwritten until then. Thus, the SSDEBUG utility can be used to inspect or save data from the corresponding AUs or cartridges. If the AUs are not allocated, the inhibit flag is also set in the 7990 catalog for that cartridge so that no new files will overwrite any data that might be on the cartridge.

## **Validation Report**

The validation report consists of a report heading and a series of report groups for each subfamily and SM being reported on. The heading identifies the subfamily, the SM, whether or not there are any problems, and the last purge date and time for the SM (the last time orphans on this SM were released). There is one report group for each error detected, and the actual information recorded in a report group depends on the type of error, as described next. Each report group, however, contains the following items.

- Error type (a number from 1 to 7).
- Identification (refer to the particular error type, described next).
- Chain information (7990 catalog ordinal, AU number, A or U designation for allocated or unallocated, H or E designation for HOC or EOC).
- Error description.

After the last report group, the validation report lists the number of trouble-free orphans, the amount of released or releasable 7990 space, the total number of errors detected, and whether or not the MSAS system files were updated.

#### Error Types 1 and 2

Error types 1 and 2 identify mismatches between the SM map and the 7990 catalog. In the validation report, the identification field lists the 7990 catalog ordinal, the y and z coordinates, and the csn of the cartridge in error. The chain field is blank because problem chains are not identified as either error type 1 or 2. The analyst should run the SSUSE utility to produce a detailed report of the appropriate SM map and 7990 catalog entries to determine the exact problem.

## Error Types 3 and 4

Error types 3 and 4 identify problem chains and problem as avalues. In the validation report, the identification field lists the permanent file name and user index of the affected file; the dump control date and time (from the PFC entry for the file) to identify the backup file, if any; and the letter N (no) or Y (yes) to indicate whether or not the file has a disk image. The chain field lists the 7990 catalog ordinal and volume number for all AUs in the affected chain. An A or U indicates whether each AU is allocated or unallocated, and an H or E identifies the HOC or EOC. An error description is printed for each error detected; one chain can have several errors.

# Error Types 5, 6, and 7

Error types 5, 6, and 7 identify problem orphans, fragments, and problem unallocated AUs. In the validation report, the information reported is the same as for error types 3 and 4, except for the identification field. Instead of the permanent file identification, the word ORPHAN (error type 5), FRAGMENT (error type 6), or UNALLOCATED (error type 7) is printed. Error type 7 is an unallocated AU that is pointed to by a chain or fragment. Each such AU is also reported with the chain for the corresponding orphan or fragment.

## Intersections

Intersections occur when more than one chain links to the same AU; they are classified as either error type 4 or 5. Thus, they are reported as explained previously. Intersections are also reported in a separate entry consisting of a heading and additional information identifying the 7990 catalog ordinals and AU numbers of the intersecting chains. Therefore, when intersections are reported, there are two entries for the affected subfamily and SM: one lists only the intersections and the other lists all the errors encountered.

#### Validation Report Example

The following output shows the format of a validation report. SSVAL was run for problem reporting purposes (RF not specified), and no errors were detected.

SSVAL - VALIDATION REPORT

FAMILY = SYSTST

SSVAL, FM=SYSTST, SB=0, SM=A.

L = OUTPUT RF = 0 AM = 0 SM = A FM = SYSTST FX = 0 RL = 0 SB = 0 ST = 0

SUBFAMILY = 0SM = A--GOOD--LPDT = \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*RELEASABLE 7990FILES=12RELEASABLE 7990AUS=800TOTAL VALIDATION ERRORS=0\*\*REPORT COMPLETE\*\*

# **Typical SSVAL Runs**

As described previously, SSVAL is run either to make 7990 space available for reuse or to report on problems with the current MSAS system files and/or PFC entries. The following examples show typical SSVAL runs that may be used periodically for these purposes.

# Example:

The following SSVAL command causes 7990 space to be made available for reuse.

#### SSVAL, RF=DUMP1, RL.

DUMP1 is the release data file produced by a previous PFDUMP run from which SSVAL can identify all the 7990 files that were orphans at the time of the dump. If no error conditions are detected in the 7990 catalog and PFC entries contained on file DUMP1 (FX=0 by default), the orphans are purged and the 7990 space assigned to them is released. The last purge date and time field in the subcatalog (in the 7990 catalog) for each SM for each subfamily is updated to the time of the SSVAL run if any file from that SM is purged. This is to ensure that a subsequent SSVAL run does not release the same space a second time, as the 7990 space may be reallocated to a new file. If errors were detected, they are listed on the validation report and release processing is not performed. This is indicated by the CATALOGS NOT MODIFIED message at the end of the validation report. The analyst can rerun SSVAL with the following command to ensure that release processing is performed (n is the number of errors detected during the previous SSVAL run).

SSVAL, RF=DUMP1, RL, FX=n.

After this SSVAL run has completed, an analysis of the current version of the SM map, 7990 catalog, and PFC entries should be made to determine whether or not the errors detected in the first SSVAL run exist in the current MSAS system files and PFC entries. This is accomplished using the command:

SSVAL,FM=familyname,AM.

familyname is that on the release data file, DUMPl.

Example:

Upon completion of any device reload that includes recovery of a 7990 catalog and/or SM map, SSVAL should be run to determine whether any SM map/7990 catalog mismatches exist. The following call accomplishes this.

SSVAL,FM=familyname,SB=n<sub>1</sub>,n<sub>2</sub>,...,n<sub>h</sub>,AM.

familyname is that for which recovery was done;  $n_1, n_2, \ldots, n_h$  are the affected subfamilies if just some of the devices of the family were reloaded.

SSVAL analyzes the SM map, 7990 catalog, and PFC entries for the subfamilies specified by the SB parameter and reports any discrepancies or inconsistencies. For example, if the recovery was not scheduled and SSLABEL was run to add or remove cartridges or cubicles from one of the affected subfamilies after the last incremental or full dump for these subfamilies, then the SM map will reflect the results of the SSLABEL run but the 7990 catalog will not. Such mismatches will be reported on the validation report.

If the following SSVAL command is then made, the errors detected during the previous run will be flagged, as described previously under Release Processing and Problem Fixing.

SSVAL,FM=familyname,SB=n1,n2,...,nh,AM,FX=n.

familyname and  $n_1, n_2, \ldots, n_h$  are the same as in the previous SSVAL run; n is the number of errors detected during the previous run. After investigating the cause of these errors, the analyst can run the SSDEBUG utility to correct the error conditions (refer to SSDEBUG later in this section).

If a device reload includes recovery of all SM maps (default family, user index= $377760_8$ ), the latest SM maps should be recovered from backup copies. Then each family that has 7990-resident files should be analyzed using the following command to detect SM map/7990 catalog mismatches.

SSVAL,FM=familyname,AM.

It is recommended that the previous SSVAL run be made periodically to check whether any unexpected error conditions exist. As the site analyst becomes more familiar with MSAS processing, these periodic SSVAL runs can be done less frequently.

# **Restrictions to SSVAL**

- Only one copy of SSVAL can be run at a time.
- SSVAL, SSLABEL, and SSDEBUG cannot be run at the same time.

# SSUSE

SSUSE reads data in the 7990 catalogs and SM maps and produces reports on the availability of space on 7990 cartridges and the allocation of cubicle space within an SM. The reports may not be completely up to date because the 7990 catalogs and SM maps can be updated while the reports are being generated.

The types of reports that SSUSE generates are:

| Report             | Description                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic usage report | Usage report that lists general information about the use of each SM in a subfamily.                                                                                                                                |
| Optional report A  | SM map report that lists the contents of an SM as described in the SM map.                                                                                                                                          |
| Optional report B  | Cartridge summary report that lists general status information<br>for each cartridge entry in the 7990 catalog. The report<br>identifies the available AUs and flags set for each cartridge<br>in the 7990 catalog. |
| Optional report C  | Detailed cartridge report that lists cartridge usage information for each cartridge entry in the 7990 catalog.                                                                                                      |
| Optional report D  | Detailed AU status report that lists AU status information for each entry in the 7990 catalog plus cartridge usage information.                                                                                     |

The format of the SSUSE command is:

 $SSUSE, p_1, p_2, \ldots, p_n$ .

| $\frac{p_{i}}{1}$ | Description                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------|
| CM=A-             | Cartridge manufacturer code is A-, indicating IBM.                                                                      |
| СМ                | Same as CM=A                                                                                                            |
| CM omitted        | Same as CM=A                                                                                                            |
| CN=csn            | Cartridge serial number of a specific cartridge. The CN=csn parameter is valid only if the OP=D parameter is specified. |
| CN                | Cartridge serial number is not specified.                                                                               |
| CN omitted        | Same as CN.                                                                                                             |
| FM=familyname     | Family to be reported on.                                                                                               |
| FM                | Same as FM=system default family.                                                                                       |
| FM omitted        | Same as FM=system default family.                                                                                       |

| <sup>p</sup> i | Description                                                                                                                                               |  |  |  |  |  |  |  |  |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
| L=filename     | File on which listable output is to be written.                                                                                                           |  |  |  |  |  |  |  |  |
| L              | Same as L=OUTPUT.                                                                                                                                         |  |  |  |  |  |  |  |  |
| L=0            | No output file is to be generated.                                                                                                                        |  |  |  |  |  |  |  |  |
| L omitted      | Same as L=OUTPUT.                                                                                                                                         |  |  |  |  |  |  |  |  |
| OP=op          | Type of report to be generated. Multiple options can be specified (for example, OP=AB).                                                                   |  |  |  |  |  |  |  |  |
|                | op Description                                                                                                                                            |  |  |  |  |  |  |  |  |
|                | A Optional report A and basic usage report.                                                                                                               |  |  |  |  |  |  |  |  |
|                | B Optional report B and basic usage report.                                                                                                               |  |  |  |  |  |  |  |  |
|                | C Optional report C and basic usage report.                                                                                                               |  |  |  |  |  |  |  |  |
|                | D Optional report D and basic usage report.                                                                                                               |  |  |  |  |  |  |  |  |
| OP             | Basic usage report only is to be generated.                                                                                                               |  |  |  |  |  |  |  |  |
| OP omitted     | Same as OP.                                                                                                                                               |  |  |  |  |  |  |  |  |
| SB=subfamily   | Subfamily to be reported on. Up to eight subfamilies can be selected by the numbers 0 through 7. For example, SB=0273 selects subfamilies 0, 2, 3, and 7. |  |  |  |  |  |  |  |  |
| SB             | Same as SB=01234567.                                                                                                                                      |  |  |  |  |  |  |  |  |
| SB omitted     | Same as SB=01234567.                                                                                                                                      |  |  |  |  |  |  |  |  |
| SM=id          | SM identifier of the SM to be used. Up to eight SMs can be selected<br>by the letters A through H. For example, SM=AGC selects SM A, C,<br>and G.         |  |  |  |  |  |  |  |  |
| SM             | Same as SM=A.                                                                                                                                             |  |  |  |  |  |  |  |  |
| SM omitted     | Same as SM=A.                                                                                                                                             |  |  |  |  |  |  |  |  |

# **Basic Usage Report**

The basic usage report includes a title line, which identifies the family and SM being reported on. The statistics in this report contain data for each group followed by totals for SMs and subfamilies. The following items are listed.

- Number of cubicles reserved for each subfamily. .
- Number of cartridges in each subfamily.
- Number of unassigned and unflagged AUs for small files.
- Number of unassigned and unflagged AUs for large files. .
- Number of flagged cartridges. ٠
- Number of flagged AUs.
- If any empty cubicles are assigned, they are listed first for each subfamily. This . line shows a hyphen (-) as the group designator since groups are assigned only to cartridges.

The following output shows the format of a basic usage report.

yy/mm/dd. hh.mm.ss. PAGE 1

| SS     | USE    | REF     | PORT F1                    | LE     |               | ,,,                                                                                                                                                                                       |               |        |        |        | •      |        |                                                                                                                                         |        |           |     |        |  |
|--------|--------|---------|----------------------------|--------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------|--------|--------|--------|-----------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|-----|--------|--|
|        | ss     | USE     | BASIC                      | REPORT |               | FAMILY =                                                                                                                                                                                  | FAMILY = MTST |        |        |        |        |        |                                                                                                                                         |        |           |     |        |  |
|        | CA     | RT =    | E CUBIC<br>CARTR<br>UBFAMI | IDGES  | _             | CARTRIDGE FLAGS<br>M = MISSING<br>I = INHIBIT ALLOCATION<br>F = FREE CARTRIDGE<br>L = OFF CARTRIDGE LINKS AVAILABLE<br>P = EXCESSIVE PARITY ERRORS<br>E = MAP ERROR(AS DETECTED BY SSVAL) |               |        |        |        |        |        | AU FLAGS<br>FA = FLAWED AND ALLOCATED<br>FU = FLAWED AND UNALLOCATED<br>SF = START OF FRAGMENT<br>FC = FROZEN CHAIN<br>AC = AU CONFLICT |        |           |     |        |  |
|        |        |         |                            |        | AVA II        | ABLE                                                                                                                                                                                      | N             | UMBER  | CARTRI | DGES F |        |        |                                                                                                                                         | NUMBER | AU FLAGGI | ED  |        |  |
| SUB    | SM     | GR      | CUBE                       | CART   | AU<br>(SMALL) | AU<br>(LARGE)                                                                                                                                                                             | M             | I      | F      | L      | Р      | E      | FA                                                                                                                                      | FU     | SF        | FC  | AC     |  |
| 0      | A      | -       | 2                          | 0      | 0             | 0                                                                                                                                                                                         | 0             | 0      | 0      | 0      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 0      | A<br>A | 1<br>** | 2                          | 2      | 1167<br>1167  | 2662<br>2662                                                                                                                                                                              | 0             | 0      | 0      | 2      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| Ţ      |        |         | _                          | _      |               |                                                                                                                                                                                           | -             | -      |        | _      | -      | •      | -                                                                                                                                       | -      | -         | -   | -      |  |
| 1      | A<br>A | 1       | 3<br>2                     | 0<br>2 | 0<br>1168     | 0<br>2662                                                                                                                                                                                 | 0             | 0      | 0      | 0<br>2 | 0<br>0 | 0<br>0 | 0                                                                                                                                       | 0      | 0<br>0    | 0   | 0      |  |
| 1      | A      | **      | 5                          | 2      | 1168          | 2662                                                                                                                                                                                      | Õ             | õ      | õ      | 2      | Ö      | õ      | õ                                                                                                                                       | õ      | õ         | õ   | ŏ      |  |
| 2      | A      | -       | 3                          | 0      | 0             | 0                                                                                                                                                                                         | 0             | 0      | 0      | 0      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 2      | A<br>A | 1<br>** | 25                         | 2      | 1168<br>1168  | 2606<br>2606                                                                                                                                                                              | 0             | 0      | 0      | 2      | 0      | 0<br>0 | 0                                                                                                                                       | 0      | 0         | 0   | 0<br>0 |  |
| 2      | A      | **      | 2                          |        | 1100          | 2000                                                                                                                                                                                      | Ū             | Ū      | -      | _      | -      | -      |                                                                                                                                         | -      | -         |     | -      |  |
| 3      | A<br>A | -       | 3                          | 0<br>2 | 0             | 0                                                                                                                                                                                         | 0             | 0      | 0      | 0      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 3<br>3 | Ă      | **      | 5                          | ź      | 1168<br>1168  | 2586<br>2586                                                                                                                                                                              | 0             | 0      | 0<br>0 | 2<br>2 | 0<br>0 | 0<br>0 | 0<br>0                                                                                                                                  | 0      | 0<br>0    | 0   | 0<br>0 |  |
| 4      | A      | _       | 3                          | 0      | 0             | 0                                                                                                                                                                                         | 0             | 0      | 0      | 0      | 0      | 0      | 0                                                                                                                                       | 0      | o         | 0   | 0      |  |
| 4      | A      | 1       | 2                          | 2      | 1168          | 2662                                                                                                                                                                                      | ŏ             | Ō      | ŏ      | ž      | ŏ      | ŏ      | ŏ                                                                                                                                       | ŏ      | ŏ         | ŏ   | ŏ      |  |
| 4      | A      | **      | 5                          | 2      | 1168          | 2662                                                                                                                                                                                      | 0             | 0      | 0      | 2      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 5      | A      | -       | 3                          | 0      | 0             | 0                                                                                                                                                                                         | 0             | 0      | 0      | 0      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 5      | A      | 1       | 2                          | 2      | 1168          | 2662                                                                                                                                                                                      | 0             | 0      | 0      | 2      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 5      | A      | **      | 5                          | 2      | 1168          | 2662                                                                                                                                                                                      | 0             | 0      | 0      | 2      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 6      | A      | -<br>1  | 23                         | 0<br>3 | 0             | 0<br>7                                                                                                                                                                                    | 0<br>0        | 0<br>2 | 0<br>0 | 0<br>1 | 0      | 0      | 0                                                                                                                                       | 0<br>0 | 0         | 03  | 0      |  |
| 6<br>6 | A<br>A | **      | 5                          | 3      | 5400<br>5400  | 7                                                                                                                                                                                         | 0             | 2      | 0      | 1      | 0      | Ö      | 0                                                                                                                                       | 0      | 0         | 3   | 0<br>0 |  |
| 7      | A      |         | 3                          | 0      | 0             | 0                                                                                                                                                                                         | 0             | 0      | 0      | 0      | 0      | 0      | 0                                                                                                                                       | 0      | 0         | 0   | 0      |  |
| 7      | A      | 1       | 2                          | 2      | 1200          | 2662                                                                                                                                                                                      | 0             | Ō      | 0      | 2      | 0      | Õ      | Ō                                                                                                                                       | Ō      | ō         | Ō   | Ō      |  |
| 7      | A      | **      | 5                          | 2      | 1200          | 2662                                                                                                                                                                                      | 0             | 0      | 0      | 2      | 0      | 0      | · 0                                                                                                                                     | 0      | 0         | · 0 | 0      |  |
|        |        |         |                            |        |               |                                                                                                                                                                                           |               |        |        |        |        |        |                                                                                                                                         |        |           |     |        |  |

(Continued)

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SSUSE REPORT FILE

# yy/mm/dd.hh.mm.ss.PAGE 2

SSUSE BASIC REPORT SM AND SUBFAMILY TOTALS FAMILY = MTST

| SUB | S  | M  | GR | CUBE   | CART   | AVAIL<br>AU<br>(SMALL) | ABLE<br>AU<br>(LARGE) | N<br>M | UMBER<br>I | CARTRI<br>F | DGES<br>L | FLAGGED-<br>P | <br>Е | FA | -NUMBER A<br>FU | U FLAGG<br>SF | ED<br>FC | AC |
|-----|----|----|----|--------|--------|------------------------|-----------------------|--------|------------|-------------|-----------|---------------|-------|----|-----------------|---------------|----------|----|
| SM  | то | TA | LS | FOR SP | ECIFIE | D SUBFAMIL             | .IES                  |        |            |             |           |               |       |    |                 |               |          |    |
| **  | A  |    | ** | 39     | 17     | 13607                  | 18509                 | 0      | 2          | 0           | 15        | 0             | 0     | 0  | 0               | 0             | 3        | 0  |
| SUB | FA | MI | LY | TOTALS | FOR SI | PECIFIED S             | SM-S                  |        |            |             |           |               |       |    |                 |               |          |    |
| 0   | *  | *  | ** | 4      | 2      | 1167                   | 2662                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |
| 1   | *  | *  | ** | 5      | 2      | 1168                   | 2662                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |
| 2   | *  | *  | ** | 5      | 2      | 1168                   | 2606                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |
| 3   | *  | *  | ** | 5      | 2      | 1168                   | 2586                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |
| 4   | *  | *  | ** | 5      | 2      | 1168                   | 2662                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |
| 5   | *  | *  | ** | 5      | 2      | 1168                   | 2662                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |
| 6   | *  | *  | ** | 5      | 3      | 5400                   | 7                     | 0      | 2          | 0           | 1         | 0             | 0     | 0  | 0               | - 0           | 3        | 0  |
| 7   | *  | *  | ** | 5      | 2      | 1200                   | 2662                  | 0      | 0          | 0           | 2         | 0             | 0     | 0  | 0               | 0             | 0        | 0  |

•

# **Optional Report A**

Optional report A includes a title line that identifies the SM being reported on. This report is made up of 15 pages, each page describing the SM map for specific y and z coordinates. Each page describes 22 y coordinates (rows) and 1 z coordinate (column). Column 6 (z=6) is not reported on because it contains the data recording drives. The information listed in optional report A includes the following items.

- y and z coordinates.
- Cartridge manufacturer code and CSN of the cartridge.
- Family and subfamily.
- Group and ordinal in group.
- Flags.

SSUSE REPORT FILE

The following output shows the format of optional report A.

yy/mm/dd. hh.mm.ss. PAGE

SSUSE OPTIONAL REPORT A - STORAGE MODULE MAP FOR SM = A

| FLAGS:                                                               | :                                       | F = NOT | ASSIGNED       | ISTS IN POOL<br>TO THIS FAM<br>ALTERNATE SM | S = RESI<br>ILY E = ERRI<br>IMAP | ERVED FOR<br>Dr flag | SYSTEM U | SE                    | C = RESERVED FOR CUSTOMER ENGINEERING<br>N = (Y,Z) does not exist in SMMAP<br>GPORD = ORDINAL IN GROUP |
|----------------------------------------------------------------------|-----------------------------------------|---------|----------------|---------------------------------------------|----------------------------------|----------------------|----------|-----------------------|--------------------------------------------------------------------------------------------------------|
| Y                                                                    | z                                       | CM C    | SN F           | AMILY SU                                    | JBFAMILY (                       | GROUP                | GPORD    | FLAG                  | 5                                                                                                      |
| 0 1 2 3 4 5 6 7 8 9 10 1 12 3 4 5 6 7 8 9 20 1 12 13 4 5 16 7 8 9 20 | 000000000000000000000000000000000000000 | A-516   | M1<br>80502 M1 | TST<br>TST<br>TST<br>TST                    | 0<br>0<br>0                      | 1                    | 1        | C<br>N<br>N<br>N<br>N |                                                                                                        |
| 20                                                                   | 0<br>0                                  | A-137   | 27600 11       | TST                                         | 0                                | 1                    | 0        | S F                   |                                                                                                        |

3

# **Optional Report B**

Optional report B includes a title line identifying the subfamily, family, and SM being reported on. There is one line of output per cartridge within a subfamily and storage module. The report includes the following cartridge information about entries in the 7990 catalog.

- Group and ordinal in group.
- y and z coordinates.
- Cartridge manufacturer code and CSN of the cartridge.
- Free AUs for small and large files.
- Cartridge flags.
- Error conditions.

The following output shows the format of optional report B.

SSUSE REPORT FILE

#### yy/mm/dd. hh.mm.ss. PAGE 25

SSUSE OPTIONAL REPORT B - CARTRIDGE SUMMARY REPORT SM = A SUBFAMILY = 6 FAMILY = MTST CARTRIDGE FLAGS: NOTES: FA = FLAWED AND ALLOCATED M = MISSING FU = FLAWED AND UNALLOCATED I = INHIBIT SF = START OF FRAGMENT F = FREE CARTRIDGE L = LINK(FREE AU EXIST, NO OFF CARTRIDGE LINK)
P = EXCESSIVE WRITE ERRORS FC = FROZEN CHAIN AC = AU CONFLICT E = MAP ERROR (DETECTED BY SSVAL) GPORD = ORDINAL IN GROUP --ERROR CONDITIONS---FREE AU CART -NUMBER OF AU----GP GPORD Y z CM CSN SMALL LARGE FLAGS FA FU SF FC AC 0 21 7 A-13268794 1800 n ΙL n ٥ 0 3 n 1 õ 20 1 1 7 7 A-51329412 1800 3 4 I 0 0 0 0 L õ ō õ ō Ō 19 A-51328839 1800 1 2

# **Optional Report C**

Optional report C is the detailed cartridge report. It lists the group and FCT ordinal for each 7990 catalog entry and the y and z coordinates and CSN for each cartridge. The report also includes the AU numbers of the first AUs for small and large files and the division point for each cartridge.

The following output shows the format of optional report C.

| รรบ            | ISE REP     | ORT FILE                               |             | уу             | /mm/dd. h | h.mm.dd.                 | PAGE                 | 33                   |             |                                 |
|----------------|-------------|----------------------------------------|-------------|----------------|-----------|--------------------------|----------------------|----------------------|-------------|---------------------------------|
|                | SSUSE       | OPTIONAL REPO                          | ORT C - DE  | TAILED CA      | RTRIDGE F | REPORT SM                | = A SU               | BFAMILY = 6 F        | AMILY = MT  | ST                              |
|                | FLAGS:      | I = INHIE<br>E = MAP E                 |             | TION           |           | = MISSING<br>CL = AVAILA | BLE LINK             |                      |             | PARITY ERRORS<br>ATALOG ORDINAL |
| Y              | Z           | CM CSN                                 | GROUP       | FCTORD         | FLAGS     | FIRST<br>SMALL           | AU<br>FIRST<br>LARGE | DIVISION             | OCL         |                                 |
| 21<br>20<br>19 | 7<br>7<br>7 | A-13268794<br>A-51329412<br>A-51328839 | 1<br>1<br>1 | 16<br>17<br>18 | I<br>I    | 1<br>1<br>1              | 0<br>1916<br>1832    | 1801<br>1801<br>1801 | 0<br>2<br>0 |                                 |

604**5930**0 D

## **Optional Report D**

Optional report D is the detailed AU status report. It lists the group and FCT ordinal of the cartridge, the CSN, the y and z coordinates of the cartridge, and the number of available off-cartridge links. The report also includes the octal numbers of the AUs with flawed AU, start of volume, and error flags noted. This report also specifically notes when a cartridge is empty (for use in determining the status of a cartridge that is to be made available).

The following output shows the format of optional report D.

SSUSE REPORT FILE

yy/mm/dd. hh.mm.ss. PAGE 6

SSUSE OPTIONAL REPORT D - DETAILED AU STATUS REPORT SM = A SUBFAMILY = 1 FAMILY = MTST

F = FLAWED AU (DEMARK FAILURE)

V = START OF VOLUME

E = ONE OF THE ERROR FLAGS SET (AU CONFLICT, FROZEN CHAIN, START OF FRAGMENT)

| FCTORD<br>16 | Y Z        | CM CSN<br>A-51328833 | GROUP<br>1 |            |             |            |            |            |
|--------------|------------|----------------------|------------|------------|-------------|------------|------------|------------|
|              |            | . 91920099           | •          |            |             |            |            |            |
| AU           | XXXO       | XXX1                 | XXX2       | XXX3       | XXX4        | XXX5       | XXX6       | XXX7       |
| 100X         | 0041300731 | 0041270731           | 0041260731 | 0041250731 | 0041240731  | 0041230731 | 0041220731 | 0041210731 |
| 101 X        | 0041200731 | 0041170731           | 0041160731 | 0041150731 | 0041140731  | 0041130731 | 0041120731 | 0041110731 |
| 102X         | 0041100731 | 0041070731           | 0041060731 | 0041050731 | 0041040731  | 0041030731 | 0041020731 | 0041010731 |
| 103X         | 0041000731 | 0040770731           | 0040760731 | 0040750731 | 0040740731  | 0040730731 | 0040720731 | 0040710731 |
| 104X         | 0040700731 | 0040670731           | 0040660731 | 0040650731 | 0040640731  | 0040630731 | 0040620731 | 0040610731 |
| 105 X        | 0040600731 | 0040570731           | 0040560731 | 0040550731 | 0040540731  | 0040530731 | 0040520731 | 0040510731 |
| 106X         | 0040500731 | 0040470731           | 0040460731 | 0040450731 | 0040440731  | 0040430731 | 0040420731 | 0040410731 |
| 107X         | 0040400731 | 0040370731           | 0040360731 | 0040350731 | 0040340731  | 0040330731 | 0040320731 | 0040310731 |
| 110X         | 0040300731 | 0040270731           | 0040260731 | 0040250731 | 0040240731  | 0040230731 | 0040220731 | 0040210731 |
| 111X         | 0040200731 | 0040170731           | 0040160731 | 0040150731 | 0040140731  | 0040130731 | 0040120731 | 0040110731 |
| 112X         | 0040100731 | 0040070731           | 0040060731 | 0040050731 | 0040040731  | 0040030731 | 0040020731 | 0040010731 |
| 113X         | 0040000731 | V0000621214          | 0040611131 | 0040601131 | 0040571131  | 0040561131 | 0040551131 | 0040541131 |
| 114X         | 0040531131 | 0040521131           | 0040511131 | 0040501131 | 0040471131  | 0040461131 | 0040451131 | 0040441131 |
| 115X         | 0040431131 | 0040421131           | 0040411131 | 0040401131 | 0040371131  | 0040361131 | 0040351131 | 0040341131 |
| 116X         | 0040331131 | 0040321131           | 0040311131 | 0040301131 | 0040271131  | 0040261131 | 0040251131 | 0040241131 |
| 117X         | 0040231131 | 0040221131           | 0040211131 | 0040201131 | 0040171131  | 0040161131 | 0040151131 | 0040141131 |
| 120X         | 0040131131 | 0040121131           | 0040111131 | 0040101131 | 0040071131  | 0040061131 | 0040051131 | 0040041131 |
| 121 X        | 0040031131 | 0040021131           | 0040011131 | 0040001131 | V0001771414 | 0041761214 | 0041751214 | 0041741214 |
| 122X         | 0041731214 | 0041721214           | 0041711214 | 0041701214 | 0041671214  | 0041661214 | 0041651214 | 0041641214 |
| 123X         | 0041631214 | 0041621214           | 0041611214 | 0041601214 | 0041571214  | 0041561214 | 0041551214 | 0041541214 |
| 124X         | 0041531214 | 0041521214           | 0041511214 | 0041501214 | 0041471214  | 0041461214 | 0041451214 | 0041441214 |
| 125X         | 0041431214 | 0041421214           | 0041411214 | 0041401214 | 0041371214  | 0041361214 | 0041351214 | 0041341214 |
| 126X         | 0041331214 | 0041321214           | 0041311214 | 0041301214 | 0041271214  | 0041261214 | 0041251214 | 0041241214 |
| 127X         | 0041231214 | 0041221214           | 0041211214 | 0041201214 | 0041171214  | 0041161214 | 0041151214 | 0041141214 |
| 130x         | 0041131214 | 0041121214           | 0041111214 | 0041101214 | 0041071214  | 0041061214 | 0041051214 | 0041041214 |
| 131x         | 0041031214 | 0041021214           | 0041011214 | 0041001214 | 0040771214  | 0040761214 | 0040751214 | 0040741214 |
| 132X         | 0040731214 | 0040721214           | 0040711214 | 0040701214 | 0040671214  | 0040661214 | 0040651214 | 0040641214 |
| 133X         | 0040631214 | 0040621214           | 0040611214 | 0040601214 | 0040571214  | 0040561214 | 0040551214 | 0040541214 |
| 134X         | 0040531214 | 0040521214           | 0040511214 | 0040501214 | 0040471214  | 0040461214 | 0040451214 | 0040441214 |
| 135X         | 0040431214 | 0040421214           | 0040411214 | 0040401214 | 0040371214  | 0040361214 | 0040351214 | 0040341214 |
| 136X         | 0040331214 | 0040321214           | 0040311214 | 0040301214 | 0040271214  | 0040261214 | 0040251214 | 0040241214 |
| 137X         | 0040231214 | 0040221214           | 0040211214 | 0040201214 | 0040171214  | 0040161214 | 0040151214 | 0040141214 |
|              |            |                      |            |            |             |            |            |            |

## SSDEBUG

SSDEBUG allows the analyst to update appropriate entries in the SM maps and/or 7990 catalogs and thereby resolve inconsistencies reported by the SSVAL utility. SSDEBUG can also copy data from selected 7990 files or cartridges to disk. This function of SSDEBUG is intended for use when errors such as unrecoverable read errors do not allow successful staging of a 7990 file.

# NOTE

SSDEBUG updates the SM map for the specified SM. (Refer to the definition of SM map earlier in this section.) It is recommended that the SM map is copied on tape or on another device or family immediately after every update of the SM map.

Input to SSDEBUG is via a directive file. Refer to SSLABEL, earlier in this section, for a description of the directive file format.

The format of the SSDEBUG command is:

SSDEBUG, p1, p2, p3.

| <sup>p</sup> i | Description                                                                  |
|----------------|------------------------------------------------------------------------------|
| I=filename     | File on which directives are written.                                        |
| I              | Same as I=INPUT.                                                             |
| I omitted      | Same as I=INPUT.                                                             |
| L=filename     | File on which listable output is to be written.                              |
| L              | Same as L=OUTPUT.                                                            |
| L=0            | No output file is to be generated.                                           |
| L omitted      | Same as L=OUTPUT.                                                            |
| Ζ              | Directives are contained on the SSDEBUG command. The I parameter is ignored. |
| Z omitted      | Directives are contained on the file specified by the I parameter.           |

# **SSDEBUG Directives**

The following directives are available with SSDEBUG. The descriptions of the parameters for these directives follow this listing of directives.

# OP=RS - Read AUs

OP=RS reads selected AUs of a cartridge identified by its csn (CN=csn) or y and z coordinates (YI and ZI parameters). The SM parameter specifies the SM where the cartridge resides. The range of AUs to be read is specified by the SL and SU parameters. The AUs are written to the file specified by the PF parameter. All CYBER data plus 7990 and CRC data, including header and trailer information, is returned. The analyst can write an application program to reconstruct the permanent file by stripping off all CYBER or 7990 related control information. Refer to Format of Disk Files Read From 7990 by SSDEBUG later in this section for a description of the control information written to disk along with the disk file contents.

# OP=RF - Read File

OP=RF reads the file whose alternate storage address is specified by the FO, SB, SM, and ST parameters. The file is written to the file specified by the PF parameter. All data, including header and trailer information, is returned (refer to Format of Disk Files Read From 7990 by SSDEBUG later in this section).

## OP=RP - Release Frozen Chain Space

OP=RP clears flags in the 7990 catalog and releases 7990 space for the chain whose alternate storage address is specified by the FO, SB, SM, and ST parameters.

# OP=RL - Remove Cartridge Entry From 7990 Catalog

OP=RL removes a 7990 catalog entry that is not linked properly to the SM map. The FO, SB, and SM parameters identify the 7990 catalog entry to be removed.

# OP=RC - Remove Cartridge Entry From SM Map

OP=RC removes an SM map entry that does not have a corresponding FCT entry in the 7990 catalog. The SM, YI, and ZI parameters identify the SM map entry to be removed. The cartridge at the particular location (y,z) is put into the exit tray and the SM map entry is changed to unassigned. The SM map should be backed up immediately after the SSDEBUG run to ensure consistency with cartridge labels and 7990 catalogs (refer to the definition of SM map earlier in this section).

A scratch label is written on the cartridge prior to it being replaced in the exit tray, but the cartridge history information remains intact.

## OP=CF - Change Flag in SM Map or 7990 Catalog

OP=CF sets or clears flags in the SM map or 7990 catalog. The FL and ON or OF parameters indicate the flag type and the action to be taken. The appropriate FCT entry or SM map entry is determined from the CN, FO, or YI and ZI parameters. For FCT flags (FL=AC, FC, or SF), the analyst can specify either a single AU using the ST parameter or a range of AUs using the SL and SU parameters.

## **Parameters for the SSDEBUG Directives**

The descriptions of the parameters to the SSDEBUG directives follow. Not all parameters are valid with all directives, as indicated.

| P <sub>i</sub> | Description                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CM=A-          | Cartridge manufacturer code is A-; indicating IBM.                                                                                                                    |
| СМ             | Same as CM=A                                                                                                                                                          |
| CM omitted     | Same as CM=A                                                                                                                                                          |
| CN=csn         | Cartridge serial number of the cartridge to be used; not valid for OP=RS if YI=y or ZI=z is specified; and not valid for OP=CF if FO=ord, YI=y, or ZI=z is specified. |

| <sup>p</sup> i     | Description                                                                                                                                                      |  |  |  |  |  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| CN omitted         | YI=y and ZI=z must be specified for OP=RS. FO=ord or YI=y and ZI=z must be specified for OP=CF.                                                                  |  |  |  |  |  |
| FL=flag            | Name of flag in SM map or 7990 catalog to be set or cleared. Valid only for OP=CF.                                                                               |  |  |  |  |  |
|                    | flag Description                                                                                                                                                 |  |  |  |  |  |
|                    | AC AU conflict flag.                                                                                                                                             |  |  |  |  |  |
|                    | EW Excessive write parity error flag.                                                                                                                            |  |  |  |  |  |
|                    | FC Frozen chain flag.                                                                                                                                            |  |  |  |  |  |
|                    | FE Linkage error flag (in 7990 catalog FCT).                                                                                                                     |  |  |  |  |  |
|                    | IB Inhibit allocation flag.                                                                                                                                      |  |  |  |  |  |
|                    | LC Lost cartridge flag.                                                                                                                                          |  |  |  |  |  |
|                    | ME Linkage error flag (in SM map).                                                                                                                               |  |  |  |  |  |
|                    | SF Start of fragment flag.                                                                                                                                       |  |  |  |  |  |
| FL omitted         | FL=flag must be specified for OP=CF.                                                                                                                             |  |  |  |  |  |
| FM=familyname      | Family to be processed.                                                                                                                                          |  |  |  |  |  |
| FM                 | Same as FM=system default family.                                                                                                                                |  |  |  |  |  |
| FM omitted         | Same as FM=system default family.                                                                                                                                |  |  |  |  |  |
| F0=ord             | 7990 catalog ordinal indicating the file to be read or the chain<br>whose space is to be released. Not valid for OP=CF if CN=csn, YI=y,<br>or ZI=z is specified. |  |  |  |  |  |
| FO omitted         | FO=ord must be specified for OP=RF, OP=RP, and OP=RL. CN=csn or YI=y and ZI=z must be specified for OP=CF.                                                       |  |  |  |  |  |
| OF                 | Flag specified by FL=flag is to be cleared. Valid only with OP=CF.                                                                                               |  |  |  |  |  |
| ON                 | Flag specified by FL=flag is to be set. Valid only with $OP=CF$ .                                                                                                |  |  |  |  |  |
| <b>PF=filename</b> | File to which the 7990 image is to be copied. This file is defined under the user's current family and user index.                                               |  |  |  |  |  |
| PF                 | Same as PF=MMMBUG.                                                                                                                                               |  |  |  |  |  |
| PF omitted         | Same as PF=MMMBUG.                                                                                                                                               |  |  |  |  |  |
| SB=subfamily       | Subfamily to be used; $0 \leq $ subfamily $\leq 7$ .                                                                                                             |  |  |  |  |  |

# Description

| P <sub>i</sub> | Description                                                                                                                                                                                                                                                                                                                                              |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SB             | Same as SB=0.                                                                                                                                                                                                                                                                                                                                            |
| SB omitted     | Same as SB=0.                                                                                                                                                                                                                                                                                                                                            |
| SL=i           | AU where OP=RS begins copying or OP=CF begins changing flags; $1 \le i \le 1931$ ; $i \le j$ (refer to SU=j).                                                                                                                                                                                                                                            |
| SL             | Same as SL=1.                                                                                                                                                                                                                                                                                                                                            |
| SL omitted     | Same as SL=1.                                                                                                                                                                                                                                                                                                                                            |
| SM=id          | SM identifier of the SM to be used by SSDEBUG; id is a letter from A to H.                                                                                                                                                                                                                                                                               |
| SM             | Same as SM=A.                                                                                                                                                                                                                                                                                                                                            |
| SM omitted     | Same as SM=A.                                                                                                                                                                                                                                                                                                                                            |
| ST=s           | AU where OP=RF begins reading files or fragments or OP=RP begins<br>releasing frozen chain space. If specified with OP=CF, ST=s<br>specifies the AU number of an FCT flag to be changed and takes<br>precedence over the range of AUs specified by the SL and SU<br>parameters. AU numbers are meaningful with OP=CF only for flags<br>FL=AC, FC, or SF. |
| ST omitted     | ST=s must be specified for OP=RF and OP=RP.                                                                                                                                                                                                                                                                                                              |
| SU=j           | AU where OP=RS ends copying or OP=CF ends changing flags; $1 \le j \le 1931$ ; $i \le j$ (refer to SL=i).                                                                                                                                                                                                                                                |
| SU             | Same as SU=1.                                                                                                                                                                                                                                                                                                                                            |
| SU omitted     | Same as SU=1.                                                                                                                                                                                                                                                                                                                                            |
| YI=y           | y coordinate of the cubicle where the cartidge to be read resides; $0 \leq y \leq 21$ . ZI=z must also be specified. CN=csn must not be specified with OP=RS. FO=ord or CN=csn must not be specified with OP=CF.                                                                                                                                         |
| YI omitted     | CN=csn must be specified for OP=RS. FO=ord or CN=csn must be specified for OP=CF. YI=y and ZI=z must be specified for OP=RC.                                                                                                                                                                                                                             |
| ZI=z           | z coordinate of the cubicle where the cartridge to be read resides;<br>$0 \le z \le 15$ and $z \ne 6$ . YI=y must also be specified. CN=csn must not<br>be specified with OP=RS. FO=ord or CN=csn must not be specified<br>with OP=CF.                                                                                                                   |
| ZI omitted     | CN=csn must be specified for OP=RS. FO=ord or CN=csn must be specified for OP=CF. YI=y and ZI=z must be specified for OP=RC.                                                                                                                                                                                                                             |

# **Restrictions to SSDEBUG**

The following restrictions apply to the SSDEBUG utility.

- SSEXEC must be running when SSDEBUG is run.
- Only one copy of SSDEBUG can be run at one time.
- SSDEBUG, SSVAL, and SSLABEL cannot be run at the same time.

# y,z Relationship With SM Map Ordinal

A one to one functional mapping exists between coordinate (y,z) pairs and the ordinal entries within the SM map. To determine the coordinate pair (y,z) from the SM map ordinal (ord), use the following equations.

$$y = \frac{(352 - \text{ord})}{16}$$

z = 352 - ord - 16y

To determine the SM map ordinal (ord) from the coordinate pair (y,z), use the following equation.

ord = 352 - z - 16y

# Format of Disk Files Read From 7990 by SSDEBUG

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A local disk file created by SSDEBUG with the OP=RS or OP=RF option includes all CYBER and 7990 header and trailer information. Figure 11-1 shows the format of a disk file created when SSDEBUG reads a full stripe; figure 11-2 shows the format of a disk file created when SSDEBUG reads a partial stripe.

| WORD 0<br>12 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                       | 7990 READ RAW DATA MESSAGE (64 BYTES)<br>(PACKED 6 BYTES PER 60-BIT WORD, LEFT-JUSTIFIED,<br>ZERO-FILLED)                                                                               |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                                                                                                                                                                                                                                                                                                                 | 7990 STRIPE HEADER (32 BYTES) ① ②<br>7990 BLOCK HEADER LABEL (16 BYTES)<br>(PACKED 7.5 BYTES PER WORD WITH 1 BYTE LEFT-<br>JUSTIFIED IN THIRD WORD)<br>CYBER HEADER LABEL (150 BYTES) ① |  |
| CYBER DATA ③                                                                                                                                                                                                                                                                                                                                                    | 13 PRUS OF CYBER DATA (6279 BYTES) ①<br>(483 BYTES PER PRU)<br>CYBER TRAILER LABEL (90 BYTES) ①                                                                                         |  |
|                                                                                                                                                                                                                                                                                                                                                                 | 7990 BLOCK TRAILER LABEL (16 BYTES)<br>(SAME FORMAT AS 7990 BLOCK HEADER LABEL)<br>UNUSED BYTES (11 BYTES) ①<br>(TO FILL STRIPE)                                                        |  |
| 1601 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                               | 7990 STRIPE TRAILER (32 BYTES) ①                                                                                                                                                        |  |
| <ol> <li>Bytes are 8-bit ASCII bytes packed 7.5 bytes per 60-bit word in a continuous bit stream.</li> <li>For full stripes, the block type in the 7990 block header is 01.</li> <li>For CYBER data, every 255th byte is a CRC byte. The last byte is always a CRC byte to take care of short data blocks. Full CYBER data blocks have 26 CRC bytes.</li> </ol> |                                                                                                                                                                                         |  |

Figure 11-1. Full Stripe Disk File Format

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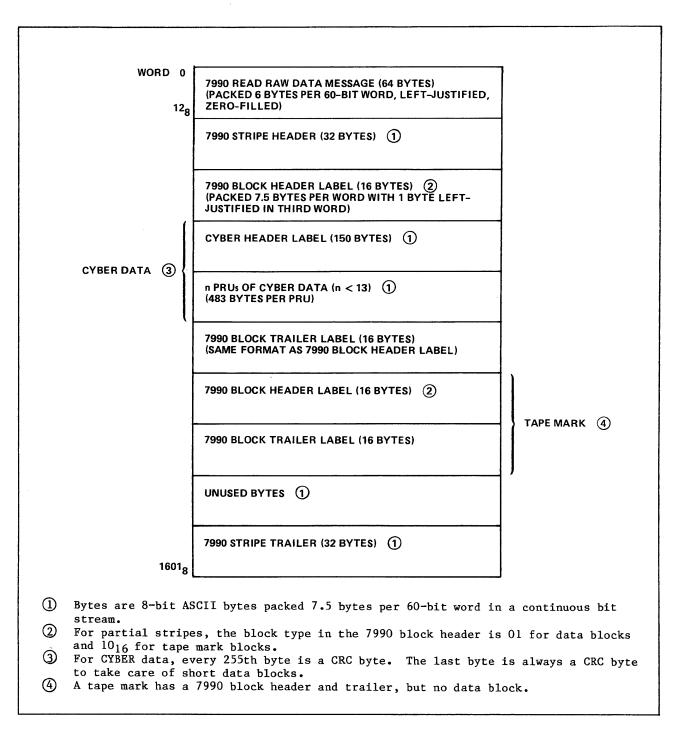


Figure 11-2. Partial Stripe Disk File Format

# Format of Disk Files Read From 7990 by SSDEBUG

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A local disk file created by SSDEBUG with the OP=RS or OP=RF option includes all CYBER and 7990 header and trailer information. Figure 11-1 shows the format of a disk file created when SSDEBUG reads a full stripe; figure 11-2 shows the format of a disk file created when SSDEBUG reads a partial stripe.

| WORD 0<br>12 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                       | 7990 READ RAW DATA MESSAGE (64 BYTES)<br>(PACKED 6 BYTES PER 60-BIT WORD, LEFT-JUSTIFIED,<br>ZERO-FILLED)      |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--|
|                                                                                                                                                                                                                                                                                                                                                                 | 7990 STRIPE HEADER (32 BYTES) ① ②                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                 | 7990 BLOCK HEADER LABEL (16 BYTES)<br>(PACKED 7.5 BYTES PER WORD WITH 1 BYTE LEFT-<br>JUSTIFIED IN THIRD WORD) |  |
|                                                                                                                                                                                                                                                                                                                                                                 | CYBER HEADER LABEL (150 BYTES) ①                                                                               |  |
| CYBER DATA ③                                                                                                                                                                                                                                                                                                                                                    | 13 PRUs OF CYBER DATA (6279 BYTES) ①<br>(483 BYTES PER PRU)                                                    |  |
|                                                                                                                                                                                                                                                                                                                                                                 | CYBER TRAILER LABEL (90 BYTES) ①                                                                               |  |
|                                                                                                                                                                                                                                                                                                                                                                 | 7990 BLOCK TRAILER LABEL (16 BYTES)<br>(SAME FORMAT AS 7990 BLOCK HEADER LABEL)                                |  |
|                                                                                                                                                                                                                                                                                                                                                                 | UNUSED BYTES (11 BYTES) ①<br>(TO FILL STRIPE)                                                                  |  |
|                                                                                                                                                                                                                                                                                                                                                                 | 7990 STRIPE TRAILER (32 BYTES) ①                                                                               |  |
| 1601 <sub>8</sub>                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |  |
| <ol> <li>Bytes are 8-bit ASCII bytes packed 7.5 bytes per 60-bit word in a continuous bit stream.</li> <li>For full stripes, the block type in the 7990 block header is 01.</li> <li>For CYBER data, every 255th byte is a CRC byte. The last byte is always a CRC byte to take care of short data blocks. Full CYBER data blocks have 26 CRC bytes.</li> </ol> |                                                                                                                |  |
|                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                |  |

Figure 11-1. Full Stripe Disk File Format

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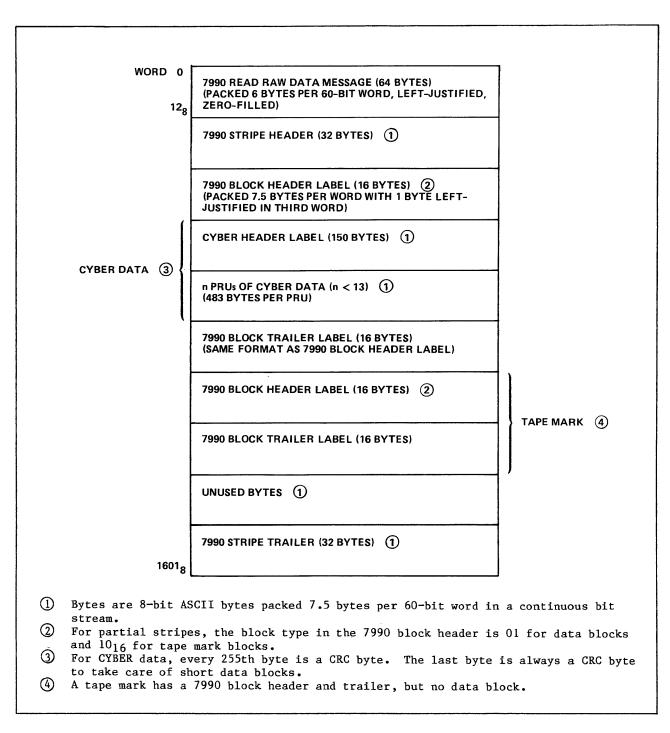


Figure 11-2. Partial Stripe Disk File Format

# 7990 Stripe Header and Trailer

The 7990 stripe header is a 32-byte block that occupies the first 32 bytes of the stripe; the 7990 stripe trailer occupies the last 32 bytes. The 7990 stripe header and trailer have the same format.

| Bytes | Description                                                                                                                                                                 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0-5   | Volume serial number. A 6-character string specifying the volume serial number of the stripe.                                                                               |
| 6-7   | Version number. Two characters specifying the version number associated with the volume serial number.                                                                      |
| 8-9   | File number. Two characters specifying the number of the file within the volume.                                                                                            |
| А-В   | Logical stripe number. Relative stripe number within the volume.<br>The logical stripe number may not correlate with the physical stripe<br>number due to demarked stripes. |
| C-D   | Address of last block trailer. Byte number, within the stripe, of the first byte of the last block trailer.                                                                 |
| E-1D  | Reserved.                                                                                                                                                                   |
| 1E-1F | Checksum. Chosen such that the sum, modulo 65536, of all bytes in the header equals zero.                                                                                   |

# 7990 Block Header and Trailer

Each 7990 block has a 16-byte header that precedes each block and a 16-byte trailer that follows each block, or partial block, of data on the stripe. The 7990 block header and trailer have the same format.

Byte(s) Description 0-1 Block type. The following block types are valid. Block type Description 01 A complete block is contained in this stripe. 02 First block segment of a multistripe block. 04 Intermediate block segment of a multistripe block. 80 Last block segment of a multistripe block. 1016 Tape mark. 2-3 Block length. The number of bytes in a data block excluding the block header and trailer. The block length of a tape mark is zero. 4-7 Block sequence number. The number of a given data block within a file.

| Byte(s) | Description                                                                                                                                                                              |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8–9     | Block segment number. For complete blocks, the segment number is 0 (zero). For multistripe blocks, the segment number is the sequence number of the block segment within the data block. |
| A-E     | Reserved.                                                                                                                                                                                |
| F       | Checksum. Chosen such that the sum, modulo 256, of all bytes in the header equals zero.                                                                                                  |

# SSBLD

SSBLD reads a specified direct access permanent file that contains SSBLD statements. These statements consist of 7990 component-oriented mnemonics that define the logical mapping from component to component within the 7990 configuration. SSBLD processes these statements and generates a direct access permanent file which SSEXEC uses as its unit device table (UDT).

The format of the SSBLD command is:

SSBLD, CF=confile, BF=bldfile.

| Parameter  | Description                                                                                         |
|------------|-----------------------------------------------------------------------------------------------------|
| CF=confile | Configuration file on which SSBLD statements are written under user index $377760_8$ .              |
| CF         | Same as CF=SUDT.                                                                                    |
| CF omitted | Same as CF=SUDT.                                                                                    |
| BF=bldfile | Build file on which SSBLD generates the UDT for SSEXEC. The build file is under user index 3777608. |
| BF         | Same as BF=BUDT.                                                                                    |
| BF omitted | Same as BF=BUDT.                                                                                    |

#### SSBLD Statements

The 7990 hardware consists of a number of 7990 control units (CU) and a number of 7991 storage modules (SM). SSBLD uses two types of statements: those that link individually controllable nodes and paths within each CU, and those that link SMs to CUs. SSBLD statements must be processed in the following sequence or SSBLD aborts.

- 1. Statements that define the linkage between nodes and paths within each CU.
- 2. Statements that define the linkage between SMs and CUs.

#### Node/Path Linkage Statements

These SSBLD statements are order dependent. There are seven types of statements for a given CU and they must appear together in the following sequence and format.

1. CUest=da,CH01=st,CH02=st,CH03=st,CH04=st.

est is the EST ordinal of the CU. da is the device address of CUest. st is the channel status (ON or OFF).

The CYBER channel number is associated with the 7990 channel interface (CIF) number. The position (first, second, and so on) of the channel in the CU statement minus 1 defines the CIF number wired to that channel. For example, CHO2 is wired to CIF1. Also, if a single digit channel is used to connect to a 7990, it must have a leading 0 in the CU statement. For example, channel 3 is entered as CHO3.

2. CIFn=DTIO=st,DTI1=st,DTO0=st,DTO1=st.

n is the device address of CIF (0 through 3). DTI is the data transfer input. DTO is the data transfer output. st is the data transfer status (ON or OFF).

3. DTIn=DIFO=st,DIF1=st.

n is the device address of DTI (0 or 1). DIF is the device interface. st is the specified device interface status (ON or OFF).

4. DTOn=DIF0=st,DIF1=st.

n is the device address of DTO (0 or 1). st is the device interface status (ON or OFF).

5. DIFn=DRCO=st,DRC1=st.

n is the device address of DIF (0 or 1). DRC is the data recording controller. st is the data recording controller status (ON or OFF).

6. DRCn=DRDO=st,...,DRD7=st.

n is the device address of DRC (0 or 1). DRD is the data recording driver. st is the data recording driver status (ON or OFF).

7. AIFn=ACO=st,AC1=st,AC2=st,AC3=st.

AIF is the accessor interface. n is the device address of AIF. AC is the accessor. st is the accessor status (ON or OFF).

## SM/CU Linkage Statements

The SM statement defines the linkage between SMs and CUs; its format is:

SMid=st,ACn,CUest,CUest,DRDa=st,DRDa=st.

id is the SM identifier (A through H).
st is the status (ON or OFF).
n is the device address of AC (0 through 3).
est is the EST ordinal of the CU(s) connected to SMid.
a is the device address of the DRD(s) connected to ACn.

SSBLD and SSEXEC use the common deck COMBUDT to define the amount of memory to reserve within SSEXEC for the unit device tables. Any attempt to change the number of SMs or CUs specified in the common deck will cause SSBLD to abort.

## Example of SSBLD Statements

The first two SSBLD statements specify the total number of CUs and SMs in the following configuration. The first statement specifies CUs and the second statement specifies SMs. The rest of the statements define the 7990 configuration.

```
1

1

CU41=0,,CH23=ON,..

CIF1=DTIO=ON,,DTOO=ON,.

DTIO=DIFO=ON,DIF1=ON.

DTOO=DIFO-ON,DIF1=ON.

DIF0=DRCO=ON,DRC1=ON.

DIF1=DRCO=ON,DRC1=ON.

DRC0=DRDO=ON,DRD1=ON,...

AIF0=ACO=ON,...

SMA=ON,ACO,,CU41,DRDO=ON,DRD1=ON.

*COMMENT.
```

An asterisk (\*) in the first column of an SSBLD statement specifies a comment statement. Comment statements are not sent to the dayfile.

## 7990 Equipment Configuration Constraints

Controls paths and data paths within the 7990 configuration have certain constraints placed upon the allowable device addresses of the accessors and DRDs. The accessor numbers and corresponding DRD numbers are:

| Accessor Number | DRD Numbers |
|-----------------|-------------|
| 0               | 0 or 1      |
| 1               | 2 or 3      |
| 2               | 4 or 5      |
| 3               | 6 or 7      |

Accessors and DRDs that are to be coupled to two controllers must have the same path numbers assigned from each controller. For example, if an accessor is plugged into accessor path 2 of CU1, then a DRD on the same storage module must be coupled to a DRC path of 4 or 5 from CU1. If a second controller is to be attached to this same storage module, then the other accessor port must also be plugged into accessor path 2 of CU2 and a DRD must be coupled to a DRC path of 4 or 5 from CU2.

## SSALTER

SSALTER displays the current 7990 hardware configuration and allows an analyst to change the status of certain elements in the 7990 configuration. SSALTER works with SSEXEC to make the specified changes to the existing 7990 configuration.

The initial 7990 configuration file is built by the SSBLD utility and stored as a permanent file (default file name is BUDT) under user index  $377760_8$  on the default family. This configuration file is the unit device table read by SSEXEC during initialization.

SSALTER can be run at SSEXEC initialization time or at any time after SSEXEC has been initialized. SSALTER aborts if SSEXEC is not executing.

#### **Console Input**

SSALTER can be executed only from the system console. Input from the console requires the following sequence of entries and responses.

1. Call SSALTER by entering:

X.SSALTER.

The B,O display indicates the job sequence name (jsn) of SSALTER. To the right of the entry appears the message:

REQUEST \*K\* DISPLAY

- 2. Activate the K display for that control point by entering:
  - K,jsn. (jsn is the job sequence name of SSALTER as specified on the B,O display)
- 3. Select the desired K display by entering

K.SM=id. (id is the SM identifier, A through H)

to select the SM K display (figure 11-3), which shows the 7990 configuration of the storage module and DRDs complete with status information; or

K.CUest. (est is the EST ordinal of the CU)

to select the CU K display (figure 11-4), which shows the status of various paths/nodes in the specified control unit.

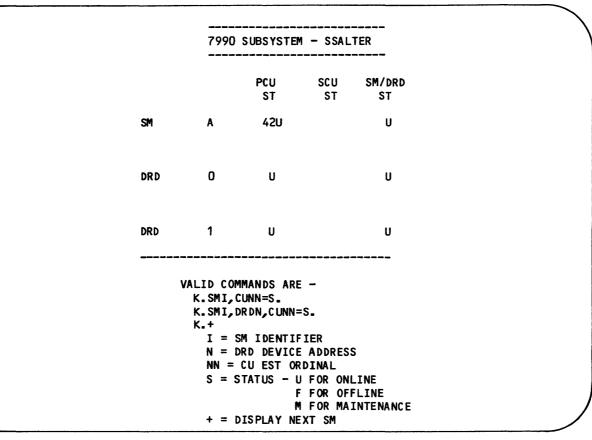


Figure 11-3. SM K Display

When a DRD's status is changed to online, any cartridges in the DRD are placed in service cells if space is available; otherwise, they are ejected from the storage module. A clear cartridge is then loaded into the DRD, its cartridge label and CSN are checked, and it is unloaded. The same cartridge is reloaded, its label and CSN are checked again, and the cartridge is returned to its cubicle. The service cells are then checked for cartridges. If a cartridge is found, it is either returned to the cubicle matrix or ejected from the storage module, depending on the cartridge label's contents.

When a SM's status is changed to online, the accessor is first cleared of any cartridge it may contain. The cartridge is stored in a service cell if one is empty; otherwise, the cartridge is ejected from the storage module. The accessor then picks a clear cartridge from its cubicle, and immediately puts it back. If the SM's status is changed to online after SSEXEC has been initialized, the service cells are then checked for cartridges. Any cartridges found are ejected from the storage module.

|      |            |    | ORD   | CU<br>ST |       |       |      |       |
|------|------------|----|-------|----------|-------|-------|------|-------|
|      |            |    | CU42  | ON       |       |       |      |       |
| CIF1 |            |    | DTIO  | DT00     | DIFO  | DRCO  | DRC1 | AIFO  |
| DIIO | U          |    | DIFOU | DIFOU    | DRCOU | DRDOU |      | SMAOU |
| DTI1 | U          |    | DIF1U | DIF1U    | DRC1U | DRD1U |      |       |
| ΦΤΟΟ | U          |    | DTI1  | DT01     | DIF1  |       |      |       |
| DTO1 | U          |    | DIFOU | DIFOU    | DRCOU |       |      | AIF1  |
|      | CH<br>St c | IF | DIF1U | DIF1U    | DRC1U |       |      | SMAOU |
| 24   | ON         | 1  |       |          |       |       |      |       |

Figure 11-4. CU K Display

# **MSAS OPERATIONAL PROCEDURES**

Next is a summary of the operational procedures used in an MSAS environment. These procedures include modifications to existing procedures and new MSAS procedures, especially in the areas of permanent file backup and reloading and disk space management. Refer to the descriptions of the appropriate utilities for details about these operational procedures.

## INITIALIZATION

MSAS processing is initiated when the SSDEF utility is run to create the system files necessary to allow storage of files on 7990. SSDEF creates both an SM map for each SM that is to store file data on cartridges and eight 7990 catalogs (one for each subfamily) for each family that is to have 7990-resident files. Once these system files have been created, the SSLABEL utility can then be run to allocate portions of the SM to each subfamily and to initialize cartridges for use by files belonging to these subfamilies. Note that SSEAEC need not be executing when SSDEF is run, but SSEXEC must be executing when SSLABEL is run.

When permanent files are defined, they reside on disk until the SSMOVE utility is run. Depending on the parameters specified, SSMOVE can destage files to 7990 and release the disk space assigned to files so that it is available for general use.

#### DISK SPACE MANAGEMENT

The availability of disk space must be managed more frequently in an MSAS environment than in a non-MSAS environment. This is necessary because 7990-resident files must be staged to disk before a user can access them, and their disk space is not immediately released upon completion of the jobs that attached the files. Consequently, disks are apt to approach a disk-full condition unless the SSMOVE utility is used periodically to release disk space.

The SSMOVE utility destages selected files to 7990 and optionally releases their disk space. It is recommended that the site analyst use SSMOVE as part of a periodic disk space management procedure and also just prior to a full dump to reduce the amount of data dumped to tape. (Refer to Dump Tape Management later in this section.)

The E,M display can be used to monitor the tracks on a device or set of devices. When too few tracks (as defined by the installation) are available on the direct access devices for a family or subfamily, the SSMOVE utility should be run. SSMOVE reads the PFC entries for the specified family, selects certain files to reside on 7990, and decides which files should be released from disk.

Files can be destaged to 7990 without their disk space being released. This destage-only feature can be used prior to a routine backup dump to create 7990 images for files with the BR=MD attribute and thereby eliminate the need to include them on a backup dump tape. (Refer to Dump Tape Management later in this section.) Having a 7990 image also provides backup for the file in special cases where the permanent file is being updated at the same time PFDUMP is being run.

The destage-only feature can also be used to allow disk space to become available immediately when SSMOVE is run again. That is, SSMOVE can directly release disk space of files that have both disk and 7990 images but are to reside on 7990 only. However, for files that have no 7990 image, there is a delay before the disk space can be released because these files must first be destaged to 7990.

#### **7990 SPACE MANAGEMENT**

The availability of 7990 space must be managed because 7990 space is not automatically released when a permanent file is purged. This allows you to perform a permanent file recovery to a time prior to the purging of the file. On a typical dump tape, the entry for a 7990-resident file includes the PFC and permit entries, but not the file data. A subsequent reload operation recovers only what was dumped; the PFC and permit information, but not the file data. Thus, 7990 space for a purged permanent file cannot be released until you no longer need to recover the file data, because the file data resides on 7990 only and typically not on any dump tape.

A 7990-resident file is stored only on the cartridges within the cubicles of SMs assigned to a subfamily. When destaging a file to 7990, SSEXEC selects the SM with the most space available. If no SM has enough free space to store the file being destaged, SSEXEC abandons that destage request, issues a message to the dayfile, and continues to destage other files that fit on the available 7990 space. To avoid this problem, use the SSVAL utility periodically to release 7990 space for purged files, thereby making it available for reuse.

When you want to reuse 7990 space currently allocated to files that have been purged, run SSVAL with the RF and RL parameters specified. The RF parameter specifies an RDF, which is an auxiliary file produced by the permanent file utility PFDUMP and which contains versions of the 7990 catalogs and PFC entries that were current at the time of the dump. SSVAL examines the RDF to identify unneeded 7990 files (those without PFC entries) and their 7990 space is released. Choose which RDF to use based on the date and time of the dump that produced it. That is, a particular RDF is used only if there is no need for a permanent file recovery to a time prior to the dump that produced the RDF.

Once an RDF is used by SSVAL to release 7990 space, you should discard it and any other RDFs for the same set of devices. These RDFs cannot be used as input to SSVAL in any future run. The MSAS software does not permit an RDF to be specified by the RF parameter on an SSVAL call, unless it was produced by PFDUMP after the last SSVAL run that released 7990 space was completed. This prevents the inadvertent release of 7990 space that was previously released and reassigned to a file.

Example 1:

Assume that two PFDUMPs were run a week apart producing two release data files, RDF1 and RDF2. Assume, also, that according to both RDF1 and RDF2, file AFILE is an orphan (it has been purged but still resides on 7990). If the following call to SSVAL is made, the 7990 space assigned to AFILE is released and made available for reuse, if no errors were encountered.

## SSVAL, RF=RDF1, RL.

Now, suppose that a new file, BFILE, which did not exist when RDF1 and RDF2 were produced, is assigned to the 7990 space on which AFILE has resided. If SSVAL were to accept either RDF1 or RDF2 on a subsequent SSVAL call, the 7990 space allocated to file AFILE (which is now the space where BFILE resides) is released. However, any RDF created after the SSVAL run that purged AFILE would not have an entry for AFILE and, hence, SSVAL would not inadvertently release the 7990 space presently allocated to BFILE.

After SSVAL uses a release data file to release 7990 space, the corresponding backup tape from PFDUMP is the oldest tape that should be used for the first reel of a future incremental load. The first reel determines which files are to be reloaded according to the CIR on the tape (refer to PFLOAD in section 17, Permanent File Utilities). Use of an older tape as the first reel can allow the PFC entry for a purged file to be restored even though its 7990 space may have been reassigned. The MSAS software does not prevent loading from the wrong dump tape, but does detect as an error an attempt to stage a file whose data was overwritten (see Example 2).

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#### Example 2:

Assume that RDF1 and RDF2 are as in the previous example, and that file CFILE is an orphan according to RDF2, but not according to RDF1. The following SSVAL call releases 7990 space allocated to CFILE.

SSVAL, RF=RDF2, RL.

Now, suppose that the dump tape created by the PFDUMP run that produced RDF1 is used as the first reel of an incremental PFLOAD. Then the PFC and permit entries for file CFILE are reloaded, but, in fact, file CFILE does not exist on 7990. This will be detected as an error when a user attempts to attach CFILE.

## **BACKUP AND RECOVERY**

Permanent file backup and recovery methods in an MSAS environment are similar to those in a non-MSAS environment. It is assumed that most sites with disk-resident permanent files have a file backup procedure consisting of a full dump followed by a series of incremental dumps. The assumed reload procedure is to load from tapes starting with the most recent incremental dump tape and continuing through older incremental dump tapes until the most recent full dump tape is processed. These procedures can be modified as follows to accommodate 7990-resident files.

## **File Dumping**

The normal backup dump procedure is to dump files based on the modification date field in the PFC entries for the files. New parameters to PFDUMP provide the capability to dump files that have been modified during a certain interval, which is useful in recycling old dump tapes (refer to Dump Tape Management later in this section). For files that reside only on 7990, you can either stage the file to disk and thereby include it in the dump or suppress staging and include only the file's PFC and permit information on the dump tape. If the device or family being dumped has 7990-resident files, the following procedures should be included with the normal dumping procedures.

#### Full Dumps

Full dumps should be performed as usual, but OP=S should be specified on the call to PFDUMP to suppress staging. Thus, all files on disk are dumped but only the PFC and permit entries for 7990 files without disk images are included in the dump. It is unnecessary and not feasible to dump the files that reside only on 7990. Specify OP=S and SD on the call to PFDUMP; use the RD=filename parameter at your own discretion.

| Parameter   | Description                                                                                                                                                                                                                             |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OP=S        | Selects no staging. If the SD option was inadvertently used on any previous nonincremental dump, an incremental dump should be taken prior to the full dump.                                                                            |
| SD          | Updates the dump date/time field on each master device dumped to<br>permit files created or modified prior to this dump to be released<br>when SSMOVE is run again. Refer to Destage and Release Algorithms<br>earlier in this section. |
| RD=filename | Specifies that PFDUMP is to write a release data file to be used<br>later by SSVAL. RD=filename is included or excluded on a call to<br>PFDUMP depending on how often you want to purge unneeded 7990 files.                            |

#### Incremental Dumps

Incremental dumps should be performed as usual. No staging should occur because any files that were created or modified since the last dump will still be on disk if a tape backup is required. The following parameters should be specified on the call to PFDUMP.

| Parameter  | Description                                                                                       |
|------------|---------------------------------------------------------------------------------------------------|
| OP=M       | Selects incremental dumps.                                                                        |
| SD         | Updates the date/time field on each master device dumped, as previously described for full dumps. |
| AD=y ymmdd | Selects the date and time just prior to the previous incremental or                               |
| and        | full dump of the device. Hence, all files not included in the last dump are dumped.               |
| AT=hhmmss  | • •                                                                                               |

The following parameters should be used with caution.

| Parameter   | Description                                                                                                                                                                                                                                  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OP=S        | Selects no staging. If the SD option was inadvertently used on any<br>recent partial dump, OP=S should not be specified so any file with a<br>BR=Y attribute that had its disk space inadvertently released will<br>be included in the dump. |
| RD=filename | Specifies that PFDUMP is to write a release data file to be used later by SSVAL, as previously described for full dumps.                                                                                                                     |

#### Dump Tape Management

In a non-MSAS environment, it is possible to make all previous dump tapes available for use after a full dump is completed. However, in an MSAS environment, such dump tape recycling cannot occur because files that have resided only on 7990 for some time are probably not included on any recent dump tape. When a low percentage of files on a tape are active files, it is possible to redump any remaining files in order to recycle the tape by running PFDUMP and specifying the OP=M, BD, and BT parameters, but not specifying the OP=S parameter.<sup>†</sup> This performs a dump of all files that were last dumped before the date and time specified on the PFDUMP call. If necessary, files will be staged in from 7990; after the dump is completed, the disk space for these staged files is released. Thus, files that might not be on any dump tape made after the date specified by the BD parameter are dumped and tapes created before this date can be recycled.

The number of dump tapes created can be reduced by using SSMOVE to reduce the amount of data written on these dump tapes. If SSMOVE is run prior to an incremental dump, files with the BR=MD attribute can be destaged to 7990 and excluded from the dump. That is, the incremental dump will exclude the files with a BR=MD attribute that are on both 7990 and disk. If SSMOVE is run prior to a full dump, disk space for files that do not have to be on disk can be released and these files are not written on the dump tape. The following procedure involving dumps and SSMOVE runs can be used for efficiency.

- 1. Run SSMOVE to destage files with the BR=MD attribute.
- 2. Take an incremental dump to back up files with the BR=Y attribute.
- 3. Run SSMOVE to release the disk images of files backed up in step 2.
- 4. Take a full dump to reduce the number of dump tapes involved if a reload is required.

## SM Map/7990 Catalog Backup

An SM map is created for each SM in an MSAS environment and is updated by the SSLABEL, SSVAL, and SSDEBUG utilities. (Refer to the definition of SM map earlier in this section.) It is recommended that the SM map be copied on tape or on another device or family immediately after every update of the SM map. PFDUMP can be used to do this by dumping user index 3777608 with FM equal the default system family name, but only if SSEXEC is not running. When SSEXEC is executing, it has the SM map files attached in modify mode; hence, PFDUMP will not dump the SM maps.

If the device containing subfamily 0 of the default family is reloaded, the latest SM maps should be recovered from the backup copies. After recovering the SM maps, run the SSVAL utility with the AM and FM parameters specified to ensure that the SM map and 7990 catalog entries match. If they do not, corrective action should be taken as described in Error Conditions and Corrective Actions later in this section. Failure to retain or recover the latest SM maps can cause problems with future SSLABEL runs (refer to the definition of SM map earlier in this section).

<sup>&</sup>lt;sup>†</sup>It is possible to specify the AD and AT parameters also, thereby dumping files that were dumped during an interval after the date and time specified by AD and AT and before the date and time specified by BD and BT (refer to parameters for PFDUMP). This performs a dump of all files last dumped during the interval specified (including 7990-resident files) and allows your site to recycle all dump tapes created during this interval.

## Full Dumps

Full dumps should be performed as usual, but OP=S should be specified on the call to PFDUMP to suppress staging. Thus, all files on disk are dumped but only the PFC and permit entries for 7990 files without disk images are included in the dump. It is unnecessary and not feasible to dump the files that reside only on 7990. Specify OP=S and SD on the call to PFDUMP; use the RD=filename parameter at your own discretion.

| Parameter   | Description                                                                                                                                                                                                                             |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OP=S        | Selects no staging. If the SD option was inadvertently used on any previous nonincremental dump, an incremental dump should be taken prior to the full dump.                                                                            |
| SD          | Updates the dump date/time field on each master device dumped to<br>permit files created or modified prior to this dump to be released<br>when SSMOVE is run again. Refer to Destage and Release Algorithms<br>earlier in this section. |
| RD=filename | Specifies that PFDUMP is to write a release data file to be used<br>later by SSVAL. RD=filename is included or excluded on a call to<br>PFDUMP depending on how often you want to purge unneeded 7990 files.                            |

## Incremental Dumps

Incremental dumps should be performed as usual. No staging should occur because any files that were created or modified since the last dump will still be on disk if a tape backup is required. The following parameters should be specified on the call to PFDUMP.

| Parameter | Description                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------|
| OP=M      | Selects incremental dumps.                                                                        |
| SD        | Updates the date/time field on each master device dumped, as previously described for full dumps. |
| AD=yymmdd | Selects the date and time just prior to the previous incremental or                               |
| and       | full dump of the device. Hence, all files not included in the last dump are dumped.               |
| AT=hhmmss |                                                                                                   |

The following parameters should be used with caution.

#### Parameter

## Description

- 0P=S
  - Selects no staging. If the SD option was inadvertently used on any recent partial dump, OP=S should not be specified so any file with a BR=Y attribute that had its disk space inadvertently released will be included in the dump.

RD=filename Specifies that PFDUMP is to write a release data file to be used later by SSVAL, as previously described for full dumps.

#### Dump Tape Management

In a non-MSAS environment, it is possible to make all previous dump tapes available for use after a full dump is completed. However, in an MSAS environment, such dump tape recycling cannot occur because files that have resided only on 7990 for some time are probably not included on any recent dump tape. When a low percentage of files on a tape are active files, it is possible to redump any remaining files in order to recycle the tape by running PFDUMP and specifying the OP=M, BD, and BT parameters, but not specifying the OP=S parameter.<sup>†</sup> This performs a dump of all files that were last dumped before the date and time specified on the PFDUMP call. If necessary, files will be staged in from 7990; after the dump is completed, the disk space for these staged files is released. Thus, files that might not be on any dump tape made after the date specified by the BD parameter are dumped and tapes created before this date can be recycled.

The number of dump tapes created can be reduced by using SSMOVE to reduce the amount of data written on these dump tapes. If SSMOVE is run prior to an incremental dump, files with the BR=MD attribute can be destaged to 7990 and excluded from the dump. That is, the incremental dump will exclude the files with a BR=MD attribute that are on both 7990 and disk. If SSMOVE is run prior to a full dump, disk space for files that do not have to be on disk can be released and these files are not written on the dump tape. The following procedure involving dumps and SSMOVE runs can be used for efficiency.

- 1. Run SSMOVE to destage files with the BR=MD attribute.
- 2. Take an incremental dump to back up files with the BR=Y attribute.
- 3. Run SSMOVE to release the disk images of files backed up in step 2.
- 4. Take a full dump to reduce the number of dump tapes involved if a reload is required.

## SM Map/7990 Catalog Backup

An SM map is created for each SM in an MSAS environment and is updated by the SSLABEL, SSVAL, and SSDEBUG utilities. (Refer to the definition of SM map earlier in this section.) It is recommended that the SM map be copied on tape or on another device or family immediately after every update of the SM map. PFDUMP can be used to do this by dumping user index 377760g with FM equal the default system family name, but only if SSEXEC is not running. When SSEXEC is executing, it has the SM map files attached in modify mode; hence, PFDUMP will not dump the SM maps.

If the device containing subfamily 0 of the default family is reloaded, the latest SM maps should be recovered from the backup copies. After recovering the SM maps, run the SSVAL utility with the AM and FM parameters specified to ensure that the SM map and 7990 catalog entries match. If they do not, corrective action should be taken as described in Error Conditions and Corrective Actions later in this section. Failure to retain or recover the latest SM maps can cause problems with future SSLABEL runs (refer to the definition of SM map earlier in this section).

<sup>&</sup>lt;sup>†</sup>It is possible to specify the AD and AT parameters also, thereby dumping files that were dumped during an interval after the date and time specified by AD and AT and before the date and time specified by BD and BT (refer to parameters for PFDUMP). This performs a dump of all files last dumped during the interval specified (including 7990-resident files) and allows your site to recycle all dump tapes created during this interval.

A 7990 catalog is created for each subfamily of a family that can have 7990-resident files and is updated by the SSLABEL, SSMOVE, SSVAL, and SSDEBUG utilities. When PFDUMP copies permanent files to tape for a master device or all devices in a family, it ensures that corresponding 7990 catalogs are also dumped. (If SSEXEC has a 7990 catalog attached in modify mode, PFDUMP interfaces with SSEXEC so that the 7990 catalog is included on the dump tape. While PFDUMP is accessing the 7990 catalog, any file destage requests for that subfamily are delayed.) Consequently, if PFLOAD is used to reload all files, the 7990 catalogs are automatically recovered and entries for all 7990-resident files reflected in recovered PFC entries will exist in the recovered 7990 catalog.

If PFLOAD is run after the SSLABEL utility has updated the 7990 catalog and SM map but before the 7990 catalog has been backed up, the recovered 7990 catalog will not match exactly the corresponding SM map. In this case, recovery procedures (as described in 7990 Catalog/SM Map Mismatch later in this section) must be taken to bring the SM map, 7990 catalog, and cartridge label information into agreement.

## **File Reloading**

PFLOAD runs should be made as usual. PFLOAD reads the CIR records from the most recent incremental dump tape to control loading of file data and PFC and permit information. For 7990-resident only files, PFLOAD reloads only the PFC and permit information (if PFDUMP dumped only this information). The following situations involve PFLOAD in an MSAS environment.

- If one device needs to be reloaded, the DN or TD parameter specifies the device. The OP=Z and UD parameters should not be specified.
- If PFLOAD is used for other than a device recovery, both OP=Z and UD should be specified. The OP=Z parameter ensures that the PFC entry does not link to a 7990 file that may no longer exist, and UD ensures that the file is included in the next incremental or full dump.
- If a file has a nonzero as a value in its PFC entry (indicating that the file has a 7990 image), the SSCVER flag in the PFC entry will be set when the PFC and permit information are reloaded. If the file is successfully staged to disk when it is attached, this flag is cleared. Otherwise, the flag remains set. This can be used to indicate the possibility of an operational error, such as omitting OP=Z when a file or set of files is reloaded from an obsolete dump tape.
- If any unscheduled device reload that includes recovery of a 7990 catalog and/or SM map is made, SSVAL should be run with the AM and FM parameters specified. SSVAL examines the PFC entries for 7990-resident files, the 7990 catalog, and the SM map to detect any error conditions that exist.

## ERROR CONDITIONS AND CORRECTIVE ACTIONS

It is possible for operational, hardware, or software malfunctions to cause a variety of error conditions to exist or appear to exist in the 7990 catalogs, SM maps, PFC entries, or cartridge labels. The SSVAL utility can analyze the 7990 catalogs, SM maps, and PFC entries to detect these errors, and the SSLABEL utility can identify problems with cartridge labels. The following paragraphs describe some specific error conditions and the actions that should be taken to correct them. Most of the errors are caused either by incorrect operational procedures that result in the recovery of the wrong version of an MSAS system file, or by abnormal termination of SSEXEC or MSAS utility processing, which can interrupt the updating of an MSAS system file.

## **Clearing Permanent File Error Flags**

The permanent file error flags that have been set by SSEXEC in the PFC can be cleared by the CE parameter of the CHANGE command. The job must be of system origin.

## Permanent File Recovery

If a permanent file cannot be accessed or is included by SSVAL on the validation report, try the following procedures to recover a copy of the file.

- 1. Attach the file. If the file has a disk image or can be staged in from 7990, the file data will be available on disk and can be copied to another file. SSVAL should then be run as described in step 2.
- 2. If the file cannot be attached, reload the file from a dump tape using PFLOAD with OP=Z. To identify the PFDUMP run that saved a backup copy of the file, check the output from SSVAL or PFCAT, which includes date and time fields from the PFC entry for the file. Depending on the BR attribute (backup requirement) of the file, a backup copy on a dump tape may not exist.

If the file can be reloaded to disk, SSVAL should be run as follows:

SSVAL, FM=familyname, SB=subfamily, FX=n, AM.

familyname and subfamily identify the family and subfamily of the recovered file and n is sufficiently large that the fixing/flagging will be done. SSVAL sets the obsolete flag in the PFC entry because the file now has a disk image; thus the file is disassociated from the error condition. The error condition may still exist in the 7990 catalog or SM map, but you can analize and then correct the error by using the SSDEBUG utility. Before using SSDEBUG to correct the error, you should take an incremental dump so the old PFC entry with an asa value pointing to a problem 7990-resident file will not be reloaded if a device reload occurs before the next scheduled backup dump.

- 3. If steps 1 and 2 fail, try to regenerate the file. Depending on the particular problem and status of the cartridges to which the file was destaged, the OP=RF or OP=RS directive to SSDEBUG might recover the file data.
- 4. If the file cannot be recovered, purge it so there is no PFC entry pointing to a problem 7990-resident file.

#### Cartridge Restoration and Reuse

If a cartridge is unexpectedly found anywhere outside its assigned cubicle, follow these steps to restore the cartridge so it can be used again:

- 1. Put the cartridge in the input tray of the SM to which it is assumed to belong and run SSLABEL with the OP=RS directive. If the cartridge label information agrees with the SM map entry for the cubicle with the coordinates (y,z) written on the cartridge label, the cartridge will be restored to that cubicle and the 7990 catalog entry for the cartridge is updated to clear the lost flag. Otherwise, the cartridge is put in the exit tray and the cartridge label information is included in the output from SSLABEL.
- 2. If the cartridge was not restored to its SM cubicle, examine the label information reported by SSLABEL. If the cartridge is assigned to a different SM, repeat step 1 using the correct SM. If the family name is blank, the cartridge has a scratch label and can be assigned normally with the OP=AM directive to SSLABEL.
- 3. If steps 1 and 2 fail, examine the SM map entry for the cubicle with the coordinates (y,z) written on the cartridge label to see how the cubicle is assigned. Examine the cartridge, if any, in this cubicle. Also, it might be useful to run SSVAL to ensure the SM map and 7990 catalog entries for the cartridge match or to identify affected permanent files, if any, if they do not match.
- 4. If step 3 does not produce any useful information and the cartridge cannot be restored, use the OP=FX directive to SSLABEL to rewrite the cartridge label and thereby make a scratch cartridge. It might be useful to first run SSDEBUG with the OP=RS directive to preserve the data on the cartridge.

## **Removal of Faulty or Missing Cartridges**

Follow these steps to remove a cartridge that has unrecoverable errors, or to release the SM map entry for a cartridge that is missing.

For unallocated cartridges:

- 1. Attempt to remove the cartridge with the SSLABEL OP=RM directive.
- 2. If CARTRIDGE NOT FOUND is reported, repeat step 1 specifying the LT parameter.
- 3. If CARTRIDGE NOT EMPTY is reported, at least one AU on the cartridge is still allocated.

For allocated cartridges:

- 1. Use the SSLABEL OP=FC directive to inhibit further allocation of the cartridge.
- 2. Run SSVAL specifying the AM parameter. Examine the report for possible discrepancies between the SM map, 7990 catalog, and PFC entries related to this cartridge.
- 3. If no 7990 catalog entry corresponds to the SM map entry, use the OP=RC directive to SSDEBUG to remove the map entry.
- 4. If no discrepancy is reported by SSVAL, the affected files should be attached in write mode (if possible), reloaded using PFLOAD with the OP=Z parameter, or purged. Then SSVAL release processing should be done to release the 7990 space on the cartridge, and the cartridge can be removed with the SSLABEL OP=RM directive.

## 7990 Catalog/SM Map/PFC Problems

If error conditions exist in the 7990 catalogs or SM maps, the recovery procedure is to correct the appropriate entry rather than reload the entire file. Reloading other than the latest copy of the SM map is not feasible because it can contain entries for several families and these entries would not be up to date. Reloading an old copy of the 7990 catalog is not desirable because any permanent file that was destaged and released from disk since the last incremental dump will be lost. The following paragraphs describe corrective action for specific problems with 7990 catalogs, SM maps, or PFC entries.

#### 7990 Catalog/SM Map Mismatch

The following examples of 7990 catalog/SM map mismatches can appear as error type 1 or 2 on the SSVAL output report, which identifies the mismatch and the permanent files or orphans affected. Before taking any corrective action, the analyst should ensure that operational errors did not result in loading the wrong version of the SM map or 7990 catalog.

- If a cartridge has a 7990 catalog entry indicating that all AUs on the cartridge are available for allocation but is not identified in any SM map entry (type 1 mismatch), use the OP=RL directive to SSDEBUG to remove the 7990 catalog entry for the cartridge.
- If a cartridge is identified in an SM map entry but has no 7990 catalog entry (type 2 mismatch), use the OP=RC directive to SSDEBUG to update the SM map entry to unassigned and empty status. This directive will write a scratch label for the cartridge, if any, and place the cartridge in the exit tray.
- If a cartridge has a 7990 catalog entry indicating that at least one AU on the cartridge is allocated, recover the disk space for the affected permanent file, if any, or purge the file. Run SSVAL to purge unneeded 7990 files and thereby make the cartridge unallocated. Use the OP=RL directive to SSDEBUG to remove the 7990 catalog entry for the cartridge.

NOTE

It sometimes takes two SSVAL/SSDEBUG runs to completely clear up type 1 or type 2 errors. Therefore, it is recommended that SSVAL be rerun with the AM parameter after an SSDEBUG run using OP=RC or OP=RL.

#### 7990 Catalog Chain Problems

AUs that are allocated to a 7990-resident file are chained together in the 7990 catalog to identify the sequence of AUs that contain the file. (Refer to the definition of cartridge earlier in this section.) For most files, the AUs in the chain reside on the same cartridge. Hence, one disk access is sufficient to update information for the entire chain at one time. However, a 7990-resident file can reside on several cartridges, and several disk accesses may be necessary to update its chain. If SSEXEC is interrupted during such an update, the resultant chain will be incomplete. SSVAL identifies incomplete chains as error type 4, 5, or 6 on the validation report. The following are types of incomplete chains.

- If an incomplete chain is produced while a 7990-resident file is being purged, it is a chain fragment (one without an HOC entry).
- If an incomplete chain is produced while a file is being destaged to 7990, it is an ill-formed chain (one without an EOC entry).
- If an ill-formed chain is not corrected, the AU that should have been linked to it may be reused and become part of a good chain. Although the ill-formed chain may appear to be complete, the ill-formed chain and the good chain are intersecting.

The corrective action for any of these bad chain conditions is:

- 1. Run SSVAL with the FM parameter specified and use a sufficiently large FX=n value so that SSVAL updates the 7990 catalog entries affected by the problem chains.
- Recover the permanent files, if any, that have 7990 images potentially affected by these error conditions. (The SSVAL report identifies these files.) Use the procedure described under Permanent File Recovery earlier in this section.
- 3. Take an incremental or full backup dump. This prevents PFC entries with inaccurate as a values or problem 7990 chains from being recovered if a device reload is necessary.
- 4. Run SSDEBUG with the OP=RP directive to make each AU on the problem chain available for allocation. Thus, the AUs can be included in a new chain without any problems. In the case of intersecting chains, all chains that have an AU in common with another chain should be released before any further destage attempts; otherwise, errors will occur when a user tries to attach a file that is contained on an intersecting chain.

#### PFC/7990 Catalog Mismatch

It is possible that an old version of a 7990 catalog can be reloaded because of incorrect operational procedures. If so, the asa value in the PFC entry for a file can be invalid according to the obsolete 7990 catalog or can point to a problem chain. If the correct version of the 7990 catalog is available on tape, it should be reloaded. If it is not available, the following action is appropriate. If the file also has a disk image, SSVAL should be run to clear the asa field in the PFC entry. If there is no disk image, the analyst should reload the file from tape, if possible, and then run SSVAL to clear the asa value.

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# INTRODUCTION

The MSF hardware product is a large-capacity online mass storage device, which is a costeffective extension to the disk file storage system and an alternative to conventional magnetic tape storage. Storing files on MSF retains the security, data integrity, and online access capabilities provided by disk and reduces the operational and data integrity problems caused by storing, retrieving, and mounting tape volumes. You can use both MSF and magnetic tapes to protect files from hardware and system failures.

MSF is composed of the following components.

| Component | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cartridge | A plastic housing that encloses 2540 mm (100 in) of magnetic tape on which data is stored under program control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Coupler   | The interface between the peripheral processor (PP) and the mass<br>storage adapter (MSA), which includes a buffer that contains data<br>going to or coming from the mass storage transport.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| CSU       | Cartridge storage unit (CSU), which includes storage cells<br>(cubicles) for 2052 cartridges <sup>†</sup> and a selector that moves cartridges<br>among the mass storage transport, the cubicles, and the input/output<br>(I/O) drawers of the CSU. Each CSU has two I/O drawers; the top one<br>is the input drawer and the bottom one is the output drawer. Each<br>drawer has eight vertically aligned drawer slots, numbered from O<br>(top slot) to 7 (bottom slot). There can be up to 13 CSUs in an MSS<br>configuration. Each CSU in a configuration is associated with a<br>letter from A to M, which is the CSU identifier. |
| MSA       | Mass storage adapter, which interfaces between the coupler and the mass storage transport or the CSU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| MST       | Mass storage transport, which includes storage positions for five<br>cartridges: one being read or written, two queued for reading or<br>writing, and two queued for storage by the selector into the CSU.                                                                                                                                                                                                                                                                                                                                                                                                                            |

The MSS is the product consisting of the MSF hardware, the CYBER coupler, the diagnostics, and the operational software. The basic function of MSS is to store data on MSF and move it to disk upon request for access by an authorized user. Control of file movement between disk and MSF is transparent to the applications programmer; however, there are operational changes and additions that site personnel should note. These include modifications to operational procedures in the areas of permanent file backup, permanent file recovery, and disk space management. In addition, new MSS utilities are introduced.

<sup>&</sup>lt;sup>†</sup>2000 cartridges are available for file data storage and the rest are reserved for customer engineer and system use.

Detailed information about the call and operation of each MSS utility is included in this section.

| <b>Utility</b> | Description                                                                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASDEF          | Creates the system files (CSU maps and MSF catalogs) necessary for MSS processing.                                                                           |
| ASLABEL        | Manages allocation of cubicles and assignment of cartridges in the CSU.                                                                                      |
| ASMOVE         | Controls the destaging of files (creating MSF images) and the release of disk space.                                                                         |
| ASVAL          | Controls the release of MSF space and analyzes the CSU maps, MSF catalogs, and PFC entries to identify and flag discrepancies within these three components. |
| ASUSE          | Provides reports on the assignment and availability of cartridges and cubicles within a CSU.                                                                 |
| ASDEBUG        | Corrects error conditions detected by ASVAL and recovers data from MSF cartridges.                                                                           |

## UTILITY DESCRIPTION TERMINOLOGY

Review the following terms; they are defined as used in the descriptions of the MSAS utilities later in this section.

#### Cartridge

A cartridge is the MSS data storage component consisting of 16 streams, called allocation units (AUs). Streams that have data written on them (allocated streams) are chained together in the MSF catalog (definition following) to identify the sequence of streams that must be accessed in order to read a file on MSF. A head-of-chain (HOC) flag identifies the first AU in the chain, a link field identifies the next AU in the chain, and an end-of-chain (EOC) flag identifies the last AU in the chain.

The cartridge label contains information that characterizes one of the three types of cartridges that can be used in an MSS environment. Cartridges having label types other than the following cannot be processed by MSS except by the ASLABEL utility, which can rewrite the cartridge label, or by the ASDEBUG utility, which can write the data on the cartridge to a permanent file.

- A manufacturer's label contains the volume serial number (vsn) of the cartridge in a machine-readable format. A cartridge with a manufacturer's label can be added to a CSU and assigned to a subfamily or pool (refer to the ASLABEL utility later in this section).
- A scratch label contains the vsn of the cartridge and additional system information indicating that the cartridge is available for assignment by the ASLABEL utility. A scratch label also contains the usage record of the cartridge. A cartridge with a scratch label is called a scratch cartridge.
- A family label contains the vsn of the cartridge and additional system information indicating that the cartridge is assigned to a particular subfamily. It also indicates the CSU identifier and the coordinates x and y of the cubicle where the cartridge resides when it is not in use.

The addition, removal, and reassignment of cartridges are managed by the MSS utilities. The cartridge labels, and also the MSF catalogs and CSU maps (definitions following), contain information concerning the location and content of the cartridges. When a cartridge is labeled and assigned to a subfamily, a label is written on each stream of the cartridge, which contains the cartridge vsn, the CSU id, x and y coordinates, family, and subfamily to which it was assigned, and the stream number of the particular stream. If such a cartridge is accessed for relabeling or for reading or writing an MSF file, the stream label verification procedure is used to verify this stream label information against the data in the MSF catalogs and CSU maps. If a discrepancy is detected, an error message is issued and corrective action must be taken to update the cartridge labels and/or system files as described in a later section. Whenever the cartridge location or content is changed, the cartridge. The descriptions of the MSS utilities later in this section contain further information on cartridge management.

# CSU Map

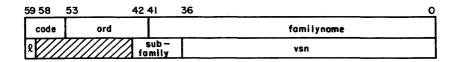
A CSU map is a direct access permanent file that contains information indicating how cubicles in a CSU are assigned to a family and identifying the cartridges that reside in the CSU. There is one CSU map for each CSU in the configuration. The permanent file name of the CSU map is CSMAPi, where i is the CSU identifier (a letter from A to M); its user index is 377760<sub>8</sub>; and its family is the default family on the mainframe on which MSSEXEC executes (refer to the definition of MSSEXEC later in this section).

A CSU map contains an entry for each possible coordinate pair (x,y) that identifies a cubicle in the CSU, from (0,0), which is bottom right, to (57,36), which is upper left. There are no cubicles at the positions where x=30 or y=18, but there are entries in the CSU map for such coordinate pairs and these entries indicate that no cubicle exists there. Thirty-one cubicles are reserved for customer engineer use; they have these coordinates: (57,36), (0,36), (57,0), and (26 through 0,0). Twenty-one cubicles are reserved for system use; they have these coordinates: (48 through 31,0), (29,0), (28,0), and (27,0). In all, there are 2146 entries in a CSU map and they are ordered (assigned a map entry ordinal) according to the positions in the CSU of the corresponding cubicles. That is, the following scheme is used to relate the coordinate pairs (x,y) and the map entry ordinals.

- Given the coordinates x and y, the ordinal is 2146-x-(y\*58).
- Given the ordinal, y is the whole number quotient of (2146-ordinal)/58 and x is the remainder.
- Ordinal 0 does not represent a coordinate pair; it is used as a map header entry.

Thus, in a CSU map the zero entry is the map header entry; the first entry describes the cubicle at coordinates (57,36); the second entry describes the cubicle at coordinates (56,36); and so forth.

Each entry in a CSU map has this format:



| <u>Field</u> | Description                                                                                                                                                                                                                                           |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| code         | Number from 1 to 7 indicating how the cubicle is assigned.                                                                                                                                                                                            |
|              | code Description                                                                                                                                                                                                                                      |
|              | 1 Reserved for customer engineer.                                                                                                                                                                                                                     |
|              | 2 Reserved for system use.                                                                                                                                                                                                                            |
|              | 3 Reserved for a different CSU map.                                                                                                                                                                                                                   |
|              | 4 Assigned to the cartridge scratch pool. <sup>†</sup>                                                                                                                                                                                                |
|              | 5 Assigned to a subfamily.                                                                                                                                                                                                                            |
|              | 6 Unassigned.                                                                                                                                                                                                                                         |
|              | 7 No cubicle exists at these coordinates $(x=30 \text{ or } y=18)$ .                                                                                                                                                                                  |
| ord          | Ordinal for this cubicle in the MSF catalog of the subfamily to<br>which the cubicle is assigned. This ordinal is referred to as the<br>FCT ordinal (refer to the definition of MSF catalog later, next).<br>This field is meaningful only if code=5. |
| familyname   | The 7-character name, in 6-bit display code, of the family to which the cubicle is assigned. This field is meaningful only if code=5.                                                                                                                 |
| ٤            | Linkage error flag that is set by the ASVAL utility when a CSU map<br>entry of a cubicle assigned to a family has no corresponding entry<br>in the MSF catalog.                                                                                       |
| subfamily    | Number from 0 to 7 identifying the subfamily to which the cubicle is assigned. This field is meaningful only if code=5.                                                                                                                               |
| vsn          | The 6-character volume serial number of the cartridge assigned to the cubicle. If no cartridge is assigned, this field contains spaces.                                                                                                               |
|              |                                                                                                                                                                                                                                                       |

The zero entry in the CSU map is the map header entry. In this entry the code field is 7, the leftmost 6 bits of the second word contain the CSU identifier, and the remaining bits are unused.

The CSU map is updated whenever the ASLABEL, ASVAL, or ASDEBUG utility causes a change in cubicle or cartridge assignment. It is recommended that the CSU map be backed up after every update to avoid problems such as:

- Mismatches between CSU map and MSF catalog entries.
- Lost CSU maps because of a disk failure or other problem.
- Attempts to access cartridges that are no longer available.
- Attempts to store cartridges in cubicles that are no longer empty.

<sup>&</sup>lt;sup>†</sup>The pool is an area of the CSU that stores scratch cartridges that are managed by the ASLABEL utility.

Thus, you should make a copy of the CSU map on tape or another device or family in order to retain the latest version of the CSU map. If a device containing CSU maps is reloaded, the latest version of the CSU maps should be recovered from the backup copy after the reload is completed. After recovering the CSU maps, the analyst should run the ASVAL utility to check that the entries in the CSU maps and MSF catalogs match. If there are inconsistencies, corrective action should be taken as described under Error Conditions and Corrective Actions later in this section.

## **MSF** Catalog

An MSF catalog is a disk-resident direct access permanent file that contains information describing which streams of each cartridge assigned to a particular subfamily are allocated to MSF files and which streams are available for allocation. There is one MSF catalog for each subfamily of a family that can have MSF-resident files, and it resides on the master device for the subfamily. The permanent file name of the MSF catalog file is MSFCATi and its user index is 3777618, where i is the subfamily identifier (a number from 0 to 7). For example, file MSFCAT3 and user index 3777638 identify the MSF catalog for subfamily 3.

An MSF catalog is partitioned into subcatalogs, one subcatalog for each CSU used by the subfamily. The maximum number of subcatalogs in an MSF catalog is 13 (the maximum number of CSUs in a configuration). Each subcatalog consists of two parts: the file and cartridge table (FCT) and the available stream table (AST). The FCT has an entry for each cubicle assigned to the subfamily from the given CSU. The maximum number of FCT entries in a subcatalog is 2000 (the maximum number of user cartridges in a CSU). The AST contains information used by the allocation algorithm to select the cartridges on which a file will reside.

The first part of the MSF catalog contains a header and at most 13 subcatalog entries. The header identifies the family and subfamily of the MSF catalog. Each subcatalog entry contains the length and location of its FCT and AST, the CSU identifier, unallocated stream count, and date of the last ASVAL run that resulted in the releasing of MSF space assigned to the particular CSU or the setting of flags in entries for cubicles in the CSU. The format of the header is:

| i9 |            | 17 11          |        |
|----|------------|----------------|--------|
|    | familyname | sub-<br>family | unused |
|    | unused     |                |        |

Field

Description

familyname

The 7-character name in 6-bit display code of the family for this MSF catalog.

subfamily Number from 0 to 7 identifying the subfamily for this MSF catalog.

# The format of the subcatalog entry is:

| 59        | 53     | 41                                                                                                                                                                                 | 35  | 29      | 17       | 0   |
|-----------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------|----------|-----|
| id        | length | FCT                                                                                                                                                                                | loc | AST loc | streams  |     |
|           | unused |                                                                                                                                                                                    |     | date    | time     |     |
| Field     |        |                                                                                                                                                                                    |     |         | Descript | ion |
| id        |        | CSU identifier for the subcatalog (a letter from A to M).                                                                                                                          |     |         |          |     |
| length    |        | Number of FCT (and AST) entries in the subcatalog.                                                                                                                                 |     |         |          |     |
| FCT loc   |        | Location (beginning PRU number) of the FCT.                                                                                                                                        |     |         |          |     |
| AST loc   |        | Location (beginning PRU number) of the AST.                                                                                                                                        |     |         |          |     |
| streams   |        | Number of unallocated streams for this subcatalog.                                                                                                                                 |     |         |          |     |
| date time | :      | Date and time of the last releasing of orphan files on the CSU<br>identified by id, or the last time flags were set for cartridges or<br>cubicles in the CSU (whichever is later). |     |         |          |     |

The header and subcatalog information is arranged in this order:

- 1. First word of the header.
- 2. First word of each of the subcatalog entries.
- 3. Second word of the header.
- 4. Second word of each of the subcatalog entries.

Each cubicle from the given CSU assigned to the subfamily has an entry in the FCT of the subcatalog. This entry contains the coordinates (x,y) of the assigned cubicle. If a cartridge has been assigned to the cubicle, the FCT entry also contains the vsn of the cartridge, usage information, status flags, and information about each of the 16 streams of the assigned cartridge. The format of each FCT entry is:

| 57         | 53                                        | 47                                                                     | 41                                                                                                                                                                           | 35 33                                                                                                                                                                                            | 29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20                                                                                                                                                                                                                                                               | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|-------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bps        | flags <sub>1</sub>                        | x                                                                      | у                                                                                                                                                                            |                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | vsn                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| used       | link                                      | 1                                                                      |                                                                                                                                                                              | load thre                                                                                                                                                                                        | sholo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | load count                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| used       | link                                      | 2                                                                      |                                                                                                                                                                              | pass thre                                                                                                                                                                                        | iss threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | pass count                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| used       | link                                      | 3_                                                                     | error threshold                                                                                                                                                              |                                                                                                                                                                                                  | error threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | error count                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ۲ <b>۱</b> | ×2                                        | ×з                                                                     |                                                                                                                                                                              | unused                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | nused                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1          | У2                                        | УЗ                                                                     |                                                                                                                                                                              |                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | u                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | nused                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            |                                           |                                                                        | res                                                                                                                                                                          | erved fo                                                                                                                                                                                         | r si                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ie (2 w                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | vords)                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1          | pru                                       |                                                                        | flags 2                                                                                                                                                                      | chair                                                                                                                                                                                            | ı u                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | stream <sub>1</sub> detail                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            |                                           |                                                                        |                                                                                                                                                                              |                                                                                                                                                                                                  | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            |                                           | <u> </u>                                                               | reser                                                                                                                                                                        | ved for                                                                                                                                                                                          | CDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (8 wor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ds)                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | bps<br>used<br>used<br>used<br>(1)<br>(1) | ops flags <sub>1</sub><br>used link<br>used link<br>used link<br>(1 ×2 | pps flags <sub>1</sub> x<br>used link <sub>2</sub><br>used link <sub>3</sub><br>x <sub>1</sub> x <sub>2</sub> x <sub>3</sub><br>y <sub>1</sub> y <sub>2</sub> y <sub>3</sub> | ops     flags1     x     y       used     link1     used       used     link2     used       used     link3     used       1     X2     X3       Y1     Y2     Y3       res       pru     flags2 | transmission     transmission       transmission | pps     flags1     x     y       used     link1     load threshold       used     link2     pass threshold       used     link3     error threshold       used     used     link3       used     link3     error threshold       used     used     link3       used     used     link3       used     used     link3 | pps     flags1     x     y       used     link1     load threshold       used     link2     pass threshold       used     link3     error threshold       used     link3     used       1     ¥2     ¥3       used     y2     ¥3       used     flags2     chain | transmission     transmission       transmission |

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                   |  |  |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| bps               | Number of blocks per stream on the cartridge assigned to this cubicle.                                                                                                                                                                                                                                                                                                                        |  |  |
| flagsl            | One of the following flags.                                                                                                                                                                                                                                                                                                                                                                   |  |  |
|                   | Bit Description                                                                                                                                                                                                                                                                                                                                                                               |  |  |
|                   | 53 Inhibit allocation flag indicating that space from the<br>cartridge assigned to this cubicle is not to be allocated<br>to a file. This flag is set by a directive to the<br>ASLABEL utility.                                                                                                                                                                                               |  |  |
|                   | 52 Lost cartridge flag indicating that the cartridge<br>assigned to this cubicle was not there the last time<br>MSSEXEC tried to pick it. This flag can be cleared by a<br>directive to the ASLABEL utility.                                                                                                                                                                                  |  |  |
|                   | 51 Excessive write parity error flag. Space from such a cartridge will not be allocated. This flag can be cleared by a directive to the ASDEBUG utility.                                                                                                                                                                                                                                      |  |  |
|                   | 50 Reserved.                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
|                   | 49 Linkage error flag indicating that the CSU map entry for<br>the location (x,y) is inconsistent with this FCT entry.                                                                                                                                                                                                                                                                        |  |  |
|                   | 48 Reserved.                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
| x                 | x coordinate of this cubicle.                                                                                                                                                                                                                                                                                                                                                                 |  |  |
| у                 | y coordinate of this cubicle.                                                                                                                                                                                                                                                                                                                                                                 |  |  |
| vsn               | The 6-character volume serial number of the cartridge assigned to this cubicle. If no cartridge is assigned, this field contains spaces.                                                                                                                                                                                                                                                      |  |  |
| link <sub>i</sub> | Ordinal of the FCT entry for the cubicle containing the next car-<br>tridge n which the file on the cartridge assigned to this cubicle<br>resides. If a file does reside on multiple cartridges, the entire<br>file must be contained in one CSU. Also, since there are only three<br>link fields, if a cartridge contains several files, only three can be<br>contained on other cartridges. |  |  |
| load threshold    | If the number of loads of the cartridge exceeds this threshold value, streams from this cartridge will not be allocated to new files.                                                                                                                                                                                                                                                         |  |  |
| load count        | Number of times the cartridge assigned to this cubicle has been loaded to a mass storage transport read/write station.                                                                                                                                                                                                                                                                        |  |  |
| pass threshold    | If the number of passes across the read/write heads exceeds this threshold value, streams from this cartridge will not be allocated to new files.                                                                                                                                                                                                                                             |  |  |
| pass count        | Number of times the cartridge assigned to this cubicle has been passed across a read/write head.                                                                                                                                                                                                                                                                                              |  |  |
| error threshold   | If the number of errors recorded exceeds this threshold value, streams from this cartridge will not be allocated to new files.                                                                                                                                                                                                                                                                |  |  |

# Description

| Field              | Description                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
|--------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| error count        | Number of recov<br>cubicle.                    | vered read errors for the cartridge assigned to this                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |
| <sup>x</sup> i     | x coordinate of<br>the link <sub>i</sub> field | the cubicle in which the cartridge referred to by resides.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| yi                 | y coordinate of<br>the link <sub>i</sub> field | the cubicle in which the cartridge referred to by resides.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| u                  | Unused.                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
| pru                | Number of PRUs                                 | on the stream.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
| flags <sub>2</sub> | One of the following flags.                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
|                    | Bit(s)                                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |
|                    | 47                                             | Start of fragment flag; set by the ASVAL utility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
|                    | 46                                             | Frozen chain flag indicating a problem with this<br>allocation chain. Streams in this chain are not<br>reused until a directive to the ASDEBUG utility<br>clears the flag.                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
|                    | 45                                             | Stream conflict flag indicating an allocation con-<br>flict involving this stream. This flag is set by<br>the ASVAL utility or by MSSEXEC.                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
|                    | 44                                             | Stream selected flag indicating that the allocation<br>routine has selected this stream but the file data<br>has not yet been written on the stream. This field<br>is meaningful only if the free/busy flag indicates<br>that the stream is free.                                                                                                                                                                                                                                                                                                                  |  |  |
|                    | 43                                             | Free/busy flag indicating whether or not this stream is currently allocated to a file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |
|                    | 42                                             | Reserved.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |
|                    | 41-40                                          | Off-cartridge link flag indicating that the next stream of the file is on another cartridge. The next cartridge is identified by one of the link <sub>i</sub> fields. The value of the off-cartridge link flag $(1, 2, \text{ or } 3)$ specifies which link <sub>i</sub> to use. The chain field specifies the stream number on the next cartridge. Only 3 of the 16 streams of a cartridge can have this flag set at any one time. This field is meaningful only if the chain control field indicates that this stream is the first or middle stream of the file. |  |  |
|                    | 39-38                                          | Unused.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |
|                    | 37-36                                          | Chain control indicating whether the stream is a<br>first (1), last (2), only (3), or middle (0) stream<br>of the file. This field is meaningful only if the<br>stream is allocated to a file.                                                                                                                                                                                                                                                                                                                                                                     |  |  |

35-34 Unused.

60459300 D

| Field                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| chain                      | Next stream number, if any, containing file data for the file. This field is meaningful only if the stream is allocated to a file.                                                                                                                                                                                                                                                                                                                   |
| stream <sub>l</sub> detail | PRU, flag, and chain control information about stream 1. The upper<br>30 bits of this word contain information about stream 0. The lower<br>30 bits are divided into the same fields, and contain information<br>about stream 1. The next seven words are divided similarly: the<br>upper 30 bits contain information about stream 2, 4, 6, 8, 10, 12,<br>or 14 and the lower 30 bits contain information about stream 3, 5,<br>7, 9, 11, 13, or 15. |

The MSF catalog is updated whenever the ASLABEL, ASMOVE, ASVAL, or ASDEBUG utility causes a change in cartridge or cubicle assignment that affects the subfamily. Because the MSF catalog for a subfamily resides on its master device, it will be backed up by PFDUMP whenever the master device for the subfamily is dumped. Consequently, when PFLOAD reloads all files, the MSF catalogs are automatically recovered and all MSF-resident files as indicated in a recovered PFC will also have entries in the recovered MSF catalog. Thus, no special operational procedures are needed to back up an MSF catalog. It is possible, however, that the MSF catalog will be inconsistent with the CSU maps or cartridge labels. If such inconsistencies do exist, corrective action will have to be taken as described under Error Conditions and Corrective Actions later in this section.

#### **MSF** Files

In an MSS environment, permanent files can be categorized according to whether or not they reside on MSF. A disk file is a permanent file that resides on disk but not on MSF. An MSF file is a permanent file that resides on MSF and may or may not also reside on disk, depending on how the disk space is managed (refer to Disk Space Management later in this section). Depending on backup requirements (BR parameters), both disk and MSF files can also have backup images on tape (refer to the NOS 2 Reference Set, Volume 3).

When a user defines a direct access file, initially it is a disk file. A disk file becomes an MSF file when it is destaged to MSF; that is, an image of the file is created on MSF. You can destage files through the ASMOVE utility, which is run periodically to manage disk space. When ASMOVE is run, files are destaged to MSF and/or their disk space released depending on certain file characteristics (refer to ASMOVE later in this section). Thus, after an ASMOVE run a file can reside on disk, on MSF, or on both. If the file does have an MSF image, the asa field in the PFC entry for the file indicates the location of the MSF copy. The obsolete (AFOBS) flag in the PFC entry indicates whether or not the MSF image is a current version of the file.

When a user attaches an MSF file, it is staged to disk from MSF (that is, a disk image is created) if the current version of the file is not on disk. If the file is attached in write mode, the MSF image is marked obsolete; that is, the AFOBS flag in the PFC entry for the file is set. This is because the disk image is immediately updated when the user makes changes to the file, but the MSF image is not updated until the ASMOVE utility is run again. Hence, the current version of the file resides on disk only. Setting the AFOBS flag ensures that the current version of the file will be copied to MSF and will replace the obsolete MSF file the next time ASMOVE is run. When a user attaches a file, however, it is always the current version of the file that the user accesses; an obsolete file cannot be accessed.

If the file is purged, its disk space, but not its MSF space, is immediately released. The ASVAL utility must be run to release MSF space allocated to purged files. Thus, because a purged file has no PFC entry linking to its MSF catalog entry, the MSF image that still exists before ASVAL is run is called an orphan file. However, a user can never access an orphan file.

When a file is destaged to MSF, information is written on each stream to which the file data is written. This information includes the file's creation date and time and user index from the PFC entry, the identity of the first stream to which the file is written, the identity of the stream immediately preceding this one, and the number of disk PRUs of data recorded on previous streams (for all but the first stream of multistream files).

When a file is staged back to disk, the file label verification procedure is used to verify this file label information against the stream label information (refer to the definition of cartridge earlier in this section) for each stream of the file. If a discrepancy is detected, an error message is issued, the file stage is aborted, an error flag is set in the PFC entry to indicate that the MSF file could not be accessed, and the stream conflict error flag is set in the MSF catalog entry for the particular cartridge(s) and stream(s).

## MSSEXEC

MSSEXEC is the main processing program that is responsible for controlling MSS activities. The MSS utilities issue requests to MSSEXEC to destage files from disk to MSF, purge unneeded MSF files, label or relabel cartridges, update CSU maps and MSF catalogs, and so forth. In a multimainframe environment, two versions of this program exist: the mainframe to which the MSF device is physically connected (the master mainframe) has a program called MSSEXEC, and all other mainframes (the slave mainframes) have a program called MSSELV. Refer to section 13, Multimainframe Operations, for more information.

## Subfamily

Each permanent file family consists of eight subfamilies, subfamily 0 through subfamily 7. The lower 3 bits of the user index identify the subfamily to which a user belongs. For example, a user whose index ends in 3 (or 011 in bit notation) belongs to subfamily 3. When the ASDEF utility is run to create MSS system files, the CSU maps are created under user index 377760g (subfamily 0) and one MSF catalog is created under each user index 377761g (subfamily i), i=0,1,2,...,7. When the ASLABEL utility is used to assign a CSU, cubicle, or cartridge to a family, it is possible to specify assignment to particular subfamilies of the family.

# **MSS UTILITIES**

MSS utilities are described next. All of these utilities must be run from system origin jobs. In a multimainframe environment, the ASDEF and ASUSE utilities can be run on any mainframe that has access to the family being processed. However, the remaining utilities must be run on the mainframe on which MSSEXEC executes.

## ASDEF

ASDEF creates the system files (CSU maps and MSF catalogs) that are necessary for MSS processing. If a CSU is added to the MSF hardware configuration, ASDEF is used to create the CSU map for that CSU. If a family is to be permitted to have MSF-resident files, ASDEF is used to create the eight MSF catalogs for that family (one catalog for each subfamily).

# NOTE

If the CS parameter is specified, ASDEF will create a CSU map for the specified CSU (refer to the definition of CSU map earlier in this section). It is recommended that the CSU map be copied on tape or on another device or family immediately after it is created.

The format of the ASDEF command is:

ASDEF, p1, p2.

| $\frac{p_i}{i}$ | Description                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------|
| CS=id           | CSU identifier of the CSU for which a CSU map is to be created; id is a letter from A to M. |
| CS              | Same as CS=A.                                                                               |
| CS omitted      | No CSU map is to be created. FM=familyname or FM must be specified.                         |
| FM=familyname   | Family for which MSF catalogs are to be created, one catalog for each subfamily.            |
| FM              | Same as FM=system default family.                                                           |
| FM omitted      | No MSF catalogs are to be created. CS=id or CS must be specified.                           |

#### Example:

ASDEF,CS=B.

CSMAPB, the CSU map for CSU B, is created, and its entries are as described in the definition of CSU map earlier in this section. However, since ASDEF does not assign cubicles, the entries for cubicles available for use initially have zeros or spaces in all but the code field, which indicates the cubicles are unassigned.

## ASLABEL

ASLABEL manages cartridge assignment and cubicle allocation in a CSU. The following functions are performed through the use of directives to ASLABEL.

- Add a CSU to a subfamily (AC directive).
- Remove a CSU from a subfamily (RC directive).
- Add cubicles to a subfamily, the pool, or the reserved area (AB directive).
- Remove cubicles from a subfamily, the pool, or the reserved area (RB directive).
- Add cartridges to a subfamily or the pool (AM directive).
- Remove cartridges from a subfamily or the pool (RM directive).
- Restore an abnormally removed cartridge (RS directive).
- Repair a cartridge label or overwrite a family label (FX directive).
- Inhibit or allow further allocation of files to a cartridge (IB directive).

Input to ASLABEL is via a directive file. ASLABEL reads the appropriate CSU maps and MSF catalogs to determine how to process each directive and then issues requests to MSSEXEC to read and/or write cartridge labels and to update the CSU maps and MSF catalogs. ASLABEL generates a report detailing the action taken for each input directive. If the assignment information or cartridge label is not appropriate or conflicts with data in the CSU map or MSF catalog, the cartridge label information is included on this report and the cartridge is put into the output drawer. It may be possible to restore such a cartridge as described under Cartridge Restoration and Reuse later in this section.

## NOTE

ASLABEL updates the CSU map for the specified CSU (refer to the definition of CSU map earlier in this section). It is recommended that the CSU map be copied on tape or on another device or family immediately after each update.

The format of the ASLABEL command is:

ASLABEL, p1, p2.

 Pi
 Description

 I=filename
 File containing the directives to ASLABEL.

 I
 Same as I=COMPILE.

 I omitted
 Same as I=INPUT.

| <sup>p</sup> i | Description                                                                  |
|----------------|------------------------------------------------------------------------------|
| L=filename     | File on which listable output is to be written.                              |
| L              | Same as L=OUTPUT.                                                            |
| L=0            | No output file is to be generated.                                           |
| L omitted      | Same as L=OUTPUT.                                                            |
| Z              | Directives are contained on the ASLABEL command. The I parameter is ignored. |
| Z omitted      | Directives are contained on the file specified by the I parameter.           |

## **ASLABEL** Directives

The directives to ASLABEL can be specified on a separate file (specified by the I parameter) or after the ASLABEL command (Z specified). If on the input file, each directive must be specified on a separate line via the OP=directive option. Parameters for a directive are on the same line, are separated by commas, and end with a period:

OP=directive,p1,p2,...,pn.

Example:

ASLABEL, I=DIRFILE.

DIRFILE is the directive file; it contains the following directives.

OP=AM,N=4,PK=D. OP=RM,V=VSN444,FM,SB=1.

Two directives to ASLABEL are specified. OP=AM adds four cartridges to the pool of CSU A (CS parameter not specified). OP=RM removes the cartridge whose vsn is VSN444 from subfamily 1 of the default family. (Refer to the following descriptions of directives and parameters.)

If the directives are contained on the command, they follow the command terminator. The first character following the terminator is the separator. Any character that does not appear in any of the directives can be used as the separator character. Each directive must be preceded by the separator and terminated by a period.

Example:

ASLABEL,Z./OP=AM,N=4,PK=D./OP=RM,V=VSN444,FM,SB=1.

The slant is used as the separator. This command performs the same functions as those in the preceding example.

The following directives are available with ASLABEL. Some of these directives cause cartridges to be physically moved to and from cubicles and the input or output drawer (refer to OP=AM, OP=RM, OP=RS, and OP=FX). The remaining directives cause only logical operations to occur, updating the MSS system files. Descriptions of the parameters for these directives follow the directives.

#### **OP=PC** - **Add CSUs**

OP=AC adds a CSU to a subfamily. The MSF catalog for the specified subfamily is updated to reflect that cartridges and permanent files for the subfamily can reside on the specified CSU. This directive, however, does not manipulate cartridges or cubicles.

## **OP=RC - Remove CSUs**

OP=RC removes a CSU from a subfamily. The MSF catalog for the specified subfamily is updated to reflect that cartridges and permanent files for the subfamily cannot reside on the specified CSU. Before OP=RC can be specified, all cubicles in the specified CSU must have been removed previously from the family (refer to the OP=RB directive). This directive, however, does not manipulate cartridges or cubicles.

## OP=AB - Add Cubicles

OP=AB adds an unassigned cubicle within a CSU to a subfamily (PT=F), the pool (PT=P), or the reserved area of the CSU (PT=R). More than one cubicle (N=n) can be added at a time. Specific cubicles (XI and YI parameters) can be added, but they must be currently unassigned. For PT=R, XI and YI must be used to add multiple cubicles; N=n is not valid. If cubicles are to be assigned to a subfamily, ASLABEL selects available cubicles closest to the top of the CSU. If cubicles are to be assigned to the pool, ASLABEL selects available cubicles cubicles closest to the bottom of the CSU. The CSU map is updated to reflect the new assignment of cubicles.

#### OP=RB - Remove Cubicles

OP=RB removes an assigned empty cubicle from a subfamily (PK=F), the pool (PK=P), or the reserved area of the CSU (PK=R). More than one cubicle (N=n) can be removed at a time. ASLABEL reads the CSU map and selects the first empty cubicle assigned to the subfamily, pool, or reserved area to be removed. Specific cubicles (XI and YI parameters) can be removed, but they must be empty. The CSU map is updated to reflect that the cubicles are unassigned.

## OP=AM - Add Cartridges

OP=AM adds a cartridge with a manufacturer's label or a scratch label to either a specific subfamily (PT=F) or the pool (PT=P). ASLABEL selects the first empty cubicle assigned to the subfamily or pool as the new location for the cartridge. More than one cartridge (N=n) can be added at a time or a specific cartridge (V=vsn) from the pool can be added to a subfamily. The CSU map, MSF catalog, and cartridge label are updated to reflect the new assignment of the cartridge.

| <u>p</u> i | Description                                                                  |
|------------|------------------------------------------------------------------------------|
| L=filename | File on which listable output is to be written.                              |
| L          | Same as L=OUTPUT.                                                            |
| L=0        | No output file is to be generated.                                           |
| L omitted  | Same as L=OUTPUT.                                                            |
| Z          | Directives are contained on the ASLABEL command. The I parameter is ignored. |
| Z omitted  | Directives are contained on the file specified by the I parameter.           |

## **ASLABEL Directives**

The directives to ASLABEL can be specified on a separate file (specified by the I parameter) or after the ASLABEL command (Z specified). If on the input file, each directive must be specified on a separate line via the OP=directive option. Parameters for a directive are on the same line, are separated by commas, and end with a period:

OP=directive,p1,p2,...,pn.

Example:

ASLABEL, I=DIRFILE.

DIRFILE is the directive file; it contains the following directives.

OP=AM,N=4,PK=D. OP=RM,V=VSN444,FM,SB=1.

Two directives to ASLABEL are specified. OP=AM adds four cartridges to the pool of CSU A (CS parameter not specified). OP=RM removes the cartridge whose vsn is VSN444 from subfamily l of the default family. (Refer to the following descriptions of directives and parameters.)

If the directives are contained on the command, they follow the command terminator. The first character following the terminator is the separator. Any character that does not appear in any of the directives can be used as the separator character. Each directive must be preceded by the separator and terminated by a period.

Example:

ASLABEL,Z./OP=AM,N=4,PK=D./OP=RM,V=VSN444,FM,SB=1.

The slant is used as the separator. This command performs the same functions as those in the preceding example.

The following directives are available with ASLABEL. Some of these directives cause cartridges to be physically moved to and from cubicles and the input or output drawer (refer to OP=AM, OP=RM, OP=RS, and OP=FX). The remaining directives cause only logical operations to occur, updating the MSS system files. Descriptions of the parameters for these directives follow the directives.

#### **OP=PC** - Add CSUs

OP=AC adds a CSU to a subfamily. The MSF catalog for the specified subfamily is updated to reflect that cartridges and permanent files for the subfamily can reside on the specified CSU. This directive, however, does not manipulate cartridges or cubicles.

#### OP=RC - Remove CSUs

OP=RC removes a CSU from a subfamily. The MSF catalog for the specified subfamily is updated to reflect that cartridges and permanent files for the subfamily cannot reside on the specified CSU. Before OP=RC can be specified, all cubicles in the specified CSU must have been removed previously from the family (refer to the OP=RB directive). This directive, however, does not manipulate cartridges or cubicles.

#### **OP=AB - Add Cubicles**

OP=AB adds an unassigned cubicle within a CSU to a subfamily (PT=F), the pool (PT=P), or the reserved area of the CSU (PT=R). More than one cubicle (N=n) can be added at a time. Specific cubicles (XI and YI parameters) can be added, but they must be currently unassigned. For PT=R, XI and YI must be used to add multiple cubicles; N=n is not valid. If cubicles are to be assigned to a subfamily, ASLABEL selects available cubicles closest to the top of the CSU. If cubicles are to be assigned to the pool, ASLABEL selects available cubicles cubicles closest to the bottom of the CSU. The CSU map is updated to reflect the new assignment of cubicles.

#### **OP=RB** - Remove Cubicles

OP=RB removes an assigned empty cubicle from a subfamily (PK=F), the pool (PK=P), or the reserved area of the CSU (PK=R). More than one cubicle (N=n) can be removed at a time. ASLABEL reads the CSU map and selects the first empty cubicle assigned to the subfamily, pool, or reserved area to be removed. Specific cubicles (XI and YI parameters) can be removed, but they must be empty. The CSU map is updated to reflect that the cubicles are unassigned.

#### OP=AM - Add Cartridges

OP=AM adds a cartridge with a manufacturer's label or a scratch label to either a specific subfamily (PT=F) or the pool (PT=P). ASLABEL selects the first empty cubicle assigned to the subfamily or pool as the new location for the cartridge. More than one cartridge (N=n) can be added at a time or a specific cartridge (V=vsn) from the pool can be added to a subfamily. The CSU map, MSF catalog, and cartridge label are updated to reflect the new assignment of the cartridge.

#### OP=RM - Remove Cartridges

OP=RM either removes an empty cartridge from a subfamily (PK=F) and moves the cartridge to the pool (PT=P) or the output drawer (PT=D), or it removes any cartridge from the pool (PK=P) and moves it to the output drawer (PT=D). Any cartridge currently assigned to a subfamily cannot be removed unless it is empty; that is, all 16 streams must be unallocated. More than one cartridge (N=n) can be removed or a specific cartridge (V=vsn) from the pool can be removed to the output drawer. The CSU map, MSF catalog, and cartridge label are updated to reflect the change in location of the cartridge. The removed cartridge then has a scratch label, which allows it to be reassigned via the OP=AM directive.

If the cartridge specified by the V parameter is lost (does not reside in its assigned cubicle), the LT parameter should be specified. This allows the appropriate entries in the CSU map and MSF catalog to be deleted even though the cartridge is not available to have its label updated. If LT is not specified, an error message is issued and ASLABEL aborts.

#### OP=RS - Restore Lost Cartridges

OP=RS restores to its proper cubicle a cartridge that was inadvertently removed from a CSU. If restoration is successful, the lost flag in the MSF catalog is cleared. If data recorded on the cartridge label does not agree with the information in the MSF catalog and the CSU map entry for the cubicle to which the cartridge is to be restored, the cartridge label information is reported and the cartridge is put into the output drawer for use in further processing of the cartridge.

#### OP=FX - Fix Cartridge Labels

OP=FX writes a scratch label on a cartridge and adds the cartridge to the pool. This directive is intended for use when a cartridge label has been destroyed, but the cartridge itself is not physically damaged and can be reused. It can also be used when a cartridge with a family label is to be assigned to a different subfamily via the OP=AM directive, but it is not feasible to first remove the cartridge normally via the OP=RM directive. For example, if ASLABEL is run to add a cartridge to a subfamily, and a system failure occurs before the MSF catalog and CSU map are updated but after the cartridge is relabeled, then the cartridge label does not match the corresponding entries in the MSF catalog and CSU map. Hence, OP=RM cannot be used to remove the cartridge from the subfamily, but OP=FX can be used to rewrite the cartridge label and then OP=AM can be used to add the cartridge to a subfamily. However, if a family label is to be overwritten, the FM and SB parameters must identify the family and subfamily to which the cartridge was assigned. The CSU map and MSF catalog are updated to reflect the new cartridge label.

# OP=IB - Control Cartridge Allocation

OP=IB sets or clears the inhibit allocation flag in the MSF catalog entry for the specific cartridge (V=vsn must be specified). If the flag is set (ON), MSSEXEC does not allocate new MSF files to this cartridge. If the flag is cleared (OF), allocation of files to this cartridge is enabled.

# Parameters for ASLABEL Directives

The descriptions of the parameters to the ASLABEL directives follow. Not all parameters are valid with all directives, as indicated.

| <sup>p</sup> i | Description                                                                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS=id          | CSU identifier of the CSU to be used by ASLABEL; id is a letter from A to M.                                                                                    |
| CS             | Same as CS=A.                                                                                                                                                   |
| CS omitted     | Same as CS=A.                                                                                                                                                   |
| D=d            | Input drawer slot from which ASLABEL picks the cartridge; valid only with OP=AM, OP=RS, or OP=FX.                                                               |
| D              | First nonempty input drawer slot is to be used; valid only with OP=AM, OP=RS, or OP=FX.                                                                         |
| D omitted      | Same as D.                                                                                                                                                      |
| FM=familyname  | Family to which ASLABEL adds or from which it removes a cartridge or CSU. With OP=FX, this parameter specifies the family to which the cartridge was assigned.  |
| FM             | Same as FM=system default family.                                                                                                                               |
| FM omitted     | Same as FM=system default family.                                                                                                                               |
| LT             | CSU map and MSF catalog entries are to be updated, even though the cartridge is lost and its label cannot be updated; valid only with OP=RM.                    |
| LT omitted     | If the cartridge is lost and OP=RM is specified, an error message is issued and ASLABEL aborts.                                                                 |
| N=n            | Number of cartridges or cubicles to be added, removed, or repaired; l $\leq$ n $\leq$ 2000; not valid if PT=R is specified. If V=vsn is specified, n must be l. |
| N              | Same as N=1.                                                                                                                                                    |
| N omitted      | Same as N=1.                                                                                                                                                    |
| OF             | Inhibit allocation flag in the MSF catalog is to be cleared; valid only with OP=IB.                                                                             |
| ON             | Inhibit allocation flag in the MSF catalog is to be set; valid only with OP=IB.                                                                                 |

| <sup>p</sup> i   | Description                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| PK=pkloc         | Location from which the cartridge or cubicle is to be picked; not valid if V=vsn is specified. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|                  | pkloc                                                                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                  | D                                                                                              | Cartridge is to be picked from the specified input<br>drawer slot (D=d). PK=D is valid only with OP=AM,<br>OP=RS, or OP=FX.                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                  | F                                                                                              | Cartridge or cubicle is to be picked from the specified family (FM=familyname) and subfamily (SB=subfamily).<br>PK=F is valid only with OP=RM or OP=RB.                                                                                                                                                                                                                                                                                                                                                                        |  |
|                  | P                                                                                              | Cartridge or cubicle is to be picked from the pool.<br>PK=P is valid only with OP=AM, OP=RM, or OP=RB. PK=P is<br>not valid if PT=P is specified.                                                                                                                                                                                                                                                                                                                                                                              |  |
|                  | R                                                                                              | Cubicle is to be picked from the reserved area of the CSU. PK=R is valid only with OP=RB.                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| РК               | Same as PK=1                                                                                   | P •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| PK omitted       | Same as PK=1                                                                                   | P•                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| PT=ptloc         | Location into which the cartridge or cubicle is to be put.                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|                  |                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|                  | ptloc                                                                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                  | <u>ptloc</u><br>D                                                                              | <u>Description</u><br>Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                  |                                                                                                | Cartridge is to be put into the first available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|                  | D                                                                                              | Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.<br>Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily<br>(SB=subfamily). PT=F is valid only with OP=AM or                                                                                                                                                                                                                                                                      |  |
|                  | D                                                                                              | Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.<br>Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily<br>(SB=subfamily). PT=F is valid only with OP=AM or<br>OP=AB.<br>Cartridge or cubicle is to be put into the pool.<br>PT=P is valid only with OP=AM, OP=RM, or OP=AB.                                                                                                                                                     |  |
| PT               | D<br>F<br>P                                                                                    | Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.<br>Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily<br>(SB=subfamily). PT=F is valid only with OP=AM or<br>OP=AB.<br>Cartridge or cubicle is to be put into the pool.<br>PT=P is valid only with OP=AM, OP=RM, or OP=AB.<br>PT=P is not valid if PK=P is specified.<br>Cubicle is to be put into the reserved area of the<br>CSU. PT=R is valid only with OP=AB.             |  |
| PT<br>PT omitted | D<br>F<br>P<br>R                                                                               | Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.<br>Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily<br>(SB=subfamily). PT=F is valid only with OP=AM or<br>OP=AB.<br>Cartridge or cubicle is to be put into the pool.<br>PT=P is valid only with OP=AM, OP=RM, or OP=AB.<br>PT=P is not valid if PK=P is specified.<br>Cubicle is to be put into the reserved area of the<br>CSU. PT=R is valid only with OP=AB.             |  |
|                  | D<br>F<br>P<br>R<br>Same as PT=)<br>Same as PT=)<br>Subfamily to<br>or CSU; 0 <                | Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.<br>Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily<br>(SB=subfamily). PT=F is valid only with OP=AM or<br>OP=AB.<br>Cartridge or cubicle is to be put into the pool.<br>PT=P is valid only with OP=AM, OP=RM, or OP=AB.<br>PT=P is not valid if PK=P is specified.<br>Cubicle is to be put into the reserved area of the<br>CSU. PT=R is valid only with OP=AB.             |  |
| PT omitted       | D<br>F<br>P<br>R<br>Same as PT=)<br>Same as PT=)<br>Subfamily to<br>or CSU; 0 <                | Cartridge is to be put into the first available<br>output drawer slot. PT=D is valid only with OP=RM.<br>Cartridge or cubicle is to be put into the specified<br>family (FM=familyname) and subfamily<br>(SB=subfamily). PT=F is valid only with OP=AM or<br>OP=AB.<br>Cartridge or cubicle is to be put into the pool.<br>PT=P is valid only with OP=AM, OP=RM, or OP=AB.<br>PT=P is not valid if PK=P is specified.<br>Cubicle is to be put into the reserved area of the<br>CSU. PT=R is valid only with OP=AB.<br>P.<br>P. |  |

| <sup>p</sup> i                                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| V=vsn                                                                          | Volume serial number of the cartridge to be added, removed, or<br>repaired; not valid if PK=pkloc is specified. If V=vsn is<br>specified, n must be l if N=n is specified.                                                                                                                                                                                                                                                                                                         |
| v                                                                              | Volume serial number of the cartridge is not specified.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| V omitted                                                                      | Same as V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| XI=x1                                                                          | Column of the CSU to be added or removed; $0 \le x_1 \le 57$ , $x_1 \ne 30$ ; valid only with OP=AB or OP=RB.                                                                                                                                                                                                                                                                                                                                                                      |
| YI=y1                                                                          | Row of the CSU to be added or removed; $0 \le y_1 \le 36$ , $y_1 \ne 18$ ; valid only with OP=AB or OP=RB.                                                                                                                                                                                                                                                                                                                                                                         |
| XI=x1,YI=y1                                                                    | x and y coordinates of the cubicle to be added or removed;<br>$0 \le x_1 \le 57$ , $0 \le y_1 \le 36$ , $x_1 \ne 30$ , $y_1 \ne 18$ ; valid only with OP=AB or<br>OP=RB.                                                                                                                                                                                                                                                                                                           |
| XI=x <sub>1</sub> ,YI=y <sub>1</sub> ,<br>XF=x <sub>2</sub> ,YF=y <sub>2</sub> | Rectangle of cubicles to be added or removed; cubicles with x coordinates between x1 and x2 and y coordinates between y1 and y2 are included; valid only with OP=AB or OP=RB. At most, 100 cubicles can be included in the rectangle. $x_1, x_2 \leq 57$ , $x_1, x_2 \neq 30$ ; $y_1, y_2 \leq 36$ , $y_1, y_2 \neq 18$ ; $x_1 < x_2$ ; $y_1 < y_2$ . XF and YF must both be specified, if either is specified. XF and YF cannot be specified unless both XI and YI are specified. |
| XI and YI omitted                                                              | With OP=AB, the next available cubicle closest to the top (for<br>assignment to a family) or the bottom (for assignment to the pool)<br>is to be selected. With OP=RB, the first empty assigned cubicle is<br>to be selected.                                                                                                                                                                                                                                                      |

#### ASLABEL Update Sequence

The general result of each directive to ASLABEL is an update of the CSU maps, MSF catalogs, and cartridge labels, whichever are appropriate, to reflect the changes in cartridge, cubicle, or CSU assignment. Because the MSF catalog is a disk-resident permanent file, it will be backed up on a dump tape whenever PFDUMP dumps the master device for its particular subfamily. Thus, it is not necessary for the analyst to back up the MSF catalogs immediately after an ASLABEL run. However, the backup and recovery of CSU maps do require special operational procedures, which should be performed immediately after an ASLABEL run (refer to the definition of CSU map earlier in this section). When ASLABEL is run to change the assignment of a cartridge, the update sequence consists of a series of steps to delete the old assignment information from the MSS system files, relabel the cartridge, and add the new assignment information to the MSS system files. If an interruption such as a system failure, ASLABEL abort, or MSSEXEC abort prevents ASLABEL from completing the update sequence, the location of the affected cartridge and the status of the CSU maps and MSF catalogs depend on the point of interruption, as follows:

- If the cartridge label, MSF catalog, and CSU map do not all match, then the cartridge is put into the output drawer. The OP=RS directive cannot be used to restore the cartridge because of the inconsistency. However, OP=FX can be used to overwrite the cartridge label and add the cartridge to the pool, if the FM and SB parameters specify the family and the subfamily on the cartridge label.
- If the cartridge label, MSF catalog, and CSU map do match, then the cartridge may be returned to its original location, the new location, or the output drawer, depending on the exact point of interruption. If the cartridge is in the output drawer, OP=RS can be used to restore the cartridge to the location indicated on the cartridge label.

Cartridge Restoration and Reuse later in this section describes the procedure for restoring cartridges found in the output drawer.

# **Restrictions to ASLABEL**

The following restrictions apply to the ASLABEL utility.

- MSSEXEC must be running when ASLABEL is run.
- Only one copy of ASLABEL can be run at a time.
- ASLABEL, ASVAL, and ASDEBUG cannot be run at the same time.

### Example

The following output shows the format of an ASLABEL report. The cartridge label information is included on the report because of a mismatch with the CSU map. An error message is issued for the first directive on the command (in this case, the only directive).

ASLABEL REPORT FILE

ASLABEL,Z./OP=RS,PK=D,CS=B.

- 1 OP=RS, PK=D, CS=B.
- 1 OP=RS,PK=D,CS=B.

```
VSN = P66157

FAMILY = SYSTST

SUBFAMILY = 0

CSU = B

X = 2

Y = 6

*** ERROR 8 DIRECTIVE 1

UNEXPECTED CSU, X, Y, FAMILY OR SUBFAM.***
```

# ASMOVE

ASMOVE manages disk and MSF residence. That is, ASMOVE determines which files should be left on disk, which files should be released from disk and moved to MSF, and which files should be resident both on disk and on MSF. The ASVAL utility, not ASMOVE, controls the release of MSF space.

The selection process includes these two algorithms that weigh certain file characteristics as follows:

- Files are selected for destaging to MSF based on file length, time since the last update, and the preferred residence specified by the user.
- Files are selected for release from disk based on time since the last access and the backup requirement specified by the user.

ASMOVE reads the PFC entries for a particular family and calculates release and destage values (refer to Selection Algorithms later in this section) for each file to determine its residence. If a file has both disk and MSF images but is to reside only on MSF, ASMOVE releases the disk space for the file. For files that do not have an MSF image, ASMOVE creates entries on the ASMOVE/MSSEXEC communication file, MOVCOM, to identify the files to be destaged and to specify whether or not the file's disk space is to be released upon completion of the destage. MSSEXEC then processes each destage and destage/release request on MOVCOM.

ASMOVE generates an output report that lists the files released by ASMOVE and the files contained on MOVCOM. A report on the use of disk space before and after the ASMOVE run is included in the output file and the dayfile.

The format of the ASMOVE command is:

```
ASMOVE, p1, p2,..., pn.
```

P<u>i</u> FM=familyname

FM omitted

L=filename

FM

Family to be used by ASMOVE. Same as FM=system default family. Same as FM=system default family. File on which listable output is to be written.

Description

L Same as L=OUTPUT.

L=0 No output file is to be generated.

L omitted Same as L=OUTPUT.

NW No wait. ASMOVE will not wait for completion of destage and release processing by MSSEXEC.

NW omitted ASMOVE will wait for completion of destage and release processing by MSSEXEC.

RD=yymmdd Last access date. All files not accessed after yymmdd are to be released from disk.

| p <sub>i</sub>    | Description                                                                                                                                                                                                                                                                                              |  |  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| RD omitted        | No files are to be released.                                                                                                                                                                                                                                                                             |  |  |
| RO                | Report only. ASMOVE does not release files from disk and does not send requests to MSSEXEC to destage or destage/release files.                                                                                                                                                                          |  |  |
| RO omitted        | Disk space is to be released and requests are to be sent to MSSEXEC, if appropriate.                                                                                                                                                                                                                     |  |  |
| RT=hhmmss         | Last access time. All files not accessed after hhmmss of the day specified by the RD parameter are to be released.                                                                                                                                                                                       |  |  |
| RT                | Same as RT=000000 (midnight).                                                                                                                                                                                                                                                                            |  |  |
| RT omitted        | Same as RT=000000 (midnight).                                                                                                                                                                                                                                                                            |  |  |
| TM=mode           | Selects or deselects test mode (refer to Pseudorelease later in this section).                                                                                                                                                                                                                           |  |  |
|                   | mode Description                                                                                                                                                                                                                                                                                         |  |  |
|                   | Y Select test mode. Pseudorelease of all files selected for release from disk by this ASMOVE run is performed.                                                                                                                                                                                           |  |  |
|                   | N Deselect test mode. The pseudorelease flag is cleared<br>and disk images for all files from the selected family<br>that were previously pseudoreleased are really released<br>from disk. Normal release processing is performed for<br>all files selected for release from disk by this ASMOVE<br>run. |  |  |
| TM omitted        | Normal release processing is to be performed for files that do not<br>have the pseudorelease flag set. Files with the pseudorelease flag<br>set are treated as if they have already been released.                                                                                                       |  |  |
| UI=userindex      | Destage and release processing is restricted to files having user index userindex.                                                                                                                                                                                                                       |  |  |
| U=1U              | All user indexes are processed.                                                                                                                                                                                                                                                                          |  |  |
| <b>UI</b> omitted | All user indexes are processed.                                                                                                                                                                                                                                                                          |  |  |

The following parameters for ASMOVE redefine the values of the weight factors or thresholds (installation parameters) used in the algorithms that select files to be destaged or released. Use these parameters to increase or decrease the importance of certain file characteristics used to determine which files are to be destaged and/or released. For example, specifying a large MN parameter prohibits ASMOVE from selecting small files for destaging to MSF. Unless otherwise stated, each of these parameters causes the installation-defined value to be multiplied by the integer value n; n  $\leq 0$ .

| Parameter  | Description                                                                                                                                                                |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DB=n       | n times the installation-defined DB weight factor is to be used as the preferred residence value for destage decisions involving files with a PR=M attribute. <sup>†</sup> |
| DB         | Same as DB=1.                                                                                                                                                              |
| DB omitted | Same as DB=1.                                                                                                                                                              |
| DC=n       | n times the installation-defined weight factor is to be used as the preferred residence value for destage decisions involving files with a PR=N attribute. <sup>†</sup>    |
| DC         | Same as DC=1.                                                                                                                                                              |
| DC omitted | Same as DC=1.                                                                                                                                                              |
| DL=n       | n times the installation-defined length weight factor is to be used as the length weight factor for destage decisions.                                                     |
| DL         | Same as DL=1.                                                                                                                                                              |
| DL omitted | Same as DL=1.                                                                                                                                                              |
| DT=n       | n times the installation-defined time weight factor is to be used as the time weight factor for destage decisions.                                                         |
| DT         | Same as DT=1.                                                                                                                                                              |
| DT omitted | Same as DT=1.                                                                                                                                                              |
| DV=n       | n times the installation-defined destage control value is to be used as the destage control value.                                                                         |
| DV         | Same as DV=1.                                                                                                                                                              |
| DV omitted | Same as DV=1.                                                                                                                                                              |
| MN=n       | n times the installation-defined minimum length threshold is to be<br>used as the minimum allowable size in disk PRUs (64 words) for MSF<br>files.                         |

<sup>&</sup>lt;sup>†</sup>The file owner specifies the preferred residence attribute via the PR parameter on the DEFINE or CHANGE command (refer to of the NOS 2 Reference Set, Volume 3).

| Parameter  | Description                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|
| MN         | Same as MN=1.                                                                                                                        |
| MN omitted | Same as MN=1.                                                                                                                        |
| MX=n       | n times the installation-defined maximum length threshold is to be<br>used as the maximum allowable size in disk PRUs for MSF files. |
| MX         | Same as MX=1.                                                                                                                        |
| MX omitted | Same as MX=1.                                                                                                                        |

#### **Selection Algorithms**

ASMOVE determines which files to destage and/or release according to the following algorithms. Files that reside only on MSF are not considered because they have been destaged and released previously. Also, indirect access files are excluded from consideration because they cannot reside on MSF. For all other files, ASMOVE checks the file length and excludes from further consideration any file whose length in PRUs is less than the minimum length threshold (refer back to the MN parameter) or greater than the maximum length threshold (refer back to the MX parameter).

If the current image of the file resides on both disk and MSF, ASMOVE uses the release algorithm to determine whether or not to release disk space; the destage algorithm is not used. If the current file resides on disk only, ASMOVE uses the destage algorithm to determine whether or not to destage the file. If the file is to be destaged to MSF, ASMOVE also determines via the release algorithm whether or not to release the file's disk space.

#### Destage Algorithm

The destage algorithm is used to select for destaging certain files that do not have current MSF images. ASMOVE calculates the destage value for each eligible file according to the following equation. If the destage value exceeds the destage control value (refer back to the DV parameter), ASMOVE selects the file for destaging. Otherwise, the file remains on disk only.

destage value = (l+t\*time)\*(l+l\*length)\*(res)

#### Variable

# Description

- t Installation-defined time weight factor.
- time Number of days since the file was last modified.
- l Installation-defined length weight factor.
- length Length of the file in PRUs.
- res Installation-defined preferred residence value. This value depends on whether the file owner specified no preferred residence or MSF residence preferred for the file. Refer back to the DB and DC parameters.

#### Release Algorithm

The release algorithm is used to select files whose disk space is to be released. Any file with a backup required (BR=Y)<sup>†</sup> attribute and whose master device has not been dumped since the file was last modified is not considered for disk space release. The date and time the master device was last dumped was set by the SD parameter on PFDUMP. For all other files, ASMOVE checks the last access date and time in the PFC entry for each file. If the file was last accessed before the date and time specified by the RD and RT parameters, its disk space is to be released. If the file to be released has a current MSF image, ASMOVE releases the disk space. If the file to be released does not have a current MSF image, MSSEXEC creates one before releasing the disk space.

#### Disk Space/Dump Tape Management

As more disk-resident files are created and more MSF-resident files are staged to disk, it will be necessary to monitor the availability of disk space. It is recommended that ASMOVE be used as a periodic disk space management procedure to avoid frequent disk full conditions (refer to Disk Space Management later in this section). ASMOVE can also be used to reduce the amount of data written on dump tapes and thereby avoid maintaining large numbers of dump tapes. This is accomplished by destaging to MSF and/or releasing disk space of files that need not be on the dump tape (refer to Dump Tape Management later in this section).

### Restriction to ASMOVE

Only one copy of ASMOVE per family can be run at a time. A second ASMOVE aborts if the first one has not completed.

#### Example

The following output shows the format of an ASMOVE report. The files that are to be destaged and destaged/released are listed. An account of the disk space and the destage for backup, release date, and release time values is given.

<sup>&</sup>lt;sup>†</sup>The file owner specifies the backup requirement using the BR parameter on the DEFINE or CHANGE command (refer to the NOS 2 Reference Set, Volume 3).

ASMOVE REPORT.

# ASMOVE,FM=SYSTST,L=MOV,RD=791109,RT=085547,MN=1,MX=9999,TM=Y

| FILE            | UI       | LENGTH |           |     |         |
|-----------------|----------|--------|-----------|-----|---------|
| AAAAA           | 172      | 22     | RELEASE   |     | DESTAGE |
| AAAAAJ          | 172      | 22     | RELEASE   |     |         |
| AAAAAAK         | 172      | 7      | RELEASE   |     |         |
| AAAAAAL         | 172      | 29     | RELEASE   |     |         |
| AAAAAAM         | 172      | 41     | RELEASE   |     |         |
| AAAAAAN         | 172      | 50     | RELEASE   |     |         |
| AAAAAA          | 172      | 43     | RELEASE   |     | DESTAGE |
| AAAAAAP         | 172      | 31     | RELEASE   |     |         |
| AAAAAA          | 172      | 27     | RELEASE   |     |         |
| AAAAAAR         | 172      | 34     | RELEASE   |     | DESTAGE |
| AAAAAAS         | 172      | 16     | RELEASE   |     |         |
| DEF0002         | 170      | 78     | RELEASE   |     |         |
| AAAOAAA         | 172      | 19     | RELEASE   |     |         |
| AAAEAAA         | 172      | 17     | RELEASE   |     |         |
| AAAPAAA         | 172      | 20     | RELEASE   |     |         |
| M0V0040         | 170      | 6      | RELEASE   |     |         |
| M0V0005         | 170      | 6      | RELEASE   |     |         |
| DLF0006         | 170      | 4      | RELEASE   |     |         |
| DLF0012         | 170      | 70     | RELEASE   |     |         |
| DMP0012         | 170      | 160    | RELEASE   |     |         |
| RDF0012         | 170      | 59     | RELEASE   |     |         |
| CLF0012         | 170      | 5      | RELEASE   |     |         |
| DWK0013         | 170      | 1065   | RELEASE   |     |         |
| WLF0013         | 170      | 29     | RELEASE   |     |         |
| M0V0014         | 170      | 7      | RELEASE   |     |         |
| DEF0015         | 170      | 692    | RELEASE   | AND |         |
| DLF0017         | 170      | 78     | RELEASE   |     |         |
| CLF0017         | 170      | 5      | RELEASE   |     |         |
| STIMABS         | 170      | 103    | DESTAGE   |     |         |
| GLOSARY         | 172      | 66     | DESTAGE   |     |         |
| AAAVAAA         | 172      | 14     | DESTAGE   |     |         |
| DMP0017         | 170      | 287    | DESTAGE   |     |         |
| RDF0017         | 170      | 59     | DESTAGE   |     |         |
| DWK0018         | 170      | 1089   | DESTAGE   |     |         |
| WLF0018         | 170      | 31     | DESTAGE   |     |         |
| RPT0019         | 170      | 119    | DESTAGE   |     |         |
| M0V0020         | 170      | 8      | DESTAGE   |     |         |
| DLF0021         | 170      | 107    | DESTAGE   |     |         |
| DMP0021         | 170      | 481    | DESTAGE   |     |         |
| RDF0021         | 170      | 60     | DESTAGE   |     |         |
| RPT0022         | 170      | 150    | DESTAGE   |     |         |
| DEF0023         | 170      | 687    | DESTAGE   |     |         |
| AAAXAAA         | 172      | 12     | DESTAGE   |     |         |
| AAAYAAB         | 172      | 13     | DESTAGE   |     |         |
| AAAYAAC         | 172      | 14     | DESTAGE   |     |         |
| ACTPFSPACE BEFO |          |        | 6488      |     |         |
| ACTPFSPACE AFTE | R PROCES | SING = | 3846      |     |         |
| PF SPACE RELEAS |          | =      | 2642      |     |         |
| RELEASE DATE US |          | =      | 82/02/10. |     |         |
| RELEASE TIME US | ED       | =      | 08.55.47. |     |         |

4

# ASVAL

ASVAL either performs release processing or reports on problems with the current MSS system files. That is, it either makes available MSF space presently allocated to files that are no longer needed, or reports on irregularities or discrepancies found in the current MSF catalogs and PFC entries for the specified family and, optionally, in certain CSU maps. The function to be performed is determined by whether or not the RF option is specified, as described in the following paragraphs.

# NOTE

ASVAL updates the CSU map for the specified CSU. (Refer to the definition of CSU map earlier in this section.) It is recommended that the CSU map be copied on tape or on another device or family immediately after every update of the CSU map.

The format of the ASVAL command is:

| ASVAL,p1,p2,,Pn | •                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <sup>p</sup> i  | Description                                                                                                                                            |
| AM              | The CSU map for the CSU specified by the CS parameter is to be analyzed in addition to the MSF catalogs; not valid if RF=filename or RF is specified.  |
| AM=             | Same as AM.                                                                                                                                            |
| AM omitted      | CSU maps are not to be analyzed.                                                                                                                       |
| CS=id           | CSU identifier of the CSU to be used. Up to 13 CSUs can be selected<br>by the letters A through M. For example, CS=ACJG selects CSU A, C,<br>G, and J. |
| CS              | Same as CS=ABCDEFGHIJKLM.                                                                                                                              |
| CS omitted      | Same as CS=ABCDEFGHIJKLM.                                                                                                                              |
| FM=familyname   | Family to be analyzed; not valid if the RF option is specified.                                                                                        |
| FM              | Same as FM=system default family; not valid if the RF option is specified.                                                                             |
| FM omitted      | Same as FM=system default family if the RF option is not specified.<br>The family on the release data file is used if the RF option is specified.      |
| FX=n            | Error threshold. If the total error count is greater than n, neither release processing nor problem fixing is performed.                               |
| FX              | Same as FX=0.                                                                                                                                          |

| <sup>p</sup> i | Description                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FX omitted     | Same as FX=0.                                                                                                                                                                                                                                                                                                                                                                                                      |
| L=filename     | File on which listable output is to be written.                                                                                                                                                                                                                                                                                                                                                                    |
| L              | Same as L=OUTPUT.                                                                                                                                                                                                                                                                                                                                                                                                  |
| L=0            | No output file is to be generated.                                                                                                                                                                                                                                                                                                                                                                                 |
| L omitted      | Same as L=OUTPUT.                                                                                                                                                                                                                                                                                                                                                                                                  |
| RF=filename    | File that contains the release data file.                                                                                                                                                                                                                                                                                                                                                                          |
| RF             | Same as RF=ZZZZRDF.                                                                                                                                                                                                                                                                                                                                                                                                |
| RF omitted     | Current versions of the MSF catalogs are to be analyzed.                                                                                                                                                                                                                                                                                                                                                           |
| RL             | Release processing is to be performed; valid only if the RF parameter is specified.                                                                                                                                                                                                                                                                                                                                |
| RL omitted     | No release processing is to be performed.                                                                                                                                                                                                                                                                                                                                                                          |
| SB=subfamily   | Subfamily to be processed. Up to eight subfamilies can be selected<br>by the numbers 0 through 7. For example, SB=723 selects subfamilies<br>2, 3, and 7.                                                                                                                                                                                                                                                          |
| SB             | Same as SB=01234567.                                                                                                                                                                                                                                                                                                                                                                                               |
| SB omitted     | Same as SB=01234567.                                                                                                                                                                                                                                                                                                                                                                                               |
| ST=n           | Scattered file criterion. Files are indicated as scattered if they<br>are contained on at least n more cartridges than the minimum number<br>needed to contain them. The minimum number of cartridges is the<br>quotient of (number of streams+15)/16; the remainder is ignored.<br>For example, if the file is contained on 100 streams and 10<br>cartridges, it is scattered if n=1 but is not scattered if n=5. |
| ST             | Same as ST=0. That is, files are scattered if they are contained on more than the minimum number of cartridges needed to contain them.                                                                                                                                                                                                                                                                             |
| ST omitted     | Same as ST=0.                                                                                                                                                                                                                                                                                                                                                                                                      |

#### Release Processing

If RF=filename or RF is specified, ASVAL determines which MSF files are no longer needed and issues a request to MSSEXEC to purge these files so their MSF space can be reused. The procedure is for ASVAL to analyze copies of the MSF catalogs and PFC entries for the specified family that are contained on the release data file (RDF) specified by the RF parameter. Those MSF files described in an MSF catalog but not having a PFC entry (that is, orphans) can be purged. During the analysis (refer to both MSF Catalog Analysis and PFC Analysis later in this section), ASVAL keeps track of the error conditions it discovers, and if the error count is less than or equal to the threshold specified by the FX parameter, release processing is performed if RL is specified and the last purge date in the MSF catalog is prior to the RDF file dump date. That is, trouble-free orphans are purged and their MSF space is made available for reuse. The current MSF catalog is updated to reflect that these files no longer exist. A validation report is issued that lists the errors encountered, the number of trouble-free orphans, and the amount of released MSF space. If RL is not specified or the last purge date in the MSF catalog follows the RDF file dump date, no release processing is performed but the validation report is issued, which lists the errors encountered, the number of trouble-free orphans, and the amount of releasable MSF space.

The RDF used for this analysis is a file produced during a previous PFDUMP run and it contains versions of the MSF catalogs and PFC entries that were current at the time of the dump. The site analyst chooses which RDF to use depending on how long after a file was purged he/she wants to wait before releasing MSF space. For example, the analyst might run ASVAL every week for release processing purposes and use the RDF from the previous week's full dump. There are some restrictions as to which RDFs can be used (refer to MSF Space Management later in this section). The capability to release trouble-free orphans by analyzing the current MSF catalogs and PFC entries is not provided in order to ensure that an MSF file is released from MSF only after it is no longer needed.

### **Problem Reporting**

If RF=filename or RF is not specified, ASVAL reports on problems with the current MSF catalogs and PFC entries for the specified family. If AM is specified, problems with CSU maps are also included in the report. ASVAL examines the MSS system files and PFC entries and searches for problem chains and fragments, problem asa values, and CSU map/MSF catalog mismatches. The procedures ASVAL uses to detect and classify inconsistencies and discrepancies are described later in this section under Error Detection and Classification. ASVAL keeps track of the error conditions, if any, it discovers, and if the error count is less than or equal to the threshold specified by the FX parameter, problem fixing is performed. That is, ASVAL sets flags in the appropriate entries of the CSU map, MSF catalog, and/or PFC entries to prevent propagation of errors due to the inconsistencies or discrepancies found and to permit error recovery by the ASDEBUG utility. A count of the errors is recorded in the dayfile. A validation report is issued that lists the errors encountered, the number of trouble-free orphans, and the amount of releasable MSF space.

## **Error Detection and Classification**

ASVAL detects and classifies errors according to the following procedures. During the CSU map analysis, ASVAL detects and classifies errors in the CSU map. During the MSF catalog analysis, ASVAL detects errors with chains of AUs; during the PFC analysis, ASVAL classifies these errors. Whenever an error is encountered, the total error count is increased by 1. The action taken for each type of error is discussed under Release Processing and Problem Fixing later in this section.

#### CSU Map Analysis

If the AM option is specified, ASVAL attempts to locate problems with CSU map entries by comparing the MSF catalogs and the CSU map. For each coordinate pair (x,y) in an MSF catalog entry, ASVAL locates the corresponding CSU map entry. A type 1 error exists if the code field in the CSU map entry is not 5 (assigned to a subfamily), or if the family, subfamily, or vsn fields in the CSU map entry do not match those in the corresponding MSF catalog entry. ASVAL also scans the CSU map for all other entries assigned to the subfamily and reports as a type 2 error any of these entries that does not have a corresponding MSF catalog entry.

#### MSF Catalog Analysis

The MSF catalog analysis locates problems with chains of AUs (refer to the definition of cartridge earlier in this section) and identifies on each HOC whether any of the following problems exist or whether any part of the MSF files resides on a cartridge that is lost or has excessive write parity errors.

ASVAL scans the MSF catalog for HOC entries that are allocated and follows each chain until it terminates. Normal termination occurs with an EOC entry. Abnormal termination occurs when no EOC is found, but rather an incorrect link value exists, an AU links to an unallocated stream, or an AU links to an AU previously found in the chain being followed (looping chain).

During the chain scans, the following types of chains can be encountered; they are linkage problems that are identified on the HOC entry.

### Chain

#### Description

Intersecting More than one chain links to the same AU.

Scattered file The number of cartridges used for the file exceeds the value specified by the ST parameter plus the minimum number of cartridges needed for the file.

ASVAL also locates any AUs that are allocated but were not on any chain being followed. Such AUs are linked together to form partial chains without an HOC. These partial chains are called fragments and the first AU in a fragment is designated as the start of fragment. Each fragment chain is followed until it terminates. The abnormal termination conditions previously listed can also occur with fragments. Intersections can occur, but a fragment chain that intersects the start of another fragment chain is not an intersection; rather, one is the tail end of the other.

### PFC Analysis

The PFC analysis is performed to classify the errors encountered on chains during the MSF catalog analysis. For each PFC entry with  $asa \neq 0$  (the file has an MSF image and the asa value identifies the first AU in the chain containing the file), ASVAL classifies the following errors. Error type 3 exists if the asa value is incorrect. Error type 4 exists for any of the following reasons.

- The AU specified by the asa value is not allocated or is not an HOC entry.
- The chain does not terminate normally.
- The chain intersects with another chain or fragment.
- More than one PFC entry points to the chain.
- The chain includes a cartridge for which the lost or excessive parity error flag is set.

ASVAL also classifies the following error conditions.

- Error type 5 exists if an orphan chain terminates abnormally or intersects with other chains or fragments. Trouble-free orphans (chains without a PFC entry pointing to them and without linkage problems) are not classified as errors.
- Error type 6 exists if an orphan is a fragment.
- Error type 7 exists if a chain or fragment points to an unallocated AU.

ASVAL generates informational report messages if either of the following conditions is true.

- The system error flag is set in the PFC.
- The read error flag is set in the PFC.

### **Release Processing and Problem Fixing**

If the total error count calculated during the analyses described previously exceeds the value specified by the FX parameter, then neither release processing nor action to flag or fix the detected error conditions is performed. The validation report, however, is produced. Otherwise, action taken depends on the parameter specified and the type of errors found, as follows.

If ASVAL was run for release processing purposes (RF=filename or RF specified), ASVAL issues a request to MSSEXEC to release trouble-free orphans if RL was specified. If RL was not specified, no release processing is performed. If ASVAL was run for problem reporting purposes (RF omitted), the following action is taken.

- For error type 1, the linkage error flag is set in the MSF catalog entry.
- For error type 2, the linkage error flag is set in the CSU map entry.
- For error type 3, there are two alternatives. If the file also has a disk image, the asa field in the PFC entry is cleared. Thus, the good disk image will not be released and the file is accessible even if the MSF image cannot be retrieved. If the file does not have a disk image, no action is taken. However, if the disk image can be reloaded from tape, it is recommended that the file be reloaded and that ASVAL then be rerun to clear the asa field in preparation for other corrective action.
- For error type 4, the action taken is both that taken for error type 3 and that taken for error type 5, 6, or 7.
- For error type 5, 6, or 7, the frozen flag is set in the MSF catalog entry for the initial AU on the problem chain or fragment. This enables the problem chain/fragment/AU to be made available to the ASDEBUG utility, but prevents these AUs from being overwritten until then. Thus, the ASDEBUG utility can be used to inspect or save data from the corresponding streams or cartridges.

#### **Validation Report**

The validation report consists of a report heading and a series of report groups for each subfamily and CSU being reported on. The heading identifies the subfamily, the CSU, whether or not there are any problems, and the last purge date and time for the CSU (the last time orphans on this CSU were released). There is one report group for each error detected, and the actual information recorded in a report group depends on the type of error as described in the following paragraphs. Each report group, however, contains the following items.

- Error type (a number from 1 to 7).
- Identification (refer to the particular error type described in the following paragraphs).
- Chain information (MSF catalog ordinal, stream number, A or U designation for allocated or unallocated, H or E designation for HOC or EOC).
- Error description.

After the last report group, the validation report lists the number of trouble-free orphans, the amount of released or releasable MSF space, the total number of errors detected, and whether or not the MSS system files were updated.

#### Error Types 1 and 2

Error types 1 and 2 identify mismatches between the CSU map and the MSF catalog. In the validation report, the identification field lists the MSF catalog ordinal, the x and y coordinates, and the vsn of the cartridge in error. The chain field is blank because problem chains are not identified as either error type 1 or 2. The analyst should run the ASUSE utility to produce a detailed report of the appropriate CSU map and MSF catalog entries to determine the exact problem.

#### Error Types 3 and 4

Error types 3 and 4 identify problem chains and problem as values. In the validation report, the identification field lists the permanent file name and user index of the affected file; the dump control date and time (from the PFC entry for the file) to identify the backup file, if any; and the letter N (no) or Y (yes) to indicate whether or not the file has a disk image. The chain field lists the MSF catalog ordinal and stream number for all AUs in the affected chain. An A or U indicates whether each AU is allocated or unallocated, and an H or E identifies the HOC or EOC. An error description is printed for each error detected; one chain can have several errors.

#### Error Types 5, 6, and 7

Error types 5, 6, and 7 identify problem orphans, fragments, and problem unallocated AUs. In the validation report, the information reported is the same as for error types 3 and 4, except for the identification field. Instead of the permanent file identification, the word ORPHAN (error type 5), FRAGMENT (error type 6), or UNALLOCATED (error type 7) is printed. Error type 7 is an unallocated AU that is pointed to by a chain or fragment. Each such AU is also reported with the chain for the corresponding orphan or fragment.

#### Intersections

Intersections occur when more than one chain links to the same AU; they are classified as either error type 4 or 5. Thus, they are reported as explained previously. Intersections are also reported in a separate entry consisting of a heading and additional information identifying the MSF catalog ordinals and stream numbers of the intersecting chains. Therefore, when intersections are reported, there are two entries for the affected subfamily and CSU: one lists only the intersections and the other lists all the errors encountered.

The following output shows the format of a validation report. ASVAL was run for problem reporting purposes (RF not specified), and no errors were detected.

#### ASVAL - VALIDATION REPORT

ASVAL - VER 1.0

FAMILY = SYSTST

ASVAL, FM=SYSTST, SB=0, CS=J.

| L = OUTPUT<br>RF = 0<br>AM = 0<br>CS = J<br>FM = SYSTST<br>FX = 0<br>RL = 0<br>SB = 0<br>ST = 0 |                        |
|-------------------------------------------------------------------------------------------------|------------------------|
| SUBFAMILY = 0 CSU = J GOOD                                                                      | LPDT = ******* ******* |
| RELEASABLE MSS FILES = 12                                                                       |                        |
| RELEASABLE MSS STREAMS = 16                                                                     |                        |
| TOTAL VALIDATION ERRORS = 0                                                                     |                        |
| CATALOGS NOT MODIFIED                                                                           |                        |

\*\*REPORT COMPLETE\*\*

#### **Typical ASVAL Runs**

As described previously, ASVAL is run either to make MSF space available for reuse or to report on problems with the current MSS system files and/or PFC entries. The following examples show typical ASVAL runs that may be used periodically for these purposes.

Example:

The following ASVAL command causes MSF space to be made available for reuse.

ASVAL, RF=DUMP1, RL.

DUMP1 is the release data file produced by a previous PFDUMP run from which ASVAL can identify all the MSF files that were orphans at the time of the dump. If no error conditions are detected in the MSF catalog and PFC entries contained on file DUMP1 (FX=0 by default), the orphans are purged and the MSF space assigned to them is released. The last purge date and time field in the subcatalog (in the MSF catalog) for each CSU for each subfamily is updated to the time of the ASVAL run if any file from that CSU is purged. This is to ensure that a subsequent ASVAL run does not release the same space a second time, since the MSF space may be reallocated to a new file.

If errors were detected, they are listed on the validation report and release processing is not performed. This is indicated by the CATALOGS NOT MODIFIED message at the end of the validation report. The analyst can rerun ASVAL with the following command to ensure that release processing is performed (n is the number of errors detected during the previous ASVAL run).

ASVAL, RF=DUMP1, RL, FX=n.

After this ASVAL run has completed, an analysis of the current version of the CSU map, MSF catalog, and PFC entries should be made to determine whether or not the errors detected in the first ASVAL run exist in the current MSS system files and PFC entries. This is accomplished through the following command.

ASVAL, FM=familyname, AM.

familyname is that on the release data file, DUMP1.

Example:

Upon completion of any device reload that includes recovery of an MSF catalog and/or CSU map, ASVAL should be run to determine whether any CSU map/MSF catalog mismatches exist. The following call accomplishes this.

ASVAL, FM=familyname, SB=n1, n2, ..., nh, AM.

familyname is that for which recovery was done and  $n_1, n_2, \ldots, n_h$  are the affected subfamilies if just some of the devices of the family were reloaded.

ASVAL analyzes the CSU map, MSF catalog, and PFC entries for the subfamilies specified by the SB parameter and reports any discrepancies or inconsistencies. For example, if the recovery was not scheduled and ASLABEL was run to add or remove cartridges or cubicles from one of the affected subfamilies after the last incremental or full dump for these subfamilies, then the CSU map will reflect the results of the ASLABEL run but the MSF catalog will not. Such mismatches will be reported on the validation report. If the following ASVAL command is then made, the errors detected during the previous run will be flagged as described previously under Release Processing and Problem Fixing.

ASVAL, FM=familyname, SB=n1, n2,...,nh, AM, FX=n.

familyname and  $n_1, n_2, \ldots, n_h$  are the same as in the previous ASVAL run and n is the number of errors detected during the previous run. After investigating the cause of these errors, the analyst can run the ASDEBUG utility to correct the error conditions (refer to ASDEBUG later in this section).

If a device reload includes recovery of all CSU maps (default family, user index= $377760_8$ ), the latest CSU maps should be recovered from backup copies. Then each family that has MSF-resident files should be analyzed via the following command to detect CSU map/MSF catalog mismatches.

ASVAL, FM=familyname, AM.

It is recommended that the previous ASVAL run be made periodically to check whether any unexpected error conditions exist. As the site analyst becomes more familiar with MSS processing, these periodic ASVAL runs can be done less frequently.

#### **Restrictions to ASVAL**

- Only one copy of ASVAL can be run at a time.
- ASVAL, ASLABEL, and ASDEBUG cannot be run at the same time.

# ASUSE

ASUSE reads data in the MSF catalogs and CSU maps and produces reports on the availability of space on MSF cartridges and the allocation of cubicle space within a CSU. The reports may not be completely up to date because the MSF catalogs and CSU maps can be updated while the reports are being generated.

The types of reports that ASUSE generates are:

| Report             | Description                                                                         |
|--------------------|-------------------------------------------------------------------------------------|
| Basic usage report | Lists general information about the use of each CSU in a subfamily.                 |
| Optional report A  | Identifies cartridges with a specified number of streams available for assignment.† |
| Optional report B  | Identifies cartridges with flags set in the MSF catalog.                            |
| Optional report C  | Lists the contents of a CSU as described in the CSU map.                            |

<sup>†</sup> A cartridge that has the lost cartridge flag, inhibit allocation flag, or excessive write parity errors flag set is considered to have zero streams available for allocation regardless of the number of unallocated streams on the cartridge.

| Report                  | Description                                                                                                                                      |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Optional report D       | Lists detailed cartridge status information on each entry in the MSF catalog.                                                                    |
| Optional report E       | Lists detailed cartridge and stream status information on each entry in the MSF catalog.                                                         |
| The format of the ASUSE | command is:                                                                                                                                      |
| ASUSE,p1,p2,,Pn.        |                                                                                                                                                  |
| °,                      | Description                                                                                                                                      |
| CS=id                   | CSU identifier of the CSU to be used. Up to 13 CSUs can be selected by the letters A through M. For example, CS=ACJG selects CSU A, C, G, and J. |
| CS                      | Same as CS=ABCDEFGHIJKLM.                                                                                                                        |
| CS omitted              | Same as CS=ABCDEFGHIJKLM.                                                                                                                        |
| FM=familyname           | Family to be reported on.                                                                                                                        |
| FM                      | Same as FM=system default family.                                                                                                                |
| FM omitted              | Same as FM=system default family.                                                                                                                |
| L=filename              | File on which listable output is to be written.                                                                                                  |
| L                       | Same as L=OUTPUT.                                                                                                                                |
| L=0                     | No output file is to be generated.                                                                                                               |
| L omitted               | Same as L=OUTPUT.                                                                                                                                |
| 0P=op                   | Type of report to be generated. Multiple options can be specified (for example, OP=AB).                                                          |
|                         | op Description                                                                                                                                   |
|                         | A Optional report A and basic usage report.                                                                                                      |
|                         | B Optional report B and basic usage report.                                                                                                      |
|                         | C Optional report C and basic usage report.                                                                                                      |
|                         | D Optional report D and basic usage report.                                                                                                      |
|                         | E Optional report E and basic usage report.                                                                                                      |
| OP                      | Basic usage report only is to be generated.                                                                                                      |
| OP omitted              | Same as OP.                                                                                                                                      |

| <sup>p</sup> i | Description                                                                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SB=subfamily   | Subfamily to be reported on. Up to eight subfamilies can be selected by the numbers 0 through 7. For example, SB=0273 selects subfamilies 0, 2, 3, and 7.                                      |
| SB             | Same as SB=01234567.                                                                                                                                                                           |
| SB omitted     | Same as SB=01234567.                                                                                                                                                                           |
| SL=n           | Minimum number of streams available for assignment; valid only with optional report A. Cartridges with n or more streams available are reported. $0 \le n \le 16$ , $n \le m$ (refer to SU=m). |
| SL             | Same as SL=0.                                                                                                                                                                                  |
| SL omitted     | Same as SL=0.                                                                                                                                                                                  |
| SU=m           | Maximum number of streams available for assignment; valid only with optional report A. Cartridges with m or less streams available are reported. $0 \le m \le 16$ , $n \le m$ (refer to SL=n). |
| SU             | Same as SU=16.                                                                                                                                                                                 |
| SU omitted     | Same as SU=16.                                                                                                                                                                                 |

#### **Basic Usage Report**

The basic usage report includes a title line, which identifies the subfamily, family, and CSU being reported on. The statistics in this report contain separate totals for CSUs and subfamilies. The following items are listed.

- Number of CSU locations reserved for the subfamily.
- Number of cartridges in the subfamily.
- Number of cartridges with 0 streams available for assignment.
- Number of cartridges with 1 stream available for assignment.
- Number of cartridges with 16 streams available for assignment.
- Number of unassigned and unflagged streams.
- Number of assigned and unflagged streams.
- Number of flagged streams.
- Number of cartridges with the inhibit allocation flag set.
- Number of available off-cartridge links.
- Number of cartridges with available streams and no off-cartridge links.

The following output shows the format of a basic usage report.

ASUSE REPORT FILE

SUBFAMILY = 3 CSU = J FM = SYSTST

BASIC REPORT

| COUNT C | DF C | SU LOCATION | NS RES | SER\ | ED FOR    | SUB-FAMILY  | = 10 |
|---------|------|-------------|--------|------|-----------|-------------|------|
| NUMBER  | 0F   | CARTRIDGES  | IN TH  | IE S | SUB-FAMIL | _Y =        | 4    |
| NUMBER  | 0F   | CARTRIDGES  | WTTH   | 0    | STREAMS   | AVATLABLE   | = 4  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 1    | STREAMS   | AVAILABLE   | •    |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 2    | STREAMS   | AVATLABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  |        | 3    | STREAMS   | AVAILABLE   | -    |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 4    | STREAMS   | AVAILABLE   |      |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 5    | STREAMS   | AVATLABLE   | -    |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 6    | STREAMS   | AVAILABLE   | -    |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 7    | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 8    | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 9    | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 10   | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 11   | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 12   | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 13   | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 14   | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 15   | STREAMS   | AVAILABLE   | = 0  |
| NUMBER  | 0F   | CARTRIDGES  | WITH   | 16   | STREAMS   | AVAILABLE   | = 0  |
|         |      |             |        |      |           |             | •    |
| NUMBER  |      | FREE AND U  |        |      |           |             | 0    |
| NUMBER  | OF   |             |        |      | GGED STR  | AMS =       | 64   |
| NUMBER  |      | FLAGGED ST  |        |      |           |             | 0    |
| NUMBER  | OF   | CARTRIDGES  |        |      |           | AG SEI =    | 0    |
| NUMBER  |      | AVAILABLE   |        |      |           |             | 3    |
| NUMBER  | •••  | CARTRIDGES  |        | AV/  | AILABLE S | SIREAMS AND |      |
| NO OFF  | CAR  | TRIDGE LIN  | () =   |      |           |             | 0    |

#### **Optional Reports A and B**

Optional reports A and B both include a title line, which identifies the subfamily, family, and CSU being reported on, and list the following information about cartridges. Optional report A includes a cartridge only if the number of streams available for assignment is within the range specified by the SL and SU parameters. Optional report B includes only those cartridges for which flags are set in the MSF catalog.

- Volume serial number of the cartridge.
- x and y coordinates of the cartridge location.
- Number of streams available on the cartridge.
- Number of off-cartridge links available on the cartridge.

In addition to the preceding items, optional report B lists one or more of the following messages depending on the flags set in the MSF catalog. Refer to the definition of MSF catalog earlier in this section for more information about these flags.

- EXCESSIVE PARITY ERRORS.
- . LOST.
- INHIBIT SET.
- STREAM n START OF FRAGMENT.
- STREAM n FROZEN CHAIN.
- STREAM n STREAM CONFLICT.

The following output shows the format of optional report A.

ASUSE REPORT FILE SUBFAMILY = 3 CSU = J FM = SYSTST OPTIONAL REPORT(S) AB VSN = V9900445 X = Y = 36 AVAILABLE STREAMS = 0 OFF CARTRIDGE LINKS = 0 VSN = V99005 X = 44 36 Y = AVAILABLE STREAMS = 0 OFF CARTRIDGE LINKS = 0 VSN = V99006X = 43 Y = 36 AVAILABLE STREAMS = 0 **OFF CARTRIDGE LINKS =** 0 VSN = V99007X = 42 Y = 36 AVAILABLE STREAMS = 0 OFF CARTRIDGE LINKS = 3 END OF REPORT(S) AB

# **Optional Report C**

Optional report C includes a title line, which identifies the CSU being reported on. The CSU number and y coordinate are printed at the top of the page. There is a new y coordinate on each page, from y=36 to y=0. x coordinates are written two to a line, from x=57 to x=0. The information listed in this report includes the following items.

- x coordinate
- code
- vsn
- family
- subfamily
- FCT link
- flags

### Optional Reports D and E

Optional reports D and E both include a title line, which identifies the subfamily, family, and CSU being reported on. Both reports list the following cartridge information about entries in the MSF catalog.

- FCT ordinal of the MSF catalog entry.
- x and y coordinates of the location of the cartridge in the cubicle described by this entry.
- Volume serial number of the cartridge in the cubicle described by this entry.

In addition to the preceding information, optional report E lists the following information about the streams on the cartridges previously described.

- Off-cartridge links. Also referred to as Off-MSC (mass storage cartridge) links.
- Two words reserved for site use.
- Stream detail in octal.

Refer to the definition of MSF catalog earlier in this section for more information about the catalog entries.

The following output shows the format of optional report E.

ASUSE REPORT FILE

OPTIONAL REPORT E MSFCATALOG FOR SUBFAMILY 3, CSU J FM = SYSTST

ORD X Y VSN

| 1 | 45       | 36       | v99004                                                                           | LINK1=<br>SITE=00000                                                                               | 2 LINK2=                                                                                                  | 2 LINK3=<br>0/000000000000                                                                             | 2<br>00000000                                                                                       |
|---|----------|----------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|   |          |          | STREAM                                                                           |                                                                                                    |                                                                                                           |                                                                                                        |                                                                                                     |
|   |          |          | 00-03                                                                            | 20106                                                                                              | 20300                                                                                                     | 22100                                                                                                  | 24101                                                                                               |
|   |          |          | 04-07                                                                            | 26102                                                                                              | 20300                                                                                                     | 20007                                                                                                  | 20010                                                                                               |
|   |          |          | 10-13                                                                            | 20011                                                                                              | 20012                                                                                                     | 20013                                                                                                  | 20014                                                                                               |
|   |          |          | 14-17                                                                            | 20015                                                                                              | 20200                                                                                                     | 20300                                                                                                  | 20300                                                                                               |
| 2 | 44       | 36       | v99005                                                                           | LINK1=                                                                                             | 3 LINK2=                                                                                                  | 3 LINK3=                                                                                               | 3                                                                                                   |
|   |          |          |                                                                                  | SITE=00000                                                                                         | 000000000000000000000000000000000000000                                                                   | 0/000000000000                                                                                         | 00000000                                                                                            |
|   |          |          | STREAM                                                                           |                                                                                                    |                                                                                                           |                                                                                                        |                                                                                                     |
|   |          |          | 00-03                                                                            | 20006                                                                                              | 20014                                                                                                     | 20200                                                                                                  | 22101                                                                                               |
|   |          |          | 04-07                                                                            | 24102                                                                                              | 26103                                                                                                     | 20007                                                                                                  | 20010                                                                                               |
|   |          |          | 10-13                                                                            | 20011                                                                                              | 20012                                                                                                     | 20200                                                                                                  | 20300                                                                                               |
|   |          |          | 14-17                                                                            | 20015                                                                                              | 20016                                                                                                     | 20200                                                                                                  | 20300                                                                                               |
|   |          |          |                                                                                  |                                                                                                    |                                                                                                           |                                                                                                        |                                                                                                     |
| 3 | 43       | 36       | v99006                                                                           | LINK1=                                                                                             | 4 LINK2=                                                                                                  | 4 LINK3=                                                                                               | 4                                                                                                   |
| 3 | 43       | 36       | v99006                                                                           |                                                                                                    | 4 LINK2=                                                                                                  |                                                                                                        | - ,                                                                                                 |
| 3 | 43       | 36       | STREAM                                                                           | SITE=00000                                                                                         | 000000000000000000000000000000000000000                                                                   | 0/0000000000000000000000000000000000000                                                                | 00000000                                                                                            |
| 3 | 43       | 36       | STREAM                                                                           |                                                                                                    |                                                                                                           | 0/00000000000<br>20013                                                                                 | 00000000<br>22001                                                                                   |
| 3 | 43       | 36       | STREAM<br>00-03<br>04-07                                                         | SITE=000000<br>20106<br>24102                                                                      | 20000000000000000000000000000000000000                                                                    | 0/00000000000<br>20013<br>20007                                                                        | 22001<br>20200                                                                                      |
| 3 | 43       | 36       | STREAM<br>00-03<br>04-07<br>10-13                                                | SITE=00000<br>20106<br>24102<br>20300                                                              | 200000000000000<br>20011<br>26103<br>20200                                                                | 0/000000000000<br>20013<br>20007<br>20300                                                              | 22001<br>20200<br>20200<br>20014                                                                    |
| 3 | 43       | 36       | STREAM<br>00-03<br>04-07                                                         | SITE=000000<br>20106<br>24102                                                                      | 20000000000000000000000000000000000000                                                                    | 0/00000000000<br>20013<br>20007                                                                        | 22001<br>20200                                                                                      |
| 3 | 43<br>42 | 36<br>36 | STREAM<br>00-03<br>04-07<br>10-13                                                | SITE=00000<br>20106<br>24102<br>20300<br>20015<br>LINK1=                                           | 00000000000000000000000000000000000000                                                                    | 0/00000000000<br>20013<br>20007<br>20300<br>20017<br>0 LINK3=                                          | 000000000<br>22001<br>20200<br>20014<br>20200<br>0                                                  |
|   |          |          | STREAM<br>00-03<br>04-07<br>10-13<br>14-17                                       | SITE=00000<br>20106<br>24102<br>20300<br>20015<br>LINK1=                                           | 200000000000000<br>20011<br>26103<br>20200<br>20016                                                       | 0/00000000000<br>20013<br>20007<br>20300<br>20017<br>0 LINK3=                                          | 000000000<br>22001<br>20200<br>20014<br>20200<br>0                                                  |
|   |          |          | STREAM<br>00-03<br>04-07<br>10-13<br>14-17<br>V99007<br>STREAM                   | SITE=00000<br>20106<br>24102<br>20300<br>20015<br>LINK1=<br>SITE=000000                            | 00000000000000000<br>20011<br>26103<br>20200<br>20016<br>0 LINK2=<br>000000000000000000000000000000000000 | 0/00000000000<br>20013<br>20007<br>20300<br>20017<br>0 LINK3=<br>0/00000000000000000000000000000000000 | 000000000<br>22001<br>20200<br>20014<br>20200<br>0<br>000000000                                     |
|   |          |          | STREAM<br>00-03<br>04-07<br>10-13<br>14-17<br>V99007<br>STREAM<br>00-03          | SITE=00000<br>20106<br>24102<br>20300<br>20015<br>LINK1=<br>SITE=000000<br>20106                   | 00000000000000000<br>20011<br>26103<br>20200<br>20016<br>0 LINK2=<br>000000000000000000000000000000000000 | 0/00000000000<br>20013<br>20007<br>20300<br>20017<br>0 LINK3=<br>0/000000000000<br>20016               | 000000000<br>22001<br>20200<br>20014<br>20200<br>0<br>000000000<br>20200                            |
|   |          |          | STREAM<br>00-03<br>04-07<br>10-13<br>14-17<br>V99007<br>STREAM<br>00-03<br>04-07 | SITE=00000<br>20106<br>24102<br>20300<br>20015<br>LINK1=<br>SITE=000000<br>20106<br>20106<br>20300 | 0000000000000000<br>20011<br>26103<br>20200<br>20016<br>0 LINK2=<br>000000000000000<br>20014<br>20300     | 0/00000000000<br>20013<br>20007<br>20300<br>20017<br>0 LINK3=<br>0/0000000000000<br>20016<br>20007     | 000000000<br>22001<br>20200<br>20014<br>20200<br>0<br>000000000<br>20200<br>20200<br>20200<br>20010 |
|   |          |          | STREAM<br>00-03<br>04-07<br>10-13<br>14-17<br>V99007<br>STREAM<br>00-03          | SITE=00000<br>20106<br>24102<br>20300<br>20015<br>LINK1=<br>SITE=000000<br>20106                   | 00000000000000000<br>20011<br>26103<br>20200<br>20016<br>0 LINK2=<br>000000000000000000000000000000000000 | 0/00000000000<br>20013<br>20007<br>20300<br>20017<br>0 LINK3=<br>0/000000000000<br>20016               | 000000000<br>22001<br>20200<br>20014<br>20200<br>0<br>000000000<br>20200                            |

# ASDEBUG

ASDEBUG allows the analyst to update appropriate entries in the CSU maps and/or MSF catalogs and thereby resolve inconsistencies reported by the ASVAL utility. ASDEBUG can also copy data from selected MSF files or cartridges to disk. This function of ASDEBUG is intended for use when errors such as unrecoverable read errors do not allow successful staging of an MSF file.

# NOTE

ASDEBUG updates the CSU map for the specified CSU. (Refer to the definition of CSU map earlier in this section.) It is recommended that the CSU map be copied on tape or on another device or family immediately after every update of the CSU map. Input to ASDEBUG is via a directive file. Refer to the ASLABEL utility earlier in this section for a description of the directive file format.

The format of the ASDEBUG command is:

ASDEBUG, p1, p2, p3.

| <sup>p</sup> i | Description                                                                  |
|----------------|------------------------------------------------------------------------------|
| I=filename     | File on which directives are written.                                        |
| I              | Same as I=COMPILE.                                                           |
| I omitted      | Same as I=INPUT.                                                             |
| L=filename     | File on which listable output is to be written.                              |
| L              | Same as L=OUTPUT.                                                            |
| L=0            | No output file is to be generated.                                           |
| L omitted      | Same as L=OUTPUT.                                                            |
| Z              | Directives are contained on the ASDEBUG command. The I parameter is ignored. |
| Z omitted      | Directives are contained on the file specified by the I parameter.           |

# **ASDEBUG** Directives

The following directives are available with ASDEBUG. The descriptions of the parameters for these directives follow this section.

#### OP=RS - Read Streams

OP=RS reads selected streams of a cartridge in a specified drawer (D=d) or a cartridge identified by its vsn (V=vsn) or x and y coordinates (XI and YI parameters). The CS parameter specifies the CSU where the cartridge resides. The range of streams to be read is specified by the SL and SU parameters. The streams are written to the file specified by the PF parameter.

#### OP=RF - Read File

OP=RF reads the file whose alternate storage address is specified by the CS, FO, and ST parameters. The file is written to the file specified by the PF parameter.

## OP=RP - Release Frozen Chain Space

OP=RP clears flags in the MSF catalog and releases MSF space for the chain whose alternate storage address is specified by the CS, FO, and ST parameters.

# OP=RL - Remove Cartridge Entry from MSF Catalog

OP=RL removes an MSF catalog entry that is not linked properly to the CSU map. The CS and FO parameters identify the MSF catalog entry to be removed.

#### OP=RC - Remove Cartridge Entry from CSU Map

OP=RC removes a CSU map entry that does not have a corresponding FCT entry in the MSF catalog. The CS, XI, and YI parameters identify the CSU map entry to be removed. The cartridge at the particular location (x,y) is put into the output drawer and the CSU map entry is changed to unassigned. The CSU map should be backed up immediately after the ASDEBUG run to ensure consistency with cartridge labels and MSF catalogs (refer to the definition of CSU map earlier in this section).

# OP=CF - Change Flag in CSU Map or MSF Catalog

OP=CF sets or clears flags in the CSU map or MSF catalog. The FL and ON or OF parameters indicate the flag type and the action to be taken. The appropriate FCT or CSU map entry is determined from the FO, V, or XI and YI parameters. For FCT stream detail flags (FL=SF, FC, or SC), the user can specify either a single stream via the ST parameter or a range of streams via the SL and SU parameters.

#### **Parameters for the ASDEBUG Directives**

The descriptions of the parameters to the ASDEBUG directives follow. Not all parameters are valid with all directives, as indicated.

| <sup>p</sup> i | Description                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------|
| CS=id          | CSU identifier of the CSU to be used by ASDEBUG; id is a letter from A to M.                       |
| CS             | Same as CS=A.                                                                                      |
| CS omitted     | Same as CS=A.                                                                                      |
| D=d            | Input drawer slot to be used; $0 \le d \le 7$ . Not valid for OP=RS if V=vsn or XI=x is specified. |
| D              | First available input drawer slot is to be used.                                                   |
| D omitted      | V=vsn or XI=x and YI=y must be specified for OP=RS.                                                |

# Description

Name of flag in CSU map or MSF catalog to be set or cleared. Valid

Description

EW Excessive write parity error flag.

ME Linkage error flag (in CSU map).

FE Linkage error flag (in MSF catalog FCT).

FC Frozen chain flag.

IB Inhibit allocation flag.

LC Lost cartridge flag.

SC Stream conflict flag.

SF Start of fragment flag.

FL=flag must be specified for OP=CF.

FM=familyname Family to be processed. FM Same as FM=system default family. FM omitted Same as FM=system default family. F0=ord MSF catalog ordinal indicating the file to be read or the chain whose space is to be released. Not valid for OP=CF if V=vsn or XI=x is specified. FO=ord must be specified for OP=RF, OP=RP, and OP=RL. V=vsn or XI=x FO omitted and YI=y must be specified for OP=CF. OF Flag specified by FL=flag is to be cleared. Valid only with OP=CF. Flag specified by FL=flag is to be set. Valid only with OP=CF. ON PF=filename File to which the MSF image (streams or file) is to be copied. Each stream copied is separated by an end-of-record. This file is defined under the user's current family and user index. PF Same as PF=ZZZZBUG. PF omitted Same as PF=ZZZZBUG. SB=subfamily Subfamily to be used;  $0 \leq \text{subfamily} \leq 7$ . SB Same as SB=0. SB omitted Same as SB=0. SL=i Stream where OP=RS begins copying or OP=CF begins changing flags;  $0 \leq i \leq 15$ ;  $i \leq j$  (refer to SU=j).

p<u>i</u> FL=flag

FL omitted

only for OP=CF.

flag

| <sup>p</sup> i | Description                                                                                                                                                                                                                                      |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SL             | Same as SL=0.                                                                                                                                                                                                                                    |
| SL omitted     | Same as SL=0.                                                                                                                                                                                                                                    |
| ST=s           | Stream where OP=RF begins reading or OP=RP begins releasing. If<br>specified with OP=CF, ST=s indicates a single stream detail to be<br>changed and takes precedence over the SL and SU parameters.                                              |
| ST omitted     | ST=s must be specified for OP=RF and OP=RP.                                                                                                                                                                                                      |
| SU=j           | Stream where OP=RS ends copying or OP=CF ends changing flags; $0 \le j \le 15$ ; $i \le j$ (refer to SL=i).                                                                                                                                      |
| SU             | Same as SU=15.                                                                                                                                                                                                                                   |
| SU omitted     | Same as SU=15.                                                                                                                                                                                                                                   |
| V=vsn          | Volume serial number of the cartridge to be used; not valid for OP=RS if D=d, D, XI=x, or YI=y is specified; and not valid for OP=CF if FO=ord, XI=x, or YI=y is specified.                                                                      |
| V omitted      | D=d or D, or XI=x and YI=y must be specified for OP=RS. FO=ord or XI=x and YI=y must be specified for OP=CF.                                                                                                                                     |
| XI=x           | x coordinate of the cubicle where the cartridge to be read resides;<br>$0 \le x \le 57$ and $x \ne 30$ . YI=y must also be specified. D=d, D, or V=vsn<br>must not be specified with OP=RS. FO=ord or V=vsn must not be<br>specified with OP=CF. |
| XI omitted     | D=d, D, or V=vsn must be specified for OP=RS. FO=ord or V=vsn must<br>be specified for OP=CF. XI=x and YI=y must be specified for OP=RC.                                                                                                         |
| YI=y           | y coordinate of the cubicle where the cartidge to be read resides;<br>$0 \le y \le 36$ and y $\ne 18$ . XI=x must also be specified. D=d, D, or V=vsn<br>must not be specified with OP=RS. FO=ord or V=vsn must not be<br>specified with OP=CF.  |
| YI omitted     | D=d, D, or V=vsn must be specified for OP=RS. FO=ord or V=vsn must<br>be specified for OP=CF. XI=x and YI=y must be specified for OP=RC.                                                                                                         |

# **Restrictions to ASDEBUG**

The following restrictions apply to the ASDEBUG utility.

- MSSEXEC must be running when ASDEBUG is run.
- Only one copy of ASDEBUG can be run at one time.
- ASDEBUG, ASVAL, and ASLABEL cannot be run at the same time.

# **MSS OPERATIONAL PROCEDURES**

The operational procedures used in an MSS environment are summarized next. These include modifications to existing procedures and also new MSS procedures, especially in the areas of permanent file backup and reloading and disk space management. Refer to the descriptions of the appropriate utilities for details about these operational procedures.

# INITIALIZATION

MSS processing is initiated when the ASDEF utility is run to create the system files necessary to allow storage of files on MSF. ASDEF creates both a CSU map for each CSU that is to store file data on cartridges and eight MSF catalogs (one for each subfamily) for each family that is to have MSF-resident files. Once these system files have been created, the ASLABEL utility can then be run to allocate portions of the CSU to each subfamily and to initialize cartridges for use by files belonging to these subfamilies. When permanent files are defined, they reside on disk until the ASMOVE utility is run. Depending on the parameters specified, ASMOVE can destage files to MSF and release the disk space assigned to files so that it is available for general use.

#### DISK SPACE MANAGEMENT

The availability of disk space must be managed more frequently in an MSS environment than in a non-MSS environment. This is necessary because MSF-resident files must be staged to disk before a user can access them, and their disk space is not immediately released upon completion of the jobs that attached the files. Consequently, disks are apt to approach a disk full condition unless the ASMOVE utility is used periodically to release disk space.

The ASMOVE utility destages selected files to MSF and, optionally, releases their disk space. It is recommended that the site analyst use ASMOVE as part of a periodic disk space management procedure and also just prior to a full dump to reduce the amount of data dumped to tape. (Refer to Dump Tape Management, under File Dumping, later in this section.)

The E,M display can be used to monitor the tracks on a device or set of devices. When too few tracks (as defined by the installation) are available on the direct access devices for a family or subfamily, the ASMOVE utility with the RD and RT parameters specified should be run. ASMOVE reads the PFC entries for the specified family, selects certain files to reside on MSF, and decides which files should be released from disk.

Files can be destaged to MSF without their disk space being released. This destage-only feature can be used prior to a routine backup dump to create MSF images for files with the BR=MD attribute and thereby eliminate the need to include them on a backup dump tape. (Refer to Dump Tape Management, under File Dumping, later in this section.) Having an MSF image also provides backup for the file in special cases where the permanent file is being updated at the same time PFDUMP is being run.

The destage-only feature can also be used to allow disk space to become available immediately when ASMOVE is run again. That is, ASMOVE can directly release disk space of files that have both disk and MSF images but are to reside on MSF only. However, for files that have no MSF image, there is a delay before the disk space can be released because these files must first be destaged to MSF.

#### **MSF SPACE MANAGEMENT**

The availability of MSF space must be managed because MSF space is not automatically released when a permanent file is purged. This allows you to perform a permanent file recovery to a time prior to the purging of the file. On a typical dump tape, the entry for an MSF-resident file includes the PFC and permit entries, but not the file data. A subsequent reload operation recovers only what was dumped; the PFC and permit information, but not the file data. Thus, MSF space for a purged permanent file cannot be released until you no longer need to recover the file data, because the file data resides on MSF only and typically not on any dump tape.

An MSF-resident file is stored only on the cartridges within the cubicles of CSUs assigned to a subfamily. When destaging a file to MSF, MSSEXEC selects the CSU with the most space available. If no CSU has enough free space to store the file being destaged, MSSEXEC abandons that destage request, issues a message to the dayfile, and continues to destage other files that fit on the available MSF space. To avoid this problem, use the ASVAL utility periodically to release MSF space for purged files, thereby making it available for reuse.

When you want to reuse MSF space currently allocated to files that have been purged, run ASVAL with the RF and RL parameters specified. The RF parameter specifies an RDF, which is an auxiliary file produced by the permanent file utility PFDUMP and which contains versions of the MSF catalogs and PFC entries that were current at the time of the dump. ASVAL examines the RDF to identify unneeded MSF files (those without PFC entries) and their MSF space is released. Choose which RDF to use based on the date and time of the dump that produced it. That is, a particular RDF is used only if there is no need for a permanent file recovery to a time prior to the dump that produced the RDF.

Once an RDF is used by ASVAL to release MSF space, you should discard it and any other RDFs for the same set of devices. These RDFs cannot be used as input to ASVAL in any future run. The MSS software does not permit an RDF to be specified by the RF parameter on an ASVAL call, unless it was produced by PFDUMP after the last ASVAL run that released MSF space was completed. This prevents the inadvertent release of MSF space that was previously released and reassigned to a file.

#### Example 1:

Assume that two PFDUMPs were run a week apart producing two release data files, RDF1 and RDF2. Assume, also, that according to both RDF1 and RDF2, file AFILE is an orphan (it has been purged but still resides on MSF). If the following call to ASVAL is made, the MSF space assigned to AFILE is released and made available for reuse, if no errors were encountered.

#### ASVAL, RF=RDF1, RL.

Now, suppose that a new file, BFILE, which did not exist when RDF1 and RDF2 were produced, is assigned to the MSF space on which AFILE has resided. If ASVAL were to accept either RDF1 or RDF2 on a subsequent ASVAL call, the MSF space allocated to file AFILE (which is now the space where BFILE resides) is released. However, any RDF created after the ASVAL run that purged AFILE would not have an entry for AFILE and, hence, ASVAL would not inadvertently release the MSF space presently allocated to BFILE.

After ASVAL uses a release data file to release MSF space, the corresponding backup tape from PFDUMP is the oldest tape that should be used for the first reel of a future incremental load. The first reel determines which files are to be reloaded according to the CIR on the tape (refer to PFLOAD in section 17, Permanent File Utilities). Use of an older tape as the first reel can allow the PFC entry for a purged file to be restored even though its MSF space may have been reassigned. The MSS software does not prevent loading from the wrong dump tape, but does detect as an error an attempt to stage a file whose data was overwritten (see Example 2).

#### Example 2:

Assume that RDF1 and RDF2 are as in the previous example, and that file CFILE is an orphan according to RDF2, but not according to RDF1. The following ASVAL call releases MSF space allocated to CFILE.

ASVAL, RF=RDF2, RL.

Now assume that the dump tape created by the PFDUMP run that produced RDF1 is used as the first reel of an incremental PFLOAD. Then the PFC and permit entries for file CFILE are reloaded, but, in fact, file CFILE does not exist on MSF. This will be detected as an error when a user attempts to attach CFILE.

## BACKUP AND RECOVERY

Permanent file backup and recovery methods in an MSS environment are similar to those in a non-MSS environment. It is assumed that most sites with disk-resident permanent files have a file backup procedure consisting of a full dump followed by a series of incremental dumps. The assumed reload procedure is to load from tapes starting with the most recent incremental dump tape and continuing through older incremental dump tapes until the most recent full dump tape is processed. These procedures can be modified as follows to accommodate MSF-resident files.

#### File Dumping

The normal backup dump procedure is to dump files based on the modification date field in the PFC entries for the files. New parameters to PFDUMP provide the capability to dump files that have been modified during a certain interval, which is useful in recycling old dump tapes (refer to Dump Tape Management later in this section). For files that reside only on MSF, you can either stage the file to disk and thereby include it in the dump, or suppress staging and include only the file's PFC and permit information on the dump tape. If the device or family being dumped has MSF-resident files, the following procedures should be included with the normal dumping procedures.

# Full Dumps

Full dumps should be performed as usual, but OP=S should be specified on the call to PFDUMP to suppress staging. Thus, all files on disk are dumped but only the PFC and permit entries for MSF files without disk images are included in the dump. It is unnecessary and not feasible to dump the files that reside only on MSF. Specify OP=S and SD on the call to PFDUMP; use the RD=filename parameter at your own discretion.

| Parameter   | Description                                                                                                                                                                                                                               |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OP=S        | Selects no staging. If the SD option was inadvertently used on any previous nonincremental dump, an incremental dump should be taken prior to the full dump.                                                                              |
| SD          | Updates the dump date/time field on each master device dumped to<br>permit files created or modified prior to this dump to be released<br>when ASMOVE is run again. Refer to Release Algorithm, under ASMOVE,<br>earlier in this section. |
| RD=filename | Specifies that PFDUMP is to write a release data file to be used<br>later by ASVAL. RD=filename is included or excluded on a call to<br>PFDUMP depending on how often you want to purge unneeded MSF files.                               |

# Incremental Dumps

Incremental dumps should be performed as usual. No staging should occur because any files that were created or modified since the last dump will still be on disk if a tape backup is required. The following parameters should be specified on the call to PFDUMP.

| Parameter     | Description                                                                                       |
|---------------|---------------------------------------------------------------------------------------------------|
| OP <b>=</b> M | Selects incremental dumps.                                                                        |
| SD            | Updates the date/time field on each master device dumped, as previously described for full dumps. |
| AD=yymmdd     | Selects the date and time just prior to the previous incremental or                               |
| and           | full dump of the device. Hence, all files not included in the last dump are dumped.               |
| AT=hhmmss     |                                                                                                   |

The following parameters should be used with caution.

| Parameter   | Description                                                                                                                                                                                                                              |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OP=S        | Selects no staging. If the SD option was inadvertently used on any<br>recent partial dump, OP=S should not be specified so that any file<br>with a BR=Y attribute that had its disk space inadvertently released<br>will be in the dump. |
| RD=filename | Specifies that PFDUMP is to write a release data file to be used later by ASVAL, as previously described for full dumps.                                                                                                                 |

#### Dump Tape Management

In a non-MSS environment, it is possible to make all previous dump tapes available for use after a full dump is completed. However, in an MSS environment, such dump tape recycling cannot occur because files that have resided only on MSF for some time are probably not included on any recent dump tape. When a low percentage of files on a tape are active files, it is possible to redump any remaining files in order to recycle the tape by running PFDUMP and specifying the OP=M, BD, and BT parameters, but not specifying the OP=S parameter. † This performs a dump of all files that were last dumped before the date and time specified on the PFDUMP call. If necessary, files will be staged in from MSF; after the dump is completed, the disk space for these staged files is released. Thus, files that might not be on any dump tape made after the date specified by the BD parameter are dumped and tapes created before this date can be recycled.

The number of dump tapes created can be reduced by using ASMOVE to reduce the amount of data written on these dump tapes. If ASMOVE is run prior to an incremental dump, files with the BR=MD attribute can be destaged to MSF and excluded from the dump. That is, the incremental dump will exclude the files with a BR=MD attribute that are on both MSF and disk. If ASMOVE is run prior to a full dump, disk space for files that do not have to be on disk can be released and these files are not written on the dump tape. The following procedure involving dumps and ASMOVE runs can be used for efficiency.

- 1. Run ASMOVE to destage files with the BR=MD attribute.
- 2. Take an incremental dump to back up files with the BR=Y attribute.
- 3. Run ASMOVE to release the disk images of files backed up in step 2.
- 4. Take a full dump to reduce the number of dump tapes involved if a reload is required.

#### CSU Map/MSF Catalog Backup

A CSU map is created for each CSU in an MSS environment and is updated by the ASLABEL, ASVAL, and ASDEBUG utilities. (Refer to the definition of CSU map earlier in this section.) It is recommended that the CSU map be copied on tape or on another device or family immediately after every update of the CSU map. If the device containing subfamily 0 of the default family is reloaded, the latest CSU maps should be recovered from the backup copies. After recovering the CSU maps, run the ASVAL utility with the AM and FM parameters specified to ensure that the CSU map and MSF catalog entries match. If they do not, corrective action should be taken as described under Error Conditions and Corrective Actions later in this section. Failure to retain or recover the latest CSU maps can cause problems with future ASLABEL runs (refer to the definition of CSU map earlier in this section).

An MSF catalog is created for each subfamily of a family that can have MSF-resident files and is updated by the ASLABEL, ASMOVE, ASVAL, and ASDEBUG utilities. When PFDUMP copies permanent files to tape for a master device or all devices in a family, it ensures that corresponding MSF catalogs are also dumped. (If MSSEXEC has an MSF catalog attached in modify mode, PFDUMP interfaces with MSSEXEC so that the MSF catalog is included on the dump tape. While PFDUMP is accessing the MSF catalog, any file destage requests for that subfamily are delayed.) Consequently, if PFLOAD is used to reload all files, the MSF catalogs are automatically recovered and entries for all MSF-resident files reflected in recovered PFC entries will exist in the recovered MSF catalog.

<sup>†</sup> It is possible to specify the AD and AT parameters also, thereby dumping files that were dumped during an interval after the date and time specified by AD and AT and before the date and time specified by BD and BT (refer back to the parameters for PFDUMP). This performs a dump of all files last dumped during the interval specified (including MSF-resident files) and allows your site to recycle all dump tapes created during this interval.

If PFLOAD is run after the ASLABEL utility has updated the MSF catalog and CSU map but before the MSF catalog has been backed up, the recovered MSF catalog will not match exactly the corresponding CSU map. In this case, recovery procedures (as described in MSF Catalog/CSU Map Mismatch later in this section) must be taken to bring the CSU map, MSF catalog, and cartridge label information into agreement.

#### **File Reloading**

PFLOAD runs should be made as usual. PFLOAD reads the CIR records from the most recent incremental dump tape to control loading of file data and PFC and permit information. For MSF-resident only files, PFLOAD reloads only the PFC and permit information (if PFDUMP dumped only this information). The following situations involve PFLOAD in an MSS environment.

- If one device needs to be reloaded, the DN or TD parameter specifies the device. The OP=Z and UD parameters should not be specified.
- If PFLOAD is used for other than a device recovery, both OP=Z and UD should be specified. The OP=Z parameter ensures that the PFC entry does not link to an MSF file that may no longer exist, and UD ensures that the file is included in the next incremental or full dump.
- If a file has a nonzero as avalue in its PFC entry (indicating that the file has an MSF image), the ASCVER flag in the PFC entry will be set when the PFC and permit information are reloaded. If the file is successfully staged to disk when it is attached, this flag is cleared. Otherwise, the flag remains set. This can be used to indicate the possibility of an operational error, such as omitting OP=Z when a file or set of files is reloaded from an obsolete dump tape.
- If any unscheduled device reload that includes recovery of an MSF catalog and/or CSU map is made, ASVAL should be run with the AM and FM parameters specified. ASVAL examines the PFC entries for MSF-resident files, the MSF catalog, and the CSU map to detect any error conditions that exist.

#### ERROR CONDITIONS AND CORRECTIVE ACTIONS

It is possible for operational, hardware, or software malfunctions to cause a variety of error conditions to exist or appear to exist in the MSF catalogs, CSU maps, PFC entries, or cartridge labels. The ASVAL utility can analyze the MSF catalogs, CSU maps, and PFC entries to detect these errors, and the ASLABEL utility can identify problems with cartridge labels. The following paragraphs describe some specific error conditions and the actions that should be taken to correct them. Most of the errors are caused either by incorrect operational procedures that result in the recovery of the wrong version of an MSS system file, or by abnormal termination of MSSEXEC or MSS utility processing, which can interrupt the updating of an MSS system file.

#### **Clearing Permanent File Error Flags**

The permanent file error flags that have been set by MSSEXEC in the PFC can be cleared by the CE parameter of the CHANGE command. The job must be of system origin.

#### **Permanent File Recovery**

If a permanent file cannot be accessed or is included by ASVAL on the validation report, try the following procedures to recover a copy of the file:

- 1. Attach the file. If the file has a disk image or can be staged in from MSF, the file data will be available on disk and can be copied to another file. ASVAL should then be run as described in step 2.
- 2. If the file cannot be attached, reload the file from a dump tape. To identify the PFDUMP run that saved a backup copy of the file, check the output from ASVAL or PFCAT, which includes date and time fields from the PFC entry for the file. Depending on the BR attribute (backup requirement) of the file, a backup copy on a dump tape may not exist.

If the file can be reloaded to disk, ASVAL should be run as follows:

ASVAL, FM=familyname, SB=subfamily, FX=n, AM.

familyname and subfamily identify the family and subfamily of the recovered file and n is sufficiently large that the fixing/flagging will be done. ASVAL sets the obsolete flag in the PFC entry because the file now has a disk image; thus the file is disassociated from the error condition. The error condition may still exist in the MSF catalog or CSU map, but you can analyze and then correct the error by using the ASDEBUG utility. Before using ASDEBUG to correct the error, you should take an incremental dump so the old PFC entry with an asa value pointing to a problem MSF-resident file will not be reloaded if a device reload occurs before the next scheduled backup dump.

- 3. If steps 1 and 2 fail, try to regenerate the file. Depending on the particular problem and status of the cartridges to which the file was destaged, the OP=RF or OP=RS directive to ASDEBUG might recover the file data.
- 4. If the file cannot be recovered, purge it so there is no PFC entry pointing to a problem MSF-resident file.

#### Cartridge Restoration and Reuse

If a cartridge is unexpectedly found anywhere outside its assigned cubicle, follow these steps to restore the cartridge so it can be used again:

- 1. Put the cartridge in the input drawer of the CSU to which it is assumed to belong, and run ASLABEL with the OP=RS directive. If the cartridge label information agrees with the CSU map entry for the cubicle with the coordinates (x,y) written on the cartridge label, the cartridge will be restored to that cubicle and the MSF catalog entry for the cartridge is updated to clear the lost flag. Otherwise, the cartridge is put in the output drawer and the cartridge label information is included in the output from ASLABEL.
- 2. If the cartridge was not restored to its CSU cubicle, examine the label information reported by ASLABEL. If the cartridge is assigned to a different CSU, repeat step 1 using the correct CSU. If the family name is blank, the cartridge has a scratch label and can be assigned normally with the OP=AM directive to ASLABEL.

- 3. If steps 1 and 2 fail, examine the CSU map entry for the cubicle with the coordinates (x,y) written on the cartridge label to see how the cubicle is assigned. Examine the cartridge, if any, in this cubicle. Also, it might be useful to run ASVAL to ensure the CSU map and MSF catalog entries for the cartridge match or to identify affected permanent files, if any, if they do not match.
- 4. If step 3 does not produce any useful information and the cartridge cannot be restored, use the OP=FX directive to ASLABEL to rewrite the cartridge label and thereby make a scratch cartridge. It might be useful to first run ASDEBUG with the OP=RS directive to preserve the data on the cartridge.

#### **Removal of Faulty or Missing Cartridges**

The following steps should be taken to remove a cartridge that has unrecoverable errors, or to release the CSU map entry for a cartridge that is missing.

For unallocated cartridges:

- 1. Attempt to remove the cartridge with the ASLABEL OP=RM directive.
- 2. If CARTRIDGE NOT FOUND is reported, repeat step 1 specifying the LT parameter.
- 3. If CARTRIDGE NOT EMPTY is reported, at least one AU on the cartridge is still allocated.

#### For allocated cartridges:

- 1. Use the ASLABEL OP=IB directive to inhibit further allocation of the cartridge.
- 2. Run ASVAL specifying the AM parameter. Examine the report for possible discrepancies between the CSU map, MSF catalog, and PFC entries related to this cartridge.
- 3. If no MSF catalog entry corresponds to the CSU map entry, use the OP=RC directive to ASDEBUG to remove the map entry.
- 4. If no discrepancy is reported by ASVAL, the affected files should be attached in write mode (if possible), reloaded using PFLOAD with the OP=Z parameter, or purged. Then ASVAL release processing should be done to release the MSF space on the cartridge, and the cartridge can be removed with the ASLABEL OP=RM directive.

#### MSF Catalog/CSU Map/PFC Problems

If error conditions exist in the MSF catalogs or CSU maps, the recovery procedure is to correct the appropriate entry rather than reload the entire file. Reloading other than the latest copy of the CSU map is not feasible because it can contain entries for several families and these entries would not be up to date. Reloading an old copy of the MSF catalog is not desirable because any permanent file that was destaged and released from disk since the last incremental dump will be lost. The following paragraphs describe corrective action for specific problems with MSF catalogs, CSU maps, or PFC entries.

#### MSF Catalog/CSU Map Mismatch

The following examples of MSF catalog/CSU map mismatches can appear as error type 1 or 2 on the ASVAL output report, which identifies the mismatch and the permanent files or orphans affected. Before taking any corrective action, the analyst should ensure that operational errors did not result in loading the wrong version of the CSU map or MSF catalog.

- If a cartridge has an MSF catalog entry indicating that all AUs on the cartridge are available for allocation but is not identified in any CSU map entry (type l mismatch), use the OP=RL directive to ASDEBUG to remove the MSF catalog entry for the cartridge.
- If a cartridge is identified in a CSU map entry but has no MSF catalog entry (type 2 mismatch), use the OP=RC directive to ASDEBUG to update the CSU map entry to unassigned and empty status. This directive will write a scratch label for the . cartridge, if any, and place the cartridge in the output drawer.
- If a cartridge has an MSF catalog entry indicating that at least one AU on the cartridge is allocated, recover the disk space for the affected permanent file, if any, or purge the file. Run ASVAL to purge unneeded MSF files and thereby make the cartridge unallocated. Use the OP=RL directive to ASDEBUG to remove the MSF catalog entry for the cartridge.

# NOTE

It sometimes takes two ASVAL/ASDEBUG runs to completely clear up type 1 or type 2 errors. Therefore, it is recommended that ASVAL be rerun with the AM parameter after an ASDEBUG run using OP=RC or OP=RL.

#### MSF Catalog Chain Problems

AUs that are allocated to an MSF-resident file are chained together in the MSF catalog to identify the sequence of AUs that contain the file. (Refer to the definition of cartridge earlier in this section.) For most files, the AUs in the chain reside on the same cartridge. Hence, one disk access is sufficient to update information for the entire chain at one time. However, an MSF-resident file can reside on several cartridges, and several disk accesses may be necessary to update its chain. If MSSEXEC is interrupted during such an update, the resultant chain will be incomplete. ASVAL identifies incomplete chains as error type 4, 5, or 6 on the validation report. The following are types of incomplete chains.

- If an incomplete chain is produced while an MSF-resident file is being purged, it is a chain fragment (one without an HOC entry).
- If an incomplete chain is produced while a file is being destaged to MSF, it is an ill-formed chain (one without an EOC entry).
- If an ill-formed chain is not corrected, the AU that should have been linked to it may be reused and become part of a good chain. Although the ill-formed chain may appear to be complete, the ill-formed chain and the good chain are intersecting.

The corrective action procedure for any of these bad chain conditions follows.

- 1. Run ASVAL with the FM parameter specified and use a sufficiently large FX=n value so that ASVAL updates the MSF catalog entries affected by the problem chains.
- Recover the permanent files, if any, that have MSF images potentially affected by these error conditions. (The ASVAL report identifies these files.) Use the procedure described under Permanent File Recovery earlier in this section.
- 3. Take an incremental or full backup dump. This prevents PFC entries with inaccurate as avalues or problem MSF chains from being recovered if a device reload is necessary.
- 4. Run ASDEBUG with the OP=RP directive to make each AU on the problem chain available for allocation. Thus, the AUs can be included in a new chain without any problems. In the case of intersecting chains, all chains that have an AU in common with another chain should be released before any further destage attempts; otherwise, errors will occur when a user tries to attach a file that is contained on an intersecting chain.

#### PFC/MSF Catalog Mismatch

It is possible that an old version of an MSF catalog can be reloaded because of incorrect operational procedures. If so, the asa value in the PFC entry for a file can be invalid according to the obsolete MSF catalog or can point to a problem chain. If the correct version of the MSF catalog is available on tape, it should be reloaded. If it is not available, the following action is appropriate. If the file also has a disk image, ASVAL should be run to clear the asa field in the PFC entry. If there is no disk image, the analyst should reload the file from tape, if possible, and then run ASVAL to clear the asa value.

#### PSEUDORELEASE

The pseudorelease capability allows the site analyst to experiment with MSS operational procedures in order to determine which procedures should be used normally, and to become adept at recognizing error conditions and performing appropriate recovery procedures. While employing the pseudorelease feature, the analyst runs no risk of losing any permanent files used in this checkout phase, as explained in the following paragraphs.

Pseudorelease mode is initiated by an ASMOVE run with TM=Y specified. ASMOVE selects files to be destaged and/or released from disk by using the destage and release algorithms as usual. The destage to MSF process is the same whether or not pseudorelease mode is in effect (refer to the description of ASMOVE earlier in this section for details on destaging). However, the procedures for disk space release vary depending on whether or not pseudorelease mode is enabled. Disk space is not actually released in pseudorelease mode. Rather, the AFPDR flag is set in the PFC entry for a file that has been selected for disk space release. This flag indicates that PFM should ignore the disk image for this file. Therefore, if the user attaches such a file, the disk image is ignored and the file is staged to disk from MSF. The normal staging process is followed except that the disk image is created on a scratch device instead of a permanent file device. Thus, in actuality, two disk images of the file exist. However, once the file is staged to disk, whether or not staging errors are detected and reported by MSSEXEC, the AFPDR flag is cleared so that the user accesses the original disk image. Also, the file staged to the scratch disk is released so the scratch space is available for reuse. If MSS processing becomes disabled, the original disk image can still be accessed using an ATTACH request.

There are two methods for terminating pseudorelease mode. One is to perform a full dump followed by a reload with OP=Z specified on the PFLOAD call. This clears the asa field in the PFC entry for each file, thereby indicating that no MSF images exist and that the files reside on disk only. The other method is to run ASMOVE with TM=N specified. This causes the disk images for pseudoreleased files to be really released from disk, thereby leaving the file with only the MSF image.

You can use the following examples after pseudorelease mode is enabled to force different error conditions to occur. You can implement these incorrect operational procedures and then perform error recovery action without endangering any of the permanent files involved. These examples assume that ASDEF has been run to create a CSU map and the MSF catalogs for the CSU and family being tested.

#### Example 1:

- 1. Run ASLABEL to add cartridges (for example, A, B, C) to a subfamily.
- 2. Dump the CSU map file to tape.
- 3. Run ASLABEL to remove cartridge A and add another cartridge (for example, D).
- 4. Reload the CSU map file dumped in step 2. This creates a mismatch between the CSU map and MSF catalog, because the MSF catalog indicates that cartridge D resides in the CSU but cartridge A does not.
- 5. Run ASVAL to detect the mismatch.
- 6. Run ASDEBUG to correct the mismatch. The resultant CSU map and MSF catalog should contain entries for cartridges B and C, but not A or D.

#### Example 2:

- 1. Run ASLABEL to add several cartridges to a subfamily.
- 2. Create some permanent files with different backup requirements and preferred residence requirements.
- 3. Run ASMOVE to destage and/or release the files created in step 2.
- 4. Physically remove one of the cartridges from the CSU; do not use ASLABEL to remove it.
- 5. Attach the files whose disk space was released in step 3.
- 6. Run ASVAL to verify that only files resident on the removed cartridge are affected.
- 7. Run ASLABEL to restore the cartridge removed in step 4.
- 8. Attach the files reported in step 6. There should be no problems reported.

Example 3:

- 1. Run ASLABEL to add several cartridges to a subfamily. Make a backup copy of the CSU map and MSF catalog files.
- 2. Create several files with the BR=Y or BR=MD attribute. Run ASMOVE to destage all of them and release those with the BR=MD requirement.
- 3. Take a backup dump of the family.
- 4. Reload the CSU map and MSF catalog backed up in step 1.
- 5. Create several new files with the BR=MD attribute. Run ASMOVE to destage them and to release the disk space of the files with the BR=Y attribute in step 2.
- Attach the files created in step 2. They should have been overwritten by the files destaged in step 5.
- 7. Recover the files with the BR=Y attribute from the dump tape made in step 3.

## Example 4:

Try to interrupt MSSEXEC while it is destaging new files or releasing unused MSF files to create incomplete chains. ASVAL reports such errors and ASDEBUG fixes them.

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# INTRODUCTION

Multimainframe operation provides mechanisms by which more than one computer can share mass storage devices. Each mainframe in a multimainframe configuration has access to the shared mass storage devices and their preserved files. Preserved files are those files that are retained across a level 0 deadstart (nonsystem recovery). Types of preserved files are permanent files, queued files, and system dayfiles.

There are two types of multimainframe configurations: linked shared device multimainframe (SDM), and independent SDM. The main difference between the two SDM configurations is their method of maintaining the critical device tables necessary to control shared mass storage and intermainframe communications. Linked SDM configurations maintain the critical device tables in extended memory, while independent SDM configurations maintain the tables on each shared mass storage device. Because the independent SDM configurations maintain the tables on the shared devices, it causes some performance degradation.

Each mainframe in a multimainframe configuration can operate in multimainframe mode or in standalone mode; however, two machines may not access the same device unless both are in multimainframe mode. A device is considered shared if it can be accessed by more than one of the mainframes; it need not be accessible to all mainframes in the complex.

The fact that a computer is operating as part of a multimainframe complex is not apparent to the user, except for some degrading of performance for the independent SDM. However, there are operational changes and additions that the operator should note. These include deadstart commands, displays, online commands necessary in the event of an interruption on one of the sharing mainframes, and the UNLOAD/MOUNT process for removable devices.

Recovery allows a machine to either join other machines operational in a multimainframe complex or to operate in a standalone mode. The standalone system is not allowed to use the same mass storage devices as other machines. In the event of a system interruption to one machine, it is possible to operate the remaining machines in a multimainframe environment.

Automatic detection of extended memory is not provided, because it is not possible to determine its absence and continue to run on all machine types. For example, a 6600 will hang if an attempt is made to execute an extended memory instruction without extended memory. Extended memory status is checked during deadstart when processing an extended memory entry in the EQPDECK.

Except where explicitly specified that controllers and/or equipment can be shared between mainframes, assume they cannot be shared. For example, NOS does not support sharing a two-channel tape controller between mainframes; nor does it support sharing mass storage controllers except as specified in this section.

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# LINKED SDM OPERATION

In a linked SDM complex, up to four computers can access mass storage devices. Any combination of 1 to 4 model 71, 72, 73, 74, 171, 172, 173, 174, 175, 720, 730, 740, 750, 760, 865, 875 mainframes or 6000 Computer Systems mainframes can be used. Each mainframe requires one CPU port connected to extended memory. The presence of a DDP on a CPU port decreases by one the total number of mainframes that can run together. Shared mass storage devices supported are: 844 (single and double density), 885-11/12, and extended memory.

Extended memory is the means for controlling shared mass storage and intermainframe communications. Each mainframe has a CPU port into extended memory through which system activity is controlled. In order to control shared mass storage devices, several extended memory resident tables are required. The device access table (DAT) contains the logical description (family name/pack name and device number) of each mass storage device (shared or nonshared) that is accessible by any machine in the linked SDM complex. For each device in the DAT that is to be accessed by more than one machine, a corresponding MST (image of central memory resident MST) and TRT also reside in extended memory. In addition, a machine recovery table (MRT) exists in extended memory for each machine and device (that is, there are as many MRTs for each shared device as there are mainframes in the complex).

If MSS is used, one mainframe in the linked SDM complex is physically connected to MSF and is called the master mainframe; all other mainframes in the complex can access MSF files and are called slave mainframes. MSSEXEC runs on the master mainframe and is the main processing program that controls MSS activity. MSSSLV runs on each slave mainframe and communicates with MSSEXEC to retrieve files from MSF in response to ATTACH requests by jobs running on the slave mainframes.

If MSAS is used, one mainframe in the linked SDM complex is physically connected to 7990 and is called the master mainframe; all other mainframes in the complex can access 7990 files and are called slave mainframes. SSEXEC runs on the master mainframe and is the main processing program that controls MSAS activity. SSSLV runs on each slave mainframe and communicates with SSEXEC to retrieve files from 7990 in response to ATTACH requests by jobs running on the slave mainframes.

#### DEADSTART

A linked SDM environment is defined at deadstart by CMRDECK and EQPDECK entries in each machine. Use the following entries to do this.

#### CMRDECK Entry

#### Description

MID=id.

The 2-character machine identification. This identification is used to associate a specific machine with its access to a shared device. It is required, however, even if no devices are shared during system operation. This id must be unique for each machine in the complex. If id is omitted, the default value is MID=AA.

#### EQPDECK Entry

#### Description

 $SHARE=est_1, est_2, \dots, est_n$ . est\_i are the EST ordinals of the mass storage devices that will be shared with other machines in the linked SDM complex. The MST/TRT for each device resides in extended memory.

PRESET, n.

You can specify this entry only at the system console. n is the total number of devices to be shared by all mainframes in the complex. You must specify the PRESET entry on a level 0 deadstart on the first machine to be deadstarted in the linked SDM complex. This entry initializes the flag register and extended memory resident tables. If n is omitted, the default value is the number of shared devices defined for the particular machine.

These entries are also described in section 3, Deadstart Decks.

Because in a linked SDM complex two or more machines can utilize the same mass storage devices, the device assignments and EQPDECKs of all machines are interrelated. Care must be taken to ensure proper EQPDECK settings for each machine to obtain the desired device configuration. The following items are important in obtaining this proper device configuration.

- Each machine must specify a unique machine identification (using the MID entry in the CMRDECK). This identification associates a particular machine with its files on a shared device. There are no external characteristics associated with this identification. However, if the machine identification specified on a machine deadstarting into a multimainframe complex is identical to a machine identification on a machine already operating, the deadstart process halts and an appropriate message is displayed.
- The assignment of shared mass storage devices should be made properly to ensure the recoverability of the device and the proper operation of the system (refer to Shared Mass Storage later in this section).
- If SHARE EQPDECK entries are present, an extended memory entry (DE or DP equipment type) must also be present in the EQPDECK. If none is found, an error message is given to the operator indicating that no link device has been defined.

- The first machine deadstarted (level 0 only) must specify the PRESET EQPDECK entry. This command causes tables to be preset in extended memory, and in so doing, assures that no other machine has arrived at the same point in the deadstart sequence and is attempting the same thing. These other machines should not have the PRESET entry specified during deadstart. All other machines that arrive at that point in the deadstart process display a message indicating that they are waiting for deadstart on the preset machine. A machine that does not preset extended memory has no means of detecting whether extended memory has been preset previously by another machine. Therefore, the operator must ensure that extended memory has been preset by a prior deadstart before deadstarting another machine that is to be in the multimainframe complex.
- If extended memory is initially placed in maintenance mode (half of extended memory used for online diagnostics), the first machine deadstarted in a complex must have the INITIALIZE and PRESET EQPDECK entries specified when deadstarting (level 0 only). The remaining machines must have the extended memory size correspondingly reduced in their EQPDECKs.

When a mainframe joins a linked SDM complex, it is associated with an identification that it utilizes during system operation but which is independent of the machine identification. This association is done during deadstart, when the machine investigates the multimainframe tables residing on the link device and places its machine identification in an empty slot of the four that are available. Associated with each slot is a unique machine index and a unique machine mask, which the machine uses either to index itself into various MMF tables or to identify itself in these tables. The indices are 1, 2, 3, and 4. The masks are 1, 2, 4, and 8.

When performing a level 0 recovery deadstart on one of the machines, the MREC utility should be run on some or all of the remaining machines before the deadstart proceeds. The purpose of this utility is to clear interlocks held by the machine to be deadstarted that have not been cleared by CPUMTR. It can also recover mass storage space on a shared device that is currently not accessible because of a machine interruption (necessitating a level 0 deadstart). MREC may have to be run from more than one machine since it affects only shared devices (that is, devices specified on the SHARE EQPDECK entry) of the machine on which MREC is run. If the interrupted machine shares different devices with different machines, MREC must be run from enough machines to account for all devices shared with the interrupted machine. The interface to the MREC utility is described in section 8, K-Display Utilities.

If a level 3 recovery deadstart will be performed, extended memory must be intact as well as CMR. For a level 1 or 2 recovery in a linked SDM environment, extended memory must be intact.

Figure 13-1 illustrates the steps generally needed to deadstart a machine in a multimainframe complex.

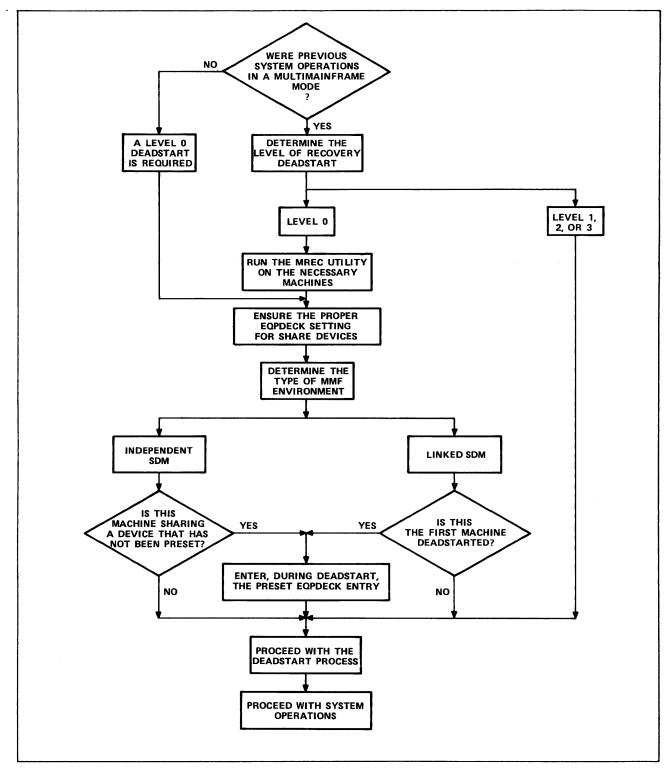


Figure 13-1. Deadstarting a Machine in a Multimainframe Complex

#### SHARED MASS STORAGE

A major reason for operating a multimainframe complex is to be able to share mass storage devices between machines. Thus, the users of two systems may be able to utilize the same files if these files reside on a shared mass storage device. Having the ability to share files between systems also means that several additional procedures are required when operating a multimainframe complex. Additional consideration must also be given when configuring mass storage devices. This material, which is unique to multimainframe operation, is discussed in the following paragraphs.

#### **CONFIGURING SHARED MASS STORAGE DEVICES**

Some consideration should be given as to which devices should be made shared devices and which ones should not. Since a shared device contains preserved files that can be accessed by more than one machine, it must be physically connected to and logically defined (as shared) by each machine sharing the device. If one device of a family is defined as shared, then normally all devices in the family should be defined as shared for accessibility. If a removable device will be treated as shared, it must be defined as removable in each machine sharing it. If a shared device is not removable, additional use of the device (beyond preserved files) is defined by each machine, independently of any other machine definition (that is, each machine specifies whether the device is to contain such things as a copy of the system or temporary files).

There is no real advantage to having nonpreserved files on a shared device, unless spreading them across shared devices outweighs having them on a dedicated device. A key factor is drive and controller contention. Another factor is whether or not enough drives and accesses to those drives are available to warrant spreading temporary files across several devices from all systems. Also, additional overhead is incurred by the system for each shared device. This includes additional CMR space for each device (100<sub>8</sub> CM words) and additional time that is required to maintain the device-related tables (such as the MST or the TRT) on the link device. These factors must be weighed to determine how best to configure shared devices.

#### **DEVICE ACCESS TABLES**

In a linked SDM complex, mainframes use DATs to determine device usage. The DATs identify the status of all shared and nonshared devices for the mainframes in the complex. One DAT for each machine resides in extended memory.

In order to minimize configuration problems, shared removable equipment should be configured the same way on all machines in the complex. For example, if one system defines three shared units as three single-unit devices and another system defines the same units as one three-unit device, the first system can accommodate a two-unit device on these units, whereas the second system would consider it an error. Unless the configurations are the same on all machines, any devices mounted on those drives may not necessarily be recoverable on all machines.

# NOTE

RESEX considers only the configuration of the machine on which it is executing in its overcommitment algorithm.

# MASS STORAGE RECOVERY TABLES

One problem that is created by having more than one machine sharing a mass storage device is that of recovering the mass storage space and interlocks of a machine, if it requires recovery processing. This problem is solved by defining a table that provides the information needed to recover the mass storage space of a machine and by having a machine recovery utility that performs the recovery. The table is called the mass storage recovery table (MRT). There is one MRT for each mainframe per device. It tells which tracks are interlocked and which tracks are first tracks of files local to a particular machine. The MRT is utilized by CPUMTR on another machine to clear track interlocks and by the MREC utility on another machine to recover the mass storage space of the interrupted machine. For specific information on the MRT, refer to the NOS 2 Systems Programmer's Instant.

#### **DEVICE INITIALIZATION**

To initialize a mass storage device, it is necessary first to prevent any new activity from starting up on the device, then to wait until all current activity has completed, and finally to interlock the device and proceed with initialization. To accomplish this on shared mass storage devices in a linked SDM environment, follow these steps:

- 1. Enter the DSD UNLOAD command. All machines sharing the device must unload it to prevent any new activity. (This command can be used for both removable and nonremovable shared devices.)
- 2. Enter the DSD INITIALIZE command on the machine from which the initialization is to take place. If you enter the INITIALIZE command from another machine, an error message is displayed. Refer to the NOS 2 Operations Handbook for error messages.
- 3. The machine from which the INITIALIZE command was entered monitors the status of the other machines that are sharing the device. Once they have unloaded the device and user activity has ceased, the device tables are updated and the device is checkpointed.
- 4. To activate the device on the other machines, enter the DSD MOUNT command from each machine. This command clears the UNLOAD status. If initialization is still in progress on another machine when you enter a MOUNT command, the MOUNT process is terminated with an error. Refer to the NOS 2 Operations Handbook for error messages.

#### **DEVICE UNLOAD**

In a linked SDM environment, unloading a device involves more than it does under a onemachine system. A device can be unloaded from a machine (referred to as a local unload), or it can be unloaded from the entire multimainframe complex (referred to as a global unload). A device can be physically removed from the complex only after a global unload has been accomplished. This is the general procedure to complete a global unload:

- 1. Enter the UNLOAD command from each machine. This is an indication to the machine that no new accesses should be initiated. You must enter this command from each machine sharing the device.
- 2. When all local unloads are set and user access has ceased, global unload status is set if the device is a removable device. This global unload status is displayed on all machines, indicating that there is no activity on the device from any machine and that the device may be physically unloaded.
- 3. You can then switch packs and enter the MOUNT command at the console to initiate recovery of the device. The MOUNT command clears the global unload status and the local unload status on the machine from which it was entered and indicates that this machine is now accessing the device. All other machines continue to ignore the device until you enter the MOUNT command on each machine. The MOUNT command does nothing if local unload status is not set on the machine.

# **DEVICE RECOVERY**

Deadstart and online recovery methods are similar in logic for recovering mass storage devices.

When a device is recovered in a linked SDM complex, the DAT in extended memory is interlocked while a check is made to see if an entry exists for this device. The presence of an entry indicates that another machine is also accessing the device. If an entry is found and the machine recovering the device has not been instructed to share it, an error is indicated and recovery halts with an appropriate message displayed. If the machine already accessing the device is not allowing it to be shared, the same error condition occurs. Therefore, if a device is being accessed, another machine can recover that device only if the recovering machine and the accessing machine use the device in a multimainframe mode.

NOTE

If two devices recovered on separate machines have the same family name/device number or pack name, there is no method of determining whether or not they are the same device if both are shared. If they are different devices, they are both destroyed when used.

#### **DEVICE CHECKPOINT**

Local MST information for each machine that shares a mass storage device is maintained on the device. MST information for other machines may also be present on the device. The information for each machine is kept in one sector on the label track following the TRT sectors. Entries for up to 31 unique machine identifiers can exist.

During checkpoint, only the local MST information of the machine performing the checkpoint is updated. Since local MST information for many machines is kept on the device, updating of all these areas by one machine could cause a loss of information needed if the device were to be used with another system.

For shared devices in a linked SDM complex, duplication of checkpointing by more than one machine is prevented. If a machine attempts to checkpoint a shared device and determines that a second machine is performing the checkpoint (a checkpoint request bit is set in the local MST area of the second machine), no action is taken. Only one checkpoint bit is set at any given time for a device.

#### **MSS PROCESSING**

Unlike most other mass storage devices, the MSF is not shared by mainframes. Rather, MSF is physically connected to and driven by one mainframe called the master mainframe. All other mainframes that share permanent files with the master mainframe are called slave mainframes. The disks to which MSF-resident files are staged must be shared devices and accessible by all mainframes.

MSSEXEC runs on the master mainframe and is the main program that controls MSS processing activities. You can activate MSSEXEC by entering the following DSD commands at the system console.

L.SUBSYST. ENABLE,MASTER MSS. L.END. MSSffff.

MSSSLV runs on each slave mainframe and is the program that supports file retrieval from MSF for jobs running on a slave mainframe. You can activate MSSSLV by entering the following DSD commands at the system console.

L.SUBSYST. DISABLE,MASTER MSS. L.END. MSSffff.

When a job running on a slave mainframe attaches an MSF-resident file that has no disk image, MSSSLV is requested to stage the file to disk. However, MSSSLV cannot access MSF directly. MSSSLV must communicate with MSSEXEC, which stages the file to shared disk and then notifies MSSSLV when the file is available. MSSSLV then causes the requesting job to be resumed so that the file ATTACH can complete.

The permanent files used for communication between MSSEXEC and MSSSLV are initialized and recovered automatically and require no backup or recovery processing. The name of the permanent file used by MSSSLV running on mainframe i (i=1, 2, 3, 4) to send requests to MSSEXEC is STOMNOI. The name of the permanent file used by MSSEXEC to respond to all requests by all MSSSLVs is MTOSPFN. These files belong to the family that contains extended memory and are saved under the user index  $377760_8$ .

## **MSAS PROCESSING**

Unlike most other mass storage devices, the 7990 is not shared by mainframes. Rather, 7990 is physically connected to and driven by one mainframe called the master mainframe. All other mainframes that share permanent files with the master mainframe are called slave mainframes. The disks to which 7990-resident files are staged must be shared devices and accessible by all mainframes.

SSEXEC runs on the master mainframe and is the main program that controls MSAS processing activities. You can activate SSEXEC by entering the following DSD commands at the system console.

L.SUBSYST. ENABLE,MASTER MAS. L.END. MASffff.

SSSLV runs on each slave mainframe and is the program that supports file retrieval from a 7990 for jobs running on a slave mainframe. You can activate SSSLV by entering the following DSD commands at the system console.

L.SUBSYST. DISABLE,MASTER MAS. L.END. MASffff.

When a job running on a slave mainframe attaches a 7990-resident file that has no disk image, SSSLV is requested to stage the file to disk. However, SSSLV cannot access 7990 directly. SSSLV must communicate with SSEXEC, which stages the file to a shared disk and then notifies SSSLV when the file is available. SSSLV then causes the requesting job to be resumed so that the file ATTACH can complete.

The permanent files used for communication between SSEXEC and SSSLV are initialized and recovered automatically and require no backup or recovery processing. The name of the permanent file used by SSSLV running on mainframe i (i=1, 2, 3, 4) to send requests to SSEXEC is STBMNOi. The name of the permanent file used by SSEXEC to respond to all requests by all SSSLVs is MTBSPFN. These files belong to the family that contains extended memory and are saved under the user index  $377760_8$ .

# INDEPENDENT SDM OPERATION

In an independent SDM complex, up to 16 computers can access shared mass storage devices. Any combination of from 1 to 16 model 71, 72, 73, 74, 171, 172, 173, 174, 175, 176, 720, 730, 740, 750, 760, 865, 875, CYBER 180-class machines, or 6000 Computer Systems mainframes can be used. Shared mass storage devices supported are 844 (single and double density) and 885-11/12 (single and double density).

Each shared device contains in its label track all of the tables necessary to control multimainframe access. These tables include the MST, TRT, device index table (DIT), and MRT for each mainframe sharing the device. Whenever a mainframe needs to access a shared device, it is necessary for the mainframe to ensure its copies of these tables are up-to-date.

One or more of the mainframes can have extended memory, but each mainframe's extended memory must be used as a nonshared device.

If MSS or MSAS is used, one mainframe in the independent SDM complex is physically connected to MSF or 7990 and only that mainframe can assess it.

## DEADSTART

MID=id.

An independent SDM environment is defined at deadstart by CMRDECK and EQPDECK entries in each machine. Use the following entries to do this.

#### CMRDECK Entry

\_\_\_\_\_

Description

The 2-character machine identification. This identification is used to associate a specific machine with its access to a shared device. It is required, however, even if no devices are shared during system operation. This id must be unique for each machine in the complex. If id is omitted, the default value is MID=AA.

EQPDECK Entry

## Description

ISHARE=est1,est2,...,estn. esti are the EST ordinals of the mass storage devices that will be independently shared with other machines in the multimainframe complex. The ISHARE entry must precede the PRESET entry. The MST/TRT resides on each shared device.

PRESET=est1,est2,...,estn.
You can specify this entry only at the system console.
esti is the EST ordinal of the shared mass storage
device to be preset. Several machines at level 0
deadstart may need the PRESET entry. The PRESET entry is
specified only on a level 0 deadstart by the first machine
accessing the device and must follow the ISHARE entry.
PRESET initializes the tables residing on the label track
of the shared devices.

These entries are also described in section 3, Deadstart Decks.

Since in an independent SDM complex two or more machines can utilize the same mass storage devices, the device assignments and EQPDECKs of all machines are interrelated. Care must be taken to ensure proper EQPDECK settings for each machine to obtain the desired device configuration. The following items are important in obtaining this proper device configuration.

- Each machine must specify a unique machine identification (using the MID entry in the CMRDECK). This identification associates a particular machine with its files on a shared device. There are no external characteristics associated with this identification. However, if the machine identification specified on a machine deadstarting into a multimainframe complex is identical to a machine identification on a machine already operating, the deadstart process halts and an appropriate message is displayed.
- The assignment of shared mass storage devices should be made properly to ensure the recoverability of the device and the proper operation of the system (refer to Shared Mass Storage, next).
- Each machine must specify the ISHARE=est EQPDECK entry to inform the system that devices will be shared in the independent shared device mode.
- On a level 0 deadstart, any shared device that has not been shared prior to this deadstart must include the PRESET entry in its definition.

- On a level 0 deadstart, if a device was previously shared by the deadstarting machine, the MRT and DIT device resident tables must be zeroed out.
  - If the machines that share the device are not currently running, the device must be preset or initialized to zero out the tables.
  - If any machine that shares the device is running, the machine recovery utility (MREC) must be run from a running machine to remove the machine identification of any machines that are not currently running and to clear all interlocks held by these machines.
- On a level 0 deadstart, if a device was previously shared by a machine other than the deadstarting machine, the MRT and DIT device resident tables may or may not have to be zeroed out.
  - If another machine that is sharing the device is running, the device must not be preset.
  - If no machines that will be sharing the device are running and one or more of them will be deadstarted at a level 1, 2, or 3, the device must not be preset.
  - If all machines that will be sharing the device are not currently running and all will be deadstarted at level 0, the device can be preset or initialized.

When performing a level 0 recovery deadstart on one of the machines, the MREC utility should be run on some or all of the remaining machines before the deadstart proceeds. The purpose of this utility is to clear interlocks held by the machine to be deadstarted that have not been cleared by CPUMTR. It can also recover mass storage space on a shared device that is currently not accessible because of a machine interruption (necessitating a level 0 deadstart). MREC may have to be run from more than one machine since it affects only shared devices (that is, devices specified on the ISHARE EQPDECK entry) of the machine on which MREC is run. If the interrupted machine shares different devices with different machines, MREC must be run from enough machines to account for all devices shared with the interrupted machine. The interface to the MREC utility is described in section 8, K-Display Utilities.

In an independent SDM complex, as in a standalone system, critical tables that reside on the device must be intact for a level 1, 2, or 3 deadstart recovery.

Figure 13-1 illustrates the steps generally needed to deadstart a machine in a multimainframe complex.

#### SHARED MASS STORAGE

A major reason for operating a multimainframe complex is to be able to share mass storage devices between machines. Thus, the users of two systems may be able to utilize the same files if these files reside on a shared mass storage device. Having the ability to share files between systems also means that several additional procedures are required when operating a multimainframe complex. Additional consideration must also be given when configuring mass storage devices. This material, which is unique to multimainframe operation, is discussed next.

#### CONFIGURING SHARED MASS STORAGE DEVICES

Some consideration should be given as to which devices should be made shared devices and which ones should not. Since a shared device contains preserved files that can be accessed by more than one machine, it must be physically connected to and logically defined (as shared) by each machine sharing the device. If one device of a family is defined as shared, then normally all devices in the family should be defined as shared for accessibility. If a removable device will be treated as shared, it must be defined as removable in each machine sharing it. If a shared device is not removable, additional use of the device (beyond preserved files) is defined by each machine, independently of any other machine definition (that is, each machine specifies whether the device is to contain such things as a copy of the system or temporary files).

There is no real advantage to having nonpreserved files on a shared device, unless spreading them across shared devices outweighs having them on a dedicated device. A key factor is drive and controller contention. Another factor is whether or not enough drives and accesses to those drives are available to warrant spreading temporary files across several devices from all systems. Also, additional overhead is incurred by the system for each shared device. This includes additional CMR space for each device (1008 CM words) and additional time that is required to maintain the device-related tables (such as the MST or the TRT) on the link device. These factors must be weighed to determine how best to configure shared devices.

In an independent SDM complex, where device-related tables are maintained on the device itself, system performance degradation can occur if the shared devices are not properly configured. Since the device must be accessed every time its tables in CMR are not up to date, drive and controller contention is increased and system performance is affected. To reduce the impact on system performance you can:

- Put the system and temporary files on nonshared devices.
- Put only those fast-attach files that must be global on shared devices.
- Use multiple channels and multiple controllers to improve performance and provide additional paths to shared devices.

#### **DEVICE INDEX TABLES**

In an independent SDM complex, mainframes use DITs to determine device usage. The DITs contain the MIDs of the mainframes that can access the shared device. The shared device maintains a DIT for each mainframe that shares it. The DITs reside on each shared device within the MST on the device's label track.

#### MASS STORAGE RECOVERY TABLES

One problem that is created by having more than one machine sharing a mass storage device is that of recovering the mass storage space and interlocks of a machine, if it requires recovery processing. This problem is solved by defining a table that provides the information needed to recover the mass storage space of a machine and by having a machine recovery utility that performs the recovery. The table is called the MRT. There is one MRT for each mainframe per device. It tells which tracks are interlocked and which tracks are first tracks of files local to a particular machine. The MRT is utilized by CPUMTR on another machine to clear track interlocks and by the MREC utility on another machine to recover the mass storage space of the interrupted machine. For specific information on the MRT, refer to the NOS 2 Systems Programmer's Instant.

## **DEVICE INITIALIZATION**

To initialize a mass storage device, it is necessary first to prevent any new activity from starting up on the device, then to wait until all current activity has completed, and finally to interlock the device and proceed with initialization. To accomplish this on shared mass storage devices in an independent SDM environment, follow these steps:

- Enter the DSD UNLOAD command. All machines sharing the device must unload it to prevent any new activity. (This command can be used for both removable and nonremovable shared devices.)
- 2. Enter the DSD INITIALIZE command on the machine from which the initialization is to take place. Each entry of the INITIALIZE command toggles INITIALIZE on and off. If two machines in the complex enter the INITIALIZE command, the INITIALIZE command is toggled off and no error message is displayed.
- 3. The machine from which the INITIALIZE command was entered monitors the status of the other machines that are sharing the device. Once they have unloaded the device and user activity has ceased, the device tables are updated.
- 4. To activate the device on the other machines, enter the DSD MOUNT command from each machine. This command clears the UNLOAD status. If initialization is still in progress on another machine when you enter a MOUNT command, the machine waits for INITIALIZE to finish and then continues with the MOUNT process.

### **DEVICE UNLOAD**

In an independent SDM environment, unloading a device involves more than it does under a one-machine system. A device can be unloaded from a machine (referred to as a local unload), or it can be unloaded from the entire multimainframe complex (referred to as a global unload). A device can be physically removed from the complex only after a global unload has been accomplished. This is the general procedure to complete a global unload:

- 1. Enter the UNLOAD command from each machine. This is an indication to the machine that no new accesses should be initiated. You must enter this command from each machine sharing the device.
- 2. When all local unloads are set and user access has ceased, global unload status is set if the device is a removable device. This global unload status is displayed on all machines, indicating that there is no activity on the device from any machine and that the device may be physically unloaded.
- 3. You can then switch packs and enter the MOUNT command at the console to initiate recovery of the device. The MOUNT command clears the global unload status and the local unload status on the machine from which it was entered and indicates that this machine is now accessing the device. All other machines continue to ignore the device until you enter the MOUNT command on each machine. The MOUNT command does nothing if local unload status is not set on the machine.
- 4. A pack that has not been previously mounted in this system must be preset with a MOUNT,est,P command.

#### **DEVICE RECOVERY**

Deadstart and online recovery methods are similar in logic for recovering mass storage devices.

For a machine to recover a device in an independent SDM complex, the MID of the machine must be in the device's DIT. If the MID is not in the DIT, an error message is issued and recovery is impossible. When recovering a device in a standalone environment, the device is not checked if it is/was an independent shared device.

#### **DEVICE CHECKPOINT**

Local MST information for each machine that shares a mass storage device is maintained on the device. MST information for other machines may also be present on the device. The information for each machine is kept in one sector on the label track following the TRT sectors. Entries for up to 31 unique machine identifiers can exist.

During checkpoint, only the local MST information of the machine performing the checkpoint is updated. Since local MST information for many machines is kept on the device, updating of all these areas by one machine could cause a loss of information needed if the device were to be used with another system.

In an independent SDM complex, the MST and TRT information is maintained on the device. If the MST and/or TRT information changes during a device access, the system updates the MST and/or TRT information making it unnecessary for the system to periodically checkpoint the device.

#### MSS PROCESSING

Unlike most other mass storage devices, the MSF is not shared by mainframes. Rather, MSF is physically connected to and driven by one mainframe. The only machine that can access the MSF-resident files is the physically connected independent SDM. MSS processing is the same in an independent SDM environment as it is in a single mainframe environment. Refer to section 12, Mass Storage Subsystem.

#### **MSAS PROCESSING**

Unlike most other mass storage devices, the 7990 is not shared by mainframes. Rather, 7990 is physically connected to and driven by one mainframe. The only machine that can access the 7990-resident files is the physically connected independent SDM. MSAS processing is the same in an independent SDM environment as it is in a single mainframe environment. Refer to section 11, Mass Storage Archival Subsystem.

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Maintenance Logging Transfer Facility (MLTF) Dump NAD Memory (DMPNAD) 14-1

14-1

This section describes utilities that are used to maintain network access devices (NADs).

# MAINTENANCE LOGGING TRANSFER FACILITY (MLTF)

MLTF is a utility program that controls logging NAD error logs into the binary maintenance log. At regular intervals MLTF maintains the network description file on disk, calls the NETLOG program, and rolls out after execution. The time interval is determined by an input parameter to MLTF (refer to the NOS 2 Installation Handbook).

NETLOG uses the network configuration file to determine which remote NADs should be logged. Each time NETLOG runs it receives a copy of the network configuration file from RHF and saves the file on disk. If RHF is not active, NETLOG uses the saved copy of the network configuration file from disk to determine which NADs to log. Local NADs are always logged. For each NAD that is logged, NETLOG enters the NAD error log into the binary maintenance log.

The MLTF utility is started automatically by RHF when RHF is initialized. The mainframe identified as the maintenance host must have the MLTF utility running periodically even if RHF is not active.

# DUMP NAD MEMORY (DMPNAD)

DMPNAD is a utility program that reads the NAD memory and formats the data into an output file. The dump is formatted so that each NAD word is printed in both hexadecimal and 7-bit ASCII code representations.

The format of the command is:

DMPNAD,  $p_1$ ,  $p_2$ , ...,  $p_n$ .

| <u>p1</u> | Description                                                                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC=aaaa   | The 4-digit hexadecimal number specifying the remote NAD's access code (refer to the RHF K display in section 8, K-Display Utilities). The default is AC=0000. |
| B=binfile | The 1- to 7-character name of the file on which the binary output is to be written. The default is no binary output file.                                      |
| В         | Same as B=BINOUT.                                                                                                                                              |
| СН=сс     | The 1- or 2-digit octal number specifying the channel number of the local NAD defined in the EST entry associated with the NAD.                                |
| I=infile  | The 1- to 7-character name of the file on which the binary input is written. The default is no binary input file.                                              |

| Des | scr | ip | ti | on |
|-----|-----|----|----|----|
|     |     |    |    |    |

ISame as I=BININ.L=outfileThe 1- to 7-character name of the file on which the list output is<br/>to be written. The default is L=OUTPUT.LT=tot1t2t3The 4-digit binary bit pattern specifying the TCUs that connect a<br/>local NAD to a remote NAD. tn=1 enables TCUn. For example,<br/>LT=1100 indicates that local TCUs 0 and 1 are enabled.

The DMPNAD utility can be called from the console or a batch job. The calling job must be of system origin or you must be validated for system origin privileges. You normally include the channel number on the DMPNAD command to specify which online NAD is to be dumped. The dump can also be saved as a binary output file (B parameter) which can later be formatted for printing by using the file as a binary input file (I parameter) and no access to the NAD is required. No special privileges are required when using the I parameter.

For a local NAD dump, DMPNAD can dump either a local NAD (380-170 NAD connected to the host mainframe using a channel and configured in the EST) or a remote NAD (any 380 NAD accessible to a local NAD using a loosely-coupled network trunk), The EST entry associated with the local NAD's channel number must be OFF or the controlware-not-loaded flag must be set. Since the local NAD dumping process stops all NAD activity, the NAD controlware must be reloaded using LOADBC (refer to section 1, Controlware Loading Utility) before the local NAD can be used by the operating system.

Remote NAD dumping is selected by specifying the remote NAD to be dumped (AC and ND parameters), the local NAD's channel number used to access the remote NAD (CH parameter), and the TCU used to connect the local NAD to the remote NAD (LT parameter). For remote NAD dumping, the local NAD must be loaded and running and its EST entry must be ON.

Remote NAD dumping operations can occur concurrently with RHF use of the local NAD. However, extreme care should be exercised when performing a remote NAD dump to ensure that the correct remote NAD is being dumped and that the remote NAD is not being used by the mainframe to which it is connected. After the remote NAD dumping operation, the NAD controlware must be reloaded into the remote NAD before it can be used by the remote mainframe.

Pi

ND=nn The 2-digit hexadecimal number specifying the remote NAD's address (refer to the RHF K display in section 8, K-Display Utilities).

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| ····· , , , · ·                        |       |

# **NETWORK OPERATIONS**

The commands described in this section are used when the network access method (NAM) is being initialized or is active. They initialize and control the network processing units (NPUs), trunks, lines, terminals, and application programs under network supervision.

# **NETWORK ORGANIZATION**

Initiating NAM (refer to the DSD NAM command in section 5, DSD Commands) causes NAM, and the communications supervisor (CS), network supervisor (NS), network validation facility (NVF), and terminal verification facility (TVF) to be loaded and initiated at control points. Refer to the NAM/CCP 3 Terminal Interfaces Reference Manual for more information on TVF. CS provides control and status of the NPUs and all of their communication lines and terminals. NS loads and dumps all of the NPUs in the communication network. NVF validates terminal users and applications as they attempt to access the network.

Multiple hosts may belong to the network. Hosts may assume one or more supervisory roles in the network. Each host will have a copy of NVF that will validate users connecting to and applications executing in that host. The supervisors CS and NS may execute in any or all of the CYBER hosts. Whenever an NPU needs to be loaded, it may request any copy of NS to perform the load (not always the same copy). Once an NPU is running, it may request any copy of CS to supervise it. Each NPU will have a preferred copy of CS, but it may request supervision from an alternate copy of CS if its preferred CS is not available. In any case, the network is always capable of functioning without any one or more of its hosts.

The network consists of channels, couplers, lines, logical links, NPUs, terminals, and trunks (refer to figure 15-1) connected to the host computer.

- A channel is a data path on which a peripheral device controller can be accessed.
- A coupler is a hardware element that links an NPU to a channel.
- A line is the circuit that connects a terminal to an NPU.
- A logical link is a logical path connecting a coupler and an NPU or two couplers.
- An NPU is the communications controller that transmits data between terminals and a host computer or between two host computers.
- A public data network is an X.25 packet switching network (PSN). Terminals, NPUs, and foreign hosts can be connected to a PSN to exchange data.
- A terminal is a device by which a user supplies input messages to, and accepts output messages from, an application program.
- A trunk is the communication line connecting two NPUs.

CYBER HOST CYBER HOST SUPERVISORY APPLICATIONS SUPERVISORY APPLICATIONS CONSOLE CS NS NVF CS NVF NS CONSOLE COUPLER LOGICAL NPU NPU CHANNEL NAM NAM HOST HOST TRUNK OPERATOR OPERATOR (HOP) (HOP) LINE RBF IAF TAF TVF RBF IAF TAF TVF NETWORK APPLICATIONS NETWORK APPLICATIONS TERMINALS TERMINALS NPU OPERATOR (NOP) DIAGNOSTIC OPERATOR (DOP) CYBER HOST SUPERVISORY APPLICATIONS CONSOLE CS NS NVF TERMINAL PACKET SWITCHING NETWORK NPU\_ NAM HOST OPERATOR (HOP) TERMINAL .... RBF IAF TAF TVF TERMINALS NETWORK APPLICATIONS TERMINAL TERMINAL TERMINAL 00705

Figure 15-1. Sample Network

The network recognizes three types of network operators: the host operator, the NPU operator, and the diagnostic operator. A host operator (HOP) resides at the system console, initiates NAM, and can control network elements being supervised by this host. An NPU operator (NOP) resides at a terminal and controls communication network elements (such as lines, logical links, NPUs, terminals, and trunks). A diagnostic operator (DOP) resides at a terminal and control lines.

The HOP can always perform NOP and DOP functions regardless of the existence of NOPs and DOPs. NOPs can perform all DOP functions regardless of the existence of DOPs. CS supports up to 10 concurrent NOP and DOP connections in addition to one HOP connection. NS and NVF support only the HOP connection.

The HOP can communicate with NAM and any of the supervisors (CS, NS, or NVF) executing in its host. NOPs and DOPs can communicate with any CS executing in any host to which the operator has access. However, a NOP or DOP can communicate with only one CS at a time. A NOP or DOP can monitor and control only those elements owned by NPUs being supervised by their CS.

Each NPU in the network is controlled by the HOP and, optionally, one NOP connected to its supervising CS. A HOP controls all NPUs supervised by CS. Each NOP connected to CS can control one or more NPUs.

# NAM STARTUP

If the NPUs in the network were running version 3.5 or earlier Communications Control Program (CCP), you must master clear all local NPUs before initiating NAM. If the NPUs were running version 3.6 or 3.7 of CCP, then master clear NPUs only if the running version is not the desired version.

You initiate NAM by entering:

NAM.†

or

NAMNOGO.

NAM and NAMNOGO are names of procedure files that are called when the HOP initiates NAM.

The first time the network is initiated the NAMNOGO procedure must be used to create a memory file (refer to the NOS 2 Installation Handbook). The memory file contains the name of the master file, the last parameter record, and the network invocation number (NIN) used. The NIN is incremented by 1 every time NAM is started. The NIN is displayed in the NAM K display. If the network has been previously initiated, a memory file exists and the NAM procedure file may be used.

#### INITIATING NAM WITHOUT OPERATOR INTERVENTION

If you initiate NAM by entering

NAM.†

NAM is brought up without further operator action. This results in starting the network using the previously specified master file and the parameter record RESTRT.

<sup>†</sup>Any procedure file of the form NAMffff is allowed.

# ALTERING THE MEMORY FILE

If you initiate NAM by entering

NAMNOGO.

NAM displays the message:

ENTER DESIRED OPTION

You reply to this message with a CFO command in this format:

 $\tt CFO, \tt NAM.keyword_1=param_1, \tt keyword_2=param_2, \ldots, \tt keyword_n=param_n.$ 

The following keyword and parameter combinations are allowed on the CFO command.

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFN=filename    | Permanent file name of the master file to be used. The master file<br>contains all the information needed to initiate the network. Once<br>this parameter is specified all subsequent network initiations use<br>this master file until a new master file is specified. The master<br>file resides in the system default family and must be permitted to<br>SYSTEMX. If this parameter is not specified, NAMSTRT is assumed. |
| UN=username     | User name for the master file. If this parameter is not specified, NETOPS is assumed.                                                                                                                                                                                                                                                                                                                                        |
| PW=password     | Password associated with the master file user name.                                                                                                                                                                                                                                                                                                                                                                          |
| RN=recordname † | Name of the parameter record on the master file that is used for<br>this network initiation. If this parameter is not specified, the<br>previously specified parameter record is used. The parameter<br>record specifies the characteristics of any particular network<br>initiation.                                                                                                                                        |
|                 | You can select one of the parameter record names listed in table 15-1 to obtain the given combination of features.                                                                                                                                                                                                                                                                                                           |
| OIN=xx          | Previous network invocation number from which dumps/traces are collected. If this parameter is not specified, the current network invocation number minus 1 is used.                                                                                                                                                                                                                                                         |

*<sup>†</sup>* Specifying a record name changes recordname only for this initiation.

| Feature Descriptions                                                              | Parameter Record Name |        |        |       |       |        |
|-----------------------------------------------------------------------------------|-----------------------|--------|--------|-------|-------|--------|
|                                                                                   | INIT                  | RESTRT | RECOVR | MULTI | MINIT | MRECOV |
| This feature collects dumps/traces on tape before startup.                        | N †                   | Y ††   | N      | Y     | N     | N      |
| This feature stops local NPUs at startup.                                         | Y                     | N      | N      | N     | Y     | N      |
| This feature stops local NPUs at termination.                                     | Y                     | Y      | N      | N     | N .   | N      |
| This feature takes host dumps when NPU fails.                                     | Y                     | Y      | Y      | N     | N     | N      |
| This feature takes NPU dumps before initial load.                                 | N                     | Y      | N      | Y     | N     | N      |
| †N indicates that the parameter record<br>††Y indicates that the parameter record |                       |        |        |       | cur.  |        |

## Table 15-1. Parameter Record Feature Descriptions

You can enter all desired parameters with a single entry or enter several CFO commands. In this way you add (if the file is empty) or replace entries in the NAM memory file.

When you have finished adding or replacing data, enter the command:

CFO,NAM.GO.

After entering this command, you cannot add or replace additional parameters during this NAM initiation.

# NAM SHUTDOWN

NAM is idled by assigning the K display to the application NVF, followed by entering the DISABLE, HOST or IDLE, HOST command.

The sequence of commands is:

K.AP=NVF.

K.DISABLE,HOST.

or

K.IDLE,HOST.

Use the IDLE command for a graceful shutdown, and the DISABLE command for an immediate shutdown.

# NETWORK CONTROL BY HOP

The commands described next are available only to the HOP. The HOP can perform all functions of the the NPU operator and diagnostic operator as well as those unique to the HOP. The commands unique to the HOP are processed by NS and NVF.

#### **DISABLING AND ENABLING OF COUPLERS**

The HOP enables a coupler using the DSD ON command and disables the coupler using the DSD OFF command. You can examine the NP equipment entry on the E,A display to determine the EST ordinal. When an active coupler is turned OFF, NAM stops communicating with that coupler. The coupler is not used again until it is turned ON while NAM is executing. When a coupler is turned ON, NAM automatically begins to communicate with the NPU connected across the coupler.

## STATUS MESSAGE FORMATS FOR HOP

The HOP commands cause various status messages to be displayed at the system console. The normal response to a STATUS command consists of a single status line for each referenced element.

Following are the general formats for these status messages.

- Application status line

APPL: name, status, conncount, mxcopies, jsn, restart.

- Terminal status line

TERM: name, username, hh.mm.ss, applname/acn, ah.am.as, dt.

- User status line

USER: name,termname,hh.mm.ss,applname/acn,ah.am.as,dt.

In the preceding status message general formats the following variables are used.

| Variable  | Description                                                                   |
|-----------|-------------------------------------------------------------------------------|
| acn       | Connection number for the connected application.                              |
| ah.am.as  | Time of the connection to the application (hours, minutes, and seconds).      |
| applname  | Name of the connected application.                                            |
| conncount | Count of the active connections to this application.                          |
| dt        | Device type.                                                                  |
| hh.mm.ss  | Time of the system or host login (hours, minutes, and seconds).               |
| jsn       | Job sequence name of the application.                                         |
| mxcopies  | Maximum number of copies of this application that can be running at one time. |

| Variable | Description                                                                                                                                                                                                                               |    |  |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|
| name     | Name of the specified element.                                                                                                                                                                                                            |    |  |
| restart  | If the characters RS are present, they indicate that NVF will<br>automatically start up a copy of this application to complete a<br>connection request for it.                                                                            |    |  |
| status   | tatus of the application. The application program is initially set to<br>ither an enabled or disabled state. Enabled application programs<br>ecome active when they start executing. The application program is in<br>ne of these states: |    |  |
|          | status Description                                                                                                                                                                                                                        |    |  |
|          | AC Application is active (you can establish a connection to th application).                                                                                                                                                              | ıe |  |
|          | DI Application is disabled.                                                                                                                                                                                                               |    |  |
|          | DN Application is down (the application failed; NAM tables are being cleared up).                                                                                                                                                         | :  |  |
|          | EN Application is enabled.                                                                                                                                                                                                                |    |  |
| termname | ame of the terminal at which the user resides.                                                                                                                                                                                            |    |  |
| username | ogin user name of the terminal user.                                                                                                                                                                                                      |    |  |

## UNSOLICITED STATUS REPORTS FOR HOP

Each time a significant event occurs, CS, NS, or NVF updates its recent history buffer (refer to Recent History Command later in this section) and logs the event in the NAM dayfile. CS, NS, or NVF then sends a report about the event, called the unsolicited status report, to the HOP. The HOP can get unsolicited status reports from CS, NS, or NVF by assigning the NAM K display to that particular application. Refer to section 8, K-Display Utilities, for information on how to assign the NAM K display. Unsolicited status reports are time-stamped whereas solicited status reports are not time-stamped.

## HOP COMMANDS

The HOP must assign the NAM K display to a supervisory application (CS, NS, or NVF) before entering any of the following commands. Refer to section 8, K-Display Utilities, for information on how to assign the NAM K display.

All HOP commands consist of a command verb and, sometimes, one or more parameters. The commands must begin in the first character position after K. and contain no blanks. The terminator (.) is optional. Some command verbs and parameters can be shortened to a 2- or 3-character abbreviation. You can mix abbreviated and unabbreviated command verbs and parameters in all network commands. Parameters are order independent except where noted.

## NS CONTROL COMMANDS

The HOP assigns the NAM K display to NS to enter the following commands.

#### **Cancel Alternate NPU Load File Command**

After using a FILE command, the HOP can instruct NS to return to the use of the default NPU load file for loading all NPUs by specifying the NOFILE command.

The command format is:

NOFILE.

or

NO.

#### **Change NPU Load File Command**

The HOP can assign an alternate load file to NS for loading a specific NPU with the FILE command.

The command format is:

FILE,NPU=npuname,NLF=loadfile,UN=username,PW=password.

or

FI,NP=npuname,NL=loadfile,UN=username,PW=password.

| Parameter | Description                                          |
|-----------|------------------------------------------------------|
| npuname   | Name of the NPU.                                     |
| loadfile  | Name of the alternate load file loadfile.            |
| username  | Username of the user to which file loadfile belongs. |
| password  | Password for the specified username.                 |

The next load of the specified NPU will be from the alternate load file. You can return to the default NPU load file by using the NOFILE command.

## **NPU Load Status Command**

The HOP can request the current load/dump status of a specific NPU or all NPUs using the STATUS command.

There are two forms of the STATUS command.

The first form requests the current load/dump status of a specific NPU.

The command format is:

STATUS, NPU=npuname.

or

ST,NP=npuname.

The second form requests the current load/dump status of all NPUs.

The command format is:

STATUS, NPUS.

or

ST,NPS.

The normal status response consists of four lines of information for each NPU, as shown below.

| npuname     | NN=nid<br>dflag<br>message | NBS=nid,nid,nid,nid,nid EC=errcnt<br>LDS=ldcnt LD=yy/mm/dd LT=hh.mm.ss<br>dmpfile HALT ffff DD=yy/mm/dd DT=hh.mm.ss        |  |  |
|-------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------|--|--|
| Status      |                            | Description                                                                                                                |  |  |
| npuname     |                            | Name of the network processing unit.                                                                                       |  |  |
| NN=nid      |                            | Node number of the NPU identified by npuname.                                                                              |  |  |
| NBS=nid,    | ,nid                       | Node numbers of up to six neighboring NPUs or couplers.                                                                    |  |  |
| EC=errcnt   |                            | Protocol error count. Number of dump/load service messages received from the NPU that violated the NPU dump/load protocol. |  |  |
| LDS=1dcnt   |                            | Number of attempted loads of this NPU.                                                                                     |  |  |
| LD=yy/mm/dd |                            | Date in year, month, and day when the most recent load attempt of this NPU occurred.                                       |  |  |
| LT=hh.mm.ss | 3                          | Time in hours, minutes, and seconds when the most recent load attempt of this NPU occurred.                                |  |  |
| dflag       |                            | NPU memory dump indicator; one of the following:                                                                           |  |  |
|             |                            | dflag Description                                                                                                          |  |  |
|             |                            | DUMP Dump NPU before a load.                                                                                               |  |  |
|             |                            | NODUMP No NPU dump before a load.                                                                                          |  |  |
|             |                            | blank NPU is not currently being loaded.                                                                                   |  |  |
| dmpfile     |                            | Name of the most recent NPU dump file.                                                                                     |  |  |
| ffff        |                            | Halt code (halt codes are described in the CCP 3 Diagnostic<br>Handbook).                                                  |  |  |
| DD=yy/mm/dd | 1                          | Date in year, month, and day when the most recent dump of this NPU occurred.                                               |  |  |
| DT=hh/mm/ss | 3                          | Time in hours, minutes, and seconds when the most recent dump of this NPU occurred.                                        |  |  |

Description

<u>Status</u> message

Message is the NS activity and its associated status.

| Activity          | Status                                             |                            |                                                                                                                                           |
|-------------------|----------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| SAMLOAD           | STARTED<br>COMPLETED<br>ABORTED - error            |                            |                                                                                                                                           |
| DUMP/LOAD<br>DUMP | REQUESTED<br>STARTED<br>COMPLETED<br>ABORTED-error |                            |                                                                                                                                           |
| LOAD              | modname<br>COMPLETED<br>ABORTED - error            |                            |                                                                                                                                           |
|                   | modname                                            | Name of the sys<br>loaded. | stem module being                                                                                                                         |
|                   | error                                              | One of the foll            | lowing:                                                                                                                                   |
|                   |                                                    | error                      | Description                                                                                                                               |
|                   |                                                    | TIMEOUT                    | No response was<br>received from the<br>NPU during a preset<br>time-out period.                                                           |
|                   |                                                    | RETRY TIMEOUT              | Only abnormal<br>responses were<br>received from the<br>NPU during a preset<br>time-out period.                                           |
|                   |                                                    | FILE ERRORS                | Irrecoverable I/O<br>error occurred on<br>the network con-<br>figuration file or<br>network load file.                                    |
|                   |                                                    | PREEMPTED                  | An incomplete SAM<br>load or dump/load<br>sequence was<br>interrupted by a<br>request from the<br>same NPU to initiate<br>a new SAM load. |

## **NS Recent History Command**

The HISTORY command requests a display of recent unsolicited status reports from NS (refer to Recent History Command later in this section for further information).

#### **NVF CONTROL COMMANDS**

The HOP assigns the NAM K display to the network validation facility (NVF) to enter the following commands.

## **Disable Host Element Command**

The HOP uses the DISABLE command to force immediate termination of a particular application or all host network operations.

The command format is:

DISABLE, operation.

or

DI, operation.

| Parameter | Description           |                                                                                                                                                                                                              |
|-----------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| operation | One of the following: |                                                                                                                                                                                                              |
|           | operation             | Keyword Abbreviation                                                                                                                                                                                         |
|           | APPL=applicationname  | AP                                                                                                                                                                                                           |
|           | HOST                  | НО                                                                                                                                                                                                           |
|           | applicationname       | Name of the application to be<br>disabled. If more than one copy of<br>an application is allowed, then<br>applicationname can be a 1- to<br>5-character root name specifying<br>that all copies of the named |

Results of using the DISABLE, APPL command:

• The status of the named application is changed from enabled (EN), active (AC), or down (DN) to disabled (DI), thereby prohibiting the application from accessing the network.

application are affected.

• If the application is active at the time the command is entered, NAM requests the application to immediately terminate access to the network. If the application remains active for an undue period of time after entering this command, the HOP can resort to the DSD DROP or STOP command (refer to section 5, DSD Commands).

Results of using the DISABLE, HOST command:

- NAM requests that all active applications in the host immediately terminate their access to the network.
- When all applications (including CS and NS) terminate their access to the network, NAM and NVF also terminate.
- If NAM or NVF do not terminate, enter the STATUS, APPL command to determine which application has not terminated. You can then use the DSD DROP or STOP command to drop the application.

#### **Enable Application Command**

The HOP uses the ENABLE command to change the status of a network application from disabled (DI) to enabled (EN). The application status becomes active (AC) when the application begins to access the network.

The command format is:

ENABLE, APPL=applicationname.

or

EN, AP=applicationname.

Parameter

Description

applicationname Name of the application to be enabled. If more than one copy of an application is allowed, then applicationname can be a 1- to 5-character root name specifying that all copies of the named application are affected.

## Idle Host Element Command

The IDLE command terminates execution of an individual application or all host network operations.

The command format is:

IDLE, operation.

or

ID, operation.

Parameter

Description

operation

One of the following:

# operation

APPL=applicationname

HOST

Keyword Abbreviation

AP

HO

applicationname

Name of the application to be idled. If more than one copy of an application is allowed, then applicationname can be a 1- to 5-character root name specifying that all copies of the named application are affected.

Results of using the IDLE, APPL command:

- The application is warned of an imminent shutdown.
- The application completes any operations in progress but does not allow any new connections.
- When all users are disconnected, the application terminates normally.

Results of using the IDLE, HOST command:

- Applications are warned of an imminent shutdown.
- New application requests to access the network are rejected.
- New application to application connections are rejected.
- New terminal connections to the host are rejected by NAM.
- CS warns all connected NOPs and DOPs that shutdown of the network is imminent. CS terminates when all NOPs and DOPs end their connections to CS.
- NS ignores any new dump or load requests from NPUs. Any ongoing dump and load processes are completed normally before NS terminates.
- When all applications (including NS and CS) terminate their access to the network, NAM and NVF also terminate. If an application does not terminate, use the DISABLE command to request immediate termination of network activity in the host.

#### **NVF Recent History Command**

The HISTORY command requests a display of recent unsolicited status reports from NVF (refer to Recent History Command later in this section for further information).

#### **Status Host Element Command**

Host elements are the applications associated with the host, terminals currently connected to the host, and users currently logged in to the host. With the STATUS command a HOP can status a single application, terminal device, or user name; or all applications, terminal devices, or users connected to a given application.

There are five forms of the STATUS command. Refer to Status Message Formats for HOP, earlier in this section, for the format of the status line returned.

The first form requests the status of a particular host element.

The command format is:

STATUS, element.

or

ST,element.

Parameter Description

element One of the following:

| element           | Keyword Abbreviation                                                                                                                                                                                                                                                                         |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| APPL=elementname  | AP                                                                                                                                                                                                                                                                                           |
| TERM=elementname  | TE                                                                                                                                                                                                                                                                                           |
| UNAME=elementname | UN                                                                                                                                                                                                                                                                                           |
| elementname       | Name of the element whose status is<br>desired. If elementname is the name<br>of an application and more than one<br>copy of the application is allowed,<br>then elementname can be a 1- to<br>5-character root name specifying<br>that all copies of the named<br>application are affected. |

The second form requests the status of all network applications in the host.

The command format is:

.

STATUS, APPLS.

or

ST,APS.

The third form requests the status of all active network applications in the host.

The command format is:

STATUS, APPLS, AC.

or

ST, APS, AC.

The fourth form requests the status of all terminal devices connected to the specified application or logged in under the specified user name.

The command format is:

STATUS, TERMS, termelement.

or

ST, TES, termelement.

| Parameter   | Description           |                                          |
|-------------|-----------------------|------------------------------------------|
| termelement | One of the following: |                                          |
|             | termelement           | Keyword Abbreviation                     |
|             | APPL=elementname      | AP                                       |
|             | UNAME=elementname     | UN                                       |
|             | elementname           | Name of the desired application or user. |

The fifth form requests the status of all users connected to the specified application. The command format is:

STATUS, UNAMES, APPL=applicationname.

or

ST, UNS, AP=applicationname.

## Parameter

Description

applicationname

Name of the desired application.

# **NETWORK CONTROL BY NOP**

The commands described later in this section are available to both HOPs and NOPs. The NOPs can perform all functions of the diagnostic operators as well as those unique to NOPs.

The controlling NOP (refer to CONTROL command later in this section) is responsible for controlling one or more NPUs and its associated couplers, lines, logical links, terminal devices, and trunks.

A controlling NOP can control any of the NPUs supervised by a CS and shares that responsibility with the HOP. The controlling NOP and HOP must, therefore, coordinate their activities.

#### **BECOMING A NOP**

To become a NOP, you must be authorized by site personnel to access the CS application and to become a controlling NOP.

After initiation of the network, you become a NOP as follows:

- 1. Log in as described in the NOS 2 Reference Set, Volume 2.
- 2. In response to the APPLICATION: prompt, enter:

CS

3. The system responds:

HELLO, YOU ARE NOW AN NPU OPERATOR

This message is followed by the prompt:

READY ..

You can now enter the NOP commands described later in this section.

You can cancel a command that results in a large volume of output by entering the interruption or termination sequence (refer to the NOS 2 Reference Set, Volume 3).

## NOTE

Use caution when cancelling output because unsolicited status messages could also be discarded.

When you cancel output, the message

OUTPUT DISCARDED READY..

or

**OUTPUT DISCARDED..** 

appears at the terminal at the point from which the data was discarded.

If the terminal is in page wait mode, † you must press CR after every page of output before more output can be sent to the terminal.

To relinquish NOP status, enter one of the following.

To log out and end the terminal connection to the host, enter:

GOODBYE or

BYE

or

LOGOUT

To initiate a new login dialog, enter:

HELLO

or

LOGIN

To remain logged in and be prompted for another application, enter:

END

To remain logged in and be switched automatically to the application named applname, enter:

END, applname

<sup>†</sup> It is suggested that a hardcopy device be used for NOP terminals; this prevents the paging problem and provides a permanent log of network events.

#### STATUS MESSAGE FORMATS FOR NOP

Some of the NOP commands cause various status messages to be displayed on your terminal. The normal response to a STATUS command is one line of text returned when status is requested for a coupler, line, NPU, or terminal device. Two text lines can be returned when status is requested for logical links or trunks (if the CS to which you are connected is supervising NPUs at each end of the element, a line of text is returned for each end of the logical link or trunk). For multiple element status commands, a response is generated for all elements expressed or implied in the command. For example, a status request for all terminals on an NPU begins with a status report (text line) for the NPU. This is followed by a status report for the first active (AC) line on the NPU. A status report for each terminal device configured on the line follows. This is followed by a status report of the next active line and so on.

The response to the ENABLE or DISABLE command is a status report for each element affected by that command.

Following are the general formats for these status messages.

- Coupler status line

CPLER: name, status, nodenum, npuname1/cplnum.

- Line status line

LINE: name, status, linetype, npunamel/port.

- Logical link status line

LLINK: name, status, RL=n, loglinktype, npunamel/nodenum, npuname2/nodenum.

- NPU status line

NPU: name, status, nodenum, gostatus, dump.

- Archetype switched virtual circuit (SVC) status line
  - SVC: atname, EN=ennum, DI=dinum, AC=acnum, stip.
- Terminal device status line

TERM: name, status, dt/cc, /hostnid, linename/al/a2.

- Trunk status line

TRUNK: name, status, linetype, npuname1/port, npuname2/port.

In the preceding status message general formats the following variables are used.

Variable

# Description

| acnum  | Number of SVCs of the element that are in an active state (from 0 to $255$ ).  |
|--------|--------------------------------------------------------------------------------|
| atname | Name of the archetype SVC element.                                             |
| al     | First level address (cluster address, configuration ordinal).                  |
| a2     | Second level address (terminal address, stream number).                        |
| cplnum | Coupler number for the indicated NPU.                                          |
| dinum  | Number of SVCs of the element that are in a disabled state (from 0 to $255$ ). |

| Variable    | Description                                                                                                      |                                                                                                                                                                                                                                                |  |
|-------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| dt          | Device type (CON, CR, LP, CP, PL).                                                                               |                                                                                                                                                                                                                                                |  |
| dump        | NPU dump flag                                                                                                    | g (ON or OFF).                                                                                                                                                                                                                                 |  |
| ennum       | Number of SV(<br>255).                                                                                           | Cs of the element that are in an enabled state (from 0 to                                                                                                                                                                                      |  |
| gostatus    | Go status of                                                                                                     | the NPU (if waiting for GO, NEEDGO appears).                                                                                                                                                                                                   |  |
| hostnid     | Host (couple<br>currently co                                                                                     | r) node number of the host to which the terminal is<br>nnected.                                                                                                                                                                                |  |
| linename    | Name of the                                                                                                      | line to which the terminal device is connected.                                                                                                                                                                                                |  |
| linetype    | Line type (r                                                                                                     | efer to the NDL Reference Manual).                                                                                                                                                                                                             |  |
| loglinktype | Logical link                                                                                                     | type (H-N for host to NPU, H-H for host to host).                                                                                                                                                                                              |  |
| name        | Name of the                                                                                                      | element.                                                                                                                                                                                                                                       |  |
| nodenum     | Node number                                                                                                      | of a coupler or NPU.                                                                                                                                                                                                                           |  |
| npunamel    | Name of an NPU that supports or is connected to the element (also the name of the NPU that reported the status). |                                                                                                                                                                                                                                                |  |
| npuname2    | Name of the NPU at the other end of the logical link or trunk.                                                   |                                                                                                                                                                                                                                                |  |
| port        | Port number of the line or trunk on the indicated NPU.                                                           |                                                                                                                                                                                                                                                |  |
| RL=n        | Regulation level currently in effect.                                                                            |                                                                                                                                                                                                                                                |  |
| status      | state. Init<br>the course o                                                                                      | ents are initially set to either a disabled or enabled<br>ially enabled elements automatically become active during<br>f normal network operation. Every network element (such as<br>l link, NPU, or trunk) is in one of the following states. |  |
|             | status                                                                                                           | Description                                                                                                                                                                                                                                    |  |
|             | AC                                                                                                               | Network element is active. An element becomes active when it is enabled and is handling network data traffic.                                                                                                                                  |  |
|             | DI                                                                                                               | Network element is disabled. The element cannot become active unless enabled by an operator command.                                                                                                                                           |  |
|             | DN                                                                                                               | Network element is down. A failure was detected that<br>terminated data traffic for the element. If the failure<br>condition ceases, the element returns to an enabled status.                                                                 |  |
|             | EN                                                                                                               | Network element is enabled. It was enabled by the operator<br>and is in a physically operative condition.                                                                                                                                      |  |
|             | NC                                                                                                               | Network element is not configured. The NPU does not recognize the element.                                                                                                                                                                     |  |
| stip        | SubTIP type                                                                                                      | (PAD or APPL).                                                                                                                                                                                                                                 |  |
| tc          | Terminal cla                                                                                                     | SS.                                                                                                                                                                                                                                            |  |

#### UNSOLICITED STATUS REPORTS FOR NOP

Each time a significant event occurs, CS updates its recent history buffer (refer to Recent History Command later in this section) and logs the event in the NAM dayfile. CS then sends a report about the event, called the unsolicited status report, to all NOPs who have selected to receive unsolicited status reports from the NPU (refer to Report Unsolicited Status Command later in this section). Unsolicited status reports are time-stamped whereas solicited status reports are not time-stamped.

A single unsolicited status report occurs as a result of an element recovery or failure. An unsolicited status message is sent when an NPU joins the network. Batches of unsolicited status reports can occur as a result of an operator command to enable all elements of a given type (refer to Enable Network Element Command later in this section).

#### NOP COMMANDS

All NOP commands consist of a command verb and, sometimes, one or more parameters. The commands must begin in the first character position and contain no blanks. The terminator (.) is optional. Some command verbs and parameters can be shortened to a 2- or 3-character abbreviation. You can mix abbreviated and unabbreviated command verbs and parameters in all network commands. Parameters are order independent except where noted. You can enter commands pertaining only to the NPUs supervised by the CS to which you are connected.

To enter the following commands you must control the NPU (refer to CONTROL Command later in this section).

#### **ALERT** Command

The ALERT command changes the threshold that CS uses for alerting the HOP and the controlling NOP of NPU saturation.

The command format is:

ALERT, CP=cpuse, BU=buff, element.

or

AL,CP=cpuse,BU=buff,element.

| Parameter | Description                      |                                                 |  |  |
|-----------|----------------------------------|-------------------------------------------------|--|--|
| cpuse     | Percent of the NPU cen percent). | tral processor currently in use (from 50 to 100 |  |  |
| buff      | Number of available NP           | U data buffers (from 0 to 500).                 |  |  |
| element   | One of the following:            |                                                 |  |  |
|           | element                          | Keyword Abbreviation                            |  |  |
|           | NPU=npuname                      | NP                                              |  |  |
|           | NPUS                             | NPS                                             |  |  |
|           | npuname                          | Name of the NPU supervised by your CS.          |  |  |

If the CPU usage reported to CS by the NPU is greater than cpuse, the HOP and the controlling NOP are alerted. If the buffer availability reported to CS by the NPU is less than buff, the HOP and the controlling NOP are alerted. To turn off all messages, set CP=100 and BU=0.

## **CONTROL** Command

After establishing communication with a CS, you can gain or lose control of one or more NPUs supervised by your CS with the CONTROL command.

The command format is:

CONTROL, option, status.

or

CO, option, status.

Parameter

option

Description One of the following:

| option      | Keyword Abbreviation |
|-------------|----------------------|
| NPU=npuname | NP                   |
| NPUS        | NP S                 |
| AUTO        | AU                   |
| npuname     | Name of the NPU.     |

status ON or OFF.

The NPU=npuname option allows you to gain control of a specific NPU. The NPUS option allows you to gain control over all uncontrolled NPUs currently supervised by your CS. The AUTO option allows you to gain control over all uncontrolled NPUs currently supervised by your CS and all other uncontrolled NPUs that may later come under the supervision of your CS. The AUTO option can be cancelled by entering any valid CONTROL command with the OFF status specified.

## Example:

Suppose there are four NPUs (1, 2, 3, and 4) available to be controlled in the network. The first NOP logs in to CS and controls NPU 1. The second NOP establishes a connection to CS and enters the CONTROL, AUTO, ON command. The second NOP becomes the controlling NOP and controls all of the uncontrolled NPUs (in this example 2, 3, and 4). When the first NOP relinquishes control of NPU 1, that NPU is then controlled by the second NOP. The second NOP also controls all of the new NPUs joining the network automatically.

If no other NOP exists for the NPUs specified, the response to a request for control consists of a list of the NPUs you now control followed by a READY.. prompt; otherwise, you receive a diagnostic messsage.

Since a HOP automatically controls all NPUs being supervised by a CS, the CONTROL commands are not used by the HOP. Whenever a NOP loses control of an NPU for any reason (including ending the connection to CS or the failure of some network element that was supporting the connection to CS), CS informs the HOP and all other connected NOPs by sending an unsolicited status report.

If any NOP has AUTO control status, the operators are informed of the identity of the controlling NOP. Whenever a CS gains supervision of a new NPU, the HOP, all NOPs, and all DOPs are informed that the NPU is being supervised.

#### **Disable Network Element Command**

The controlling NOP changes the status of a network element from enabled (EN), active (AC), or down (DN), to disabled (DI) by the DISABLE command.

There are two forms of the DISABLE command. Refer to Status Message Formats for NOP, earlier in this section, for the format of the status line returned.

The first form disables a single element in a network.

The command format is:

DISABLE, element.

or

DI,element.

Parameter

#### Description

One of the following:

element

| element           | Keyword Abbreviation                |
|-------------------|-------------------------------------|
| LINE=elementname  | LI                                  |
| LLINK=elementname | LL                                  |
| TERM=elementname  | TE                                  |
| TRUNK=elementname | TR                                  |
| elementname       | Name of the element to be disabled. |

For a logical link or trunk, if the element is active when the command is entered, all data traffic through the element is terminated and the affected host application programs and terminal users are notified. For a line or terminal, if the element is active when the command is entered, all data traffic through the element is terminated and only the affected host application programs are notified.

The second form disables archetype switched virtual circuits (SVCs) that are in an enabled state.

The command format is:

DISABLE, SVC=atname, NCIR=numcir.

or

DI,SV=atname,NC=numcir.

 Parameter
 Description

 atname
 Archetype SVC name.

 numcir
 Number of SVCs to change from an enabled state to a disabled state.

The second form of the DISABLE command allows you to decrease the number of enabled SVCs for a particular X.25 subTIP type. If the number of enabled SVCs is greater than or equal to numcir, then the number of disabled SVCs is increased by numcir and the number of enabled SVCs is decreased by numcir. If the number of enabled SVCs is less than numcir, then the number of disabled SVCs is increased by the number of available enabled SVCs and the number of enabled SVCs is set to zero. Disabling SVCs has no effect on active SVCs. If, for a particular SVC element, the command could not be executed, an unsolicited status report is sent to you giving the reason the command was not executed.

## NOTE

No attempt is made to protect you from disabling network elements that support your connection to CS. You may lose contact with CS as a result of such a command. When this happens, you may need to use another terminal or the host console to enable the disabled network element.

The NPUs affected by the command send an unsolicited status report indicating the new status for the element.

Trunks and logical links can have two owning NPUs (one at each end of the trunk or logical link). When two NPUs are involved and both are supervised by your CS, the DISABLE,TRUNK and DISABLE,LLINK commands are processed as follows:

- If one of the NPUs is local and one is remote, the command is forwarded to the local NPU.
- If both of the NPUs are local or both are remote, the command is forwarded to the NPU with the lower node number.
- If your CS supervises only one of the NPUs, the command is forwarded to that NPU.

In either case, the trunk or logical link enters the disabled (DI) state at the owning NPU that receives the DISABLE command and is detected as being down (DN) by the other NPU. Both of these changes are reported to CS, which informs all operators of the changes by sending unsolicited status reports.

If a single NPU owns both ends of the link, the command is forwarded to that NPU. This status change is also reported by sending unsolicited status reports.

Disabling a trunk can cause one or more logical links to go down. The owning NPUs report the failure of these links by sending unsolicited status reports.

#### **Enable Network Element Command**

The controlling NOP changes the status of one or more network elements from disabled (DI) to enabled (EN), allowing the element(s) to become active for data traffic by the ENABLE command.

There are five forms of the ENABLE command. Refer to the Status Message Formats for NOP, earlier in this section, for the format of the status line returned.

The first form enables a single element in the network.

The command format is:

ENABLE, element.

or

EN,element.

#### Parameter Description

element One of the following:

| element           | Keyword Abbreviation |
|-------------------|----------------------|
| LINE=elementname  | LI                   |
| LLINK=elementname | LL                   |
| TERM=elementname  | TE                   |
| TRUNK=elementname | TR                   |
|                   |                      |

elementname

Name of the element to be enabled.

The second form enables all disabled elements of the specified type on an NPU.

The command format is:

ENABLE, element, NPU=npuname.

or

EN,element,NP=npuname.

## Parameter Description

element One of the following:

| element | Keyword Abbreviation |
|---------|----------------------|
| LINES   | LIS                  |
| LLINKS  | LLS                  |
| TERMS   | TES                  |
| TRUNKS  | TRS                  |
| •       |                      |

npuname Name of an NPU.

The third form enables all disabled elements of the specified type on all NPUs.

The command format is:

ENABLE, element, NPUS.

or

EN,element,NPS.

Parameter

operation

Description One of the following:

| element | Keyword Abbreviation |
|---------|----------------------|
| LINES   | LIS                  |
| LLINKS  | LLS                  |
| TERMS   | TES                  |
|         |                      |

The fourth form enables all disabled terminals on a line.

TRUNKS

The command format is:

ENABLE, TERMS, LINE=termline.

or

EN, TES, LI=termline.

Parameter

## Description

TRS

termline Name of the line to which terminals are connected.

The fifth form enables SVCs that are in a disabled state.

The command format is:

ENABLE, SVC=atname, NCIR=numcir.

or

EN,SV=atname,NC=numcir.

#### Parameter

## Description

atname Archetype SVC name.

numcir Number of SVCs to change from a disabled state to an enabled state.

The ENABLE, TRUNK and ENABLE, LLINK commands are forwarded to both of the owning NPUs (one at each end of the trunk or logical link) if both are supervised by your CS. Enabling a trunk can cause one or more logical links with a down status to become enabled or active. Status changes resulting from enabling a trunk or logical link are reported by the owning NPUs by sending unsolicited status reports.

Enabling a trunk can cause CS to become available to an NPU and, therefore, allow CS to gain control of an NPU.

The ENABLE command allows you to enable all lines or terminal devices on an NPU. When you enable all lines or terminal devices of a given type on an NPU or all terminals on a line, the NPU or line affected by the command sends an unsolicited status report telling you how many elements of the given type are curently disabled. The NPU then sends unsolicited status reports telling the new status of each element for which the command was executed. If, for a particular element, the command could not be executed, an unsolicited status report is sent to you giving the reason the command was not executed.

The ENABLE,SVC command allows you to increase the number of enabled SVCs for a particular X.25 subTIP type. If the number of disabled SVCs is greater than or equal to numcir, then the number of enabled SVCs is increased by numcir. If the number of disabled SVCs is less than numcir, then the number of enabled SVCs is increased by the number of disabled SVCs and the number of disabled SVCs is set to zero. Enabling SVCs has no effect on active SVCs. If, for a particular SVC element, the command could not be executed, an unsolicited status report is sent to you giving the reason the command was not executed.

#### NPU Go Command

After establishing a connection with CS, the newly supervised NPU may ask for a GO command from the controlling NOP.

The GO command format is:

GO,NPU=npuname.

or

GO,NP=npuname.

Parameter Description

npuname Network defined name of the NPU.

If there is a controlling NOP for the NPU when CS receives a GO request, the GO request is relayed to the controlling NOP and to the HOP. If there is no controlling NOP, the GO request is relayed to the HOP and to all currently connected NOPs. The HOP or controlling NOP (if there is one) can, as needed, request status information or enable/disable network elements. Thus, the controlling NOP can control the initial status or the network elements connected to or supported by a given NPU prior to that NPU beginning terminal operations.

The GO request message is repeated periodically until an operator takes control of the NPU and enters the GO command.

Upon entry of the GO command the NPU proceeds to activate lines and accept terminal connections.

## NPU Load Command

The LOAD command causes an active (AC) NPU or all active NPUS to be stopped, reloaded, and reactivated.

There are two forms of the LOAD command.

The first form causes the specified NPU to be stopped, reloaded, and reactivated.

The command format is:

LOAD, NPU=npuname, dumpoption.

or

LO,NP=npuname,dumpoption.

#### Parameter

#### Description

npuname

dumpoption Optional dump parameter; one of the following:

Name of the NPU.

| dumpoption | Keyword Abbreviation |
|------------|----------------------|
| DUMP       | DU                   |
| NDUMP      | ND                   |

If the DUMP option is specified, a memory dump of the NPU is taken prior to reloading. If the NDUMP option is specified, the NPU is reloaded without taking a memory dump. If the dump status is not specified, taking a memory dump depends upon the setting of the dump flag. Refer to NPU Memory Dump Command, next, for more information. The DUMP or NDUMP option is in effect only for the immediate load. It has no permanent effect on the NPU memory dump flag.

When an NPU executes a LOAD command, the CS connection to that NPU is lost during the dump/load process. The trunks and logical links supported by the NPU are detected as down (DN) by the NPUs at the other ends of the trunks and logical links. All of the appropriate operators receive corresponding unsolicited status reports.

The second form causes all active NPUs to be stopped, reloaded, and reactivated.

The command format is:

LOAD, NPUS, dumpoption.

or

LO,NPS, dumpoption.

Parameter

#### Description

dumpoption

Optional parameter; one of the following:

| dumpoption | Keyword Abbreviation |
|------------|----------------------|
| DUMP       | DU                   |
| NDUMP      | ND                   |

If the DUMP option is specified, a memory dump of all active NPUs (supervised by this host) is taken prior to reloading. If the NDUMP option is specified, the NPUs are reloaded without taking a memory dump. If the dump status is not specified, taking a memory dump depends upon the setting of the dump flag. Refer to NPU Memory Dump Command, next, for more information. The DUMP or NDUMP option is in effect only for the immediate load. It has no permanent effect on the NPUs memory dump flag.

When all of the NPUs execute LOAD commands, the corresponding CS connections to the NPUs are lost during the dump/load process. The trunks and logical links supported by the NPUs are detected as down (DN) by the NPUs at the other ends of the trunks and the logical links. The appropriate operators receive corresponding unsolicited status reports.

#### NPU Memory Dump Command

The DUMP command causes the memory dump flag to be reset for the specified NPU or NPUs. Initially, this reset condition is set independently for every NPU in the network and is specified on the NPU statement (refer to the NDL Reference Manual for more information on the NPU statements).

There are two forms of the DUMP command.

The first form causes a memory dump of the specified NPU to be taken.

The command format is:

DUMP, NPU=npuname, status.

or

DU, NP=npuname, status.

Parameter Description

npuname Name of the NPU.

status ON or OFF.

The second form causes a memory dump of all NPUs to be taken.

The command format is:

DUMP, NPUS, status.

or

DU, NPS, status.

ParameterDescriptionstatusON or OFF.

If status is ON, a memory dump will be taken the next time the NPU is reloaded (unless overridden by the LOAD command). If status is OFF, a memory dump will not be taken the next time the NPU is reloaded (unless overridden by the LOAD command).

## Send Message Command

A controlling NOP can send a message to the HOP or any terminal device user or group of terminal device users using the SEND command. The NOP can address the message to a single user or to all users on the specified line, logical link, NPU, or all NPUs under the supervision of the CS.

The HOP cannot use the HOST element to send a message.

The command format is:

SEND, element, MSG=message.

or

SE, element, MS=message.

#### Parameter Description

element

One of the following:

## element Keyword Abbreviation LINE=elementname LI LLINK=elementname LL NPU=elementname NP TERM=elementname TE HOST HO NPUS NPS elementname

Name of the element to which the message is addressed.

Text message of no more than 50 characters. If more than 50 characters message are entered, a diagnostic message is issued. The MSG=message parameter is order dependent and must appear as the last parameter of the command.

CS, upon accepting a SEND command, does not issue the READY.. prompt until processing of the SEND command has completed, in order to prevent an NPU from being flooded with operator messages. CS sends a message to you as each NPU receives the SEND command. When processing is complete, CS sends the READY.. message.

If a terminal is specified as the network element, it must be an interactive terminal device. Otherwise, an error message is issued to the sender.

If the element referenced by a SEND command is not currently active or enabled, you receive an error message. This error message is followed by a status line for the element; the operator is thus informed why the message could not be delivered. The status text line is followed by the READY .. prompt.

# NETWORK CONTROL BY DOP

The commands described next are available to the HOPs, NOPs, and DOPs. All DOPs can obtain unsolicited status reports and use status and diagnostic commands.

## **BECOMING A DOP**

To become a DOP you must be authorized by site personnel to access CS.

After initiation of the network, you become a DOP as follows:

1. Log in as described in the NOS 2 Reference Set, Volume 2.

2. In response to the APPLICATION: prompt, enter:

CS-

3. The system responds:

HELLO, YOU ARE NOW A DIAGNOSTIC OPERATOR

This message is followed by the prompt:

READY..

You can now enter the DOP commands described later in this section.

You can cancel a command that results in a large volume of output by entering the interruption or termination sequence (refer to the NOS 2 Reference Set, Volume 3).

# NOTE

Use caution when cancelling output because unsolicited status messages could also be discarded.

When you cancel output, the message

OUTPUT DISCARDED READY..

or

OUTPUT DISCARDED ..

appears at the terminal at the point from which the data was discarded.

If the terminal is in page wait mode, † you must press CR after every page of output before more output can be sent to the terminal.

To relinquish DOP status, enter one of the following:

To logout and end the terminal connection to the host, enter:

GOODBYE

or

BYE

or

LOGOUT

To initiate a new login dialog, enter:

HELLO

or

LOGIN

To remain logged in and be prompted for another application, enter:

END

To remain logged in and be switched automatically to the application named applname, enter:

END, applname

## STATUS MESSAGE FORMATS FOR DOP

Some of the DOP commands cause various status messages to be displayed on your terminal. The normal response to a STATUS command is one line of text returned when status is requested for a coupler, line, NPU, or terminal device. Two text lines can be returned when status is requested for logical links or trunks (if the CS to which you are connected is supervising NPUs at each end of the element, a line of text is returned for each end of the logical link or trunk). For multiple element status commands, a response is generated for all elements expressed or implied in the command. For example, a status request for all terminals on an NPU begins with a status report (text line) for the NPU. This is followed by a status report for the first active (AC) line on the NPU. A status report for each terminal device configured on the line follows. This is followed by a status report of the next active line and so on.

<sup>†</sup> It is suggested that a hardcopy device be used for DOP terminals; this prevents the paging problem and provides a permanent log of network events.

The following are the general formats for these status messages.

- Coupler status line

CPLER: name, status, nodenum, npunamel/cplnum.

- Line status line

LINE: name, status, linetype, npunamel/port.

- Logical link status line

LLINK: name, status, RL=n, loglinktype, npunamel/nodenum, npuname2/nodenum.

- NPU status line

NPU: name, status, nodenum, gostatus, dump.

- Archetype switched virtual circuit (SVC) status line

SVC: atname, EN=ennum, DI=dinum, AC=acnum, stip.

- Terminal device status line

TERM: name, status, dt/cc, / hostnid, linename/al/a2.

- Trunk status line

TRUNK: name, status, linetype, npunamel/port, npuname2/port.

In the preceding status message general formats the following variables are used.

Variable

| acnum    | Number of SVCs of the element that are in an active state (from 0 to $255$ ).        |
|----------|--------------------------------------------------------------------------------------|
| atname   | Name of the archetype SVC element.                                                   |
| al       | First level address (cluster address, configuration ordinal).                        |
| a2       | Second level address (terminal address, stream number).                              |
| cplnum   | Coupler number for the indicated NPU.                                                |
| dinum    | Number of SVCs of the element that are in a disabled state (from $0$ to 255).        |
| dt       | Device type (CON, CR, LP, CP, PL).                                                   |
| dump     | NPU dump flag (ON or OFF).                                                           |
| ennum    | Number of SVCs of the element that are in an enabled state (from 0 to $255$ ).       |
| gostatus | Go status of the NPU (if waiting for GO, NEEDGO appears).                            |
| hostnid  | Host (coupler) node number of the host to which the terminal is currently connected. |

Description

| Variable    |                                                                                                                                                                                                                                                                                               | Description                                                                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| linename    | Name of the lin                                                                                                                                                                                                                                                                               | ne to which the terminal device is connected.                                                                                                                                     |
| linetype    | Line type (refer to the NDL Reference Manual).                                                                                                                                                                                                                                                |                                                                                                                                                                                   |
| loglinktype | Logical link ty                                                                                                                                                                                                                                                                               | ype (H-N for host to NPU, H-H for host to host).                                                                                                                                  |
| name        | Name of the element.                                                                                                                                                                                                                                                                          |                                                                                                                                                                                   |
| nodenum     | Node number of a coupler or NPU.                                                                                                                                                                                                                                                              |                                                                                                                                                                                   |
| npuname l   | Name of an NPU that supports or is connected to the element (also the name of the NPU that reported the status).                                                                                                                                                                              |                                                                                                                                                                                   |
| npuname2    | Name of the NPU at the other end of the logical link or trunk.                                                                                                                                                                                                                                |                                                                                                                                                                                   |
| port        | Port number of the line or trunk on the indicated NPU.                                                                                                                                                                                                                                        |                                                                                                                                                                                   |
| RL=n        | Regulation level currently in effect.                                                                                                                                                                                                                                                         |                                                                                                                                                                                   |
| status      | Network elements are initially set to either a disabled or enabled<br>state. Initially enabled elements automatically become active during<br>the course of normal network operation. Every network element (such as<br>line, logical link, NPU, or trunk) is in one of the following states. |                                                                                                                                                                                   |
|             | status                                                                                                                                                                                                                                                                                        | Description                                                                                                                                                                       |
|             | AC                                                                                                                                                                                                                                                                                            | Network element is active. An element becomes active when it is enabled and is handling network data traffic.                                                                     |
|             | DI                                                                                                                                                                                                                                                                                            | Network element is disabled. The element cannot become active unless enabled by an operator command.                                                                              |
|             | DN                                                                                                                                                                                                                                                                                            | Network element is down. A failure was detected that<br>terminated data traffic for the element. If the failure<br>condition ceases, the element returns to an enabled<br>status. |
|             | EN                                                                                                                                                                                                                                                                                            | Network element is enabled. It was enabled by the operator and is in a physically operative condition.                                                                            |
|             | NC                                                                                                                                                                                                                                                                                            | Network element is not configured. The NPU does not recognize the element.                                                                                                        |
| stip        | SubTIP type (PA                                                                                                                                                                                                                                                                               | AD or APPL).                                                                                                                                                                      |

tc

Terminal class.

# UNSOLICITED STATUS REPORTS FOR DOP

Each time a significant event occurs, CS updates its recent history buffer (refer to Recent History Command later in this section) and logs the event in the NAM dayfile. CS then sends a report about the event, called the unsolicited status report, to all DOPs who have selected to receive unsolicited status reports from the NPU (refer to Report Unsolicited Status Command later in this section). Unsolicited status reports are time-stamped whereas solicited status reports are not time-stamped.

#### DOP COMMANDS

All DOP commands consist of a command verb and, sometimes, one or more parameters. The command must begin in the first character position and contain no blanks. The terminator (.) is optional. Some command verbs and parameters can be shortened to a 2- or 3-character abbreviation. You can mix abbreviated and unabbreviated command verbs and parameters in all network commands. Parameters are order independent except where noted. You can enter commands pertaining only to the NPUs supervised by the CS to which you are connected.

## **CS INFORMATION COMMAND**

You can access information about all operators and NPUs connected to and supervised by your CS with the INFO command.

The command format is:

INFO.

or

IN.

The response lines are an operator information line and an NPU information line for each operator (DOP and NOP) and for each NPU supervised by a CS, respectively.

The format of the operator information line is:

DOP: termname, username, acn.

NOP: termname, username, acn, auto.

The format of the NPU information line is:

NPU: npuname, status, nodenum, go-status, nopname.

In the preceding information line formats the following variables are used.

#### Variable

#### acn CS application connection number. auto Control status of the NOP (if the NOP is an auto control NOP, AUTO appears). Refer to the NOP CONTROL commands described earlier in this section. nodenum Node number of the NPU. Terminal name of the NOP that is controlling the NPU. If the NPU has no nopname controlling NOP, the field is blank. npuname Name of the supervised NPU. status Status of the NPU. (AC if the NPU is active, MI if the NPU is in a mismatch condition). termname Name of the terminal at which the DOP or NOP resides. username User name of the DOP or NOP. go-status If the NPU is waiting for GO, NEEDGO is displayed.

Description

## NPU DIAGNOSTIC TEST COMMAND

The TST command allows any operator to request, interact with, or terminate the diagnostic program within any NPU supervised by a CS.

The command format is:

TST,NPU=npuname,option.

or

TS,NP=npuname,option.

Parameter

Description

npuname

Name of the NPU containing the diagnostic program with which the operator wants to communicate.

option

One of the following:

| option      | Keyword Abbreviation                                                      |
|-------------|---------------------------------------------------------------------------|
| DROP        | DR                                                                        |
| MSG=message | MS                                                                        |
| REQUEST     | RE                                                                        |
| message     | Command that controls the execution of the diagnostic program in the NPU. |

CS keeps track of which NPUs are currently running diagnostic tests and which operators are using them. A single operator is permitted to perform diagnostic tests in several different NPUs simultaneously. All operators can interact with the diagnostics in a single NPU, but only one operator can run the diagnostics.

## **TST Drop Option**

The DROP parameter cancels your diagnostic program reservation in the specified NPU. All diagnostics currently being performed by you in the specified NPU are terminated. If the diagnostic program is not executing, the TST command is ignored and an error message is returned.

#### **TST Msg Option**

The MSG=message parameter allows you to interact with an NPU diagnostic program. It allows you to send a command message in the form of a text string to the diagnostic program in the specified NPU. A typical use of the message option is to initiate and terminate diagnostic tests. The option is accepted only if you previously entered and confirmed a REQUEST option; otherwise, an error message is received. Refer to the CCP 3 Diagnostic Handbook for more information. The diagnostic program sends text messages through CS to you. The message is an unsolicited status report with this format:

FROM npuname/DIAGNOSTIC: TO termname: messagetext

| npuname     | Name of the NPU.                     |
|-------------|--------------------------------------|
| termname    | Name of your terminal.               |
| messagetext | Message from the diagnostic program. |

#### **TST Request Option**

The REQUEST parameter allows you to initiate interaction with an NPU diagnostic program. An NPU diagnostic program is assigned to you until one of these events occurs:

- You drop the diagnostic program (by sending a TST command with the DROP option).
- The connection between you and CS is terminated for any reason.
- Supervision of the NPU is lost by CS.

# **RECENT HISTORY COMMAND**

The HISTORY command requests a display of the recent unsolicited status reports from a CS.

The command format is:

HISTORY,ALL.

or

HI,ALL.

If the ALL option is not used, only the last (most recent) page (based on your terminal's page size) of the unsolicited status reports is displayed.

Any DOP or NOP can enter the HISTORY command to obtain reports from CS.

A HOP can enter the HISTORY command to obtain reports from CS, NS, or NVF after assigning the NAM K display to the desired application (refer to section 8, K-Display Utilities, for more information on the NAM K display).

Each application maintains a separate record of the most recent significant NPU load, DOP, NOP, or HOP events. The occurrence of these various significant events prompts the sending of an unsolicited status report to all appropriate operators. All reports are temporarily available through the HISTORY command and are permanently recorded in the NAM dayfile.

# **REPORT UNSOLICITED STATUS COMMAND**

The REPORT command requests a CS to report all unsolicited status messages from an NPU.

The command format is:

REPORT, element, option

or

RE,element,option

Parameter

Description

element

One of the following:

| element     | Keyword Abbreviation |
|-------------|----------------------|
| NPU=npuname | NP                   |
| NPUS        | NPS                  |
| npuname     | Name of the NPU.     |

option ON or OFF. If option is not specified, ON is assumed. If option is ON, CS reports all unsolicited status messages until you turn reporting off.

By default, HOPs receive reports for all NPUs supervised by a CS, and controlling NOPs receive reports for the NPUs they control. Other NOPs and DOPs do not receive any reports. However, any operator can use this command to request unsolicited status reports from any NPU supervised by a CS.

# SEND MESSAGE COMMAND

A DOP can send a message to any of the other operators (HOP, NOPs, and other DOPs) connected to the same CS using the SEND command.

The command format is:

SEND, element, MSG=message

or

SE,element,MS=message

Parameter Description

element One of the following:

Keyword Abbreviation

ΤE

HO

TERM=termname

element

HOST

termname

Name of the terminal to which the message is addressed.

message Text message of no more than 50 characters. If more than 50 characters are entered, an error message is issued. The MSG=message parameter is order dependent and must appear as the last parameter of the command.

If a terminal device is specified as the network element, it must be an interactive terminal device currently connected to your CS. Otherwise, an error message is issued to the sender.

If you specify HOST, the message is sent to the HOP of the host to which you are connected.

If the element referenced by a SEND command is not currently connected to a CS, you receive a diagnostic message. The diagnostic message is followed by the READY.. prompt.

# STATUS NETWORK ELEMENT COMMAND

You request a CS to display status information on the various network elements (such as couplers, NPUs, and trunks) with the STATUS command.

There are five forms of the STATUS command. Refer to the Status Message Formats for DOP, earlier in this section, for the format of the status line returned.

The first form requests the status of a particular element in the network.

The command format is:

STATUS, element.

or

ST,element.

## Parameter

## Description

element

One of the following:

| element           | Keyword Abbreviation                         |
|-------------------|----------------------------------------------|
| CPLER=elementname | CP                                           |
| LINE=elementname  | LI                                           |
| LLINK=elementname | LL                                           |
| NPU=elementname   | NP                                           |
| SVC=elementname   | SV                                           |
| TERM=elementname  | TE                                           |
| TRUNK=elementname | TR                                           |
| elementname       | Name of the element whose status is desired. |

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The second form requests the status of all of the elements of a particular type on one or all NPUS.

The command format is:

STATUS, linkelement npuelement, statuscode.

or

ST,linkelement,npuelement,statuscode.

|--|

linkelement

Description

One of the following:

| linkelement | Keyword Abbreviation |
|-------------|----------------------|
| CPLERS      | CPS                  |
| LINES       | LIS                  |
| LLINKS      | LLS                  |
| SVCS        | SVS                  |
| TERMS       | TES                  |
| TRUNKS      | TRS                  |

npuelement

One of the following:

| npuelement  | Keyword Abbreviation |
|-------------|----------------------|
| NPU=npuname | NP                   |
| NPUS        | NPS                  |
| npuname     | Name of the NPU.     |

statuscode

Optional. If specified, only the elements with that status are reported.

| statuscode | Description |
|------------|-------------|
| AC         | Active      |
| DN         | Down        |
| DI         | Disabled    |
| EN         | Enabled     |

The third form requests the status of all terminal devices on a line or a logical link. The command format is:

STATUS, TERMS, mode, statuscode.

or

ST, TES, mode, statuscode.

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Description |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| section of the sectio |             |

mode

One of the following:

| LINE=elementname LI<br>LLINK=elementname LL                                                                      | mode             | Keyword Abbreviation |
|------------------------------------------------------------------------------------------------------------------|------------------|----------------------|
| LLINK=elementname LL                                                                                             | LINE=elementname | LI                   |
| and the second |                  | LL                   |

elementname

Name of the specified element.

statuscode

Optional. If specified only the elements with that status are reported.

| statuscode | Description |
|------------|-------------|
| AC         | Active      |
| DN         | Down        |
| DI         | Disabled    |
| EN         | Enabled     |

The fourth form requests the status of all NPUs supervised by the CS.

The command format is:

STATUS, NPUS.

or

ST, NPUS.

The fifth form requests the status of all archetype SVCs on a line.

The command format is:

STATUS, SVCS, LINE=line.

or

ST, SVS, LI=line.

Parameter

### Description

line Name of the specified line.

A CS does not keep track of the status of the various network elements. NPUs supply the information required to satisfy the STATUS commands by sending messages to CS. In the case of a multiple-element status request, the number of messages sent can become significant. You cannot enter another command until all the messages are delivered and a READY.. prompt is displayed. A controlling NOP, other NOPs, or the DOPs can cancel a STATUS command by enter-ing the interruption or termination sequence (refer to the NOS 2 Reference Set, Volume 3 for details). A HOP can cancel a STATUS command by using the slant (/) key.

When status is requested for a coupler, line, NPU, or terminal the normal response to the STATUS command is one line of text. When status is requested for logical links or trunks, two text lines may be returned (if the CS to which you are connected is supervising NPUs at each end of the element, a line of text is returned for each end of the logical link or trunk). When status is requested for archetype SVCs on a line, a text line with the line status is returned and a text line for each active archetype SVC is returned.

# SUMMARY OF NETWORK OPERATION COMMANDS

Following is a summary of the network operation commands.

#### CONTROL COMMANDS FOR HOP

The following commands are available only to the HOP.

# NAM K Display

Assign the NAM K display by using one of the following (refer to section 8, K-Display Utilities, for additional information):

| Command   | Description                                                                              |
|-----------|------------------------------------------------------------------------------------------|
| K.AP=CS.  | Assigns the NAM K display to the communication supervisor (CS).                          |
| K.AP=NS.  | Assigns the NAM K display to the network supervisor (NS).                                |
| K.AP=NVF. | Assigns the NAM K display to the network validation facility (NVF).                      |
| K•*       | Assigns the NAM K display back to NAM mode after it has been assigned to CS, NS, or NVF. |

## **NAM Startup**

Initiate NAM by entering NAM.

# NAM Shutdown

The sequence of commands used to shutdown NAM is:

K.AP=NVF.

K.DISABLE,HOST.

or

K.IDLE,HOST.

# NAM Mode Commands

The HOP assigns the NAM K display to NAM mode before entering any of the following commands.

| Command | Description                                                                                                              |
|---------|--------------------------------------------------------------------------------------------------------------------------|
| DB      | Activates the inline debug code.                                                                                         |
| DE      | Deactivates the inline debug code.                                                                                       |
| DU      | Activates field length dump.                                                                                             |
| END     | Clears the NAM K display.                                                                                                |
| FL      | Changes NAM's maximum field length.                                                                                      |
| HELP    | Displays information about the NAM mode commands on the right K-display screen.                                          |
| IG      | Causes NAM to ignore alert requests.                                                                                     |
| LB      | Begins logging of the network traffic on the debug log file.                                                             |
| LE      | Ends logging of the network traffic on the debug log file.                                                               |
| LR      | Releases the debug log file.                                                                                             |
| RS      | Dumps the statistics data to the statistics file, resets the counters to $0$ (zero), and continues gathering statistics. |
| SEND    | Sends a message to another HOP.                                                                                          |
| ST      | Causes the NAM status display to appear on the left K-display screen.                                                    |

### **NS Control Commands**

The HOP assigns the NAM K display to NS before entering any of the following commands.

| Command † | Description                                                         |
|-----------|---------------------------------------------------------------------|
| FILE      | Assigns an alternate load file to NS for loading the specified NPU. |
| HISTORY   | Requests a display of the recent unsolicited status reports.        |
| NOFILE    | Instructs NS to use the default NPU load file for loading all NPUs. |
| STATUS    | Requests the current load/dump status of NPUs.                      |

### **NVF** Control Commands

The HOP assigns the NAM K display to NVF before entering any of the following commands.

| Command † | Description                                                  |
|-----------|--------------------------------------------------------------|
| DISABLE   | Disables an application or all host network operations.      |
| ENABLE    | Enables an application.                                      |
| IDLE      | Terminates an application or all host network operations.    |
| HISTORY   | Requests a display of the recent unsolicited status reports. |
| STATUS    | Requests the status of network elements.                     |

### CONTROL COMMANDS FOR HOP AND NOP

The HOP assigns the NAM K display to CS before entering any of the following commands. The NOP can enter these commands by logging into CS.

| Command † | Description                                                                        |
|-----------|------------------------------------------------------------------------------------|
| ALERT     | Changes the threshold that CS uses for alerting the NOP and HOP of NPU saturation. |
| CONTROL   | Allows you to gain or give up control of NPUs.                                     |
| DISABLE   | Changes the status of the specified elements to disabled.                          |
| DUMP      | Causes the memory dump flag to be reset for the specified NPU.                     |
| ENABLE    | Changes the status of the specified elements to enabled.                           |
| GO        | Activates the lines and accepts terminal device connections on an NPU.             |
| LOAD      | Causes active NPUs to stop, reload, and reactivate.                                |
| SEND      | Sends a message of no more than 50 characters to users.                            |

<sup>†</sup> To use the abbreviated form of commands, you can type the first two letters of the command. For example, FI for FILE.

# CONTROL COMMANDS FOR HOP, NOP, AND DOP

The HOP assigns the NAM K display to CS before entering any of the following commands. The DOP and NOP can enter these commands by logging into CS.

| Command <sup>†</sup> | Description                                                                            |
|----------------------|----------------------------------------------------------------------------------------|
| INFO                 | Accesses information about all operators and NPUs connected to CS.                     |
| HISTORY              | Requests a display of the recent unsolicited status reports.                           |
| REPORT               | Requests CS to report all unsolicited status messages from NPUs.                       |
| SEND                 | Sends a message of no more than 50 characters to the HOP or another NOP or DOP.        |
| STATUS               | Requests the status of network elements.                                               |
| TST                  | Allows you to control interaction with an NPU diagnostic program in the specified NPU. |

<sup>&</sup>lt;sup>†</sup>To use the abbreviated form of commands, you can type the first two letters of the command. For example, IN for INFO.

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# **NETWORK UTILITIES**

This section describes the following utilities and files involved in the operation of the network and interactive subsystems of NOS.

- NAM Initialization (NAMI). This utility controls the network software startup process.
- Network Dump Collector (COLLECT). This utility produces permanent files from the various NPU and host dump, trace, statistics, and list files resulting from any abnormal termination of the network.
- Load File Generator (LFG). This utility produces a direct access file used by the Network Access Method (NAM) to perform the downline load of network processing units (NPUs).
- NPU Dump Analyzer (NDA). This utility produces readable listings from dump files produced when NAM dumps NPUs.
- PIP Dump Analyzer (LISTPPM). This utility program converts binary records from the peripheral interface package (PIP) memory dump file into a report listed in byte format.
- Application Interface Program (AIP) Trace. This utility produces a trace file of the messages transferred between an application program and NAM. The information contained in this trace can be useful in tracking network problems and in debugging application programs.
- Network description files. Network description files are used by the Transaction Facility (TAF) to describe user access characteristics defined by terminal definition directives.
- Stimulator. A stimulator is a collection of programs that artificially loads the system to analyze the effects of such a load on system performance and reliability.

# NAM INITIALIZATION (NAMI)

The NAMI utility controls the network software startup process. The network software consists of the NAM Subsystem and several rollable jobs (NS, CS, NVF, TVF, COLLECT) and network applications (IAF, TAF, RBF, MCS, PTF, QTF, ITF). The NAMI utility starts NAM and the programs NS, CS, NVF, TVF, COLLECT, and other applications desired at the site such as RBF, QTF, and ITF by submitting jobs to the input queue. The skeletons of these jobs are contained on a master startup file along with parameter records containing directives telling the NAMI utility what parameters to substitute in the job skeletons and what jobs to start. Refer to the NOS 2 Installation Handbook for descriptions of the master startup file, parameter records, and job skeleton records.

The advantage of having the NAMI utility start up the network software is that parameters that are common to more than one job or that change from one network startup to the next can be changed easily.

The console operator enters the procedure call NAM or NAMNOGO to call procedure file NAM or NAMNOGO respectively (refer to the NOS 2 Operations Handbook). These procedure files (saved under the SYSTEMX user name) contain the NAMI command, which calls the NAMI utility. The format of the NAMI command is:

NAMI, p1, p2,..., pn.

 $\mathsf{P}_1$  is a parameter consisting of a keyword or a keyword equated to a value. All parameters are order independent.

| P <sub>i</sub> |                                                                                                                                                                                                                                                                                                                                  | Description                                                                                                                                                                                                                                                                              |  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| GO             | This parameter initiates the network startup process without operator intervention.                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                          |  |
| MFN=filename † | The permanent file name of the master file to be used. Once this<br>parameter is specified, subsequent network startups use this master<br>file until a new master file is specified. If this parameter is<br>omitted, the previously selected master file is used. The master<br>file must reside on the system default family. |                                                                                                                                                                                                                                                                                          |  |
| 0IN=nnn        | dumps/traces with                                                                                                                                                                                                                                                                                                                | The previous network invocation number (nnn) for which the<br>dumps/traces will be collected during this run. If this parameter<br>is omitted, the current network invocation number minus l is used.                                                                                    |  |
| PW=password †  | The password assigned to the user name where the master file is<br>stored. If this parameter is omitted, the previously selected<br>password is used. This parameter is not required if UN=NETOPS is<br>specified.                                                                                                               |                                                                                                                                                                                                                                                                                          |  |
| RN=recordname† | The name of the parameter record on the master file that is used for<br>this network initiation. Once this parameter is specified,<br>subsequent network startups use this same parameter record until a<br>new parameter record is specified. The following recordnames can be<br>specified.                                    |                                                                                                                                                                                                                                                                                          |  |
|                | recordname                                                                                                                                                                                                                                                                                                                       | Description                                                                                                                                                                                                                                                                              |  |
|                | INIT                                                                                                                                                                                                                                                                                                                             | Purge existing dumps/traces, stop but do not dump<br>local NPUs at network startup, take host dumps when<br>an NPU fails, and stop local NPUs at host<br>termination. Use INIT for the initial startup of<br>single host networks.                                                       |  |
|                | MINIT                                                                                                                                                                                                                                                                                                                            | Purge existing dumps/traces, stop local NPUs at<br>network startup, do not take NPU dumps before<br>initial loading of NPUs, do not stop local NPUs at<br>host termination, and do not take host dumps when an<br>NPU fails. Use MINIT for the initial startup of<br>multihost networks. |  |
|                | MRECOV                                                                                                                                                                                                                                                                                                                           | Purge existing dumps/traces, do not take NPU dumps<br>before initial loading of NPUs, do not stop local<br>NPUs at network startup or host termination, and do<br>not take host dumps when an NPU fails. Use MRECOV<br>for recovery startup of multihost networks after a<br>failure.    |  |

<sup>&</sup>lt;sup>†</sup>This parameter must be specified for the initial network software startup. It can be specified either on a NAMI command or by an operator entry using the NAMNOGO procedure.

#### Description

recordname

# Description

- MULTI Collect dumps/traces on tape before network startup, take NPU dumps before initial loading of NPUs, do not stop local NPUs at network startup or host termination, and do not take host dumps when an NPU fails. Use MULTI for the normal restart of multihost networks.
- RECOVR Purge existing dumps/traces, take host dumps when an NPU fails, do not stop NPUs at network startup or termination, and do not dump NPUs before initial load. Use RECOVR for recovery startup of single host networks after a failure.
- RESTRT Collect dumps/traces on tape before network startup, take NPU dumps before initial loading of NPUs, take host dumps when an NPU fails, stop local NPUs at host termination, and do not stop local NPUs before network startup. Use RESTRT for the normal restart of single host networks.
- RS=applname The name of the application to start up. This parameter allows a specified application to be started when the network is already operational. It is not valid at network initiation. The application's startup job skeleton must reside on the parameter record/master file specified for this network initiation.

UN=username†

Pi

The user name where the master file is stored. If this parameter is omitted, the previously selected user name is used.

The first time the network startup process is executed, a permanent file is created using a network invocation number of 1 and parameters from the NAMI command. The initial call to NAMI must specify the filename, password, and username of the master file and parameter record to be used or the console operator must enter them using NAMNOGO.

On subsequent network startup operations, a permanent file exists and contains the names of the last used master file, parameter record, and network invocation number. Parameters from this permanent file will be used to start up the network unless overridden by parameters from the NAMI command or parameters entered by the console operator using NAMNOGO. The NAMI command parameters take precedence over the permanent file parameters, and operator entries take precedence over parameters from either the NAMI command or the permanent file.

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<sup>†</sup> This parameter must be specified for the initial network software startup. It can be specified either on a NAMI command or by an operator entry using the NAMNOGO procedure.

# NETWORK DUMP COLLECTOR (COLLECT)

The COLLECT utility is a program that produces two permanent files: one of the various host dump, trace, statistics, and list files that result from any abnormal termination of the network, and one of any NPU dump files. The collected local files may be copied to the two permanent files and then purged, or copied and not purged. The permanent files can then be copied to tapes. There is also an option to purge the local files without copying them to the permanent files. The format of the COLLECT command is:

COLLECT, NIN=nnn, NOPURGE, NOSAVE.

#### Parameter

### Description

NIN=nnn The 1- to 3-character network invocation number that indicates the upper limit of the invocation numbers to be collected. All files with an NIN value from 1 to nnn are copied to the permanent file. If NIN=nnn is omitted, the default value is 1.

### NOTE

NPUs that stop when the host network software terminates are dumped during the subsequent network invocation. Therefore, the network invocation number of these dumps is 1 greater than the dumps of the host programs taken at the time of the termination.

- NOPURGE Specifies that no purging activity will take place after the collected files are copied to the permanent files. If NOPURGE is omitted, the collected files are purged after they are copied to the permanent files. NOPURGE should not be specified if NOSAVE is specified.
- NOSAVE Specifies that the collection process is not performed and the files indicated by NIN=nnn are purged. NOSAVE should not be specified if NOPURGE is used.

The COLLECT utility is automatically initiated by the network startup job (NAMI) upon each invocation of the network. (COLLECT may not be automatically initiated if the master file has been modified.) The utility receives an NIN value of the last network invocation number. The current network will be initiated with an incremented value of NIN. For example, on the fifth initiation of the network the COLLECT utility has a command call of

COLLECT, NIN=004.

and the network is initiated with an NIN of 005.

The COLLECT utility processes all dump, trace, statistics, and list files whose file names are in the form:

pptsnnn

pp is a 2-character product prefix.

Description pp CS Communication Supervisor IA Interactive Facility NI Network Interface Package NΡ Network Processing Unit NS Network Supervisor NV Network Validation Facility RB Remote Batch Facility TV Terminal Verification Facility

t is the type of file.

| <u>t</u> | Description     |
|----------|-----------------|
| D        | Dump file       |
| L        | List file       |
| S        | Statistics file |
| т        | Trace file      |
|          |                 |

s is the subtype 0, 1, 2, or 3 for the file.

nnn is the network invocation number in the range 000 through 999.

In the case of NPU dumps (pp=NP), ts is a unique hexadecimal number identifying the dump.

The permanent files produced by the COLLECT utility each have one file with many records. Each dump, trace, statistics, or list file is copied to a permanent file as one or more records, where the first record copied is preceded by a 2-word record containing the original file name. This format enables an ITEMIZE or CATALOG of a COLLECT utility permanent file to show which collected files were copied to the permanent file.

The COLLECT utility assigns each permanent file a file name of the form:

DUMPnnn for host dump, trace, statistics, or list files.

or

DUNPnnn for NPU dump files.

nnn is the network invocation number from the COLLECT command.

The permanent files DUMPnnn and DUNPnnn are attached and copied to magnetic tape (or other operator-assigned equipment) if the RESTRT or MULTI startup procedure is selected. Once the files are successfully copied, they are purged.

The COLLECT utility purges all dump and trace files without collecting them on a permanent file if the INIT, MINIT, MRECOV, or RECOVR startup procedure is selected.

# LOAD FILE GENERATOR (LFG)

LFG is a utility program that reformats Communications Control Program (CCP) files for subsequent use by the network supervisor of NAM to load NPUs. LFG accepts one or more input files in single or multifile format and produces a single network load file (NLF) for use by the network supervisor.

LFG is invoked with this command:

LFG, p<sub>1</sub>, p<sub>2</sub>,..., p<sub>n</sub>.

 $P_i$  is a parameter consisting of a keyword or a keyword equated to a value. All parameters are optional and order independent.

°i

Description

BC=nn

This parameter specifies the maximum number of load service messages in a network load file record. It is used to optimize NPU loads. l  $\leq$  nn  $\leq$  64.

BC omitted Same as BC=64.

I=infile The 1- to 7-character name of the file on which the input directives are written.

I omitted Same as I=INPUT.

L=outfile The 1- to 7-character name of the file on which the summary listing is to be written.

L=O Suppress the summary listing. If an error is detected an error message is written to file OUTPUT.

L omitted Same as L=OUTPUT.

NLF=loadfile The 1- to 7-character name of the network load file.

NLF omitted Same as NLF=NLF.

An input directive is contained on the command after the terminator. The I parameter is ignored. This eliminates the need to use a separate input directive file when there are only a few input directives.

When the input directive appears on the LFG command, the first character following the command terminator is the separator  $cha^{ra}cter$ . Any character that is not used in the input directive can be used as the separator character. The input directive must be preceded by a separator and terminated by a blank, period, or the end of the input line (column 72).

For example, (slant used for separator):

LFG,Z./\*FILE,PFILE1,PFILE2.

Z omitted Input directives are not contained on the command. The system uses the I parameter.

Z

### **INPUT DIRECTIVES**

Input directives have this format:

\*FILE,filename1,filename2,...,filenamen.

An input directive begins with an asterisk followed by the directive identifier FILE and a string of file names. The directive identifier and file names are separated by commas. If a specified file is empty, LFG ignores it. LFG scans a directive until it detects a terminator or the end of the directive line (column 72). A directive is terminated by a blank, period, or the end of the line. If an asterisk is not specified, LFG assumes \*FILE and proceeds to read file names. LFG continues to read input directives until the end of the record.

Each file specified by filename contains a load partition or a program initiation control block (PICB) for LFG to reformat. These files are created by the CCP installation process (refer to the NOS 2 Installation Handbook). A load partition is any loadable software module that can be loaded into an NPU during one operation. For example, all of the software for CCP can be loaded into an NPU as one load partition. A PICB consists of a sequence of commands that controls the load or dump operations. For each step in a PICB that specifies a load operation there is a corresponding load partition.

The names of the input files can be specified on the LFG command (Z parameter) or in a separate file (I=infile parameter). In either case, these files must be local to the job that runs LFG. LFG does not rewind the input files.

If the input directives are written on a separate record in a batch job (I=INPUT), the job format is:

ujn. USER,username,password,familyname. LFG,I=INPUT. --EOR--\*FILE,AFILE1,...,AFILEn. \*FILE,BFILE1,...,BFILEn. \*FILE,CFILE1,...,CFILEn. --EOI--

### NETWORK LOAD FILE

The network load file produced by LFG is a random access file with the local file name specified by the NLF parameter of the LFG command. The default network load file name is NLF.

### SUMMARY LISTING

The summary listing produced by LFG is a summary of the network load file contents. The summary is written on the file specified by the L parameter of the LFG command. The default summary file name is OUTPUT. Error messages produced by LFG are also written on this file. The summary listing format is:

| NO. | PARTITION NAME | INPUT FILE | RECORDS |
|-----|----------------|------------|---------|
| 1   | PN 1           | AFILE1     | 3       |
| 2   | PN2            | AFILE2     | 7       |
| 3   | PN3            | AFILE3     | 2       |

| Field          | Description                                                         |
|----------------|---------------------------------------------------------------------|
| NO.            | Line number of the summary listing.                                 |
| PARTITION NAME | Name of the load partition or PICB for LFG to reformat.             |
| INPUT FILE     | Name of the input file on which the load partition or PICB resides. |
| RECORDS        | Number of records in the load partition or PICB.                    |

# NPU DUMP ANALYZER (NDA)

NDA is a utility program that produces a readable printout from the NPU dump file. The NPU dump file may contain one or more dump records, which are created by the network supervisor during the initiation or reloading of a failed NPU. NDA reports depict the state of an NPU at the time a dump is generated. NDA uses the following local scratch files during its processing: NEUFILE, ZZZZINP, and FDMP.

NDA is accessed by a command that allows selection of:

- Dumps from/to specific NPU macromemory addresses.
- Listing options.
- The input directive file.
- The output file.

The format of the command for the NPU Dump Analyzer is:

NDA,  $p_1, p_2, \ldots, p_n$ .

Each parameter is a keyword or a keyword equated to a value. All parameters are optional and order independent. If a parameter is not specified, a default value is assumed. If the same keyword is specified more than once, the last (rightmost) occurrence of the keyword overrides all previous ones. Invalid or undefined parameters cause the run to terminate.

| P <sub>i</sub> |                                                                                                                                                                                                            | Description                                                                                                                                                                                       |  |  |  |  |  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| BA=addr        | which the dump r<br>beginning of the                                                                                                                                                                       | t hexadecimal address within the NPU macromemory at<br>report begins. Default is BA=address of the actual<br>e dump. This parameter is valid only if parameter LO=M,<br>lirective 9 is specified. |  |  |  |  |  |
| EA=addr        | which the dump r                                                                                                                                                                                           | t hexadecimal address within the NPU macromemory at<br>report ends. Default is EA=address of the actual end of<br>parameter is valid only if parameter LO=M, LO=E, or<br>9 is specified.          |  |  |  |  |  |
| I=infile       |                                                                                                                                                                                                            | cacter name of the input directive file. If there is no file, I=O (zero) must be specified. Default is I=INPUT.                                                                                   |  |  |  |  |  |
| L=outfile      | The $l-$ to 7-character name of the output file. Default is L=OUTPUT.                                                                                                                                      |                                                                                                                                                                                                   |  |  |  |  |  |
| LO=opt         | The 1- to 3-character listing option. Each character specifies a portion of the NPU dump to be listed; any unspecified portions are not listed. Default is LO=MR, if no input directive file is specified. |                                                                                                                                                                                                   |  |  |  |  |  |
|                | opt                                                                                                                                                                                                        | Description                                                                                                                                                                                       |  |  |  |  |  |
|                | E                                                                                                                                                                                                          | All NPU words in the NPU dump record (all of<br>macromemory, file l registers, and page registers).<br>Redundant lines are not suppressed.                                                        |  |  |  |  |  |
|                | м                                                                                                                                                                                                          | Macromemory only. Redundant lines are suppressed.                                                                                                                                                 |  |  |  |  |  |
|                | R                                                                                                                                                                                                          | File 1 registers and page registers only.                                                                                                                                                         |  |  |  |  |  |
| NDF=npudump    | Local file name of the NPU dump file. The NPU dump file may contain<br>multiple NPU dump records. Each record causes a separate NPU dump<br>output to be generated. Default is NDF=NDF.                    |                                                                                                                                                                                                   |  |  |  |  |  |

### INPUT DIRECTIVES

Input directives must be contained in a single logical record on the input directive file. Each directive is in 80-column format. Column 1 is reserved for a 1-character keyword that indicates a change in the processing rules and defines the new rule to be used for the following directives. Each directive containing a keyword in column 1 causes NDA to begin a new listing page. Any comments contained in that directive are printed as the first line of the new page. Columns 71 through 80 are ignored on all directives. Comments are allowed in columns 11 through 70 on directives that contain a 1-character keyword.

Directive parameters are in fixed formats. The number of parameters and their respective columns within the directive varies with the 1-character keyword specified. Each parameter is a 5-digit hexadecimal value (leading zeros are required). Parameters are separated by either a comma or a blank. The remaining space between the last parameter and column 70 of a directive may contain optional comments; such comments appear on the line of the output file preceding the information produced by the directive.

### 0 — Comments

The O directive specifies that comments can be entered in columns 11 through 70 of this directive and succeeding directives until a different keyword is specified.

#### 1 — File 1 Register

The 1 directive causes the contents of a specific file 1 register to be listed. Each file 1 register is specified by its 5-digit hexadecimal address in columns 2 through 6 of the next directive and succeeding directives until a different keyword is specified.

#### 2 — Macromemory Word

The 2 directive causes the contents of a specific macromemory word to be listed. Each macromemory word is specified by its 5-digit hexadecimal address in columns 2 through 6 of the next directive and succeeding directives until a different keyword is specified.

#### 3 — Contiguous Block Data Structure

The 3 directive causes identical data structures that are contiguously addressed in macromemory to be listed. Each directive contains five parameters in 5-digit hexadecimal format. Each parameter has a field name that is used in diagnostic messages.

| Columns | Field Name | Description                                                                                                                          |
|---------|------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 2-6     | PNTR       | Macromemory location that contains the pointer to the first identical data structure.                                                |
| 8-12    | SIZE       | Size of the data structure in NPU words.                                                                                             |
| 14-18   | INDX       | Index value of the first data structure to be listed. The first identical data structure has an index value of l.                    |
| 20-24   | FIRST      | Number assigned to the first data structure to be listed.<br>The next data structure listing is assigned the next<br>highest number. |
| 26-30   | LAST       | Number assigned to the last data structure to be listed.<br>The data structure listing terminates when it reaches<br>this number.    |

### 4 — Circular Buffer Data Structure

The 4 directive causes circular buffers to be listed in chronological order. Two types of buffers can be listed; fixed-length data structures and variable-length data structures. Each directive contains seven parameters in 5-digit hexadecimal format. Each parameter has a field name that is used in diagnostic messages.

| Columns | Field Name | Description                                                                                                                                                      |
|---------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2-6     | FWA        | File l register location that contains the first word address of the circular buffer.                                                                            |
| 8-12    | OLDEST     | File l register location that contains the address of the oldest item in the circular buffer.                                                                    |
| 14-18   | LWA        | File l register location that contains the last word address of the circular buffer.                                                                             |
| 20-24   | FLAG       | File l register location used as a flag to indicate<br>whether the buffer contains meaningful data. The buffer<br>is not listed if this location contains zeros. |
| 26-30   | PTRN       | Bit pattern that delimits a variable-length data structure.                                                                                                      |
| 32-36   | MASK       | Mask for isolating the appropriate bits to identify the delimiter.                                                                                               |
| 38-42   | SIZE       | Data structure size. Nonzero indicates a fixed-length<br>data structure. Zero indicates a variable-length data<br>structure.                                     |

For variable-length data structures, the next occurrence of a data structure is determined by first masking each word to isolate the bit pattern and then comparing this pattern with the specified bit pattern until a match is found. Listing begins at the first match and ends at the second match or at the oldest item found. For fixed-length data structures, the mask and bit pattern are not used.

The circular buffer format starts by listing the oldest item in the buffer (specified in columns 8 through 12), then proceeds to the last word address (specified in columns 14 through 18), then goes to the first word address (specified in columns 2 through 6), and continues to the oldest item in the buffer.

#### 7 — Page Registers

The 7 directive causes the contents of the page registers to be listed. The 7 directive does not have parameters.

### 8 — File 1 Registers

The 8 directive causes file 1 registers to be listed in lines of 16 consecutively addressed registers in hexadecimal format. The 8 directive does not have parameters. However, if the parameter LO=E is specified on the NDA command, the selected option will be in effect.

### 9 — Macromemory Words

The 9 directive causes NPU macromemory words to be listed in lines of 16 consecutively addressed words in hexadecimal format. Repetitive lines are suppressed and addressing continues with the next nonrepetitive line. This line is flagged with double asterisks to indicate the suppression. The 9 directive does not have parameters. However, if parameters BA=addr, EA=addr, or LO=E are specified on the NDA command, the selected options will be in effect.

### A — LCB and TCB/CCB

- -

The A directive causes line control blocks (LCB) to be listed with their associated terminal control blocks (TCB) or cluster control blocks (CCB). Each directive contains seven parameters in 5-digit hexadecimal format. Each parameter has a field name that is used in diagnostic messages.

| Columns | Field Name | Description                                                                                                                                      |
|---------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 2-6     | LCBP       | Macromemory location that contains the pointer to the first LCB.                                                                                 |
| 8-12    | LCBL       | Size of the LCB in NPU words.                                                                                                                    |
| 14-18   | FTCB       | Index value of the LCB word that contains the pointer to<br>the first TCB/CCB. The first word in an LCB has an index<br>value of 0 (zero).       |
| 20-24   | TCBL       | Size of the TCB/CCB in NPU words.                                                                                                                |
| 26-30   | NTCB       | Index value of the TCB/CCB word that contains the pointer<br>to the next TCB/CCB. The first word in a TCB/CCB has an<br>index value of 0 (zero). |
| 32-36   | NLCB       | File 1 register location that contains the number of LCBs to be listed. If set to 0 (zero), only one LCB is listed.                              |
| 38-42   | LCBX       | Index value of the first LCB to be listed. The first LCB has an index value of $0$ (zero).                                                       |

The LCBs and their associated TCB/CCBs are listed vertically in columns such that any line of the report represents an LCB and its associated TCB/CCBs. In this format, an LCB and 15 TCB/CCBs can be listed in one line. If more than 15 TCB/CCBs are associated with the LCB, the next page lists the next 15 TCB/CCBs with the LCB column blank to indicate the association of these TCB/CCBs with the previous LCB.

#### B — Port Tables and MUXLCB

The B directive causes port tables to be listed with their associated multiplex line control blocks (MUXLCBs). Only one MUXLCB can be associated with each port table. Each directive contains eight parameters in 5-digit hexadecimal format. Each parameter has a field name that is used in diagnostic messages.

| Columns | Field Name | Description                                                                                                                                           |
|---------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2-6     | PTTP       | File l register location that contains the pointer to the first port table.                                                                           |
| 8-12    | PTTL       | Size of the port table in NPU words.                                                                                                                  |
| 14-18   | MUXP       | Index value of the port table word that contains the pointer to the associated MUXLCB. The first word in a port table has an index value of 0 (zero). |
| 20-24   | MUXL       | Size of the MUXLCB in NPU words.                                                                                                                      |
| 26-30   | PTRN       | Bit pattern that identifies a valid MUXLCB.                                                                                                           |
| 32-36   | MASK       | Mask for isolating the appropriate bits to identify a valid MUXLCB.                                                                                   |
| 38-42   | MUXID      | Index value of the port table word that contains the<br>MUXLCB identifier. The first word in a port table has an<br>index value of O (zero).          |
| 44-48   | NPTT       | File l register location that contains the number of port tables to be listed.                                                                        |

The validity of the pointer to a MUXLCB is determined by first masking the appropriate port table word to isolate the validating bit pattern and then determining if the specific bit pattern is present. If the MUXLCB pointer is invalid, MUXLCB is not listed.

The port tables and their associated MUXLCBs are listed vertically in columns such that any line of the report represents up to eight port tables, each with its associated MUXLCB.

Figure 16-1 is a sample of an NDA output file and its corresponding input directive file.

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| 0       THIS IS A HEADING LINE FOR THE FIRST COMMENT PAGE.         THIS IS A SAMPLE OF AN INPUT DIRECTIVE FILE SPECIFIED BY         THE I PARAMETER ON THE NDA COMMAND.         THE ZERO DIRECTIVE ALLOWS YOU TO PUT COMMENTS OR INTER-         PRETATION INFORMATION ON A LISTING PAGE JUST BEFORE         A PAGE OF THE FORMATTED DATA. FOR EXAMPLE, THE         MEANING OF BIT POSITIONS IN THE INITIALIZATION TABLE OR         THE NAME ASSOCIATED WITH WORKLIST CONTROL BLOCK 4 CAN BE         PRINTED.         1       FILE 1 REGISTER INFORMATION         000F1       FIRST PORT TABLE         000F3       MAXIMUM NUMBER OF LCBS         000F4       MACROMEMORY INTERPRETATION         00150       BYWLCB       WORKLIST CONTROL BLOCK         00151       BYCURWLP       CURRENT ACTIVE MONITOR WORKLIST CONTRL BLK         00152       BITCB       INTERNAL PROCESSING TCB         3       CONTIGUOUS DATA STRUCTURE       Input directive file         00161       000001 00001       MLIA, CONSOLE, COUPLER, TCB         00165       00000       00001       INITIALIZATION COMPLETE TABLE |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 00150       BYWLCB       WORKLIST CONTROL BLOCK         00151       BYCURWLP       CURRENT ACTIVE MONITOR WORKLIST CONTRL BLK         00152       BITCB       INTERNAL PROCESSING TCB         3       CONTIGUOUS DATA STRUCTURE         00161       00020       00001       00003         00165       00002       00001       00001       INITIALIZATION COMPLETE TABLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| 00150000080000800019WORKLIST CONTROL BLOCK NUMBER4CIRCULAR INPUT BUFFER DUMP FROM CEXX TO CEXX PATTERN00036000400003000E00OFF0000157000110003000E0000E01LCB00155000110003000E0000E01LCBTCB00155000110003000E0000E01LCBTCBAND SO FORTHAA NONZERO COLUMN 1FORCES A NEW PAGE FOR THE CCB CHAIN001570001500E1000E0000EE1LCBCCBAND SO FORTHBFRINT PORT TABLE AND MUXLCBS, TEST FOR BIT 12, PORT WORD 10006100E00101EES0EESTEEST7DUMP PAGE REGISTERS8DUMP FILE 1REGISTER PER COMMAND LO=PARAMETER VALUE9DUMP MACROMEMORY PER COMMAND BA=,EA=,LO=VALUES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |

Figure 16-1. Sample NDA Output File (Sheet 1 of 10)

NPU DUMP FILE = NP04458 NDA, I=NDAINF, L=NDAOUTF, NDF=NP04458. PAGE 1 TIME 02.22.37 DATE 84/03/23 NPU NAME LOC3 Header information NPU NODE 21 HALT CODE 0 P REGISTER 0 THIS IS A HEADING LINE FOR THE FIRST COMMENT PAGE. PAGE 2 THIS IS A SAMPLE OF AN INPUT DIRECTIVE FILE SPECIFIED BY THE I PARAMETER ON THE NDA COMMAND. THE ZERO DIRECTIVE ALLOWS YOU TO PUT COMMENTS OR INTER-PRETATION INFORMATION ON A LISTING PAGE JUST BEFORE A PAGE OF THE FORMATTED DATA. FOR EXAMPLE. THE MEANING OF BIT POSITIONS IN THE INITIALIZATION TABLE OR THE NAME ASSOCIATED WITH WORKLIST CONTROL BLOCK 4 CAN BE PRINTED. FILE 1 REGISTER INFORMATION PAGE 3 (LOC 000F1) 950F FIRST PORT TABLE MAXIMUM NUMBER OF LCBS (LOC 000F3) 008A (LOC 00040) 938A NEXT FRAME POINTER MACROMEMORY INTERPRETATION PAGE 4 (LOC 00150) 0663 BYWLCB WORKLIST CONTROL BLOCK (LOC 00151) 0753 BYCURWLP CURRENT ACTIVE MONITOR WORKLIST CONTRL BLK (LOC 00152) 05A4 B1TCB INTERNAL PROCESSING TCB

Figure 16-1. Sample NDA Output File (Sheet 2 of 10)

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|        | CONT  | LGUOUS I | DATA STI | RUCTURE  |      |      |      |               |      |              |      |      |      |      |      | PAGE | 5 |
|--------|-------|----------|----------|----------|------|------|------|---------------|------|--------------|------|------|------|------|------|------|---|
|        | MLIA  | CONSO    | LE, COU  | PLER, TO | зв   |      |      |               |      |              |      |      |      |      |      |      |   |
| OFFSET | 1     | 2        | 3        | •        |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 0      | 0000  | 0000     | 995F     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 1      | AA9F  | AABE     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 2      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 3      | 0070  | 0070     | 0003     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
|        |       |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 4      | 0000  | 0000     | 0007     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 5      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 6      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 7      | 0000  | 0000     | A000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 8      | 0000  | 0000     | 8012     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 9      | 0000  | A000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| A      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| В      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| с      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| D      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| Е      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| F      | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 10     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 11     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 12     | 0000  | 0000     |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
|        |       |          | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 13     | 0000  | 0000     | 002D     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 14     | 0000  | 0000     | 2E37     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 15     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 16     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 17     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 18     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 19     | 0000  | 0000     | 89B4     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 1A     | 0000  | 0000     | 0800     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 18     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 10     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 1D     | 0000  | 0000     | 4951     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 1E     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 1F     | 0000  | 0000     | 0000     |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
|        |       |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
|        | TNTTT | ALTZATT  | ON COMPL | LETE TAI | R.R. |      |      |               |      |              |      |      |      |      |      |      |   |
| OFFSET | 1     |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 0      | OOFF  |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 1      | FFFF  |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| -      |       |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
|        | WORKL | IST CON  | TROL BL  | OCK NUMI | BER  |      |      |               |      |              |      |      |      |      |      |      |   |
| OFFSET | 8     | 9        | A        | В        | С    | D    | E    | F             | 10   | 11           | 12   | 13   | 14   | 15   | 16   | 17   |   |
| 0      | 0000  | 0000     | 0006     | 0000     | 0000 | 0000 | 0000 | 0000          | 0000 | 0000         | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 |   |
| ĩ      | AC90  | 0000     | ECE9     | 0000     | 0000 | 0000 | 0000 | 0000          | 0000 | CC30         | 0000 | B770 | ACAO | 0000 | BD60 | 0000 |   |
| 2      | AC90  | 0000     | DFF6     | 0000     | AD10 | 0000 | 0000 | 0000          | 0000 | CC30         | 0000 | B770 | ACAO | F5BC | BD60 | 0000 |   |
| 3      | 8003  | 0003     | 8003     | 4102     | 4001 | 4001 | 4001 | 8003          | 4102 | 8001         | 8005 | 8003 | 8001 | 0003 | 8003 | 4304 |   |
| 4      | 4D58  | 0000     | 5354     | 0000     | 0000 | 0000 | 0000 | 584D          | 434F | 4250         | 4D4C | 534D | 5453 | 5248 | 4C49 | 4F4C |   |
| 4      | 4038  | 0000     | 0000     | 0000     | 0000 | 0000 | 0000 | 0000          | 06AB | 42J0<br>06B3 | 06BB | 06C3 | 06CB | 06D3 | 06DB | 06E3 |   |
|        |       |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
| 6      | 0000  | 0000     | 0000     | 0000     | 0000 | 0000 | 0000 | 0423          | 040C | 082C         | 2827 | 0404 | 0411 | 0435 | 040F | 0439 |   |
| 7      | 0000  | 0000     | 0000     | 0000     | 0000 | 0000 | 0000 | 3 <b>F9</b> D | 66F2 | 20D1         | 3FC4 | 213D | 8944 | 3885 | 80DA | 366C |   |
|        |       |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |
|        |       |          |          |          |      |      |      |               |      |              |      |      |      |      |      |      |   |

Figure 16-1. Sample NDA Output File (Sheet 3 of 10)

60459300 D

| OFFSET<br>0<br>1<br>2<br>3<br>4<br>5<br>6 | WORKI<br>18<br>0000<br>ABF0<br>8003<br>4850<br>06EB<br>0426 | 06F3<br>102C |  |  | PAGE | 6 |
|-------------------------------------------|-------------------------------------------------------------|--------------|--|--|------|---|
| 7                                         | 3473                                                        | 2748         |  |  |      |   |
|                                           |                                                             |              |  |  |      |   |
|                                           |                                                             |              |  |  |      |   |
|                                           |                                                             |              |  |  |      |   |
|                                           |                                                             |              |  |  |      |   |
|                                           |                                                             |              |  |  |      |   |

Figure 16-1. Sample NDA Output File (Sheet 4 of 10)

60459300 D

16-18

|               | CIRCULAR     | INPUT BUFFER | DUMP FROM CEXX | TO CEXX PATTERN |              |              |              |              | PAGE | 7 |
|---------------|--------------|--------------|----------------|-----------------|--------------|--------------|--------------|--------------|------|---|
| LOC<br>38B OF | 03 CC1C 0EC  | 13           |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
| 6             | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0002         | 0002         |      |   |
| 7             | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 00A0         | 0040         |      |   |
| 8             | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | C000         | 3000         |      |   |
| 9             | 0009         | 0000         | OOOE           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| A<br>B        | 0004<br>0003 | 0000<br>0000 | 000F<br>0006   | 0000<br>0000    | 0000<br>0000 | 0000<br>0000 | 0000<br>0000 | 0000<br>0000 |      |   |
| в<br>С        | 0003         | 0000         | 0008           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| D             | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| E             | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| F             | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 10            | 91A2         | 9177         | 91CD           | 91F8            | 0000         | 0000         | 0000         | 0000         |      |   |
| 11            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 12            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0003         | 0003         |      |   |
| 13            | 0303         | 0000         | 05C2           | 0000            | 0000         | 0000         | 0000         | 0000         | •    |   |
| 14            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 15            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 16            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 17            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 18            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 19            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 18            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 1B            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 10            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 1D            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 1E            | 0000         | 0000         | 0000           | 0000            | 0000         | 0000         | 0000         | 0000         |      |   |
| 1F            |              |              |                |                 |              |              |              |              |      |   |
| 20            |              |              |                |                 |              |              |              |              |      |   |
| 21            |              |              |                |                 |              |              |              |              |      |   |
| 22<br>23      |              |              |                |                 |              |              |              |              |      |   |
| 23            |              |              |                |                 |              |              |              |              |      |   |
| 24            |              |              |                |                 |              |              |              |              |      |   |
| 26            |              |              |                |                 |              |              |              |              |      |   |
| 27            |              |              |                |                 |              |              |              |              |      |   |
| 28            |              |              |                |                 |              |              |              |              |      |   |
| 29            |              |              |                |                 |              |              |              |              |      |   |
| 24            |              |              |                |                 |              |              |              |              |      |   |
| 2B            |              |              |                |                 |              |              |              |              |      |   |
| 2C            |              |              |                |                 |              |              |              |              |      |   |
| 2D            |              |              |                |                 |              |              |              |              |      |   |
| 2E            |              |              |                |                 |              |              |              |              |      |   |
| 2F            |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |
|               |              |              |                |                 |              |              |              |              |      |   |

Figure 16-1. Sample NDA Output File (Sheet 5 of 10)

| PINE ALLACES VITH THELE TOS         SUB         9           LIN         VIEN         VIEN </th <th></th> |              |      |      |          |      |      |      |      |               |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------|------|----------|------|------|------|------|---------------|---|
| OFFSET         LC8009         TCB000         LCB000         TCB000 <thlcb00< th=""> <thlcb00< th=""></thlcb00<></thlcb00<>        |              |      |      | CBS SKIP | LCBO |      |      |      | PAGE          | 9 |
| LDC.         9800         981F         983E         987C         9988         988A         9809           1         0000         0000         0800         0200         0200         0200         987C         9898         9809         987C           2         0000         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200         0200                                                                                                                                | 000000       |      |      |          |      |      |      |      | 1 00010 00000 |   |
| 0         0000         0100         0200         0200         0200         0200         1000           1         0000         9132         9150         0977         0905         0087         8003         8003         8003           2         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         00000         00000         0000                                                                                                                                 |              |      |      |          |      |      |      |      |               |   |
| 1       0000       9132       9530       977       9998       9874       9874       9874         2       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       000                                                                                                                                                                                                          |              |      |      |          |      |      |      |      |               |   |
| 2       0000       0027       0003       0003       8003       8003         4       0000       0000       0000       0000       0000       0000       0000         5       0000       0000       0000       0000       0000       0000       0000       0000         5       0000       0000       0000       0000       0000       0000       0000       0000       0000         6       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000                                                                                                                                                                                                                                            |              |      |      |          |      |      |      |      |               |   |
| 3         0000         0000         0000         0000         0000         0000         0000         0000           5         0000         0A60         0AA0         0A60         0B00         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000 <td></td>                 |              |      |      |          |      |      |      |      |               |   |
| 4       0000       0000       0000       0000       0000       0000       0000         5       0000       0044       0100       0004       0002       0002       0002         7       0000       0040       0100       0004       0000       2000       2002         9       0000       4000       4000       5000       P200       2000       2000         8       0000       0000       0011       0000       0000       0000       2000       2000         9       0000       0000       0011       0000       0000       0000       2000       2000         4       0000       0000       0011       0000       0000       2000       2000       2000         4       0000       0000       00113       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000<                                                                                                                                                                                                                                                                   |              |      |      |          |      |      |      |      |               |   |
| 5       0000       0A60       0A60       0180       0280       0180       0180         6       0000       0004       0001       0002       0002       0002       0002         7       0000       00A0       0041       00A0       80A0       00A0       00A0       80A0         8       0000       0000       0011       00A0       80A0       0000       0000       6000         4       0000       0000       0013       0000       0000       0000       0000       0000       0000         8       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>                                                                                                                                              |              |      |      |          |      |      |      |      |               |   |
| 6       0000       0004       0100       0004       0002       0002       0002       0002         7       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       00                                                                                                                                                                                                          |              |      |      |          |      |      |      |      |               |   |
| 7       0000       0040       0040       80A0       00A0       00A0       80A0         8       0000       4000       4000       5000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       7000       70                                                                                                                                                                                                          |              |      |      |          |      |      |      |      |               |   |
| 8         0000         4000         4000         5000         F000         F000         6200           9         0000         0000         0000         0000         0000         0000         0000         0000           A         0000         0000         00113         0000         0000         0000         0000         0000         0000           B         0000         0000         0000         0000         0000         0000         0000         0000           C         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         000                                                                                                                                                  |              |      |      |          |      |      |      |      |               |   |
| 9       0000       0000       0018       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       00000       0000       0000       <                                                                                                                                                                                              | 8            |      |      |          |      |      |      |      |               |   |
| B         0000         0000         0143         0000         0000         0000         0000         0000           C         0000         0000         0000         0000         0000         0000         0000           D         0000         0000         0000         0000         0000         0000         0000         0000           E         0000         0000         0000         0000         0000         0000         0000         0000           F         0000         0000         0000         0000         0000         0000         0000         0000         0000           10         0000         0000         0000         0000         0000         0000         0000         0000         0000           12         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         00000         0000         0000                                                                                                                                                                           | 9            | 0000 | 0000 | 001B     |      |      | 0000 | 0000 | 0000          |   |
| C       0000       0000       0000       0000       0000       0000       0000         B       0000       0000       0000       0000       0000       0000       0000       0000         F       0000       0000       0000       0000       0000       0000       0000       0000       0000         10       0000       0000       0000       0000       0000       0000       0000       0000       0000         11       0000       0000       0000       0000       0000       0000       0000       0000       0000         12       0000       0000       0000       0000       0000       0000       0000       0000       0000         13       0000       0000       0000       0000       0000       0000       0000       0000       0000         14       0000       0000       0000       0000       0000       0000       0000       0000       0000         15       0000       0000       0000       0000       0000       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000 <td>A</td> <td>0000</td> <td>0000</td> <td>0013</td> <td>0000</td> <td>0000</td> <td>0000</td> <td>0000</td> <td>0000</td> <td></td>                                                                                                                                                 | A            | 0000 | 0000 | 0013     | 0000 | 0000 | 0000 | 0000 | 0000          |   |
| D         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         00000         0000         0000         0                                                                                                         | В            | 0000 | 0000 | 0143     | 0000 | 0000 | 0000 | 0000 | 0000          |   |
| B         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         00000         0000         0000         0                                                                                                         | С            | 0000 | 0000 | 0003     | 0000 | 0000 | 0000 | 0000 | 0000          |   |
| F         0000         0000         0000         0000         0000         0000         0000           10         0000         0000         0000         0000         0000         0000         0000           11         0000         0000         0000         0000         0000         0000         0000           12         0000         0000         0533         0003         0003         0003         0003           13         0000         0000         0547         0000         0000         0000         0000         0000           14         0000         0000         0000         0000         0000         0000         0000         0000           15         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000                                                                                                                                                                        | D            | 0000 | 0000 | 0000     | 0000 | 0000 | 0000 | 0000 | 0000          |   |
| 10       0000       0000       0000       0000       0000       0000         11       0000       0000       0000       0000       0000       0000       0000         12       0000       0000       0000       0000       0000       0000       0000         13       0000       0000       0547       0000       0000       0000       0000       0000         14       0000       0000       0000       0000       0000       0000       0000       0000         15       0000       0000       0000       0000       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0                                                                                                                                                                                                                                                                           |              | 0000 | 0000 | 0000     | 0000 | 0000 | 0000 |      |               |   |
| 11       0000       0000       0000       0000       0000       0000       0000         12       0000       0003       0003       0003       0003       0003       0000         13       0000       0000       0547       0000       0000       0000       0000       0000         14       0000       0000       0000       0000       0000       0000       0000         15       0000       0000       0000       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         18       0000       0000                                                                                                                                                                                                                                                                                                         |              |      |      |          |      |      |      |      |               |   |
| 12       0000       0003       0003       0003       0003       0003       0003         13       0000       0000       0547       0000       0000       0000       0000       0000         14       0000       0000       0000       0000       0000       0000       0000       0000         15       0000       AB1B       AB4B       AB7B       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         10                                                                                                                                                                                                                                                                                                         |              |      |      |          |      |      |      |      |               |   |
| 13       0000       0000       0547       0000       0000       0000       0000       0000         14       0000       0000       0000       0000       0000       0000       0000         15       0000       AB1B       AB48       AB7B       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         14       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         10       0000       0000       0000       0000       0000       0000       0000         18       0000                                                                                                                                                                                                                                                                                                         |              |      |      |          |      |      |      |      |               |   |
| 14       0000       0000       0000       0000       0000       0000       0000         15       0000       AB1B       AB4B       AB7B       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0                                                                                                                                                                                                                                                                           |              |      |      |          |      |      |      |      |               |   |
| 15       0000       AB1B       AB4B       AB7B       0000       0000       0000       0000         16       0000       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000       0000         10       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000                                                                                                                                                                                                                                                             |              |      |      |          |      |      |      |      |               |   |
| 16       0000       0000       0000       0000       0000       0000       0000         17       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         1A       0000       0000       0000       0000       0000       0000       0000         1B       0000       0000       0000       0000       0000       0000       0000       0000         1B       0000       0000       0000       0000       0000       0000       0000       0000         1C       0000       0000       0000       0000       0000       0000       0000       0000         1D       0000       0000       0000       0000       0000       0000       0000       0000         1F       20                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
| 17       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         18       0000       0000       0000       0000       0000       0000       0000         10       0000       0000       0000       0000       0000       0000       0000         10       0000       0000       0000       0000       0000       0000       0000         11       0000       0000       0000       0000       0000       0000       0000         12       0000       0000       0000       0000       0000       0000       0000         12       0000       0000       0000       0000       0000       0000       0000         12       0000       0000       0000                                                                                                                                                                                                                                                                                                         |              |      |      |          |      |      |      |      |               |   |
| 18       0000       0000       0000       0000       0000       0000       0000         19       0000       0000       0000       0000       0000       0000       0000         1A       0000       0000       0000       0000       0000       0000       0000         1B       0000       0000       0000       0000       0000       0000       0000         1B       0000       0000       0000       0000       0000       0000       0000         1C       0000       0000       0000       0000       0000       0000       0000       0000         1D       0000       0000       0000       0000       0000       0000       0000       0000         1E       0000       0000       0000       0000       0000       0000       0000         1F       20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |      |      |          |      |      |      |      |               |   |
| 19         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0                                                                                                         |              |      |      |          |      |      |      |      |               |   |
| 1A         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0000         0                                                                                                         |              |      |      |          |      |      |      |      |               |   |
| 1B       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       0000       <                                                                                                                                                                                              |              |      |      |          |      |      |      |      |               |   |
| 1C       0000       0000       0000       0000       0000       0000         1D       0000       0000       0000       0000       0000       0000       0000         1E       0000       0000       0000       0000       0000       0000       0000         1F       20       21       22       23       24       25       26       27       28       28       28       24       25       26       27       28       28       24       25       26       27       28       28       24       25       26       27       28       28       26       28       28       28       26       26       27       28       28       28       26       28       28       26       28       28       26       26       28       28       26       26       27       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       28       2000       0000       0000       0000                                                                                                                                                                                                                                                                                                  |              |      |      |          |      |      |      |      |               |   |
| 1D       0000       0000       0000       0000       0000       0000       0000         1E       0000       0000       0000       0000       0000       0000       0000         1F       20       21       22       23       24       25       26       26       27       28       28       28       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20 <td></td>                                                                                                                                                                                                  |              |      |      |          |      |      |      |      |               |   |
| 1E       0000       0000       0000       0000       0000       0000         1F       20       21       22       23       24       25       26       27       28       28       28       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20       20 </td <td></td>                                                                                                                                                                                             |              |      |      |          |      |      |      |      |               |   |
| 1F<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |      |      |          |      |      |      |      |               |   |
| 20<br>21<br>22<br>23<br>24<br>25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              | 0000 | 0000 | 0000     | 0000 | 0000 | 0000 | 0000 | 0000          |   |
| 21<br>22<br>23<br>24<br>25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |      |      |          |      |      |      |      |               |   |
| 22<br>23<br>24<br>25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |      |      |          |      |      |      |      |               |   |
| 23<br>24<br>25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |      |      |          |      |      |      |      |               |   |
| 24<br>25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |      |      |          |      |      |      |      |               |   |
| 25<br>26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |      |      |          |      |      |      |      |               |   |
| 26<br>27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |      |      |          |      |      |      |      |               |   |
| 27<br>28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |      |      |          |      |      |      |      |               |   |
| 28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | - <b>-</b> . |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |      |      |          |      |      |      |      |               |   |

Figure 16-1. Sample NDA Output File (Sheet 6 of 10)

60459300 D

16-20

|        | A NONZERO COLUMN 1 FORCES A NEW PAGE FOR THE CCB CHAIN | PAGE | 28 |
|--------|--------------------------------------------------------|------|----|
| 000000 | LCB, CCB, AND SO FORTH<br>LCB017 TCB000                |      |    |
| OFFSET |                                                        |      |    |
| LOC    | 9CB2<br>0000                                           |      |    |
| 0      |                                                        |      |    |
| 1      | 0000                                                   |      |    |
| 2      | 0000                                                   |      |    |
| 3      | 0000                                                   |      |    |
| . 4    | 0000                                                   |      |    |
| 5      | 0000                                                   |      |    |
| 6      | 0000                                                   |      |    |
| 7      | 0000                                                   |      |    |
| 8      | 0000                                                   |      |    |
| 9      | 0000                                                   |      |    |
| A      | 0000                                                   |      |    |
| В      | 0000                                                   |      |    |
| C ;    | 0000                                                   |      |    |
| D      | 0000                                                   |      |    |
| E      | 0000                                                   |      |    |
| F      | 0000                                                   |      |    |
| 10     | 0000                                                   |      |    |
| 11     | 0000<br>0000                                           |      |    |
| 12     |                                                        |      |    |
| 13     | 0000                                                   |      |    |
| 14     | 0000                                                   |      |    |
| 15     | 0000                                                   |      |    |
| 16     | 0000                                                   |      |    |
| 17     | 0000                                                   |      |    |
| 18     | 0000                                                   |      |    |
| 19     | 0000                                                   |      |    |
| 14     | 0000                                                   |      |    |
| 1B     | 0000                                                   |      |    |
| 10     | 0000                                                   |      |    |
| 1D     | 0000                                                   |      |    |
| 1E     | 0000                                                   |      |    |
|        |                                                        |      |    |
|        |                                                        |      |    |
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|        |                                                        |      |    |
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|        |                                                        |      |    |
|        |                                                        |      |    |
|        |                                                        |      |    |
|        |                                                        |      |    |

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Figure 16-1. Sample NDA Output File (Sheet 7 of 10)

60459300 D

| LOC                                              | PORTOOO MUX                          | PORTOO1 MUX                          | PORTOO2 MUX                          | PORTOO3 MUX                                                                | PORTO04 MUX                                  | PORTOO5 MUX                                                                | PORTOC                                       |
|--------------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|----------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------|
| •                                                | 950F                                 | 9517                                 | 951F                                 | 9527                                                                       | 952F                                         | 9537                                                                       | 953F                                         |
| 0                                                | 0000                                 | AA81                                 | 0280                                 | AA81                                                                       | 0280                                         | 0000                                                                       | 0000                                         |
| 1                                                | 0000                                 | ECFO                                 | 0000                                 | ACDO                                                                       | 0000                                         | 0000                                                                       | 0000                                         |
| 2                                                | 0000                                 | 8807                                 | 0001                                 | 8807                                                                       | 0001                                         | 0000                                                                       | 0000                                         |
| 3                                                | 0000                                 | 41FC                                 | 41FC                                 | 41FC                                                                       | 41FC                                         | 0000                                                                       | 0000                                         |
| 4                                                | 0000                                 | 8AA7                                 | 0000                                 | 8AA7                                                                       | 0000                                         | 0000                                                                       | 0000                                         |
| 5                                                | 0000                                 | 0000                                 | 0000                                 | 0000                                                                       | 0000                                         | 0000                                                                       | 0000                                         |
| 6                                                | 0000                                 | EOOF                                 | 0000                                 | EOOF                                                                       | 0000                                         | 0000                                                                       | 0000                                         |
| 7                                                | 0000                                 | 0000                                 | 0000                                 | 0000                                                                       | 0000                                         | 0000                                                                       | 0000                                         |
| 8                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| 9                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| Å                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| В                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| č                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| D                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| Ĕ                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| F                                                |                                      |                                      |                                      |                                                                            |                                              |                                                                            |                                              |
| 0<br>1<br>2<br>3                                 | 28C0<br>AE70<br>8803<br>416C<br>8827 | 0000<br>0000<br>0000<br>0000<br>0000 | 0280<br>0000<br>0001<br>41FC<br>0000 | AA80 A180<br>B290 4189<br>8807 DE44<br>41FC 0004<br>8AA7 0000<br>0000 4DA0 | 0280<br>0000<br>0001<br>41FC<br>0000<br>0000 | 2840 0000<br>B2C0 2000<br>0803 0000<br>4126 0000<br>0827 0000<br>3200 420E | 2880<br>B2D0<br>0803<br>4126<br>0827<br>3200 |
| 4<br>5<br>7<br>8<br>9<br>A                       | 3200<br>0000<br>0000                 | 0000<br>0000<br>0000                 | 0000<br>0000<br>0000                 | E00F 0000<br>0000 0000<br>0008<br>0000                                     | 0000<br>0000                                 | 0000 0000<br>0000 0000<br>A000<br>0000                                     | 0000                                         |
| 5<br>6<br>7<br>8<br>9<br><b>A</b>                | 3200<br>0000                         | 0000                                 | 0000                                 | E00F 0000<br>0000 0000<br>0008<br>0000<br>0000<br>0000                     | 0000                                         | 0000 0000<br>0000 0000<br>A000<br>0000<br>0000                             |                                              |
| 5<br>6<br>7<br>8<br>9<br><b>A</b><br>B           | 3200<br>0000                         | 0000                                 | 0000                                 | E00F 0000<br>0000 0000<br>0008<br>0000<br>0000<br>0000<br>0                | 0000                                         | 0000 0000<br>0000 0000<br>A000<br>0000<br>0000<br>0000                     |                                              |
| 5<br>6<br>7<br>8<br>9<br><b>A</b><br>B<br>C      | 3200<br>0000                         | 0000                                 | 0000                                 | E00F 0000<br>0000 0000<br>0008<br>0000<br>0000<br>0000<br>0                | 0000                                         | 0000 0000<br>0000 0000<br>0000 0000<br>0000 0000<br>0000 0000              |                                              |
| 5<br>6<br>7<br>8<br>9<br><b>A</b><br>B<br>C<br>D | 3200<br>0000                         | 0000                                 | 0000                                 | E00F 0000<br>0000 0008<br>0000 0000<br>0000<br>0000<br>0                   | 0000                                         | 0000 0000<br>0000 0000<br>A000<br>0000<br>0000<br>0000                     |                                              |
| 5<br>6<br>7<br>8<br>9<br><b>A</b><br>B<br>C      | 3200<br>0000                         | 0000                                 | 0000                                 | E00F 0000<br>0000 0000<br>0008<br>0000<br>0000<br>0000<br>0                | 0000                                         | 0000 0000<br>0000 0000<br>0000 0000<br>0000 0000<br>0000 0000              |                                              |

Figure 16-1. Sample NDA Output File (Sheet 8 of 10)

PAGE

PORTOO7 MUX

28C0

AE60 

416C

PORTOOF MUX B2A0

499F

**EE**8

B2A0

|                                                                                                                                                                                            | DUM                                                                                                                                                                       | P PAGE                                                                                                            | REGIS                                                                                                                     | TERS                                                                                                                      |                                                                                                                           |                                                                                                   |                                                                           |                                                                                                          |                                                                                                        |                                                                                                                   |                                                                                                           |                                                                                                                                    |                                                                                                                        |                                                                                                                           |                                                                                                                   |                                                                                                                                           |     | PAGE               | 38                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------|------------------------------------|
| ADDRES:<br>000000<br>000010                                                                                                                                                                | S 0<br>0000<br>0010                                                                                                                                                       | 1<br>0001<br>0011                                                                                                 | 2<br>0002<br>0012                                                                                                         | 3<br>0003<br>0013                                                                                                         | 4<br>0008<br>0014                                                                                                         | 5<br>0009<br>0015                                                                                 | 6<br>000A<br>0016                                                         | 7<br>000B<br>0017                                                                                        | 8<br>0008<br>0018                                                                                      | 9<br>0009<br>0019                                                                                                 | A<br>000A<br>001A                                                                                         | B<br>000B<br>001B                                                                                                                  | C<br>000C<br>001C                                                                                                      | D<br>000D<br>001D                                                                                                         | E<br>000E<br>001E                                                                                                 | F<br>000F<br>001F                                                                                                                         |     |                    |                                    |
|                                                                                                                                                                                            | DUM                                                                                                                                                                       | P FILE                                                                                                            | 1 REG                                                                                                                     | ISTER                                                                                                                     | PER CO                                                                                                                    | MMAND                                                                                             | LO= PA                                                                    | RAMETE                                                                                                   | R VALU                                                                                                 | E                                                                                                                 |                                                                                                           |                                                                                                                                    |                                                                                                                        |                                                                                                                           |                                                                                                                   |                                                                                                                                           |     | PAGE               | 39                                 |
| ADDRESS<br>000000<br>00010<br>000020<br>000030<br>000040<br>000050<br>000060<br>000080<br>000080<br>000080<br>000080<br>000080<br>000080<br>000080<br>000080<br>000080<br>000080<br>000080 | 0<br>0000<br>319D<br>0185<br>938A<br>0CC1<br>0000<br>0007<br>0000<br>0508<br>0700<br>0508<br>0700<br>0508<br>0700<br>0508<br>0700<br>0508<br>0700<br>0508<br>0700<br>0508 | 1<br>0000<br>0522<br>06C3<br>0000<br>007A<br>0500<br>000F<br>2000<br>000F<br>2000<br>000F<br>2000<br>0071<br>950F | 2<br>0000<br>9520<br>ACA0<br>950F<br>CD0F<br>0000<br>0045<br>0001<br>0004<br>CC00<br>001F<br>2180<br>E640<br>2C87<br>01B8 | 3<br>0D08<br>DBB0<br>0001<br>959F<br>E00F<br>0000<br>0045<br>0720<br>5030<br>0000<br>0037<br>4000<br>0000<br>AF6B<br>008A | 4<br>0013<br>0000<br>07C0<br>41FC<br>0000<br>3994<br>0045<br>0000<br>0000<br>0560<br>003F<br>C000<br>0018<br>1918<br>844D | 5<br>CCBF<br>0000<br>0007<br>0085<br>0000<br>0000<br>0000<br>0050<br>401F<br>0000<br>7806<br>0008 | 6<br>DBBF<br>01C7<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000 | 7<br>1D08<br>037E<br>0000<br>8B7A<br>0087<br>2527<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>000 | 8<br>0003<br>03C7<br>0000<br>0801<br>846F<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0000<br>0 | 9<br>B81F<br>03D7<br>8001<br>9517<br>0000<br>DB3C<br>0000<br>0000<br>0000<br>0000<br>0000<br>1918<br>008D<br>0000 | A<br>C91F<br>0026<br>0000<br>7806<br>0001<br>0000<br>0663<br>0004<br>00FE<br>0000<br>0000<br>848A<br>0000 | B<br>3D08<br>00683<br>260A<br>AA81<br>0028<br>0000<br>2100<br>0005<br>0078<br>0000<br>0005<br>0078<br>0000<br>0000<br>F0C6<br>0000 | C<br>00F8<br>0000<br>06DB<br>995F<br>0000<br>0003<br>0004<br>0000<br>EA86<br>000F<br>F<br>F000<br>0001<br>0000<br>001B | D<br>EF7F<br>0000<br>B300<br>0026<br>9971<br>0000<br>ECF3<br>0548<br>0102<br>0007<br>0200<br>00E0<br>000A<br>0D0D<br>1502 | E<br>EABF<br>ACAO<br>0003<br>06CC<br>0000<br>2C07<br>8D14<br>0000<br>0308<br>07E0<br>0012<br>0000<br>DD86<br>0614 | F<br>7D08<br>06C3<br>0184<br>9310<br>0001<br>0000<br>3899<br>ECF3<br>0006<br>3000<br>000A<br>0000<br>D280<br>0000<br>D280<br>0000<br>888A | Q @ | <<br>P<br>@<br>X < | e<br>Y<br>&&&<br>0 <x<br>C!</x<br> |

Figure 16-1. Sample NDA Output File (Sheet 9 of 10)

16-22

|                  | DUM          | P MACR       | OMEMOR       | Y PER        | COMMAN       | D BA=,       | EA=,LO       | = VALU       | ES           |              |              | 1            |              | ,            |              |              |              |          | PAGE       | 40  |      |
|------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------|------------|-----|------|
| ADDRESS          | -            | 1            | 2            | 3            | 4            | 5            | 6            | 7            | 8            | 9            | A            | В            | с            | D            | Е            | F            |              |          |            | _   |      |
| 000000           | 5400         | 5400         | 5400         | 4D09         | 0800         | 0800         | 0800         | 0800         | 0800         | 0800         | 0800         | 0800         | 0800         | 0800         | 5400         | 8B6C         | TTTI         | 1        |            | Т   | L    |
| 000010<br>000020 | 0011<br>0000 | 0007<br>0000 | 0000<br>0000 | 0000         | 0000         | 0000         | 0000         | 0000<br>0000 |              |          |            |     |      |
| 000040*          |              | 0044         | OOFE         | 0000         | 0000         | 0000         | 0000         | 8934         | 0000<br>0A76 | 0000         | 2E37         | 0000<br>002D | 0000<br>0030 | 0000<br>001D | 0000<br>0001 | 0000<br>001D | D            | e        | 4 V        | .7  | 0    |
| 000050           | 0001         | 0002         | FFFE         | 0091         | 0001         | 0002         | 000F         | 0001         | 000F         | 0000         | CF82         | 0044         | 0000         | 0001         | 5E27         | F200         | U            | e        | - •        | D   | ×,   |
| 000060           | FFFE         | 004D         | 0056         | BD60         | 0001         | BD60         | 004D         | 0000         | 005B         | 0000         | 0001         | 5C6F         | 004D         | FFFE         | 0001         | BD60         | MV           |          | M (        | -   | M    |
| 000070           | F200         | 0052         | 0068         | 0000         | 0001         | 6203         | 07BA         | 065D         | 0091         | 0001         | 0002         | 000F         | 0001         | OOOF         | 0001         | 5B11         | RH           | в        |            | Ŭ   | 1    |
| 000080           | 0001         | FFFE         | 0091         | 0001         | 0002         | 0019         | 0001         | 0019         | 0001         | 0780         | 007F         | 2020         | 0108         | 0118         | 0128         | 0001         |              | -        | •          |     | ì    |
| 000090           | 0001         | 0001         | 4101         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | A            |          |            |     | -    |
| 0000A0           | 0000         | 0000         | 00A0         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 024C         | 024C         | 024C         | 024C         | 024C         | 024C         |              |          | LL         | LLI | LL   |
| 0000B0           | 024C         | 024C         | 0240         | 0500         | 0000         | 010B         | 0000         | 0000         | 0000         | 0000         | 0000         | 04F8         | 0000         | 0000         | 0000         | 0000         | LL@          |          |            |     |      |
| 0000C0           | 7F4F         | FF4F         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 00           |          |            |     |      |
| 0000D0           | 0140         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | e.           |          |            |     |      |
| 0000E0           | 0000         | 0000         | 0000         | 2020         | 2020         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         |              |          |            |     |      |
| 0000F0           | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0040         |              |          |            |     | 6    |
| 000100           | 0000         | 1400         | 1FAC         | 0000         | 3C45         | 1400         | 1FD5         | 0000         | 0000         | 1400         | 81F9         | 0000         | 3FAA         | 1400         | 821A         | 0000         | _            | <8       |            |     | ?    |
| 000110           | 0000         | 5400         | 828C         | 0E10         | 2945         | 5400         | 6A46         | 0E14         | 0000         | 5400         | 6A46         | 0E18         | 0000         | 5400         | 828C         | OE1C         | T            | ) ET     |            |     | Т    |
| 000120           | 8BC0         | 1400         | 8254         | 0000         | 0000         | 5400         | 828C         | 0624         | 0000         | 5400         | 828C         | 0E28         | 0000         | 5400         | 828C         | OE2C         | T            | T        |            | (T  | _ ,  |
| 000130           | 0000         | 5400         | 828C         | 0E30         | 0000         | 5400         | 828C         | 0E34         | 0000         | 5400         | 828C         | 0E38         | 0000         | 5400         | 828C         | 0E3C         | T            | 0 T      | 4 T        | 8:  | T <  |
| 000140<br>000150 | 1400         | 0000         | 1400         | 8B4D         | 1400         | F02C         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         |              | M        | '<br>N \ " |     |      |
| 000150           | 0663<br>AA9F | 0753         | 0544         | 05A5         | 079B         | 019F         | OAGE         | 07BA         | 3EA9         | 2222         | 8BC5         | 2787         | 950F         | 9310         | 995F         | 99E9         | сs           |          |            |     | ~    |
| 000170           | 0200         | 0A9F         | 0AE7<br>020C | 0010         | 9177         | OEOE         | ABCO         | 0036         | 1916         | 0614         | 3128         | 803F         | 0000         | 0000         | 019E         | 9251         |              | W        | 6          | 1(? | Q    |
| 000170           | 4510         | 0A02<br>4D30 | 5D70         | 0A02<br>7DF0 | 0000<br>6DB0 | 0000<br>0000 | 0400<br>03F0 | AFBF         | 0003<br>0434 | 950F         | 4920         | AAA1         | BAEO         | 8610         | 8E30         | 9870         | -            |          | Ĩ          |     | 0 P  |
| 000190           | 0544         | 4030         | 0000         | 9310         | 01FF         | 0000 A       | 0C15         | 0412<br>0200 | 8A00         | 0456<br>0000 | 0478<br>0000 | 049A<br>0000 | 04BC         | 04DE<br>0000 | 0500         | 0522         | E MO]P<br>DF | M        | 4          | VX  |      |
| 0001A0           | 0001         | 0005         | 0000         | 001D         | 007D         | 001D         | 001D         | 0200<br>00FF | 01FF         | 0000<br>03FF | 0000<br>07FF | OFFF         | 0000<br>1FFF | 3FFF         | 0011<br>7fef | 0000<br>FFFF | DF           |          |            |     | ?    |
| 0001B0           | 8F59         | 0000         | CABO         | 80F0         | CA09         | CALA         | 0000         | 0000         | 065D         | 0000         | OBFD         | 0000         | OBF7         | OBF9         | OBFB         | OBFD         | Y            |          | 1          |     | ·    |
| 0001C0           | 0000         | OBFB         | OBFB         | OBFB         | OBFB         | OBF9         | OBF9         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 1            |          | ,          |     |      |
| 0001D0           | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         |              |          |            |     |      |
| 000310*          |              | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | OOFF         | 0000         |              |          |            |     |      |
| 000320           | 3FFF         | CC00         | 0000         | OOCF         | 0000         | FFOO         | 0000         | 0000         | 0000         | FC00         | FFOO         | OOFF         | FFFC         | FFFF         | FFFF         | FFFF         | ?            |          |            |     |      |
| 000330           | CFF3         | FFFF         | FFFF         | FFFF         | FFFF         | FFFF         | 0000         | OFOO         | FFFF         |              |          |            |     |      |
| 000340           | FFFF         | FFFF         | 0000         | 0000         | 0000         | 0000         | FFOO         | 0000         | 0000         | FFOO         | 0000         | 0000         | OOFF         | OOFF         | 0000         | 0000         |              |          |            |     |      |
| 000350           | OOFF         | FF00         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0300         | 0000         | 0000         | 0000         | 0000         | 0000         | FFOO         |              |          |            |     |      |
| 000360           | FCFC         | FFOO         | FFOO         | 0000         | 0000         | 0000         | OOFF         | 0000         | FC00         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | FC00         |              |          |            |     |      |
| 000370           | 0000         | 0000         | 0000         | 0000         | OOFC         | 0000         | 0000         | 0000         | 0000         | 0000         | FFOO         | FFFF         | 0000         | 0000         | FC00         | 0000         |              |          |            |     |      |
| 000380           | 0000         | 0000         | 0000         | 0000         | FFOO         | OOFF         | OOFF         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         |              |          |            |     |      |
| 000390           | 0000         | 0000         | FC00         | 0000         | 0000         | 0000         | FF00         | 0000         | 0000         | 0000         | 0000         | OOFF         | 0000         | 0000         | 0000         | 0000         |              |          |            |     |      |
| 0003A0           | 000F         | 0000         | 0000         | 0000         | FFOO         | 0000         | 0000         | OOFF         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         | 0000         |              |          |            |     |      |
| 0003B0           | FC00         | 0000         | FC00         | 0000         | OOFC         | 0000         | FFFF         | 0000         | 0000         | OOFF         | 0000         | 0000         | OOFF         | 0000         | 0000         | 0000         |              |          |            |     |      |
| 0003C0           | 0000         | 0000         | FFOO         | 0000         | 0000         | 0000         | FFOO         | 8000         | 4000         | 4000         | 8000         | 2000         | 1000         | 1000         | 2000         | 0800         |              |          | 66         |     |      |
| 0003D0           | 0400         | 0400         | 0800         | 0200         | 0100         | 0100         | 0200         | C000         | 3000         | 3000         | C000         | 0000         | 0300         | 0300         | 0000         | 0032         | -            |          | 00         | -   | 2    |
| 0003E0           | ABCO         | FFFC         | 003F         | FFFD         | 0607         | 0608         | 0606         | 0605         | 0609         | 095A         | 0600         | 0601         | 0602         | 060A         | 060E         | 060B         | ?            |          |            | Z   |      |
| 0003F0           | 0000         | 0000         | 4121         | 0000         | 0000         | FFFF         | 0020         | FFFF         | 8840         | FFFF         | 0200         | FFFF         | 0100         | FFFF         | 8800         | FFFF         | A!           |          | 6          |     |      |
| 000400           | 0100         | FDFF         | 0000         | FDFF         | 0000         | FEFF         | 0000         | 0400         | 0000         | 0400         | 0000         | FFFF         | 0000         | FFFF         | 0000         | FFFF         | **           |          |            | 6   | ъ    |
| 000410           | 0000         | FFFF         | 2440         | BFBF         | 4126         | 0000         | 0000         | 7FFF         | 0020         | FFFF         | 0840         | FFFF         | 4200         | 7EFF         | 8100         | FDFF         | \$@          | A&       |            | @ 1 | В    |
| 000420           | 0800         | FFFF         | C100         | FDFF         | 0000         | FDFF         | 0000         | 7 EFF        | 0000         | 0400         | 0000         | 0400         | 0000         | FFFF         | 0000         | FFFF         |              | <u>م</u> |            | 0   | в    |
| 000430<br>000440 | 0000<br>8100 | FFFF         | 0000         | FFFF         | 2E40         | BFBF         | 4126         | 0000         | 0000         | 7FFF         | 0020         | FFFF         | 0840         | FFFF         | 4200<br>0000 | FEFF<br>FFFF |              | .@       | A&         | e   | . 15 |
| 000440           | 0000         | FDFF         | 0800<br>0000 | FFFF         | C100<br>0000 | FDFF         | 0000         | FDFF         | 0000         | 7EFF         | 0000<br>0000 | 0400<br>FFFF | 0000         | 0400<br>FFFF | 8840         | FFFF         |              |          | @ AL       |     | e    |
| 000450           | 4200         | FFFF<br>FFFF | 0000         | FFFF<br>FFFF | 8800         | FFFF<br>FFFF | 0A40<br>4100 | BFBF         | 416C<br>0000 | 0000<br>FDFF | 0000         | FFFF<br>FEFF | 0020<br>0000 | 6400         | 8840         | 6400         | в            |          | la ve<br>A |     | e    |
| 000460           | 4200         | FFFF         | 0000         | FFFF         | 0000         | FFFF         | 0000         | FDFF<br>FFFF | 0000         | FDFF<br>0000 | 0000         | 0000         | 0000         | FFFF         | 0000         | FFFF         | 8            |          | л          |     |      |
| 000470           | 0000         | FFFF         | 0000         | 0400         |              |          |            |     |      |
| 000490           | 0000         | 0400         | 0000         | FFFF         | 0000         | FFFF         | 0000         | FFFF         | 0000         | FFFF         | 0000         | 0000         | 0000         | 0000         | 0000         | FFFF         |              |          |            |     |      |
|                  |              | FFFF         | 0000         | FFFF         |              |          |            |     |      |
| 0004A0           | 0000         | F F F F      |              |              |              |              |              |              |              |              |              |              |              |              |              |              |              |          |            |     |      |

Figure 16-1. Sample NDA Output File (Sheet 10 of 10)

## NDA OUTPUT FILE CONTENT

The NDA output file (see figure 16-1) begins with a copy of the input directive file, reformatted for printing. The input directive file is followed by the header information, and then the rest of the report is printed in the same order as the input directive file. A description of the header information follows.

| NPU DUMP FILE                                                   | = NPddnnn NDA, command image                                                                                                                                                    |
|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TIME<br>DATE<br>NPU NAME<br>NPU NODE<br>HALT CODE<br>P REGISTER | hh.mm.ss<br>yy/mm/dd<br>npuname<br>nodeid<br>halt<br>preg                                                                                                                       |
| Header                                                          | Description                                                                                                                                                                     |
| NPddnnn                                                         | The name of the NPU dump record starting with NP, where dd is the hexadecimal dump number (00 through FF) and nnn is the network invocation number assigned at network startup. |
| command image                                                   | The NDA command parameters that were specified for this dump.                                                                                                                   |
| hh.mm.ss                                                        | Time of the dump in the form hour.minute.second.                                                                                                                                |
| yy/mm/dd                                                        | Date of the dump in the form year/month/day.                                                                                                                                    |
| npuname                                                         | The l- to 7-character name assigned to the NPU in the network configuration file.                                                                                               |
| nodeid                                                          | The 2-digit hexadecimal number assigned to the NPU in the network configuration file.                                                                                           |
| halt                                                            | The 1- to 4-digit hexadecimal number for the NPU halt code.                                                                                                                     |
| preg                                                            | The NPU's P-register contents at the time the NPU dump is generated in hexadecimal format.                                                                                      |

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#### **NPU DUMP FILES**

Each NPU dump file is written as a single-record direct access permanent file when an NPU dump is taken. Individual NPU dump files are named NPddnnn, where dd is a unique hexadecimal dump number consecutively assigned in the range 00 through FF and nnn is the network invocation number assigned at network startup.

#### **Dump Interpretation**

When a halt occurs, halt codes are usually sent to the network operator controlling the NPU. (Halt codes are described in the CCP 3 Diagnostic Handbook.) If a halt occurs after loading but before completion of initialization, or the system becomes trapped in a loop during initialization (before the CCP header prints), dump interpretation may be necessary to determine which halt has occurred, or in which subroutine of the initiation section the program is looping.

When interpreting the NPU dump listing to determine the cause of a halt or loop, first examine the contents of memory location  $30_{16}$ . If the content of that location is nonzero, a halt has occurred; the halt code value is contained in that location.

If memory location  $30_{16}$  equals zero after a halt during initialization, find the address table that begins at fixed memory address  $150_{16}$ . The last nonzero entry in this table is the address of NPINTAB. (This is the table that is displayed at the end of a successful initialization. NPINTAB has a fixed address.) The NPISFL entry in the NPINTAB table contains the flags that mark the initialization subroutines that have completed running when the loop occurred.

## PIP DUMP ANALYZER (LISTPPM)

The peripheral interface package (PIP) Dump Analyzer (LISTPPM) is a utility program that converts all available PIP dump binary records on the PIP memory dump file into a report to be listed in byte format. The PIP PP memory dump file is created as local file ZZZZPP by NAM when the operator drops the network or NAM detects fatal network errors.

The format of the command for the PIP Dump Analyzer is:

LISTPPM, B=pipfile, L=outfile.

The parameters are order independent. Invalid or undefined parameters cause termination of the run.

ParameterDescriptionB=pipfileLocal file name of the PIP PP memory dump file. Default is<br/>B=ZZZZZPP.L=outfileLocal file name of the output file. Default is L=OUTPUT.

# **AIP TRACE WITH IAF**

The AIP trace utility produces a trace file of the messages transferred between IAF and NAM. This file, produced as a local file named ZZZZZDN at IAF's control point, contains information that can be useful in tracking network problems and in debugging application programs. However, the data in this file is in compressed format and hence the debug log file processor (DLFP) must be used to analyze the trace file. Refer to the NAM Version 1/ CCP Version 3 Reference Manual for details about the trace output and the use of DLFP.

Select whether or not to use the AIP trace mode of operation when entering the DSD command, IAFffff, to initialize IAF. This command selects a procedure file that contains the IAFEX command. The T parameter on the IAFEX command determines whether or not AIP trace mode is to be in effect and also the number of messages to be contained on the trace file. The format of the IAFEX command is:

IAFEX, T=count.

Parameter

Description

| T=count | 5000 $\leq$ count $\leq$ 9999999. Message count specifying the number of |
|---------|--------------------------------------------------------------------------|
|         | messages that are to be logged on the trace file before that file is     |
|         | released to the system for processing. If T=* is specified, the          |
|         | trace file is processed only after IAF is terminated.                    |
|         |                                                                          |

T Same as T=16200.

T=0 AIP trace mode is not selected.

T omitted Same as T=0.

Two procedure files are provided for use with the AIP trace, IAFTM and IAFTR. You can create other procedure files using different T parameters on the IAFEX command.

### IAFTM

IAFTM is a procedure file that contains the IAFEX,T=\* command, which causes the trace file ZZZZDN to be processed only after IAF is terminated. The IAFTM procedure file also includes the commands necessary to process the ZZZZDN trace file. Also, all messages logged on the trace file are written to the output file and then sent to a printer.

#### IAFTR

IAFTR is a procedure file that contains the IAFEX,T command, which causes the trace file ZZZZDN to be processed after every 16,200 messages have been transferred between IAF and NAM. A local file called TRACIAF is required by the IAFEX,T command in order to process the trace file. TRACIAF contains a command record, which is copied to the first record of the ZZZZDN trace file by IAF. Trace information is then written to file ZZZZDN, starting at the next record. This makes file ZZZZDN suitable for submission as a batch job. The format of the TRACIAF file should be:

ujn. USER,username,password,familyname. .

DLFP , ... .

NOTE

When system activity is very high, the potential exists for these problems to occur if the AIP trace is used:

- If the system load remains at a very high level for a long period of time, a system hang due to PP saturation could occur.
- If mass storage requirements become great, the ZZZZDN trace file could reach track limit. If so, IAF would stop and wait for resources to become available.

Both of the preceding problems are unlikely to occur in most situations. Also, the risk of reaching track limit can be minimized by selecting a message count on the IAFEX command that causes the trace file to be processed and released after the specified number of messages have been logged. This lowers the mass storage requirements. There are some problems that can only be solved by using the AIP trace. For these problems, do not hesitate to use the AIP trace since any risk involved is minimal.

# **NETWORK DESCRIPTION FILES**

The network description files describe the physical and logical configuration of hardware and software elements that comprise the terminal network. They are important to the proper functioning of the TAF and NAM Subsystems of NOS as well as the QTF/PTF applications if the file transfer capability with NAM is a desired feature. Depending on which subsystems a site has, from one to three such files may be used on a single mainframe. Each file has the following unique function and/or construction.

| File Name   | Description                                                                                                                                                                                                                                                                                    |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LCF and NCF | Local configuration file and network configuration file that must be<br>present if NAM is used. They are created by the network definition<br>language processor (NDLP) from source text prepared according to<br>specifications given in the Network Definition Language Reference<br>Manual. |
| NCTF1†      | Network description file that must be used if the Transaction<br>Facility (TAF) is used. The site analyst prepares this file<br>according to the following specifications.                                                                                                                     |

Under standard operating conditions, the network subsystems expect LCF and NCF to be permanent, direct access public files stored under the NETOPS user index (3777728). LCF and NCF are binary files created by NDLP; NCTFi is a text file composed of terminal definition directives. The text file is interpreted by code in common deck COMCRTN to produce tables used by TAF during system operation. TAF expects NCTFi to be a direct access public file stored under the SYSTEMX user index (3777778).

A terminal definition directive can be up to 90 columns but only columns 1 through 72 are interpreted. Any line containing an asterisk in column 1 is a comment and is ignored.

The following format shows the terminal definition directive. No embedded blanks are allowed.

/terminalname,p<sub>1</sub>,p<sub>2</sub>,...,p<sub>n</sub>.

Parameter

#### Description

The 1- to 7-character alphanumeric name that uniquely identifies the terminal; terminalname must be specified. When NCTFi is created, terminalname must agree with any automatic login user name.

terminalname

| <sup>p</sup> i | Description                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------------------|
| TT=*ID         | Terminal type identified by terminal operator entry.                                                         |
|                | A TAF terminal is defined with the previous parameter,<br>as well as the following, which are unique to TAF. |
| DB=db          | The 2-character data base name to be used by the terminal.                                                   |
| IS=stat        | Initial on/off status of the terminal; stat can be either ON or OFF. Default is ON.                          |

<sup>&</sup>lt;sup>†</sup>i is the network file identifier as specified in the TAF configuration file (refer to the TAF Reference Manual).

#### Parameter

#### Description

| <sup>p</sup> i | Description                                                                  |
|----------------|------------------------------------------------------------------------------|
| RS=n           | Data base read security (from 0 to 7). Default is $0$ .                      |
| UA=n           | 24 bits defining the user argument area (from 0 to 777777778). Default is 0. |
| US=n           | Data base update security (from 0 to 7). Default is 0.                       |

To use the permanent file and queued file transfer capability with NAM, you must specify certain NDL statements when creating the local configuration file, as follows:

- Specify application statements with the PRU and NETXFR parameters for applications QTF, QTFS, PTF, and PTFS (QTFS and PTFS require the RS parameter).
- Specify the MXCOPY parameters for these applications depending on expected usage. Suggested values are MXCOPY=4 for QTF, and MXCOPY=14 for QTFS, PTF, and PTFS.
- Specify the INCALL and OUTCALL statements as needed.

Refer to the Network Definition Language Reference Manual for NDL statement formats.

# STIMULATOR

A stimulator is a collection of central memory and peripheral processor programs that enters a hypothetical work load (called a session or script file) into the system to analyze the effects of such a load on response time and system reliability.

The STIMULA stimulator consists of a central memory program (STIMULA) and a peripheral processor program (ITS).

To use the stimulator:

- 1. Create the hypothetical load (refer to Session File Construction later in this section).
- Process these jobs using stimulator commands at the system console (refer to Session File Processing later in this section).

Multiple stimulator sessions are described under Multiple Sessions later in this section. Errors that can occur while the stimulator software is in use are described in the NOS 2 Operations Handbook.

#### STIMULA

STIMULA is an internal stimulator that enters a hypothetical work load into the system through IAF. The stimulator software communicates directly with IAF using a channel. Therefore, 2550s are not used. Only interactive terminals can be analyzed with STIMULA; it does not check out other communication devices or paths. The format of the command is:

STIMULA, I=filename.

 Parameter
 Description

 filename
 Local file to be used as the session file. If not specified, the initial K display (refer to figure 16-5) requests the session file name.

#### SESSION FILE CONSTRUCTION

A session (or script) file is an indirect access permanent file containing the hypothetical job load that is to be analyzed by the stimulator. A session file consists of a group of records; each record is a session and contains a hypothetical job that is composed of the following required entries made in the order shown:

- 1. Begin each internal stimulation session with the entry ANSWERBAC. (Other first lines may be used; however, ANSWERBAC is used in most cases.)
- 2. Enter each session entry on a separate line or card.
- 3. After ANSWERBAC, enter a familyname entry, a username entry, and a password entry.
- 4. Specify the terminal commands and data.
- 5. End each session with the command BYE so that the login of the next session is performed correctly. The HELLO command must not be used unless it is followed by a blank line.

Figures 16-2, 16-3, and 16-4 are examples of session files and figure 16-5 shows the initial K display.

| ANSWERBAC      |                |  |
|----------------|----------------|--|
| BMS001         |                |  |
| NULL           |                |  |
| <u>++++</u>    |                |  |
| CATLIST        | Session record |  |
| I              | 1              |  |
|                |                |  |
| DAYFILE<br>Bye |                |  |
| *E0-R*         |                |  |
| ANSWERBAC      | )<br>\         |  |
| BMS001         |                |  |
| NULL           |                |  |
| <u>†††</u> †   |                |  |
| CATLIST        | Session record |  |
| t              | 1              |  |
| †              |                |  |
| DAYFILE        |                |  |
| BYE            |                |  |
| *E-0-R*        |                |  |
| ANSWERBAC      |                |  |
| BMS001<br>NULL |                |  |
| t t t          |                |  |
| CATLIST        | Session record |  |
| †              |                |  |
| ł              |                |  |
| DAYFILE        |                |  |
| BYE            |                |  |
| *E-0-R*        | )              |  |
| STASKO 50      |                |  |
| OLD,FILEO      |                |  |
| LIST           | Task record    |  |
| LIST           |                |  |
| ↓<br>★E−O−R★   |                |  |
| \$TASK1 30     | <pre>{</pre>   |  |
| OLD,FILE1      |                |  |
| LIST           | Task record    |  |
| LIST           | }              |  |
| Ļ              | 1              |  |
| *E-0-R*        | )              |  |
| \$TASK2 20     |                |  |
| OLD,FILE2      |                |  |
| LIST           | Task record    |  |
| LIST           |                |  |
| +<br>+         |                |  |
| *E-0-F*        | )              |  |

Figure 16-2. Sample Session File With Tasks for Use by STIMULA

ANSWERBAC PERFDEV MATH MATH CHARGE(7159,73KD FA) > 1 FORTRAN NEW,MATH 10 PROGRAM MATH 20 1 CONTINUE 30 READ 10,A 40 IF(A.EQ.O) STOP 50 B=A\*A 60 C=SQRT(B) 70 IF(A.LT.0) D= -C\*\*3 80 IF(A.GT.0) D=C\*\*3 90 PRINT 20,A Source line input 100 PRINT 30,8 110 PRINT 40,0 120 GO TO 1 130 20 FORMAT (' A EQUALS ',F15.3) 140 30 FORMAT(' A SQUARED = ',F15.3) 150 40 FORMAT(' A CUBED = ',F15.3) 160 10 FORMAT(F15.3) 170 END > > RUN 2.0 Program input 0.0 25 PRINT 50 155 50 FORMAT(' ENTER VALUE ') LIST RUN 1.0 2.0 4.0 0.0 160 10 FORMAT(F12.1) LIST RUN 10.0 11.1 13.3 0.0 160 10 FORMAT(F12.3) LIST RUN 15.555 40.0 50.0 0.0 LIST RUN 10.0 20.0 30.0 40.0 0.0 ENQUI RE, T DAYFILE BYE

Figure 16-3. Sample Session for Use by STIMULA

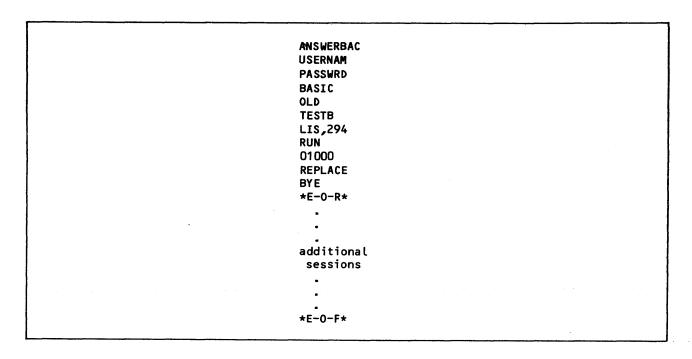


Figure 16-4. Sample Session File for Internal Stimulation

| ENTER STIMULA | TION FILE PARAMETERS IN FORM -    |
|---------------|-----------------------------------|
| P = VALUE     |                                   |
| . F =         | SESSION FILE NAME.                |
| UI = OB       | USER INDEX (OCTAL BASE ASSUMED.)  |
| N = 1         | NUMBER OF FILE ON SESSION FILE.   |
| GO            | BEGIN PROCESSING OF SESSION FILE. |

Figure 16-5. STIMULA K Display (Left Screen)

#### Dynamic Login

If each of the terminals to be analyzed is logged into the system with a unique user name and password, a unique session record for each terminal is stored in central memory at the stimulator control point. Thus, a large amount of central memory could be unavailable to other components of the system. To alleviate this condition, dynamic login is possible, whereby one session record is generated with a unique user name and password that are dynamically translated into unique user names and passwords for each terminal at run time. The generated user names and passwords are then validated via system validation files. The format choices are:

username\$\$\$

or

username\$\$\$,password\$\$\$

Parameter

username

password Password; 1 to 4 alphabetic characters.

\$

Special symbol 12/8/6 (6-bit display code 768), 1 (6-bit display code 348) punch; that is, 12/8/6 punch in one column and 1 punch in next column.

Description

#### NOTE

User name; 1 to 4 alphabetic characters.

The \$ denotes the special symbol previously described, not the character itself. The \$ character is translated into the stimulator terminal numbers at run time.

Example:

P\$\$\$,P\$\$\$ is translated into P000,P000 for the first terminal, into P001,P001 for the second terminal, and so forth.

# **Optional Think Time Specification**

Think time is the number of seconds that each line is delayed before it is sent through the interactive system. A random think time can be specified with a session file command. The format of the command is:

≥ xxx

Parameter

Description

xxx Think time (octal):  $xxx \leq 177_8$ .

To return the terminal to the initial think time (refer to figure 16-6), enter this command:

| ENTER STIMUL   | ATION PARAMETERS IN FORM -                                                               |
|----------------|------------------------------------------------------------------------------------------|
| P = VALUE      | (NUMERIC VALUES ARE ASSUMED DECIMAL BASE.)<br>(SEE RIGHT SCREEN FOR SPECIAL PARAMETERS.) |
| NT = 310B      | NUMBER OF TERMINALS TO STIMULATE.                                                        |
|                | (1 – 100B)                                                                               |
| LS = 15        | LINE SPEED IN CHARACTERS/SECOND. (1 - 1000)                                              |
| IS = 15        | INPUT SPEED IN CHARACTERS/SECOND. (1 - 1000)                                             |
| TT = 10        | THINK TIME DELAY IN SECONDS. (0 - 127)                                                   |
| TI = 8         | UPPER BOUND OF RANDOM THINK TIME INCREMENT.                                              |
|                | 0 - 64 (MUST BE A POWER OF 2.)                                                           |
|                | THINK TIME WILL VARY BETWEEN TT AND TT+TI.                                               |
| AC = 4         | ACTIVATION COUNT. $(1 - 64)$                                                             |
|                | NUMBER OF TERMINALS TO ACTIVATE EVERY                                                    |
|                | AD SECONDS.                                                                              |
| AD = 10        | ACTIVATION DELAY IN SECONDS. (0 - 127)                                                   |
| RC = 0         | NUMBER OF TIMES TO REPEAT STIMULATION.(0-31)                                             |
| LD = 0         | LOGOUT DELAY.(0 - 4095)                                                                  |
| RO = ON        | OUTPUT RECOVERY. (ON OR OFF)                                                             |
| LF = NO        | LOOP ON SESSION FILE (YES OR NO)                                                         |
| $\overline{\}$ |                                                                                          |

Figure 16-6. STIMULA Session File Parameters

#### **Task Definitions**

A task is a predefined set of interactive commands designated by a task name and a task usage parameter. Tasks can be called throughout a session, and the task usage parameter is used to determine which task is the next most eligible task (that is, the task to be called next).

An  $\dagger$  character (6-bit display code 70<sub>8</sub>) in the session calls the next most eligible task in the session file, which is determined by the following equation.

f<sub>1</sub>= Total initiations of task<sub>1</sub> (Total initiations of all tasks)(Task usage parameter for task<sub>1</sub>)

For each task<sub>i</sub> defined in the session file, the stimulator calculates  $f_i$ , and the task with the smallest f value is the next most eligible task. Multiple  $\dagger$  characters are permitted on one line and are treated as if they occurred on separate lines. For example,  $\dagger \dagger \dagger$  calls the first three most eligible tasks, where eligibility is recalculated after each initiation of a task. If a task is called and the stimulator cannot determine the next most eligible task in the time allotted, the first task defined in the session file is used.

Tasks for the stimulator are defined in the session file as task records following the session records. Tasks are not permitted in the file before session records. The tasks should be defined in descending order according to the task usage parameter. This facilitates use of the first task defined as the default next most eligible task in situations where the stimulator fails to calculate the next most eligible task on time.

The first line in a task record must be:

\$task nnn

Parameter

Description

Denotes the beginning of a new task (character position 1).

\$

task The 1- to 6-character task name.

nnn Task usage percentage;  $0 \le nnn \le 100$  (character positions 8, 9, 10). The task usage percentages of all tasks in the session file must total 100.

The last line in a task record must be a  $\downarrow$  character (6-bit display code 71<sub>8</sub>), which returns control to the calling session. An example of a session file with tasks defined is shown in figure 16-2.

#### SESSION FILE PROCESSING

The stimulator software is used to process the interactive session file following this procedure:

- 1. Ensure that an IAF stimulator entry is present in the EST and that the stimulator has an ON status (refer to the section 3, Deadstart Decks). The stimulator entry must be on a channel that is not used by any other equipment that is currently ON in the EST.
- 2. Use DSD to activate the stimulator.

Enter STMffff, where ffff is 0 to 4 alphanumeric characters. This entry calls a procedure file STMffff, which must be a permanent indirect access file stored under the system user index  $(377777_8)$ . The procedure file STM is called when you enter STM. The stimulator is invoked by a STIMULA command within the STM procedure file. The stimulator requests the K display.

- 3. Enter K,STM. Figure 16-5 appears on the left screen.
- 4. Enter the session file parameters individually as listed in the following format column or as a group on the same line in the format.

K.F=filename,UI=userindex,N=n,GO.

| Format         | Default | Description                                                                                                                          |
|----------------|---------|--------------------------------------------------------------------------------------------------------------------------------------|
| K.F=filename   | None    | filename is the indirect permanent file name of the session file.                                                                    |
| K.UI=userindex | 0       | userindex is the user index of file filename.<br>The default family is assumed.                                                      |
| K.N=n          | 0       | n is the number of files to be skipped on file<br>filename before data is read from the session<br>file; range is from 0 to 3777778. |
| K.GO           | None    | Indicates to the stimulator that all the parameters have been entered or that none are to be entered.                                |

Figure 16-6 appears on the left screen.

- 5. To display the special parameters, enter:
  - KK.

Figure 16-7 appears on the right screen.

TO ENTER MIXED MODE OF PARAMETER ASSIGNMENT -

K.MIXED.

#### Figure 16-7. STIMULA Special Parameters

6. Enter the stimulator parameters individually as listed in the following format column or as a group on the same line in the format.

K.NT=n,LS=s,IS=s,TT=n,TI=i,AC=m,AD=d,RC=n,LD=d,RO=o,GO.

Enter any special parameters (refer to figure 16-9) before the GO. entry.

| Format | Default              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| K.NT=n | Current EST<br>value | n is the current maximum number of terminals on which<br>the Interactive Subsystem is initialized. It must be<br>less than or equal to the number specified in the EST<br>entry; the range is from 3 to 10008.                                                                                                                                                                                                                                                                                    |
| K.LS=s | 15                   | s is the line speed in characters per second at which<br>you want to run the terminals; the range is from 1 to<br>1000. Any value above 60 characters per second causes<br>a line speed of approximately 60 characters per<br>second. If many terminals (600g, for example) are<br>run, the maximum realizable line speed is determined by<br>the overhead of 1TD and 1TS. The worst case can be<br>determined by checking the 1TD cycle time dayfile<br>message, which is issued IAF is dropped. |
| K.IS=s | 15                   | s is the typing speed in characters per second at which<br>you want to run the terminals; the range is from 1 to<br>1000.                                                                                                                                                                                                                                                                                                                                                                         |
| K.TT=n | 10 seconds           | n is the number of seconds (think time) that each line<br>is to be delayed before it is sent to the IAF; the<br>range is from 0 to 127 seconds.                                                                                                                                                                                                                                                                                                                                                   |
| K.TI=i | 8                    | i is the number of seconds by which the think time will<br>vary; the range is from 0 to 64 and i must be a power<br>of 2. If i is nonzero, the think time varies between n<br>(the value of TT) and n+i.                                                                                                                                                                                                                                                                                          |
| K.AC=m | 4                    | m is the number of terminals that are to be logged in<br>every d seconds (the value of AD); the range is from 1<br>to n (the value of NT). The AC and AD parameters<br>provide a method to stagger the I/O commands and data<br>to the IAF.                                                                                                                                                                                                                                                       |
| K.AD=d | 10 seconds           | d is the number of seconds of delay time until the<br>login of another terminal is allowed; the range is from<br>O to 127 seconds.                                                                                                                                                                                                                                                                                                                                                                |
| K.RC=n | 0                    | n is the number of sessions that will be executed for each terminal; the range is from 0 to $31$ .                                                                                                                                                                                                                                                                                                                                                                                                |
| K.LD=d | 0 seconds            | d is the number of seconds of delay time after a logout<br>is completed until the next login of the terminal is<br>allowed; the range is from 0 to 127 seconds.                                                                                                                                                                                                                                                                                                                                   |

| K.R0=0                                                     | ON                                     | When RO=ON, the output from the IAF is recovered on file STIMOUT. The format of this file is:                                                                                                                                                                                     |  |  |  |  |  |
|------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
|                                                            | 59                                     |                                                                                                                                                                                                                                                                                   |  |  |  |  |  |
|                                                            |                                        | Terminal Each byte is an ASCII character if less<br>number. than 4000g; otherwise, it is the<br>running-second time.                                                                                                                                                              |  |  |  |  |  |
|                                                            |                                        | When RO=OFF, the output is not recovered.                                                                                                                                                                                                                                         |  |  |  |  |  |
| K.LF=o                                                     | NO                                     | When LF=NO, looping occurs on the session assigned to<br>the terminal. When LF=YES, the subsequent session is<br>the next session in the session file.                                                                                                                            |  |  |  |  |  |
| K.MIXED                                                    | No mixed mode<br>parameters<br>entered | Specifies that special parameter assignments are re-<br>quired for specific input sessions. This command<br>displays the stimulation parameter matrix (refer to<br>figure 16-8) whose values can be changed as described<br>in the right screen K display (refer to figure 16-9). |  |  |  |  |  |
| K.GO                                                       | None                                   | Indicates to the stimulator that the parameters are entered. Stimulation is initiated.                                                                                                                                                                                            |  |  |  |  |  |
| K.MX=<br><sup>s</sup> 1-s2,<br>ttys,ls,<br>is,tt,ld,<br>rc | Current<br>value                       | Mixed mode input. $s_1$ is the number of the first<br>session to be changed, and $s_2$ is the number of the<br>last session to be changed. $s_2$ is optional; the<br>default is $s_1$ . (Refer to figure 16-9 for other<br>parameter descriptions.)                               |  |  |  |  |  |
| K.CF=<br>filename                                          | None                                   | Matrix change file. Indirect access file filename is<br>accessed for mixed mode input directives, and must be<br>saved under the same user index as the session file.                                                                                                             |  |  |  |  |  |
| K.+                                                        | None                                   | Page matrix display forward one page.                                                                                                                                                                                                                                             |  |  |  |  |  |
| K                                                          | None                                   | Page matrix display backward one page.                                                                                                                                                                                                                                            |  |  |  |  |  |
| K.GO                                                       | None .                                 | Indicates to the stimulator that the parameters are entered. Stimulation is initiated.                                                                                                                                                                                            |  |  |  |  |  |

# Description

|             | STIMULATION   | PARAMETER   | MATRIX |    |    |    |
|-------------|---------------|-------------|--------|----|----|----|
| SCRPT       | TTYS          | LS          | IS     | TT | LD | RC |
| 1           | 40            | 15          | 15     | 10 | 0  | 0  |
| 2           | 40            | 15          | 15     | 10 | 0  | 0  |
| 3           |               |             | 15     | 10 | 0  | C  |
| 4           | 40            | 15          | 15     | 10 | 0  | (  |
| 5           | 40            | 15          | 15     | 10 | 0  |    |
|             |               |             |        |    |    |    |
| NUMBER      | OF TTYS ASSI  | GNED = 200  |        |    |    |    |
| MAXIM       | UM TTYS PERMI | TTED = 200  |        |    |    |    |
| <b>65</b> - | M             | ATRIX CHANG |        |    |    |    |

Figure 16-8. Parameter Matrix (Left Screen)

#### DEFINITION OF PARAMETERS

SCRIPT - SCRIPT(S) WHICH THE PARAMS WILL AFFECT (SCRIPT(N) OR SCRIPT(N)-SCRIPT(N+X)) TTYS - NUMBER OF TTYS ASSIGNED TO SCRIPT(S) LS - LINE SPEED ASSIGNED TO SCRIPT(S) IS - INPUT SPEED ASSIGNED TO SCRIPT(S) TT - THINK TIME ASSIGNED TO SCRIPT(S) LD - LOGOUT DELAY ASSIGNED TO SCRIPT(S) RC - REPEAT COUNT ASSIGNED TO SCRIPT(S)

**\*NOTE - NULL PARAMETER WILL KEEP CURRENT VALUE** 

TO MAKE ENTRIES, FOLLOW THE FORMAT -K.MX=SCRIPT,TTYS,LS,IS,TT,LD,RC.

TO CHANGE MATRIX VIA PREDEFINED PARAMETERS-K.CF=XXX WHERE XXX IS PF CONTAINING CHANGE DIRECTIVES IN FOLLOWING FORMAT-MX=SCRIPT,TTYS,LS,IS,TT,LD,RC.

TO ADVANCE DISPLAY ENTER K.+

TO BACKUP DISPLAY ENTER K .-

Figure 16-9. Mixed Mode Parameters (Right Screen)

#### Example:

MX=2-4,3,30,30,,,1.

Three terminals will be assigned to sessions 2, 3, and 4. The line speed and input speed for these terminals will be 30 characters per second. The think time and logout delay will not be changed from the current value. The terminals will have a repeat count of 1.

#### **MULTIPLE SESSIONS**

Each session on the session file is allocated to each terminal line. When each session has been allocated, the stimulator goes to the first session and reallocates the sessions to the next group of terminals. This procedure is repeated until all the terminals are allocated to a session. If a repeat count is not designated (RC parameter), the line is shut off when the session is finished. When the session completes, the repeat count is checked.

The repeat count corresponds to the number of sessions to be executed on a given terminal. The current session is completed, and the LF parameter determines the next session to be executed. If LF=OFF, the session currently assigned to the terminal is repeated. If LF=ON, the next session in the session file is executed. For example, if the repeat count is 4, the session currently assigned to the terminal is repeated four times (LF=OFF), or the next four sessions on the session file (with repetition, if necessary) are executed (LF=ON).

#### PARAMETER OUTPUT FORMAT

The parameter information (shown in figure 16-10) is placed on the output file for printing upon completion of the stimulator run (refer to Session File Processing earlier in this section).

#### POSTPROCESSING

The postprocessing of the interactive stimulator output is accomplished by reading the file STIMOUT and sorting the data according to terminal number. Use the DEMUX command to do this. As DEMUX sorts STIMOUT, it assigns an encounter number (starting at 1) to the output from each terminal session. DEMUX includes this number in the final line of each sorted terminal session output. The data for each terminal is separated by a page eject and an end-of-line indicator. The terminal data appears as it would on a terminal page. If the ASCII character on the STIMOUT file is 4000g or greater, the lower 10 bits are assumed to be time of a carriage return or the first character of output. If STIMOUT will be processed at a later time, you should save it.

| ST         | IMULATOR PARAMETERS-   |                 |
|------------|------------------------|-----------------|
|            | SSION FILE NAME-       | F= SSCC1        |
|            | SER INDEX-             | UI= 1           |
|            | JMBER OF THE FILE-     | N= 1            |
|            | JMBER OF TERMINALS-    | NT= 100B        |
|            | INE SPEED-             | LS = 30         |
|            | NPUT SPEED-            | IS = 10         |
|            | INK TIME-              | TT = 3          |
|            | ANDOM THINK TIME-      | TI = 0          |
|            | TIVATION COUNT-        |                 |
|            | TIVATION COUNT-        | AC= 1<br>AD= 1  |
|            |                        |                 |
|            | EPEAT COUNT-           | RC= 4           |
|            | GOUT DELAY-            | LD = 0          |
|            | JTPUT RECOVERY-        | RO= ON          |
|            | OOP ON SESSION FILE-   | LF= NO          |
| - F1#      | ATRIX CHANGE FILE-     | CF=             |
|            | STIMULATION PARAMETE   | DNATDTY         |
|            | STINULATION PARAMETE   |                 |
|            | SCRPT TTYS LS IS T     | T LD RC         |
|            | 1 22 30 10 3           |                 |
|            |                        | 0 4             |
|            | 3 21 30 10 3           |                 |
|            | 5 21 50 10 5           | 5 4             |
|            |                        |                 |
|            | NUMBER OF TTYS ASSIG   | NED = 64        |
|            | MAXIMUM TTYS PERMITT   |                 |
|            |                        |                 |
|            |                        |                 |
| T          | ASK CALLS COMPLETE DES | IRED % ACTUAL % |
|            |                        |                 |
|            |                        | .000 49.970     |
|            |                        | .000 29.994     |
| T <i>I</i> | ASK2 340 327 20        | .000 20.035     |
| тс         | TALS 1697 1637 100     | .000 99.999     |
|            |                        |                 |
| DE         | FAULT TASK CALLS = 15  |                 |
|            |                        |                 |

Figure 16-10. Output Statistics

An example of output from DEMUX: ANSW ERBAC \*\*\*\*TTT.TTT (Optional output) \*\*\*\*TTT.TTT (Optional output) WELCOME TO THE NOS SOFTWARE SYSTEM. COPYRIGHT CONTROL DATA 1978, 1983. yy/mm/dd.hh.mm.ss. END OF THE LINE -- n (Page Eject) ANSW ERBAC The n in the previous listing is the decimal encounter number. The format of the DEMUX command is: DEMUX, p1, p2, ..., Pn. P; is either a keyword or a keyword equated to a value. Description P<sub>i</sub> I=filename Name of the file containing stimulator data. I omitted Same as I=STIMOUT. NR Specifies that the input and output files are not to be rewound. NT=n Number of terminals to be processed (0 < n < 512). This tells DEMUX how much memory to allocate to process the input file. If no post radix is specified, octal base is assumed. O=filename Name of the file to receive translated session output. 0 omitted Same as O=OUTPUT. SL=terminalnumber Selective terminal number (within the range specified by the NT=n parameter) to be processed. terminal number is the terminal number minus 1 in the T display. If SL is omitted, all terminals within the range specified by the NT=n parameter are processed. т Specifies that the time of each carriage return and first output character is written with the processed data. Subtracting the two time values gives the response time. The time values can also be used to correlate data between each terminal's input and output.

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# INTRODUCTION

Five utility processors maintain the NOS permanent file system. They control the processes of dumping and loading permanent files, cataloging permanent files in the system and on backup storage (archive) files, and copying archived files to a job as local files.

The utility processors are overlays under the control of the permanent file supervisor (PFS). PFS processes the parameters in the utility command and loads the correct processing overlay. The overlays interact with the permanent file utility (PFU) routine, which manages the catalogs, permits, data allocation on a device, and the data transfer between the device and the overlay. Figure 17-1 is an overview of this procedure.

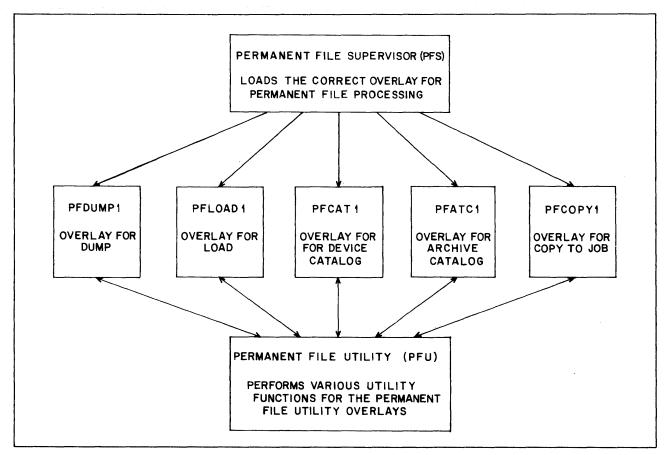


Figure 17-1. Functional Overview of the Permanent File Utility Overlays

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The names and functions of the permanent file utilities follow. Detailed information about the call and operation of each utility is contained in this section.

| Utility | Description                                                                                                                    |
|---------|--------------------------------------------------------------------------------------------------------------------------------|
| PFATC   | Produces a cataloged directory of file information derived from an archive file.                                               |
| PFCAT   | Produces a cataloged directory of file information derived from catalog tracks on a permanent file device.                     |
| PFCOPY  | Copies files from an archive file to a job as local files.                                                                     |
| PFDUMP  | Dumps files from a permanent file device to an archive file. Files created by this dump can be reloaded by the PFLOAD utility. |
| PFLOAD  | Loads files from an archive file (created by PFDUMP) to a permanent file device.                                               |

#### UTILITY DESCRIPTION TERMINOLOGY

The descriptions of the permanent file utilities in this section include some terms you should be familiar with. These terms are defined next.

#### **Archive File**

All or some of the permanent files accumulated on mass storage can be dumped to a backup tape (or other type of backup medium) to protect the files from loss in case of a device malfunction or to free a device for temporary use during preventive maintenance. Each dump of permanent files is made to a file called an archive file; each permanent file dumped is called an archived file. Each archive file is a multirecord file in which each logical record is an archived file. If two or more dumps are made on one type of backup device, these archive files constitute a multifile archive file (refer to figure 17-2).

The archive file can be loaded back onto the permanent file system as a whole or in part and can also be used to generate reports. The individual archived files can be referenced for selective use. Refer to each utility for more information on how it uses the archive file.

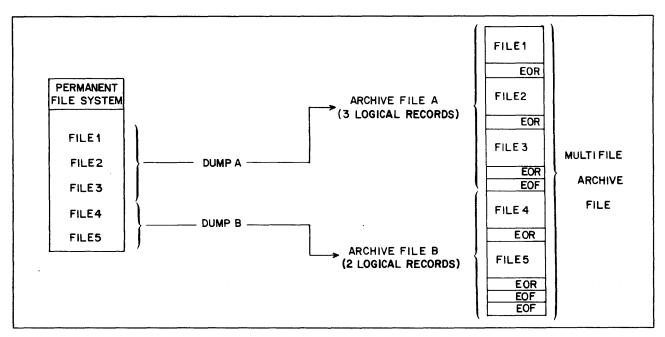


Figure 17-2. Example of Multifile Archive File Structure

#### **User Index**

A 17-bit user index is associated with each user name created on the user validation file. This index is entered through MODVAL (refer to User Validation in the Administration Handbook) with the UI parameter on the user name input directive (/username,UI=userindex) or MODVAL, by default, supplies the next available index.

Whenever you submit a job, the related user index is placed in the control point area along with the user name and other parameters that link hardware, files, and job. The permanent file manager (PFM) identifies the master device and catalog track for you by performing two masking operations that involve the user index and two sets of device parameters (device mask and number of catalog tracks) obtained from the mass storage table in central memory resident (CMR). One operation correlates the rightmost octal digit in the user index (bits 0 through 2) with the bit settings of the device mask for each device in the configuration to determine which device is your master device (refer to the device mask definition next). The other operation performs a logical AND between the remaining portion of the index and the number of catalog tracks on the master device to determine which track contains your catalog (refer to the catalog track definition later in this section).

The lower 3 bits (rightmost octal digit) of the user index are used to group users together into subfamilies. Each permanent file family (refer to the definition of family later in this section) consists of eight subfamilies, subfamily 0 through subfamily 7. Any user whose index ends in 0 belongs to subfamily 0, any user whose index ends in 1 belongs to subfamily 1, and so forth. The concept of subfamily is important in a Mass Storage Subsystem (MSS) environment or a Mass Storage Archival Subsystem (MSAS) environment.

#### **Device Masks**

Two types of device masks exist for each device, the device mask (or primary mask) and the secondary mask.

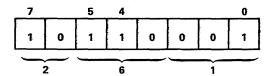
#### Device Mask

The device mask is an 8-bit quantity used to identify the group of users that has the particular device as its master device; that is, it identifies the device that contains the group's file catalogs, all its indirect access files, and possibly some or all of the group's direct access files. (Assigning direct access files to a device is described next, under Secondary Mask.)

If bit i is set in the mask of the device, any user whose index ends in i has this device as a master device.

#### Example:

The device identified by the mask 261g is the master device for any user whose index ends in 0, 4, 5, or 7, because these bits are set in the mask.



When masks are assigned at device initialization time, the following rules must be observed.

- Within a family, the sum of all the device masks must be exactly 3778.
- Each bit position (0 through 7) must be set exactly once for the masks of the devices in one family.

#### Example:

For a family of three devices,  $221_8$ ,  $042_8$ , and  $114_8$  are valid device masks because their sum is  $377_8$  and each bit is accounted for only once.

| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | = | 2218<br>0428 |  |
|---|---|---|---|---|---|---|---|---|--------------|--|
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | = | 1148         |  |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | = | 3778         |  |

If the sum of the device masks is less than 3778, then at least 1 bit is not set in any of the device masks. Any user index ending in such a bit-position value does not reference a device. Therefore, if such a user tries to create a permanent file, the system issues an error message.

#### Example:

For a family of four devices,  $142_8$ ,  $020_8$ ,  $010_8$ , and  $204_8$  are not valid device masks because their sum is less than  $377_8$ . Any user whose index ends in 0 would have no master device and could not create a permanent file.

| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | = | 3768 |
|---|---|---|---|---|---|---|---|---|------|
|   |   |   |   |   |   |   |   |   | 2048 |
|   |   |   |   |   |   |   |   |   | 0108 |
|   |   |   |   |   |   |   |   |   | 0208 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | = | 1428 |

If the sum of the device masks is greater than  $377_8$ , then at least 1 bit is set for more than one device mask. Any user index ending in such a bit-position value references more than one master device.

#### Example:

For a family of four devices,  $212_8$ ,  $106_8$ ,  $040_8$ , and  $021_8$  are not valid device masks because their sum is greater than  $377_8$ . Bit 1 is set twice, which indicates that any user whose index ends in 1 would have two master devices, one with mask  $212_8$  and one with mask  $106_8$ .

| 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | = | 2128 |
|---|---|---|---|---|---|---|---|---|------|
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | = | 1068 |
| 0 | 0 |   |   |   |   |   |   |   | 0408 |
|   |   |   |   |   |   |   |   |   | 0218 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   | 4018 |

It is a necessary but not sufficient condition that all masks for one family total  $377_8$ . It is possible, but not allowable, that in one family the device masks total  $377_8$  but some bit is set in more than one device mask.

#### Example:

For a family of three devices, 2618, 1158, and 0018 are not valid device masks because bit 0 is accounted for three times and bit 1 is not set at all. Any user whose index ends in 0 would have three master devices. Any user whose index ends in 1 would have no master device.

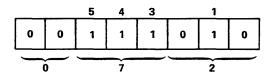
| 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | = | 2618 |
|---|---|---|---|---|---|---|---|---|------|
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | = | 1158 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | = | 0018 |
|   |   |   |   |   |   |   |   |   |      |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |   | 3778 |

#### Secondary Mask

The secondary mask of a device is an 8-bit quantity used to identify groups of users who can place direct access files on the particular device. If bit i is set in the secondary mask of the device, any user whose index ends in i can place direct access files on this device.

#### Example:

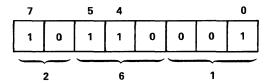
A device whose secondary mask is  $072_8$  can contain direct access files of any user whose index ends in 1, 3, 4, or 5, because these bits are set in the mask.



Direct access files may or may not reside on a master device, depending on the user index and secondary mask. The appropriate bit must be set in the secondary mask of the device on which the user's direct access files are to reside. A direct access file is placed on a valid device with the most space available unless the user specifies a particular device.

#### Example:

The following situations occur for a device whose mask is  $261_8$  and secondary mask is  $072_8$ .



- This device is the master device for, and can contain direct access files of, any user whose index ends in 4 or 5 (bits 4 and 5 are set in both the device mask and the secondary mask).
- This device is the master device for, but cannot contain direct access files of, any user whose index ends in 0 or 7 (bits 0 and 7 are set in the device mask but not in the secondary mask).
- This device is not the master device for, but can contain direct access files of, any user whose index ends in 1 or 3 (bits 1 and 3 are set in the secondary mask but not in the device mask).
- This device is not the master device for, and cannot contain direct access files of, any user whose index ends in 2 or 6 (bits 2 and 6 are not set in either the device mask or the secondary mask).

Existing files can be defined as direct access permanent files, regardless of the secondary mask, for user indexes above  $377700_8$  (AUIMX). However, PFLOAD will enforce the secondary mask check when loading these files. Direct access files for the Mass Storage Facility (MSF/7990) subfamily user indexes (377760 through  $377767_8$ ) are always loaded to their master devices regardless of previous residence or secondary mask values.

There are no restrictions on the number of devices in one family that can have the same bits set in the secondary mask or regarding the sum of the secondary masks for devices in the same family. The secondary mask must be a number between 0 and  $377_8$ .

#### Example:

For a family of three devices, 000,  $131_8$ , and  $326_8$  are possible secondary masks. Any user whose index ends in 0, 3, 4, or 6 can place direct access files on the device whose secondary mask is  $131_8$ . Any user whose index ends in 1, 2, 4, 6, or 7 can place direct access files on the device whose secondary mask is  $326_8$ . No user can place direct access files on the device whose secondary mask is 000. Any user whose index ends in 4 or 6 can place direct access files on two devices, and any user whose index ends in 5 cannot use direct access files.

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | = | 0008 |
|---|---|---|---|---|---|---|---|---|------|
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | = | 1318 |
|   |   |   |   |   |   |   |   |   | 3268 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |   |      |
| - | 1 | - | 1 |   |   |   | - |   |      |

### **Mass Storage Table**

The configuration of mass storage devices currently available to the system is defined by the CMR mass storage table (MST). Each logical device in this configuration has an entry in this table. Refer to the NOS 2 Systems Programmer's Instant for the MST format.

### **Catalog Track**

Your catalog track is a track on your master device containing the catalog entries (definition follows) that define and specify the location of each permanent file you have created. Users are assigned by groups to catalog tracks according to their user index and number of catalog tracks on their master device.

The number of catalog tracks on a device is established when the device is initialized or by default. Default values are:

| Type of Device                   | Default Number of<br>Catalog Tracks |
|----------------------------------|-------------------------------------|
| Extended memory (DE)             | 4                                   |
| 834 (DD)                         | 40 <sub>8</sub>                     |
| 844 (DI, DJ, DK, DL)             | 40 <sub>8</sub>                     |
| 885-11/12 (DM, DQ)               | 108                                 |
| 885-42 (DB)                      | 108                                 |
| 819 (DV, DW)                     | 108                                 |
| DDP path to extended memory (DP) | 4                                   |
| Private device                   | 1                                   |

The number of catalog tracks is always a power of 2; the maximum number is 2008. Therefore, the possible numbers of catalog tracks on a device are:

1, 2, 4, 108, 208, 408, 1008, 2008

Reducing these numbers by 1 produces the following numbers, referred to as track masks.

0, 1, 3, 7, 178, 378, 778, 1778

The track masks in binary form are:

0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

These track masks, except the first one, have all bits set; when bits 3 through 9 of the user index for a particular user are ANDed with the track mask for his/her master device, the user's catalog track number on that device is produced.

Example:

For a family of two devices, the following device masks, number of catalog tracks, and track masks are valid.

| Device | Device Mask                                                  | Number of Catalog<br>Tracks | Corresponding<br>Track Mask |  |  |  |  |
|--------|--------------------------------------------------------------|-----------------------------|-----------------------------|--|--|--|--|
| 1      | 2218 or 10 010 001                                           | 40 <sub>8</sub>             | 408-1=378 or 11 111         |  |  |  |  |
| 2      | $\frac{156_8}{377_8}  or  \frac{01\ 101\ 110}{11\ 111\ 111}$ | 20 <sub>8</sub>             | 208-1=178 or 1 111          |  |  |  |  |

A user whose index is  $14224_8$  is assigned device 1 as his master device because bit 4 (last digit in  $14224_8$ ) is set in the device mask for device 1. Therefore, device 1 contains this user's catalog track.

The binary form of 14224g is 001 100 010 010 100.

Therefore, the catalog track number for this user is 228 (on device 1) because the logical AND of bits 3 through 9 of the user index with the track mask for device 1 is:

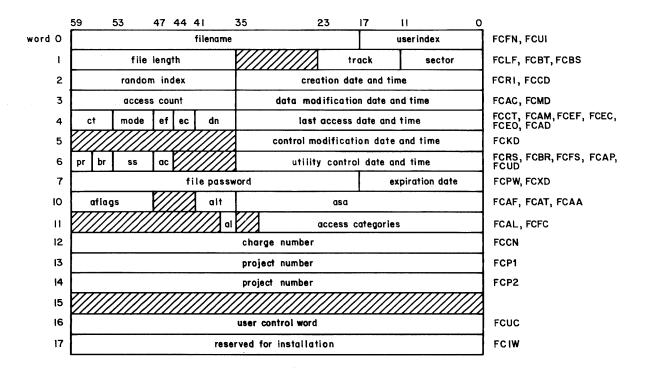
| AND | 1 ( | ) | 0 | - |   | - | 0<br>1 | _ | - |    |                 |
|-----|-----|---|---|---|---|---|--------|---|---|----|-----------------|
|     |     |   |   |   | 1 | 0 | 0      | 1 | 0 | or | 22 <sub>8</sub> |

The end of a catalog track is indicated by an end-of-information (EOI) on the device. All catalog tracks are linked in the track reservation table (TRT) and appear as one logical chain. When catalog entries exceed the logical track, a continuation track is reserved at the end of the catalog track chain in the track reservation table. The disk linkage bytes for the overflowed track point to the continuation track.

#### **Permanent File Catalog Entry**

Files in the permanent file system are referenced by dynamically updated permanent file catalog (PFC) entries on the catalog tracks of master devices. Whenever you create a permanent file, a catalog entry that specifies the characteristics of the file (access information about the file and its location) is entered on a catalog track on your master device. When you modify the file, the PFC entry is updated to reflect the modification.

The format of the PFC entry follows. The 4-character names to the right of each word are symbols used by the system to reference the PFC entry fields. These symbols are defined in common deck COMSPFM.



| Field                  | Word | <u>Bit(s)</u> | Description                                                                                                               |
|------------------------|------|---------------|---------------------------------------------------------------------------------------------------------------------------|
| filename               | 0    | 59-18         | Permanent file name.                                                                                                      |
| userindex              | 0    | 17-0          | User index of file creator.                                                                                               |
| file length            | 1    | 59-36         | Length of the file in PRUs.                                                                                               |
| track                  | 1    | 23-12         | Beginning track of the file.                                                                                              |
| sector                 | 1    | 11-0          | Beginning sector of the file.                                                                                             |
| random index           | 2    | 59-36         | Random disk address of first permit sector.                                                                               |
| creation date and time | 2    | 35-0          | yymmddhhmmss in octal when this file was first<br>entered on the permanent file system. The year<br>(yy) is biased by 70. |
| access count           | 3    | 59-36         | Total number of times this file has been accessed.                                                                        |
|                        |      |               |                                                                                                                           |

| Field                              | Word | <u>Bit(s)</u> | Description                                                                                                                                                                                                |  |  |  |
|------------------------------------|------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| data modification<br>date and time | 3    | 35-0          | yymmddhhmmss in octal when data in this file was<br>last modified. The year (yy) is biased by 70.<br>For direct access files this field is updated only<br>when the file is attached in a modifiable mode. |  |  |  |
| ct                                 | 4    | 59-54         | File category:                                                                                                                                                                                             |  |  |  |
|                                    |      |               | 0 Private.                                                                                                                                                                                                 |  |  |  |
|                                    |      |               | 1 Semiprivate.                                                                                                                                                                                             |  |  |  |
|                                    |      |               | 2 Public.                                                                                                                                                                                                  |  |  |  |
| mode                               | 4    | 53-48         | Mode of access for semiprivate and public files:                                                                                                                                                           |  |  |  |
|                                    |      |               | 0 Write, read, execute, append, modify,<br>and/or purge.                                                                                                                                                   |  |  |  |
|                                    |      |               | 1 Read and/or execute.                                                                                                                                                                                     |  |  |  |
|                                    |      |               | 2 Append.                                                                                                                                                                                                  |  |  |  |
|                                    |      |               | 3 Execute.                                                                                                                                                                                                 |  |  |  |
|                                    |      |               | 4 Negate previous permission.                                                                                                                                                                              |  |  |  |
|                                    |      |               | 5 Modify.                                                                                                                                                                                                  |  |  |  |
|                                    |      |               | 6 Read and/or execute, allow modify.                                                                                                                                                                       |  |  |  |
|                                    |      |               | 7 Read and/or execute, allow append.                                                                                                                                                                       |  |  |  |
|                                    |      |               | 10 Update.                                                                                                                                                                                                 |  |  |  |
|                                    |      |               | 11 Read and/or execute, allow update.                                                                                                                                                                      |  |  |  |
| ef                                 | 4    | 47-45         | Error flag:                                                                                                                                                                                                |  |  |  |
|                                    |      |               | 0 No error.                                                                                                                                                                                                |  |  |  |
|                                    |      |               | 1 EOI changed by recovery.                                                                                                                                                                                 |  |  |  |
| ec                                 | 4    | 44-42         | Error code:                                                                                                                                                                                                |  |  |  |
|                                    |      |               | 0 No error.                                                                                                                                                                                                |  |  |  |
|                                    |      |               | l Error in file data.                                                                                                                                                                                      |  |  |  |
|                                    |      |               | 2 Error in permit entries for file.                                                                                                                                                                        |  |  |  |
|                                    |      |               | 3 Error in data and permit entries.                                                                                                                                                                        |  |  |  |
|                                    |      |               | 4 Error in file length.                                                                                                                                                                                    |  |  |  |
|                                    |      |               | 5 Reserved.                                                                                                                                                                                                |  |  |  |
|                                    |      |               | 6 Reserved.                                                                                                                                                                                                |  |  |  |
|                                    |      |               | 7 Reserved.                                                                                                                                                                                                |  |  |  |

| Field                                 | Word | <u>Bit(s)</u> | Description                                                                                                                                                                             |  |  |  |  |
|---------------------------------------|------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| dn                                    | 4    | 41-36         | Device number (1 through 778) of the device on<br>which the direct access file resides if other<br>than the user's master device. If the file<br>resides on the master device, dn is 0. |  |  |  |  |
| last access<br>date and time          | 4    | 35-0          | yymmddhhmmss in octal when this file was last accessed. The year is biased by 70.                                                                                                       |  |  |  |  |
| control modification<br>date and time | 5    | 35-0          | yymmddhhmmss in octal when this file's control<br>information (catalog entry and permit record<br>data) was last modified.                                                              |  |  |  |  |
| pr                                    | 6    | 59-57         | Preferred residence t for this file:                                                                                                                                                    |  |  |  |  |
|                                       |      |               | <pre>l File locked to disk (PR=L specified by file owner with validation).</pre>                                                                                                        |  |  |  |  |
|                                       |      |               | 2 Disk residence preferred (PR=D specified<br>by file owner).                                                                                                                           |  |  |  |  |
|                                       |      |               | 3 MSF/7990 residence preferred (PR=M specified by file owner).                                                                                                                          |  |  |  |  |
|                                       |      |               | 4 No preferred residence (PR=N specified by file owner).                                                                                                                                |  |  |  |  |
| br                                    | 6    | 56-54         | Backup requirement † for this file:                                                                                                                                                     |  |  |  |  |
|                                       |      |               | l Backup required on dump tape (BR=Y specified by file owner).                                                                                                                          |  |  |  |  |
|                                       |      |               | 2 Backup required on dump tape only if the<br>current version of the file does not have<br>an MSF/7990 image (BR=MD specified by<br>file owner).                                        |  |  |  |  |
|                                       |      |               | 3 Backup on dump tape is not to be done<br>(BR=N specified by the file owner).                                                                                                          |  |  |  |  |
| SS                                    | 6    | 53-48         | Subsystem code for this file:                                                                                                                                                           |  |  |  |  |
|                                       |      |               | 0 Null Subsystem.                                                                                                                                                                       |  |  |  |  |
|                                       |      |               | 1 BASIC Subsystem.                                                                                                                                                                      |  |  |  |  |
|                                       |      |               | 2 FORTRAN Subsystem.                                                                                                                                                                    |  |  |  |  |
|                                       |      |               | 3 FTNTS Subsystem.                                                                                                                                                                      |  |  |  |  |
|                                       |      |               | 4 Execute Subsystem.                                                                                                                                                                    |  |  |  |  |
|                                       |      |               | 5 Batch Subsystem.                                                                                                                                                                      |  |  |  |  |

 $<sup>\</sup>ensuremath{^\dagger}$  Refer to Permanent File Commands in the NOS 2 Reference Set, Volume 3 for details on the PR, BR, and AC parameters.

| Field                       | Word | <u>Bit(s)</u> | Description                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------|------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ac                          | 6    | 47            | Alternate CATLIST permission: †                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                             |      |               | O Alternate users cannot obtain CATLIST<br>information about the file (AC=N<br>specified by file owner).                                                                                                                                                                                                                                                                                                                                         |
|                             |      |               | 1 Alternate users can obtain CATLIST<br>information about the file (AC=Y<br>specified by file owner).                                                                                                                                                                                                                                                                                                                                            |
| utility control<br>and time | 6    | 35-0          | yymmddhhmmss in octal set by PFM and PF utilities<br>and used by PFDUMP in determining whether to dump<br>the file when the OP=M option is specified. This<br>field is updated when the data modification date<br>and time field is updated or PFDUMP finds a file<br>busy (attached in modifiable mode). This ensures<br>that the file is selected on subsequent dumps<br>even if the data modification date and time field<br>does not change. |
| file password               | 7    | 59-18         | Optional password.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| expiration date             | 7    | 17-0          | yymmdd in octal when this file´s password expires. The year is biased by 70.                                                                                                                                                                                                                                                                                                                                                                     |
| aflags                      | 10   | 59-48         | Alternate storage flags; refer to section ll,<br>MSAS, or section l2, MSS, for details.                                                                                                                                                                                                                                                                                                                                                          |
|                             |      |               | Flag Bit Description                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                             |      |               | AFLOK 59 Lock to disk flag:                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                             |      |               | 0 No indirect access<br>permanent file is being<br>destaged to MSF/7990.                                                                                                                                                                                                                                                                                                                                                                         |
|                             |      |               | l Indirect access permanent<br>file is being destaged to<br>MSF/7990.                                                                                                                                                                                                                                                                                                                                                                            |
|                             |      |               | AFFRE 54 Free up cartridge flag:                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                             |      |               | 0 Do not remove file from<br>cartridge.                                                                                                                                                                                                                                                                                                                                                                                                          |
|                             |      |               | 1 Remove file from cartridge.                                                                                                                                                                                                                                                                                                                                                                                                                    |

•

 $<sup>\</sup>ensuremath{^{\dagger}}$  Refer to Permanent File Commands in the NOS 2 Reference Set, Volume 3 for details on the PR, BR, and AC parameters.

## Field

#### Word Bit(s)

# Description

# Flag

Bit

- AFTMP 53 Temporary error flag:
  - 0 No temporary error conditions have been detected.
  - A temporary error condition 1 prevented the MSF/7990 image of the file from being staged to disk. After the error condition is detected, this flag is cleared so that the file staging can be retried on the next request for the file.

Description

#### AFVER 52 Verification flag:

- 0 If alternate storage address asa#0, a successful stage/destage operation has occurred and system control errors should not be encountered.
- The PFC entry with  $asa \neq 0$ 1 was reloaded and a stage attempt has not yet been made. If a system control error is detected, the probable cause is that the asa value is obsolete, probably because an obsolete dump tape was used during the reload.
- AFPDR 51 Pseudorelease flag:
  - 0 The file can be attached immediately if it has a disk image.
  - 1 The file has a disk image that cannot be attached until the MSF/7990 image of the file is staged to disk. After the stage attempt (whether or not it is successful), this flag is cleared.

| Field |                      | Word | <u>Bit(s)</u> |              |                  | Description                                                                                                                   |
|-------|----------------------|------|---------------|--------------|------------------|-------------------------------------------------------------------------------------------------------------------------------|
|       |                      |      |               | Flag         | Bit              | Description                                                                                                                   |
|       |                      |      |               | AFPDE        | 50               | Data error flag:                                                                                                              |
| • •   |                      |      |               |              |                  | 0 No unrecoverable read<br>errors have been detected.                                                                         |
|       |                      |      |               |              |                  | 1 An unrecoverable read error<br>prevented the MSF/7990<br>image of the file from<br>being staged to disk.                    |
|       |                      |      |               | AFPSE        | 49               | System control error flag:                                                                                                    |
|       |                      |      |               |              |                  | 0 No system error conditions<br>have been detected.                                                                           |
|       |                      |      |               |              |                  | 1 A system error condition<br>prevented the MSF/7990<br>image of the file from<br>being staged to disk.                       |
|       | но на<br>1910 г. – С |      |               | AFOBS        | 48               | Obsolete flag; set to l<br>whenever the file is attached<br>in write mode.                                                    |
|       |                      |      |               |              |                  | 0 MSF/7990 image (if asa≠0)<br>is a current version of the<br>file.                                                           |
|       |                      | ч.   |               |              |                  | 1 Disk image is the current<br>version of the file; the<br>MSF/7990 image (if asa≠0)<br>is obsolete.                          |
| alt   |                      | 10   | 41-36         | Alternate    | storage          | e type:                                                                                                                       |
|       |                      |      |               | 0            | File r           | cesides on disk only.                                                                                                         |
|       |                      |      |               | 1            | File h           | nas an MSF image.                                                                                                             |
|       |                      |      |               | 2            | File h           | nas a 7990 image.                                                                                                             |
| asa   |                      | 10   | 35-0          | Alternate    | storage          | e address:                                                                                                                    |
|       |                      |      |               | 0            | An MSF<br>exist. | F/7990 image of the file does not                                                                                             |
|       |                      |      |               | Non-<br>zero | beginn<br>The AF | fies the location of the<br>bing of the file on MSF/7990.<br>FOBS flag indicates whether or<br>his MSF/7990 image is current. |

| Field             | Word  | <u>Bit(s)</u> | Description                                                                                                                                                                                                                                                                            |
|-------------------|-------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| alt               | 11    | 38-36         | File access level:                                                                                                                                                                                                                                                                     |
|                   |       |               | 0 Access level 0.                                                                                                                                                                                                                                                                      |
|                   |       |               | 1 Access level 1.                                                                                                                                                                                                                                                                      |
|                   |       |               | •                                                                                                                                                                                                                                                                                      |
|                   |       |               | •                                                                                                                                                                                                                                                                                      |
|                   |       |               | 7 Access level 7.                                                                                                                                                                                                                                                                      |
| access categories | 11    | 31-0          | File access categories:                                                                                                                                                                                                                                                                |
|                   |       |               | Each bit indicates whether the file has the<br>corresponding access category as part of its<br>category set. Bit 0 corresponds to access<br>category 0; bit 1 to access category 1, and so<br>forth. A file's category set can be any, all, or<br>none of the 32 available categories. |
| charge number     | 12    | 5 <b>9-</b> 0 | Charge number to which this file is billed.                                                                                                                                                                                                                                            |
| project number    | 13-14 | 5 <b>9-</b> 0 | Project number to which this file is billed.                                                                                                                                                                                                                                           |
| user control word | 16    | <b>59-</b> 0  | User control information.                                                                                                                                                                                                                                                              |

<sup>&</sup>lt;sup>†</sup> The 8 access levels and 32 access categories are referenced by names defined by or in micros in system common deck COMSMLS. The default names are LVLO through LVL7 for access levels and CAT00 through CAT31 for access categories. Each site determines what the access levels and categories mean, and can change the corresponding names to clarify that relationship. For example, access level 3 may be defined as meaning secret, so the name for access level 3 can be changed from LVL3 to SECRET. If any of the COMSMLS micros are changed, all decks calling COMSMLS must be reassembled.

### Track Reservation Table (TRT)

Every device in a permanent file system has a label track (usually track 0) that contains a label sector describing the device (family name, device mask, secondary mask, location of permit information, catalog information, and indirect files) and a number of physical record units (PRUs) containing the track reservation table (TRT). The TRT describes the physical layout of data on the device and is the key to allocating information on the device.

The TRT contains single-word entries that define track linkage and bit-setting controls for those tracks (refer to figure 17-3). Each word has four 12-bit linkage bytes and three sets of 4-bit control settings that match the 4 bytes (refer to figure 17-4). Linkage format is given in figure 17-5.

The numbering of the 12-bit linkage bytes or cells corresponds to the numbering of tracks on the device, with the first track starting at 4000. The entry in a cell references the next cell and its associated track. This next track either continues the information or starts a new sequence depending on the first-track bit setting.

Figures 17-3 and 17-4 show a sequential linkage of tracks (in figure 17-4, from track 4000 to track 4001 to 4002 to 4003). This numerical sequence is purely illustrative. The linkage could just as well have been:

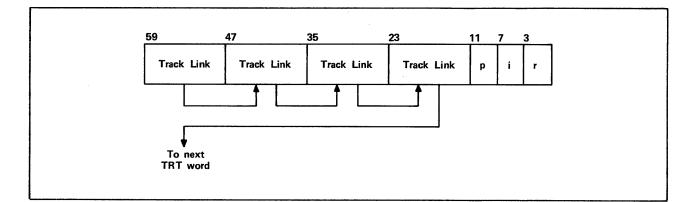


Figure 17-3. Track Reservation Table Word

Each track reservation table word contains the following entries.

| Entry      | Description                                                                                                                                                          |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Track Link | Address of the next track that is a logical continuation of this file.<br>(The track links are shown as sequential within a word, but this is not a<br>requirement.) |
| р          | Bit settings for identifying the first track of a preserved file (permanent file chain or queued file).                                                              |
| i          | Bit settings for establishing interlock of a track.                                                                                                                  |
| r          | Bit settings for track reservation.                                                                                                                                  |

The first group of control settings (bits 8 through 11) is used to identify those tracks that begin a sequence of file information. If any one of these bits is set, the associated track is the first track of a chain that may extend across a number of tracks. This chain can be a direct access file, an indirect access file data chain, a catalog chain, a permit chain, a system dayfile, or a queued file.

The second group of control settings (bits 4 through 7) is used to interlock tracks. If any one of these bits is set, the associated track cannot be accessed as long as this bit remains set. Whenever a file is accessed, the system automatically interlocks the catalog track containing the file. The interlocking capability is necessary because PFM may be processing several requests directed at one file simultaneously. Without interlock, these requests could overlap.

The third group of control settings (bits 0 through 3) is used to identify reserved tracks. A track is reserved either because it has data written on it or it is a flawed track. A flawed track is removed from availability by reservation at deadstart, by subsequent initialization, or by reformatting with the FORMAT utility for 844 devices.

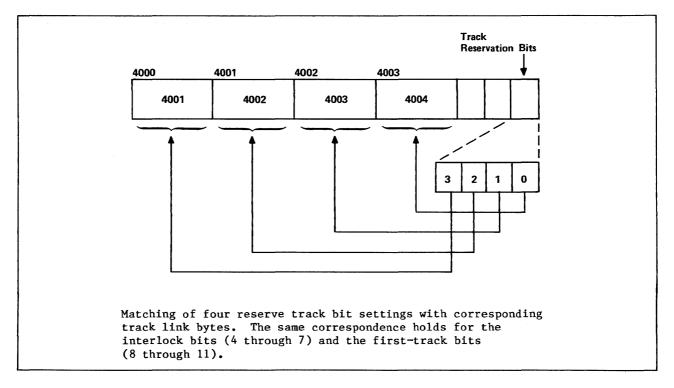


Figure 17-4. Bit Settings for Track Link Bytes

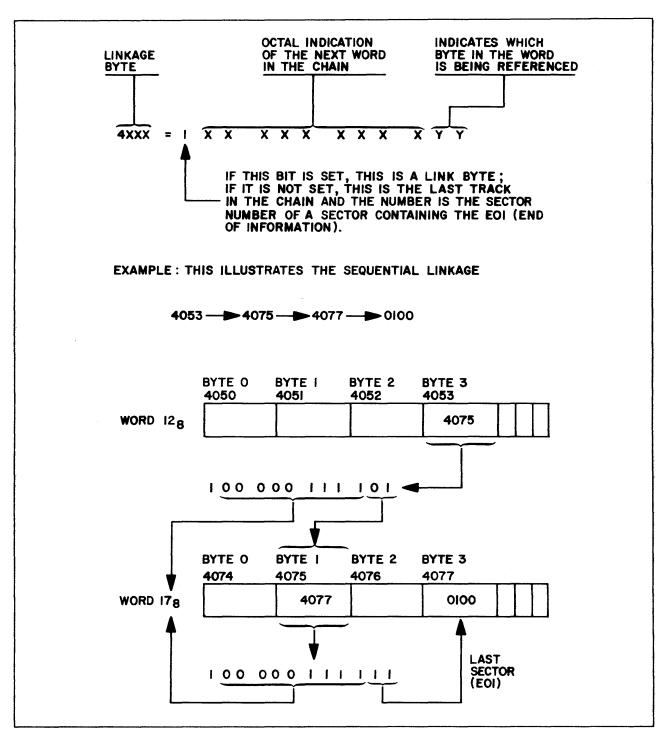


Figure 17-5. Linkage Format With Example

## Family

A family is a collection of from 1 to 63 logical devices identified by a 1- to 7-character family name. Users and their files are grouped together according to the family available to them. Usually, the grouping is within the configuration on which these users normally run jobs. However, a family can be connected to any configuration and still relate to the same users and files.

An auxiliary device, identified by a 1- to 7-character pack name, is a single device that is not included in any family and can be accessed by validated users from any family. An auxiliary device provides users with an alternative to the master devices for storing and accessing permanent files. Use of auxiliary devices enables an analyst to provide special sets of permanent files for selected users or for designated periods. For example, an auxiliary device could be made available from 1200 to 1700 every day for any properly validated user.

A permanent file device is either a member of a family or an auxiliary device. Permanent files on a family device are accessed through user catalogs contained on a master device within the family. The user catalogs that reference permanent files on an auxiliary device are contained on that device; that is, an auxiliary device is a self-contained entity.

Families and auxiliary devices are defined at initialization time by the PF entry in the EQPDECK or by the DSD INITIALIZE command. Normally, a configuration has one family available. Additional families can be defined or introduced (on removable devices) in the same configuration. If more than one family is available in a configuration, you supply the family name at login or on the USER command. The default family is used if no family name is supplied. † Any job can change its associated family name by using the USER command to specify the new family name. †† A system origin job can use the FAMILY command to change the family name associated with the job. If the FAMILY command is included in any nonsystem origin job, the job aborts.

The FAMILY command is valid for unsecured systems only.

The format of the FAMILY command is:

FAMILY, familyname.

Parameter

#### Description

familyname

The 1- to 7-character name of a family of permanent file devices. If omitted, the default family name specified at deadstart is assumed.

<sup>&</sup>lt;sup>†</sup> The default family name is specified at deadstart time with the EQPDECK FAMILY entry and cannot be changed dynamically.

<sup>††</sup> Refer to the IPRDECK entry in section 2, Deadstart Decks, and to the DSD command ENABLE, SECONDARY USER COMMANDS in section 5, DSD Commands; also refer to the USER command in the NOS 2 Reference Set, Volume 3.

If an alternate family of permanent file devices is introduced into the configuration without a user validation file, the job to create the user validation file could include a FAMILY command to identify the alternate family. If the familyname parameter is omitted, the default family name is assumed.

Figure 17-6 is an example of a typical set of configurations.

#### Example:

One configuration with six permanent file devices [equipment status table (EST) ordinals 6 through 13] is identified as system A. Three of the devices are grouped into a family with the name FAMA. They have device numbers 40, 41, and 42. The remaining three EST ordinals have been defined as removable. This means that the system will allow family and auxiliary devices to be introduced on this equipment during system operation.

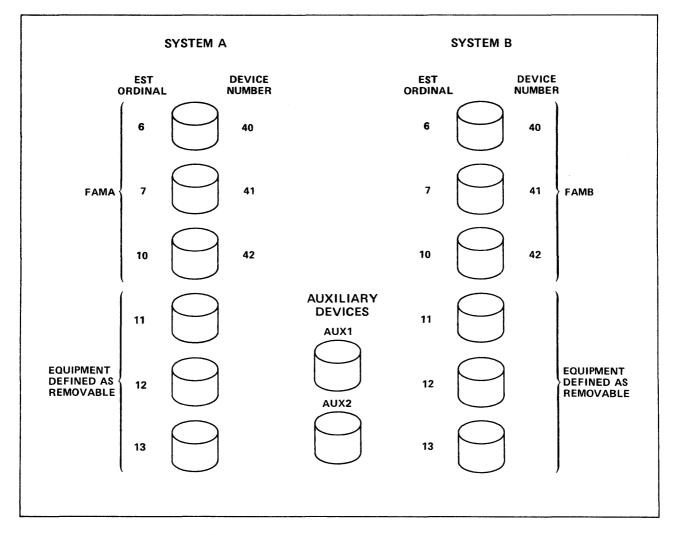


Figure 17-6. Example of Families in Two Configurations

A second configuration with six permanent file devices is identified as system B. Three of the devices have been grouped into a family with the name FAMB. They also have device numbers 40, 41, and 42. The remaining three pieces of equipment have been defined as removable.

Two auxiliary devices are available to both systems. These have the pack names AUX1 and AUX2.

Users of FAMA would normally run jobs on system A. Users of FAMB would normally run jobs on system B.

The removable equipment on system A (EST ordinals 11, 12, and 13) could be used for two purposes:

- To mount auxiliary devices AUX1 and/or AUX2 as required by users of FAMA. If users of FAMB need access to AUX1 and/or AUX2, these auxiliary devices will have to be mounted on some combination of equipment defined by EST ordinals 11, 12, and 13 on system B.
- To mount FAMB devices when they are no longer accessible through system B. In this case, users of FAMB will have to transfer their access to system A. This transfer could involve moving disk packs from equipment defined by EST ordinals 6, 7, and 10 in system B to equipment defined by EST ordinals 11, 12, and 13 in system A, or system A could already have alternate channel connections to equipment defined by EST ordinals 6, 7, and 10 in system B but would define them as EST ordinals 11, 12, and 13 in its own system. If the users of FAMB access their files through system A, they submit their jobs to system A or dial into system A using a different telephone number. (They would dial the same number if communication gear is switched.) The ISF command must be used to make the validation file from FAMB available on system A.

Assuming that access to all of FAMB is transferred from system B to system A, the new array of system A will be as illustrated in figure 17-7. System A now has two families, its original default family FAMA and the newly attached family FAMB whose devices now have the EST ordinals 11, 12, and 13. Its device numbers (40, 41, and 42) remain the same. The device numbers happen to be the same as those used within FAMA but device numbers provide uniqueness only among devices within a family. Accordingly, total uniqueness of a device is provided by the combination of family name and device number.

Users of FAMA will still be able to access their files without specifying the family name since FAMA is still the default for system A. However, users of FAMB will have to specify to system A that they belong to FAMB either at login or on the USER command.

If another equipment (EST ordinal 14) were available on system A, either auxiliary pack AUX1 or AUX2 could be mounted on it and users from either family could access files on this pack.

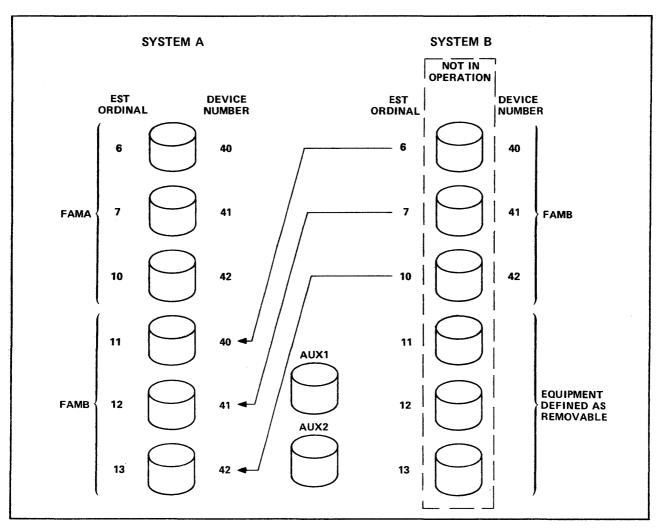


Figure 17-7. Example of Transferring Family Access

## **CALLING THE UTILITIES**

Permanent file utility operations can be initiated through console input or DIS input to a K display, batch input, terminal input, or procedure files. However, for batch or terminal input, the user must be validated for system origin privileges and the system must be in debug mode.

## **CONSOLE INPUT**

It is not possible to preassign an archive file when using the console input sequence. Since a preassigned archive file is usually required, this type of call to the utilities should be avoided in most cases (refer to DIS Input later in this section). However, the console input sequence can be used when an archive file is not required, as with the PFCAT utility.

Input from the console requires the following sequence of entries and responses.

1. Call PFS by entering:

X.PFS.

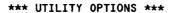
The B,O display indicates the job sequence name (jsn) of PFS. To the right of the entry appears the message:

REQUEST \*K\* DISPLAY

2. Activate the K display for that control point by entering:

K, jsn. (jsn is the job sequence name of PFS as specified on the B,O display)

The display shown in figure 17-8 appears on the left screen. Instructions at the bottom of the display describe how to select the desired utility.



CURRENT OPTION VALUE

DESCRIPTION

ENTER K.UO. WHERE \*UO\* IS

AT - TAPE CAT CA - DEVICE CAT CP - TAPE COPY DU - DUMP LD - LOAD

Figure 17-8. Initial Permanent File Utilities K Display (Left Screen)

## 3. Activate the right K display by entering:

KK.

The display shown in figure 17-9 appears on the right screen. A description of the permanent file utility options is shown.

| OPTION               | DESCRIPTION                                       |
|----------------------|---------------------------------------------------|
| UT *UTILITY*         | *LD* - PFLOAD                                     |
|                      | *DU* - PFDUMP                                     |
|                      | *CA* - PFCAT                                      |
|                      | *AT* - PFATC                                      |
|                      | *CP* - PFCOPY                                     |
| LO *LIST OPTION*     | T - FILES PROCESSED CATALOG                       |
|                      | C - PERMANENT FILE                                |
|                      | DEVICES CATALOG                                   |
|                      | E - ERRORS                                        |
|                      | S - SUMMARY                                       |
| OP *UTILITY OPTION   | IS* C - CREATION*                                 |
|                      | A - LAST ACCESS*                                  |
|                      | M - LAST MODIFICATION*                            |
|                      | I - INDIRECT ACCESS**                             |
|                      | D - DIRECT ACCESS**                               |
|                      | L - LOAD LEVELING                                 |
|                      | P - PURGE AFTER DUMP                              |
|                      | R - REPLACE<br>Q - ADD CATALOG AND PERMIT RECORDS |
|                      | E - EXTRACT CATALOG IMAGE RECORD                  |
|                      | O - OMIT CATALOG IMAGE RECORD                     |
|                      | S - SUPRESS MSF STAGING                           |
|                      | Z - ZERO OUT ASA LINKAGE                          |
| NOTE - OPTIONS ENTER | RED AS FOLLOWS -                                  |
| LO = TCS OR          |                                                   |
| OP = CIP             |                                                   |
| * ONLY ONE TYPE OF   | DATE MAY BE SPECIFIED                             |
| ** ONLY ONE ACCESS   | OPTION MAY BE SPECIFIED                           |

Figure 17-9. Permanent File Utilities K Display (Right Screen)

4. Select the desired utility by entering:

K.uo.

uo

uo is one of the following:

#### Description

- AT Catalog archive file.
- CA Catalog permanent files.
- CP Copy archived files to a job as local files.
- DU Dump permanent files.
- LD Load permanent files.

The parameter options available under the chosen utility appear on the left screen. Figure 17-10 shows the left screen after the DU utility has been called (1). The TCE appearing after the LIST OPTIONS VALID (2) indicates that

- T Files processed
- C Catalog image record (CIR) files
- E Errors

are the listings available for the PFDUMP utility. Different combinations of list options are available with the other utilities.

The CAMIDPS (3) appearing after the OPTIONS VALID indicates that

- C Creation
- A Last access
- M Last modification
- I Indirect access files
- D Direct access files
- P Purge after dump
- S Suppress staging of files

are the options available for the dump utility. Different combinations of utility options are available with the other utilities.

5. Select the desired parameter options by entering:

K.opt1=val1,opt2=val2,...,optn=valn.

The opt<sub>i</sub>=val<sub>i</sub> are selected from the parameter option list on the left screen. The selected parameters replace the default values listed on the left screen (refer to Description of Permanent File Utility Parameters later in this section).

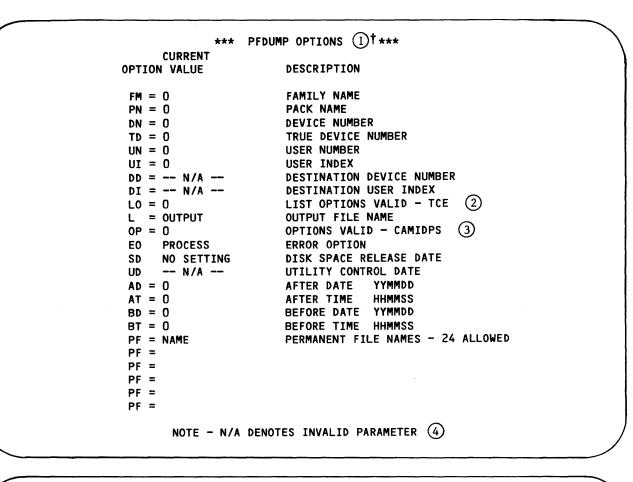
6. Initiate execution by entering:

K.GO.

The lower lines of the left display (4) disappear and are replaced by:

DEVICE MASK DATE TIME

Values appear with these identifiers as processing continues.



PFDUMP OPTIONS \*\*\* \*\*\* CURRENT OPTION VALUE DESCRIPTION ARCHIVE FILE NAME T = TAPESF = 0NUMBER OF FILES TO SKIP NUMBER OF FILES TO PROCESS N = -- N/A --VF = 0VERIFY FILE NAME MF = -- N/A --MASTER FILE NAME RD = ORELEASE DATA FILE NAME LA = 0LOWER ACCESS LEVEL UA = 0UPPER ACCESS LEVEL NOTE - N/A DENOTES INVALID PARAMETER

<sup>†</sup> The circled numbers are identified in the text preceding the figure.

Figure 17-10. PFDUMP Left K Display

## **DIS INPUT**

The following DIS input sequence is recommended for calling PF utilities from the system console. Refer to section 4, DIS Operations.

1. Call DIS by entering:

X.DIS.

- 2. If the utility requires an archive file, it must be preassigned before calling the utility. This can be done with a LABEL or ASSIGN command or by using an existing procedure file.
- 3. Call the utility either by entering

PFS.

which leads to the same sequence of entries and responses previously described under Console Input, or by entering:

 $PFuo, opt_1 = val_1, opt_2 = val_2, \dots, opt_n = val_n$ .

uo is one of the following utility options, and  $opt_i=val_i$  is a desired parameter option and value for the selected utility (refer to Parameters for the Permanent File Utilities later in this section).

| uo   | Description                              |
|------|------------------------------------------|
| ATC  | Catalog archive file.                    |
| CAT  | Catalog permanent files.                 |
| Сору | Copy archive file to job as local files. |
| DUMP | Dump permanent files.                    |
| LOAD | Load permanent files.                    |

If an error in parameters is detected at initiation of a utility, control is returned to PFS and the correct parameters can then be entered using the K display.

## **BATCH INPUT**

To call a utility from a batch job, you must be validated for system origin privileges and the system must be in debug mode. The following sequence of commands is used to call a utility.

ujn. USER,username,password,familyname. PFuo,opt<sub>1</sub>=val<sub>1</sub>,opt<sub>2</sub>=val<sub>2</sub>,...,opt<sub>n</sub>=val<sub>n</sub>.

uo and opt<sub>i</sub>=val<sub>i</sub> are the same as for DIS input.

## **TERMINAL INPUT**

The format of terminal input for calling the permanent file utilities is substantially the same as that for batch input. You must be validated for system origin privileges and the system must be in debug mode. You enter the batch subsystem (or use the X command), call the desired utility, and enter the appropriate parameters with the command:

PFuo,opt1=val1,opt2=val2,...,optn=valn.

uo and  $opt_i = val_i$  are the same as for DIS input.

### **PROCEDURE FILES**

Calling the PF utilities can be made simpler with site-defined procedure files. If these procedures are defined on file PROCFIL under user name SYSTEMX (user index 377778), they can be called from DSD. Since user name SYSTEMX is valid only from system origin jobs, the file PROCFIL should be write-permitted to another user name; this will allow easier maintenance of site-defined procedures.

For example, when called in the following manner, the procedure DUMPIT provides a full dump of device 1 of the system default family on archive tapes with VSNs of PFB11, PFB12, ..., PFB16.

X.BEGIN(DUMPIT,, DEVICE=1, SET=B)

The SETJOB command is used to set the UJN of the job so that the banner page indicates the dump operation performed. In this case it is FULLIB.

.PROC, DUMPIT, DEVICE=0, LISTOP=E, SET=A.

SETJOB, UJN=FULL DEVICE SET.

VSN, TAPE=PF SET DEVICE 1/PF SET DEVICE 2/PF SET DEVICE 3/

PF SET DEVICE 4/PF SET DEVICE 5/PF SET DEVICE 6.

LABEL, TAPE, D=GE, PO=W, W, FI=\$FULL DUMP\$.

PFDUMP, DN=DEVICE, LO=LISTOP.

# PARAMETERS FOR THE PERMANENT FILE UTILITIES

Table 17-1 lists the parameters accepted by each permanent file utility. An X means that the parameter is accepted; a blank means that the parameter is not accepted. Refer to descriptions of parameters following the table for more information.

| rameter | PFATC | PFCAT | PFCOPY | PFDUMP                                | PFLOAD   |
|---------|-------|-------|--------|---------------------------------------|----------|
|         |       |       | +      | · · · · · · · · · · · · · · · · · · · | X        |
| AD      | X     | X     | X<br>X | X<br>X                                | x        |
| AT      | X     | X     |        |                                       |          |
| BD      | X     | X     | X      | X                                     | X<br>X   |
| BT      | X     | Х     | X      | X                                     | x        |
| DD      |       |       |        |                                       | x        |
| DI      |       |       |        | v                                     |          |
| DN      |       | X     |        | X                                     | X        |
| EO      |       |       |        | X                                     | X        |
| FM      |       | X     |        | X                                     | X        |
| L       | X     | X     | X      | X                                     | X        |
| LA      | X     | X     | x      | X                                     | X        |
| LO      | X     | Х     | x      | x                                     | X        |
| MF      |       |       | X      |                                       |          |
| N       | X     |       | X      |                                       | X        |
| opt     | X     | Х     | X      | x                                     | X        |
| PF      | X     | X     | X      | Х                                     | Х        |
| PN      |       | X     |        | X                                     | Х        |
| RD      |       |       |        | x                                     |          |
| SD      |       |       |        | X                                     |          |
| SF      | x     |       | x      | х                                     | Х        |
| Т       | x     |       | x      | x                                     | X        |
| TD      |       |       |        | x                                     | Х        |
| UA      | x     | Х     | x      | x                                     | Х        |
| UD      |       |       |        |                                       | Х        |
| UI      | x     | х     | x      | x                                     | Х        |
| UN      | x     | X     | x      | x                                     | X        |
| VF      |       |       |        | Х                                     |          |
|         |       |       |        |                                       | <u>_</u> |

Table 17-1. Permanent File Utility Parameters

,

## **DESCRIPTION OF PERMANENT FILE UTILITY PARAMETERS**

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AD=yymmdd †  | After date in the form year month day. Files with a last access date<br>(if OP=A), a creation date (if OP=C), or a utility control date (if<br>OP=M) more recent than this date are to be processed. If AT=hhmmss<br>is specified, the default is the current date. If neither AD nor AT<br>are specified, after date and time are not used as selection<br>criteria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| AT=hhmmss †  | After time in the form hour minute second. Files meeting the AD=yymmdd criterion and with a last access time (if OP=A), a creation time (if OP=C), or a utility control time (if OP=M) more recent than this time are to be processed. If AD=yymmdd is specified, the de-fault is 000000 (midnight). If neither AD nor AT are specified, after date and time are not used as selection criteria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| BD=yymmdd †  | Before date in the form year month day. Files with a last access<br>date (if OP=A), a creation date (if OP=C), or a utility control date<br>(if OP=M) prior to this date are to be processed. If BT=hhmmss is<br>specified, the default is the current date. If neither BD nor BT are<br>specified, before date and time are not used as selection criteria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| BT=hhmmss †  | Before time in the form hour minute second. Files meeting the<br>BD=yymmdd criterion and with a last access time (if OP=A), a<br>creation time (if OP=C), or a utility control time (if OP=M) prior<br>to this time are to be processed. If BD=yymmdd is specified, the<br>default is 000000 (midnight). If neither BD nor BT are specified,<br>before date and time are not used as selection criteria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| DD=dn        | The 1- or 2-digit number that specifies the alternate device to<br>which PFLOAD loads files when the device on which a file is to be<br>loaded cannot be found, is not defined in the system, or cannot<br>accept the file because of secondary mask restrictions. Default is<br>0 (no device is the alternate). This parameter is assumed octal<br>unless the D radix or a nonoctal digit is specified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| DI=userindex | The l- to 6-digit number that specifies the destination user index<br>under which PFLOAD loads all files being processed. Default is 0<br>(the destination user index is the user index from which the file<br>was dumped). This parameter is assumed octal unless the D radix or<br>a nonoctal digit is specified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| DN=dn        | The 1- or 2-digit octal number that specifies the device within the<br>family to be cataloged, dumped, or loaded. For PFLOAD, refer to<br>PFLOAD Selection Process under Load Permanent File (PFLOAD) later in<br>this section for more information. For PFCAT or PFDUMP, the<br>following distinctions are made. If the specified device is a<br>master device, all files cataloged on it (whether or not they reside<br>on the device) are processed if they also meet all other specified<br>selection criteria. However, files that reside on the device that<br>are cataloged elsewhere are not processed. If the specified device<br>is not a master device, all files residing on it are processed if<br>they also meet all other specified selection criteria. (For<br>nonmaster devices the DN and TD parameters have the same effect.)<br>Default is 0 for PFDUMP and PFLOAD (all devices are to be dumped or<br>loaded). DN should always be specified for PFCAT (no default). |

<sup>&</sup>lt;sup>†</sup>When entering dates and times, always enter six characters. For example, 3:30 a.m. should be entered as 033000.

| Parameter     |                                                                                                                                                                                                                                                                                                                                            | Description                                                                                                                                                                                         |  |  |  |  |  |  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| EO            | storage err                                                                                                                                                                                                                                                                                                                                | Specifies that PFDUMP or PFLOAD does not process files with mass<br>storage errors. If EO is not specified, PFDUMP dumps files, and<br>PFLOAD loads files, regardless of mass storage errors.       |  |  |  |  |  |  |
| FM=familyname | The 1- to 7-character name of the family of permanent file devices<br>to be cataloged, dumped, or loaded. This parameter option is not<br>required if only one family of devices is active in the system.<br>Default is the default system family name.                                                                                    |                                                                                                                                                                                                     |  |  |  |  |  |  |
| L=filename    |                                                                                                                                                                                                                                                                                                                                            | -character name of the file on which reports are to be<br>Default is OUTPUT.                                                                                                                        |  |  |  |  |  |  |
| LA=level      | The 1- to 7-character name that specifies the lower limit of the<br>range of access levels to process. If this parameter is specified,<br>the UA parameter must also be specified. If neither LA nor UA is<br>specified, the default is that all access levels are selected.<br>Refer to PFDUMP in a Secured System later in this section. |                                                                                                                                                                                                     |  |  |  |  |  |  |
| LO=opt        |                                                                                                                                                                                                                                                                                                                                            | s) specifying the type of information that the permanent<br>y should include in its output report. Default is 0 (no<br>.ected).                                                                     |  |  |  |  |  |  |
|               | opt                                                                                                                                                                                                                                                                                                                                        | Description                                                                                                                                                                                         |  |  |  |  |  |  |
|               | C                                                                                                                                                                                                                                                                                                                                          | List all files in the catalog image record. This option is used only with PFATC, PFDUMP, and PFLOAD.                                                                                                |  |  |  |  |  |  |
|               | Е                                                                                                                                                                                                                                                                                                                                          | List errors.                                                                                                                                                                                        |  |  |  |  |  |  |
|               | S                                                                                                                                                                                                                                                                                                                                          | List cumulative statistics. This option is used only with PFCAT.                                                                                                                                    |  |  |  |  |  |  |
|               | Т                                                                                                                                                                                                                                                                                                                                          | List PFC data for all files processed.                                                                                                                                                              |  |  |  |  |  |  |
| MF=filename   | The 1- to 7-character name of the master file to which PFCOPY copie<br>all the files extracted from a designated archive file. Default is<br>no name; that is, the archived files are copied as individual files<br>retaining their permanent file names.                                                                                  |                                                                                                                                                                                                     |  |  |  |  |  |  |
|               | •                                                                                                                                                                                                                                                                                                                                          | a allows you to extract a file from an archive file and name as a local file.                                                                                                                       |  |  |  |  |  |  |
| N=n           | The 1- or 2-digit number that specifies the number of archive files<br>on a multifile archive file to be processed. If n=0, one file is<br>processed. Default is 1. This parameter is assumed decimal unless<br>the B radix is specified.                                                                                                  |                                                                                                                                                                                                     |  |  |  |  |  |  |
| OP=opt        | control the additional                                                                                                                                                                                                                                                                                                                     | -character string specifying the utility options that<br>processing of files. Many of the options require<br>parameters to complete the definition of the OP<br>Default is 0 (no options selected). |  |  |  |  |  |  |

## Parameter

#### Description

Only one of options A, C, or M can be used at a time. Each of these options requires one of the following to be specified.

- Specify BD/BT to select all files having a last access date/time (if OP=A), a creation date/time (if OP=C), or a utility control date/time (if OP=M) prior to this date/time.
- Specify AD/AT to select all files having a last access date/time (if OP=A), a creation date/time (if OP=C), or a utility control date/time (if OP=M) more recent than this date/time.
- Specify both BD/BT and AD/AT to select all files having a last access date/time (if OP=A), a creation date/time (if OP=C), or a utility control date/time (if OP=M) in the interval defined by these dates/times. The date/time specified by BD/BT must be more recent than the date/time specified by AD/AT to properly define an interval.

See the descriptions of the AD, AT, BD, and BT parameters for more information.

#### opt

## Description

- A Make selection according to time of last access.
- C Make selection according to time of creation.
- M Make selection according to time of last modification.

The following rules apply when OP=M is used. If the utility control date and time field meets the specified date/time criteria, the file is selected. If the date/time criteria are not met, the file can still be selected if the control modification date and time field meets the date/time criteria and is more recent than the utility control date and time field. Refer to Permanent File Catalog Entry earlier in this section for descriptions of the PFC fields.

Only one of the following two options can be used at a time. They can be used in conjunction with the A, C, or M option.

## opt Description

- D Select direct access files only.
- I Select indirect access files only.

### Description

The following options are used only with PFDUMP. Only one of them can be used at a time.

opt

#### Description

- P † Purge after dump. All files for which file data is included in the dump are purged after the dump is completed. If this option is specified, backup requirement parameters are ignored when selecting files to process. Files with no backup requirement (BR=N) are processed, and files with media-dependent backup requirement (BR=MD) are copied to disk and fully dumped.
- S <sup>††</sup> Suppress staging of files. If a file to be dumped resides on MSF/7990 and not on disk, it is not staged to disk and only its PFC and permit entries are copied to the archive file. If OP=S is omitted, the MSF/7990 file is copied to disk and included in the dump. This option should normally be specified for full dumps.
- Y <sup>†</sup> This option causes files with backup requirement BR=MD to be precessed the same as files with backup requirement BR=Y.

The following five options are used only with PFLOAD.

opt

## Description

- R Load with the replace option. If R is specified, PFLOAD loads all selected files from the archive file. If R is not specified, PFLOAD loads only those files selected from the archive file for which no corresponding files (files with identical file names and user indexes) already exist in the permanent file system.
- E Extract only the CIR. Refer to the PFLOAD description for information about the CIR. PFLOAD reads the CIR from the archive file, generates a random file and directory, and requests the next archive file without processing any of the files after the CIR on the first archive file.
- L Load each direct access file on the device with the most available space of those devices where the file is eligible to reside. This option overrides the DD parameter if it is also specified.
- O Do not read the CIR. PFLOAD does not read the CIR for the specified archive file but processes the records in this archive file. PFLOAD then terminates normally without requesting another archive file.
- Z <sup>††</sup> Zero the asa field in the PFC entry when the PFC entry is loaded, if the asa field points to an MSF/7990 image. Also suppresses the loading of PFC only files. Default is to leave the asa field intact and to load PFC only files. OP=Z should normally be omitted if the device has to be recovered and should be specified if data for the file is being reloaded.

<sup>†</sup> Refer to Permanent File Catalog Entry earlier in this section for a description of the backup requirement field.

<sup>&</sup>lt;sup>††</sup>Refer to section 11, MSAS, or to section 12, MSS, for more information.

#### Description

The following option is used only with PFCOPY.

opt

| Description |
|-------------|
|             |

- Q Select leading records. The archived file that is copied to the job as a local file includes two header records, one with the catalog entry for the file and the second with the permit information for the file.
- PF=filename The 1- to 7-character name of a permanent file to be processed. The operator can enter up to 24 permanent file names. The selected file names appear on the bottom of the first page of the left K-display screen (refer to figure 17-10). To delete a permanent file name that has been entered, enter the same file name again. When used from one of the utility commands, up to 10 file names can be entered. The format of the parameter is PF=filename1,PF=filename2,...,PF=filenamen for both the K-display and the utility commands. PF is associated with UI. Default is that permanent file names are not selection criteria.
- PN=packname The 1- to 7-character name of the auxiliary device to be cataloged, dumped, or loaded. The device must be mounted and available. Default is that pack name is not a selection criterion.
- RD=filename<sup>†</sup> The 1- to 7-character name of the release data file (RDF) to be created by PFDUMP, which identifies those MSF/7990-resident files that are pointed to by PFC entries at the time of the dump. The MSS/MSAS utility ASVAL/SSVAL uses this file to identify unneeded MSF/7990-resident files whose space can be released. If RD alone is specified, the release data file created is named ZZZZRDF. Default is that PFDUMP does not create an RDF.
- SD Specifies that PFDUMP is to enter the date and time when the dump was initiated into the inhibit date/time field of the master device. This date/time entry is used by the MSS/MSAS utility ASMOVE/SSMOVE to inhibit the releasing of the disk image of any file with a BR=Y attribute which was last modified after this date/time. The disk space can be released after the next incremental or full dump is taken.
- SF=n The 1- or 2-digit number that specifies the number of archive files on a multifile archive file to be skipped before processing begins. Default is 0. This parameter is assumed decimal unless the B radix is specified.
- T=filename The 1- to 7-character name of the file on which to store or read archive files. Usually, filename is a tape, but it can be a mass storage device. Default is TAPE.
- TD=dn The 1- or 2-digit octal number that specifies the device within the family to be dumped or loaded. For PFLOAD refer to PFLOAD Selection Process under Load Permanent File (PFLOAD) later in this section for more information. For PFDUMP, the following distinctions are made. If the specified device is a master device, all files cataloged and/or residing on it are processed if they meet all other specified selection criteria. If the specified device is not a master device, all files residing on it are processed if they also meet all other specified selection criteria. (For nonmaster devices the DN and TD parameters have the same effect.) Default is 0 (all devices are to be dumped or loaded).

<sup>†</sup>Refer to section 11, MSAS, or to section 12, MSS, for more information.

| Parameter    |                                                                                                                                                                                                                                                                                                                                            | Description                                                                                                                                                                                                                             |  |  |  |  |  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| UA=1eve1     | The 1- to 7-character name that specifies the upper limit of the<br>range of access levels to process. If this parameter is specified,<br>the LA parameter must also be specified. If neither LA nor UA is<br>specified, the default is that all access levels are selected.<br>Refer to PFDUMP in a Secured System later in this section. |                                                                                                                                                                                                                                         |  |  |  |  |  |
| עט †         | field in the PFC entry for<br>the file will be considered<br>dump. UD should normally b                                                                                                                                                                                                                                                    | o update the utility control date and time<br>the file being loaded. This ensures that<br>I for inclusion in the next incremental<br>be specified when a particular user's<br>but should normally be omitted when a full                |  |  |  |  |  |
| UI≕userindex | files to be processed are 1<br>be specified because the ut<br>Default is that user index                                                                                                                                                                                                                                                   | at specifies the user index under which<br>ocated. If UI is specified, DN need not<br>cility will locate the proper device.<br>is not a selection criterion. This<br>unless the D radix or a nonoctal digit is                          |  |  |  |  |  |
| UN=username  | The user name must match in<br>pack name. If UN is specif<br>convert username to a user<br>specified, the utility will                                                                                                                                                                                                                     | name associated with the PN parameter.<br>formation in the MST for the specified<br>ied and PN is not, the utility will<br>index. If, in addition, DN is not<br>locate the proper device in the family.<br>s not a selection criterion. |  |  |  |  |  |
| VF=filename  | a verify file which is a du                                                                                                                                                                                                                                                                                                                | that specifies that PFDUMP is to produce<br>plicate of the archive file it creates.<br>he verify file is named PFVER. Default<br>ritten.                                                                                                |  |  |  |  |  |
|              | Example:                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                         |  |  |  |  |  |
|              | (AA) and a matching verify                                                                                                                                                                                                                                                                                                                 | mands creates a two-file archive file<br>file (BB). The VERIFY command compares<br>ation. (Refer to the NOS 2 Reference Set,<br>accription of VERIFY.)                                                                                  |  |  |  |  |  |
|              | Command                                                                                                                                                                                                                                                                                                                                    | Description                                                                                                                                                                                                                             |  |  |  |  |  |
|              | PFDUMP,T=AA,VF=BB.                                                                                                                                                                                                                                                                                                                         | The dump is written on archive file AA.<br>A duplicate is written on the verify<br>file BB. PFDUMP does not rewind after<br>processing.                                                                                                 |  |  |  |  |  |
|              | PFDUMP,T=AA,VF=BB.                                                                                                                                                                                                                                                                                                                         | A second dump is written after the first<br>on both the archive (AA) and the verify<br>(BB) files. Each dump produces a<br>separate file on the archive and verify<br>files.                                                            |  |  |  |  |  |

† Refer to section 11, MSAS, or to section 12, MSS, for more information.

## Parameter

## Description

## Command

## Description

VERIFY, AA, BB, N=0, A, R.

## A binary comparison of AA and BB is performed. If words do not match, this command lists:

Record number

Word number within the record

Words from both files that do not match

N=O specifies that the verify terminates when the first empty file is encountered. The A parameter specifies an abort if a mismatch is found. R rewinds both files before and after the verify.

## PREASSIGNING THE ARCHIVE FILE

In all permanent file utilities except PFCAT, the archive file must be preassigned. This can be done by using the LABEL or ASSIGN command. For example, file assignment can be made with the following commands.

LABEL, TAPE, VSN=PFDUMP, NT, D=1600.

or

ASSIGN,NT,TAPE.

If no archive file is present, PFDUMP will write on a local mass storage file. The other utilities will attempt to read an empty archive file and terminate. PFLOAD will automatically request the assignment of any incremental or full dump archive tapes needed after the first tape; the request will be for the same track type and density as the first archive tape.

NOTE

The archive file is not rewound or unloaded before or after processing by any of the utilities.

# PERMANENT FILE UTILITY ROUTINES

The parameters available for each of the permanent file utility routines, discussed next, are listed in table 17-1.

The LO parameter allows each permanent file utility to produce a cataloged directory of file information. This catalog information is either derived from the catalog tracks on the permanent file device or from the archive tape. Although the header information may differ from utility to utility, the format of the catalog information remains the same. Following is the general format of the information listed for each file on the directory.

| filename | type    | cat            | length | dn   | cdate | ladate | dmdate | cmdate | ucdate |
|----------|---------|----------------|--------|------|-------|--------|--------|--------|--------|
| password | count   | userindex mode | subsys | stem | time  | time   | time   | time   | time   |
| exp date | level   | pr br rs ac    |        |      |       | flags  |        | at asa | amsg   |
| charge   | project |                |        |      |       |        |        |        |        |

Figure 17-11 illustrates a typical page from a cataloged directory. Although this directory was produced using the command PFATC,LO=T., directories in similar format could be produced using the other utilities. Each of the following fields is shown and cross-referenced on the figure.

| Heade | r Information | Description                                                                                                                                                                                                      |
|-------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | filename      | Permanent file name.                                                                                                                                                                                             |
| 2     | type          | Type of permanent file. This field can be either direct access (DIR) or indirect access (IND).                                                                                                                   |
| 3     | cat           | File category. This field can be either PRIVATE, SPRIV, or PUBLIC.<br>These categories are described in the NOS 2 Reference Set, Volume 3.                                                                       |
| 4     | length        | Length of the file in decimal PRUs.                                                                                                                                                                              |
| 5     | dn            | For direct access files, the device number of the mass storage device<br>on which the file resides if other than the master device. If the<br>file resides on the master device, this field is replaced by an *. |
| 6     | password      | Password associated with the file.                                                                                                                                                                               |
| 7     | count         | Count that specifies the number of times the file has been accessed.                                                                                                                                             |
| 8     | userindex     | User index of the user on whose catalog this file resides.                                                                                                                                                       |
| 9     | mode          | Permission mode. This field can be WRITE, MODIFY, UPDATE, APPEND,<br>READ, READMD, READUP, READAP, or EXECUTE. These modes are explained<br>in detail in the NOS 2 Reference Set, Volume 3.                      |
| 10    | subsystem     | Subsystem under which the file was saved. Possible entries include<br>FORT., FTNTS, BASIC, EXEC., or BATCH. If this field contains no<br>entry, a subsystem is not associated with the file.                     |
| (11)  | cdate time    | Date and time of file creation. The format is:                                                                                                                                                                   |
|       |               | yy/mm/dd.<br>hh.mm.ss.                                                                                                                                                                                           |
| (12)  | ladate time   | Date and time of the last access to the file.                                                                                                                                                                    |
| (13)  | dmdate time   | Date and time of the last data modification to the file.                                                                                                                                                         |

| Header               | r Information | Description                                                                                                                                                                                                                                             |
|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14                   | cmdate time   | Date and time of the last control information modification made in the file's PFC entry or permit entries.                                                                                                                                              |
| 15                   | ucdate time   | Utility control date and time set by PFM or a PF utility to ensure that the file will be included in the next incremental (OP=M) dump.                                                                                                                  |
| (16)                 | exp date      | Expiration date associated with the file password.                                                                                                                                                                                                      |
| (16)<br>(17)<br>(18) | level         | Security access level assigned to the file.                                                                                                                                                                                                             |
| (18)                 | pr            | Preferred residence for the file specified by the file owner. This field can be D (disk residence perferred), L (file locked to disk), M (MSF/7990 residence preferred), or N (no preferred residence).                                                 |
| (19)                 | br            | Backup requirement for the file specified by the file owner. This<br>field can be either Y (backup required on dump tape), MD (backup<br>required only if current version of file does not reside on<br>MSF/7990), or N (no backup is to be performed). |
| (20)                 | rs            | Current residence of the file. This field can be D (disk only), A (MSF/7990 only), or B (both disk and MSF/7990).                                                                                                                                       |
| (21)                 | ac            | Alternate user CATLIST permission for the file specified by the file<br>owner. This field can be Y (alternate user can obtain CATLIST<br>information about the file) or N (alternate user cannot obtain<br>CATLIST information about the file).         |
| (22)                 | flags         | Alternate storage flags set for the file (refer to Permanent File<br>Catalog Entry earlier in this section for details). If a flag is<br>not set, a dash is listed. If an undefined flag is set, an asterisk<br>is displayed. This field can be:        |
|                      |               | Field Description                                                                                                                                                                                                                                       |
|                      |               | D Data error flag.                                                                                                                                                                                                                                      |
|                      |               | F Free up cartridge flag.                                                                                                                                                                                                                               |
|                      |               | L Locked to disk flag.                                                                                                                                                                                                                                  |
|                      |               | 0 Obsolete flag.                                                                                                                                                                                                                                        |
|                      |               | R Pseudorelease flag.                                                                                                                                                                                                                                   |
|                      |               | S System control error flag.                                                                                                                                                                                                                            |
|                      |               | T Temporary error flag.                                                                                                                                                                                                                                 |
| ~                    |               | V Verification flag.                                                                                                                                                                                                                                    |
| (23)                 | at            | Alternate storage type. This field can be NONE (no MSF/7990<br>image), MSF (file resides on MSF), or 7990 (file resides on 7990).                                                                                                                       |
| 24<br>25             | asa           | Alternate storage address of the file.                                                                                                                                                                                                                  |
|                      | amsg          | Appended message, *PFC ONLY, indicating when a PFC ONLY file (that<br>is, an entry with PFC and permit entries, but no data) has been<br>processed on the archive file.                                                                                 |
| 26<br>(27)           | charge        | Charge number associated with the file.                                                                                                                                                                                                                 |
| (27)                 | project       | Project number associated with the file.                                                                                                                                                                                                                |

| P. F. ARCH                                    | IIVE CATALOG                       | PFDUMP<br>EQ. MASK             | 377                            | PAGE 24<br>YY/MM/DD. HH.MM.SS.                   |                                                          |
|-----------------------------------------------|------------------------------------|--------------------------------|--------------------------------|--------------------------------------------------|----------------------------------------------------------|
| PASSWORD<br>EXPIRES                           |                                    | PERM. SUBSYS<br>R RS AC        |                                |                                                  | CONTROL UTILITY<br>DATE/TIME DATE/TIME<br>TYPE ASA VALUE |
| 301 BIN (1)<br>System                         | 0 3006                             | READ<br>Y D N                  |                                | 83/07/08. 83/07/08.<br>15.32.46. 15.32.46.       |                                                          |
| 302 ISDWRK<br>(2<br>SYSTEM                    |                                    | (3)<br>WRITE<br>Y D N<br>(4)   |                                | 83/07/08. 83/07/08.<br>15.32.46. 15.32.46.       |                                                          |
| 303 DATA83<br>System                          | 0 3006                             | WRITE<br>Y D N                 |                                | 83/07/08. 83/07/08.<br>15.32.47. 15.32.47.       |                                                          |
| 304 MODSETS<br>System                         | DIR. PUBLIC<br>O 3006<br>LVLO N    | (5)<br>236 [★<br>READ<br>Y D Y | ]83/07/08.<br>15.32.48.        | 83/07/08. 83/07/08.<br>15.32.48. 15.32.48.       | 83/07/08. 83/07/08.<br>15.32.48. 15.32.48.<br>NONE       |
| 305 IBLKFR<br>System                          | IND. PRIVATE<br>7 11 8 1<br>LVL0 N |                                |                                | 83/07/12. 83/07/12.<br>12.26.49. 12.26.40.       |                                                          |
| 306 SCBIN<br>6 PASSW<br>10 83/07/20<br>SYSTEM | IND. PRIVATE<br>0 11<br>LVLO N     | READ BATCH<br>Y D N (10)       | 14.56.09.                      | 83/01/27. 83/01/27.<br>14.56.09. 14.56.09.       | 83/01/27. 83/01/27.<br>14.56.09. 14.56.09.<br>NONE       |
| 307 PF254A<br>(17<br>SYSTEM                   |                                    |                                | (11)<br>83/07/08.<br>12.55.12. | (12) (13)<br>[83/07/08.]<br>12.55.12.]<br>       | (14) (15)<br>83/07/08.<br>12.55.12.<br>NONE              |
| 308 A<br>System                               | 0 13                               | O<br>WRITE<br>Y D N            |                                | 78/11/06. 78/11/06.<br>15.48.31. 15.48.31.<br>23 | 15.48.31. 15.48.31.                                      |
| 309 G<br>System                               | -                                  | 1<br>WRITE<br>Y D N            | -                              | 79/09/10. 79/08/21.<br>12.26.44. 13.20.23.       |                                                          |
| 310 x<br>@ 1234                               | L <u>VLO N</u>                     | 1<br>WRITE<br>(DY<br>(27)      |                                | 79/02/05. 79/02/05.<br>16.55.59. 16.51.07.       |                                                          |

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Figure 17-11. Sample Directory Produced by PFATC,LO=T.

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### CATALOG ARCHIVE FILE (PFATC)

PFATC produces a cataloged directory of file information derived from an archive file previously created by the PFDUMP utility. The format of the directory depends upon the parameters selected.

If LO=T (list all files processed) is specified, the directory produced is similar to that shown in figure 17-11. If LO=C (list all files in catalog image record) is specified and the archive file to be cataloged was produced by an incremental dump (refer to Incremental Permanent File System Dump later in this section), the directory produced is similar to that shown in figure 17-16.

### CATALOG PERMANENT FILE DEVICE (PFCAT)

PFCAT produces a cataloged directory of file information derived from catalog tracks on a master device. The format of the directory depends upon the parameter options selected.

If LO=T (list all files processed) is specified, a directory of file information and a mass storage table report are produced. The directory is similar to that shown in figure 17-12. However, the files are listed according to user index, and totals are given after the files for each user index. The mass storage table report gives information about each mass storage device in the system. Figure 17-13 is an example of a mass storage table report. Messages issued with this report give information concerning the type and status of the device cataloged. The following status messages can be issued.

ACCOUNT INITIALIZE PENDING. CATALOG TRACK OVERFLOW. DAYFILE INITIALIZE PENDING. ERRLOG INITIALIZE PENDING. FORMAT PENDING. I/O QUEUE INITIALIZE PENDING. MAINLOG INITIALIZE PENDING. PF INITIALIZE PENDING. TOTAL INITIALIZE PENDING. UNAVAILABLE FOR PF ACCESS. 8 WORD CATALOG ENTRIES.

The following types of devices can be listed.

ALTERNATE SYSTEM REMOVABLE DEVICE SYSTEM

If LO=S (list cumulative statistics for catalog) is specified, summary reports of file information for each user index and for the entire device are produced. Figure 17-14 lists a page of the information given for each user index. Figure 17-15 lists the general device information.

| 0.1 m l             |                                                   |        |         | WW (NOV (ND) UNI NOV CO                                  |  |
|---------------------|---------------------------------------------------|--------|---------|----------------------------------------------------------|--|
|                     | LOG FILE<br>PERMANENT FILE DEVIC<br>ER INDEX 4054 | E 40   | SYS606  | YY/MM/DD. HH.MM.SS.<br>PAGE 1                            |  |
| PASSWORD<br>EXPIRES |                                                   | SUBSYS |         | ACCESS DATA MOD<br>DATE/TIME DATE/TIME<br>ASA FLAG CODES |  |
| 1 VERVAL<br>54321   |                                                   | 1      |         | 83/07/12. 83/07/12.<br>13.01.32. 13.01.32.               |  |
| 2 AUCTEST<br>SYSTEM | IND. PRIVATE<br>O WRITE<br>LVLO N Y D N           |        |         | 83/07/12. 83/07/12.<br>13.01.29. 13.01.29.               |  |
| 3 SETB<br>System    | DIR. PRIVATE<br>O READ<br>LVLO N Y D N            |        |         | 83/07/12. 83/07/12.<br>13.01.34. 13.01.34.               |  |
| 4 CATLI7<br>System  | IND. PUBLIC<br>O WRITE<br>LVLO N Y D Y            |        |         | 83/07/12. 83/07/12.<br>13.01.29. 13.01.29.               |  |
| 5 TESTINP<br>System | IND. PRIVATE<br>6 write<br>LVLO N Y D N           |        |         | 83/03/30. 83/03/02.<br>10.30.17. 15.29.09.               |  |
| 6 HISTORY<br>System | IND. PRIVATE<br>O READ<br>LVLO N Y D N            |        |         | 83/07/12. 83/07/12.<br>13.01.32. 13.01.32.               |  |
| 7 WRKTEST<br>System | IND. PRIVATE<br>O READ<br>LVLO N Y D N            |        |         | 83/07/12. 83/07/12.<br>13.01.30. 13.01.30.               |  |
| 8 NS2104B<br>System |                                                   |        |         | 83/07/12. 83/07/12.<br>13.01.36. 13.01.36.               |  |
| TOTALS              | 8 FILE(S),                                        | 310    | SECTORS |                                                          |  |

Figure 17-12. Sample Directory Produced by PFCAT,LO=T,DN=40,UI=4054.

MASS STORAGE TABLE REPORT YY/MM/DD. HH.MM.SS. FAMILY/PACK NAME SYST64 DEVICE TYPE NUMBER UNITS USER NAME 1 377 377 DEVICE NUMBER = = DJ DEVICE NOMBER = DEVICE MASK = SECONDARY MASK = D/A USER COUNT = NUMBER UNITS = 1 =-\_\_\_ EQUIPMENT STATUS = ACTIVE 0 SYSTEM.

Figure 17-13. Mass Storage Table Report

|         | SUMMARY REPOR   |         |            |           | 82/01/11. | 12.48.50. |
|---------|-----------------|---------|------------|-----------|-----------|-----------|
| DIRECTO | RY OF PERMANENT | FILE DE | VICE 40 S  | sys964    | PAGE      | 1         |
|         | (* = DAF RES)   | DENT ON | OTHER THAN | MASTER DE | VICE.)    |           |
| USER    | INDEX           | FILES   | SECTORS    | AVE.SEC.  |           |           |
|         | 1000            | 4       | 21         | 5         |           |           |
|         | 3000            | 30      | 1163       | 38        |           |           |
|         | 6000            | 44      | 602        | 13        |           |           |
|         | 60000           | 1       | 5          | 5         |           |           |
|         | 2020            | 1       | 0          | 0         |           |           |
|         | 4420            | 2       | 2          | 1         |           |           |
|         | 60              | 7       | 75         | 10        |           |           |
|         | 530             | 21      | 443        | 21        |           |           |
|         | 160             | 2       | 240        | 120       |           |           |
|         | 2160            | 14      | 25         | 1         |           |           |
|         | 260             | 37      | 5024       | 135       |           |           |
|         | 270             | 70      | 6352       | 90        |           |           |
|         | 2750            | 251     | 1386       | 5         |           |           |
|         | 377760          | 1       | 68         | 68        |           |           |
|         | 2370            | 22      | 626        | 28        |           |           |
|         | 377770          | 1       | 53         | 53        |           |           |
|         |                 | 508     | 16085      | (GROUP 1  | OTAL)     |           |
|         | 1               | 34      | 153        | 4         |           |           |
|         | 21              | 96      | 1256       | 13        |           |           |
|         | 31              | 15      | 87         | 5         |           |           |
|         | 51              | 5       | 5          | 1         |           |           |
|         | 3511            | 1       | 21         | 21        |           |           |
|         | 201             | 7       | 77         | 11        |           |           |
|         | 22201           | 3       | 362        | 120       |           |           |
|         | 3641            | 40      | 1788       | 44        |           |           |
|         | 301             | 27      | 1020       | 37        |           |           |
|         | 311             | 1       | 3          | 3         |           |           |
|         | 3331            | 8       | 168        | 21        |           |           |
|         | 43331           | 36      | 296        | 8         |           |           |
|         | 2741            | 15      | 1399       | 93        |           |           |
|         |                 | 288     | 6635       | (GROUP 1  | OTAL)     |           |

Figure 17-14. Cumulative Statistics by User Index PFCAT,LO=S,DN=40.

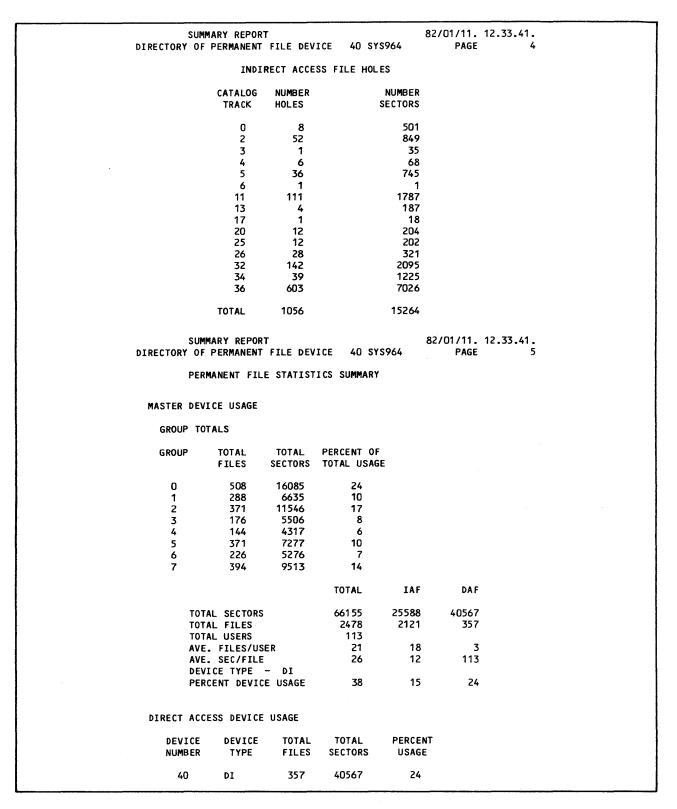


Figure 17-15. Cumulative Statistics for Entire Device PFCAT,LOS=S,DN=40.

## COPY ARCHIVE FILE (PFCOPY)

PFCOPY extracts files from an archive file and copies them to one or more files local to the job. The way the files are copied depends upon the parameter options selected.

If MF=filename is specified, all the files extracted from the archive file are copied to one master file (filename) local to the job and they do not retain their permanent file names.

In a secured system, the access level from the file's PFC entry is used to assign each file to be copied to an appropriate mass storage device. If no device can be found that allows the file to reside there, the PFCOPY utility skips the file and issues a diagnostic message.

#### DUMP PERMANENT FILE (PFDUMP)

PFDUMP copies (dumps) permanent files to backup storage (an archive file). Dumps can be reloaded by the PFLOAD utility and can be accessed by the PFATC and PFCOPY utilities for cataloging and copying. PFDUMP issues messages to the dayfile indicating how many files were dumped and how many files were not dumped due to errors. The type of dump taken depends upon the purpose of the dump and is determined by the parameters selected. The defining characteristics of the three types of dumps follow.

Incremental Dump OP=M is specified and BD=yymmdd and BT=hhmmss are not specified.

Partial Dump Any dump that is not incremental and not full.

Full Dump OP=O is specified or OP is not specified.

If PFDUMP encounters an unrecoverable parity error while writing the archive file, several options are available via the K display. These options are described on the K display. If the option to continue the dump on another reel of tape is selected (K.GO), it may not be possible to recover in such a way as to ensure that the PFLOAD utility can successfully read the archive tape. At least the archived file being written at the time of the error cannot be reloaded correctly.

#### **PFDUMP** in a Secured System

In a secured system, PFDUMP determines the maximum range of access levels that can be dumped. If the LA and UA parameters have been used to select access level limits, these limits will be used. If no access level limits were selected, PFDUMP uses the device limits determined by taking the lowest lower access limit and the highest upper access limit of all the devices to be dumped. The range of possible access levels must be within the system access level limits or PFDUMP aborts the job and issues a diagnostic message. The range of possible access levels must also be within the equipment access level limits for the equipment (tape or mass storage) assigned to the archive file and verify file (if one is being written). If not within the equipment access level limits, PFDUMP aborts the job and issues a diagnostic message. †

<sup>&</sup>lt;sup>†</sup> The system access level limits are displayed as part of the left screen header. The device access level limits (for mass storage) and equipment access level limits (for magnetic tape) are displayed on the E,A display. Refer to the NOS 2 Operations Handbook for display formats.

#### Incremental Permanent File System Dump

An incremental dump copies those permanent files modified after a specified date; that is, the OP=M option is specified together with the date (AD) and time (AT) options but BD=yymmdd and BT=hhmmss are not specified. Other options specified on the PFDUMP call can restrict the dump even further.

For example, the command

PFDUMP, OP=MI, AD=790101, AT=100000.

causes only indirect access files (I parameter) modified after the specified date and time to be dumped. Normal procedure at a site is to follow up this dump with successive incremental dumps (usually with a periodic advancement of date and/or time). This produces a series of archive files containing successive updating of all files in the defined category. (These files can reside on one file: a multifile archive file.) The archive files can then be incrementally loaded (refer to the PFLOAD utility described later in this section) to return the most recently modified versions of the archived files to the permanent file system.

Each incremental dump writes a record (or records) at the beginning of the archive file it creates. The record contains catalog images (refer to Catalog Image Record later in this section) of all files active on the device(s) being dumped when the dump took place. Files with no backup requirement (BR=N) are not included on the catalog image record. This enables a future incremental load of these files on a system or a device basis.

An example of incremental dumping is given under Load Permanent File (PFLOAD) later in this section.

## **Partial Permanent File System Dump**

A partial dump copies permanent files according to any specified option(s), except those defining a full or incremental dump. For example, the command

PFDUMP, OP=D.

is a partial dump of all direct access permanent files. Similarly, a dump of all files created (OP=C) or accessed (OP=A) after a certain date is a partial dump.

A partial dump can dump files from a certain device (DN or TD option) or can dump all files in the system (DN and TD not specified) that meet the criteria of the specified options.

#### **Full Permanent File Dump**

A full dump copies all files in the system or those cataloged on a specified device. That is, the OP option is not specified (or OP=0), and either a particular device is specified (device dump) or no device (DN=0 or TD=0) is specified (system dump).

PFDUMP interlocks a catalog track during the time it takes to dump all files whose PFC entries reside on that catalog track. No files whose PFC entries reside there are accessible until PFDUMP begins processing the next catalog track. For this reason, full permanent file dumps should not be done during heavy system use. An incremental dump provides adequate backup with less interference to the running system.

#### **PFDUMP** in an MSS/MSAS Environment

In an MSS/MSAS environment, the data for a permanent file to be dumped may reside on MSF/7990 and not on disk. However, if the file is to be copied to a dump file, it must have a disk image. The analyst can either stage the file to disk from MSF/7990 in order to include its data on the dump file (OP=S omitted), or copy to the dump file only the PFC and permit entries for the file and not the file data (OP=S specified). Typically, OP=S is specified for full dumps; otherwise, all MSF/7990 files would be included in the dump, which is not feasible because of the time involved to dump such a large permanent file base.

## NOTE

PFDUMP will dump only the PFC and permit entries for a direct access permanent file if that file has an alternate storage copy (MSF/7990 image) and is attached in write mode at dump time. The alternate storage obsolete flag (AFOBS) is cleared in the PFC written to the dump file.

As described in the NOS 2 Reference Set, Volume 3, the file owner can supply a backup requirement for a file using the BR parameter on the DEFINE, CHANGE, or SAVE command. Options include backup on a dump file, backup only if the current version of the file is not on MSF/7990, or no backup on a dump file. This partially determines whether or not a file is included in a particular PFDUMP run. Refer to section 12, MSS, or to section 11, MSAS, for further information on how the PFDUMP utility is used in an MSS/MSAS environment.

#### **PFDUMP** Protected Files

When PFDUMP specifies purging of files (OP=P), files whose user indexes are greater than PGUI (default value is 3000008) are not purged. This is done to prevent files such as critical recovery files, applications, and system utilities from being purged from the system due to lack of use.

## LOAD PERMANENT FILE (PFLOAD)

PFLOAD loads archived files produced by the PFDUMP utility back into the permanent file system. The load can reestablish the permanent file system exactly as it was at the time of the dump, or can load only a desired subset of files on the archive file (as indicated by specified parameters). PFLOAD issues messages to the dayfile indicating how many files were loaded and how many files with errors were encountered.

If LO=T (list all files processed) is specified, the listing produced is similar to that shown in figure 17-11. If LO=C (list all files in the catalog image record) is specified, the listing produced is similar to that shown in figure 17-16.

| F   |              | G OF CATALO   |                 | PAGE                     | 4                |
|-----|--------------|---------------|-----------------|--------------------------|------------------|
|     | ON           | YY/MM/DD.     | AT              | HH_MM.SS.                |                  |
|     | FILE<br>NAME | USER<br>Index | ACCESS<br>COUNT | LAST ACCESS<br>Date time | DEVICE<br>NUMBER |
| 76  | SYSB         | 6000          | 11              | 79/11/04. 12.42.09.      |                  |
| 77  | IBL2         | 1             | 6               | 82/09/23. 03.12.33.      |                  |
| 78  | IBL4         | 1             | 3               | 82/09/23. 03.12.33.      |                  |
| 79  | SET2         | 3             | 0               | 83/02/08. 06.31.35.      |                  |
| 80  | OVWO         | 3             | 0               | 83/02/08. 06.36.17.      |                  |
| 81  | PROCFIL      | 1             | 24              | 82/02/22. 17.26.11.      |                  |
| 82  | OVWRTLD      | 3             | 1               | 83/02/08. 06.43.56.      |                  |
| 83  | PACBIN       | 3006          | 2               | 82/06/01. 00.34.46.      |                  |
| 84  | PRB150       | 1             | 32              | 83/03/21. 12.50.37.      |                  |
| 85  | FNTNOS       | 1000          | 0               | 81/10/21. 10.04.42.      |                  |
| 86  | MODVMOD      | 1000          | 3               | 81/10/27. 13.01.14.      |                  |
| 87  | LIST         | 1000          | 0               | 81/11/07. 13.14.07.      |                  |
| 88  | FNT2MOD      | 1000          | 0               | 81/11/07. 13.17.22.      |                  |
| 89  | OVWRTMZ      | 3             | 1               | 83/02/08. 06.44.08.      |                  |
| 90  | OVWRTNL      | 3             | 1               | 83/02/08. 06.44.08.      |                  |
| 91  | MOD          | 3006          | 1               | 83/06/16. 14.42.54.      |                  |
| 92  | JOB          | 1             | 1               | 83/04/27. 08.10.28.      |                  |
| 93  | IBL          | 1             | 3424            | 83/06/14. 05.18.48.      |                  |
| 94  | IBLFNT       | 1             | 47              | 82/01/07. 13.41.20.      |                  |
| 95  | XED          | 3006          | 0               | 83/07/08. 15.32.31.      |                  |
| 96  | XEDITH       | 3006          | 0               | 83/07/08. 15.32.41.      |                  |
| 97  | STM150       | 1             | 3               | 83/03/29. 18.56.16.      |                  |
| 98  | IBLFNT3      | 1             | 0               | 82/01/06. 18.51.52.      |                  |
| 99  | PRB200       | 1             | 15              | 82/06/03. 03.36.05.      |                  |
| 100 | PACOPL       | 3006          | 2               | 82/07/15. 01.19.15.      |                  |
| • - |              |               |                 |                          |                  |

Figure 17-16. Catalog of Catalog Image Record

The two types of loads available are incremental and nonincremental. An incremental load builds up (increments) an accumulation of the most recently modified versions of the files extracted from the archive files for loading. A series of archive files is read in the reverse order of creation. The CIR created by the most recent incremental dump is read and checked against the archived files on these files. If a file matches an entry on the CIR, that file is a candidate for loading. A nonincremental load does no CIR checking and uses only parameters specified on the PFLOAD call, if any, to select candidates for loading.

#### Catalog Image Record

Each incremental dump (OP=M) writes a CIR at the beginning of the archive file on which the permanent files are dumped. The other types of dumps (full and partial) do not produce a CIR. The CIR is composed of 2-word entries for every permanent file on the device(s) being dumped at the time of the incremental dump (not just files included in the dump).

The format of each entry is:

| 59         |    | 41 | 35 |          | 17   | 0 |
|------------|----|----|----|----------|------|---|
| filename   |    |    | u  | serindex |      |   |
| access cou | nt | dn |    | date     | time |   |

Field Description

| filename     | Name of the permanent file.                                                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| userindex    | User index under which filename was cataloged.                                                                                                                                                                                               |
| access count | Number of times filename was accessed.                                                                                                                                                                                                       |
| dn           | Device number of the device on which filename resides if it is a<br>direct access file and resides on a device other than your master<br>device. If it resides on the master device, dn=0. If the file is<br>indirect access, dn is ignored. |
| date time    | Date and time filename was last accessed.                                                                                                                                                                                                    |

When a file is loaded, this CIR information is placed in the permanent file catalog of the device being loaded. No other information can be changed over dumps and loads without updating the utility control date and time.

Figure 17-16 contains a partial listing of the CIR. This listing can be obtained after a selective dump if the LO=C option is specified on a PFDUMP, PFLOAD, or PFATC call. A listing similar to the one in figure 17-11 can be obtained after a selective dump if the LO=T option is specified on a PFDUMP, PFLOAD, or PFATC call. In both cases, the headings vary but the format of the information is the same.

## **PFLOAD Selection Process**

Execution of the PFLOAD utility involves the following stages to determine which permanent files (from the archive file) should be loaded and on which devices they should reside.

1. If the DN, TD, or DD parameters are used, the device number specified must exist in the family being loaded or PFLOAD aborts and issues this message:

PFLOAD - DEVICE nn NOT FOUND.

2. If the specified parameters logically imply that no files can be selected (such as OP=I, DN=n where n is not a master device), PFLOAD aborts and issues this message:

PFLOAD - NO FILES SELECTED.

3. The user index mask for selecting files (based on the device mask of the device specified by the DN and DI parameters) must be such that it is possible for some files to be on the archive file. There must be some common bits between the archive file mask (written in the header record by PFDUMP) and the load selection mask. If no common bits exist, PFLOAD aborts and issues this message:

PFLOAD - SELECTED FILES NOT ON ARCHIVE FILE.

4. For nonincremental loads, this stage of checking is bypassed and the entire archive file to be loaded is passed on to the next stage.

The first step is to read the CIR from the most recent selective incremental dump file and place it on a random file. Then the archive files are read in the reverse order in which they were created (the most recently created file is read first).

Each file on an archive file is checked against the CIR on the random file for a match of file name and user index (these fields describe a file uniquely in a family). If a match is found, the file is a candidate for loading and moves to the next stage of checking. Also, the file name and user index are zeroed out in the corresponding CIR entry to prevent subsequent loading of older versions of the same file. If a match is not found, the file is skipped because it has already been accepted (it appeared on a previous archive file and a match with the CIR was found) or has been purged. This process passes on only the latest versions of files obtained from the archive files.

- 5. Only files that satisfy the criteria specified by the parameters on the PFLOAD command are selected (date/time, direct or indirect, user index, file name, and so forth). All other files are skipped.
- 6. The DN and TD parameters are used to select files from the archive file and to determine the device on which the files should be loaded.

Indirect access files, if selected, are always loaded on the appropriate master device (based on user index). Direct access files, if selected, are loaded on the device on which they previously resided. This is the device number contained in the file's PFC entry on the archive file. If the device number is 0, the file previously resided on the master device and will be reloaded there.

It may not be possible to load a direct access file on the device on which it previously resided because the device number may no longer exist or its secondary mask may not allow it. (Refer to Device Masks earlier in this section for additional information.) Either of these situations can occur as a result of a reconfiguration of the permanent file system. In either case, if a direct access file cannot be loaded, the DD parameter is checked. If an alternate device is specified and its secondary mask allows it, the file is loaded on the alternate device. Otherwise, the OP=L option is checked (see step 7). If the OP=L option is not specified, PFLOAD skips the file and issues this message:

PFLOAD - ALTERNATE DEVICE NOT FOUND, FN=filename, UI=userindex.

The DN parameter is used to select files from the archive file in the following manner. If the device specified by DN is a master device, all files (direct and indirect) cataloged on the master device (files with user indexes corresponding to that device's device mask) are selected. If the device specified by DN is not a master device, only direct access files that previously resided on the device (files with a device number of DN in their PFC entry) are selected. Similarly, the TD parameter is used to select files from the archive file in the following manner. If the device specified by TD is a master device, all files that were cataloged on it and all direct access files that previously resided on it are selected. (This corresponds to the way the TD parameter is processed by PFDUMP.) If the device specified by TD is not a master device, only direct access files that previously resided on it are selected.

If neither the DN nor TD parameters are specified, all files meeting other selection criteria are selected. If both the DN and TD parameters are specified, only files that meet the previously described criteria for both parameters are selected.

In all cases, the device masks and master device status for the devices specified by the DN or TD parameters refer to the system in which PFLOAD is running, not the system in which the files were dumped. The user index and device number from the PFC on the archive file reflect the situation that existed at the time the files were dumped.

- 7. If the OP=L option is specified, the device selected in step 6 (or the failure to select a device) for the residence of a direct access file is ignored. PFLOAD determines the device, among those devices where the file may reside (based on the device mask), which has the most available space. The OP=L option is not applicable to indirect access files since they must reside on the appropriate master device.
- 8. When a device has been selected to receive a direct access file, PFLOAD determines if the file will fit on the device. If the file is too large, PFLOAD skips the file and issues this message:

PFLOAD - NO SPACE FOR FILE,FN=filename,UI=userindex.

9. In secured systems, PFLOAD verifies before loading a file that the device where the file is to reside (as selected in steps 7 and 8) is appropriate for the file's access level. If the device is not appropriate, PFLOAD skips the file and issues this message:

PFLOAD - NO DEVICE FOUND FOR FILE, FN=filename, UI=userindex.

If PFLOAD is loading direct access files to the device with the most available space (OP=L), PFLOAD selects the device with the most space that also allows the required access level.

10. PFLOAD determines the catalog track where the files to be loaded are to reside and builds an index file with a 1-word entry for each file on the track. The format of the entry is:

| 59      | 17          | 0 |
|---------|-------------|---|
| filenam | e userindex |   |

PFLOAD checks each candidate file against this entry to determine whether it is in the permanent file system. If it is not, the file is loaded. If it is, loading depends upon the OP=R option. If OP=R was specified on the PFLOAD call, the archive duplicate replaces the one in the permanent file system. If OP=R was not specified, archive duplicates are skipped.

## **Family Reconfiguration**

When reconfiguring a permanent file family by adding or subtracting devices, or changing the device masks, use the PFLOAD OP=L parameter to greatly simplify the procedure. Follow this sequence to reconfigure a permanent file family:

- 1. PFDUMP,FM=familyname.
- 2. Initialize all devices in the family.
- 3. PFLOAD, OP=L, FM=familyname.

#### **PFLOAD** in an MSS/MSAS Environment

In an MSS/MSAS environment, an incremental load as described previously is the typical reload procedure. PFLOAD uses the CIR from the first incremental dump file to control the loading of file data and PFC and permit entries. Files that resided only on MSF/7990 at the time of the dump may or may not have been copied to the dump tape. If OP=S was specified on the PFDUMP call, then only the PFC and permit entries for the MSF/7990 files were included on the dump tape. PFLOAD reloads only what was dumped by PFDUMP. Thus, if the file data was omitted from the dump tape, it will be reloaded to disk. If the file data was omitted from the dump tape, only the PFC and permit information for the files will be reloaded. Refer to section 12, MSS, or to section 11, MSAS, for further information on how the PFLOAD utility is used in an MSS/MSAS environment.

## PFDUMP/PFLOAD EXAMPLE

In this example, permanent files created and modified on three devices are dumped nine times. The action runs from March 1, 1982 (82.3.1) to March 10, 1982 (82.3.10). To keep things simple, the time of day is not shown. Before the last dump, one of the devices becomes inoperable. The example then shows how this device can be loaded from the archive tapes. Following are the three devices.

| Device | Description                                                                                                                                    |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 40     | A master device containing indirect access files only. Users with<br>this master device have their direct access files written on 41 or<br>42. |
| 41     | A master device containing indirect and direct access files. Direct access files cataloged on this device may be written on 42 or this device. |
| 42     | A nonmaster device containing direct access files only. All files written on this device will be cataloged on 40 or 41.                        |

File names consist of a letter and a number. The letter identifies which device contains the catalog entry for this file (A=device 40 and B=device 41). The number is the same as the device on which the file is written.

Each file name is followed by a date in parentheses. This indicates either the day on which the file was created or when it was last modified.

Figure 17-17 outlines the creation, modifications, and dumps that were made. There is one particular action per column. The top of the column identifies the action and the key parameters used by the utility. If an archive tape is produced, it is shown at the bottom of the column. All files in the system are listed in each column. Those files affected by the action are underscored.

60459300 D

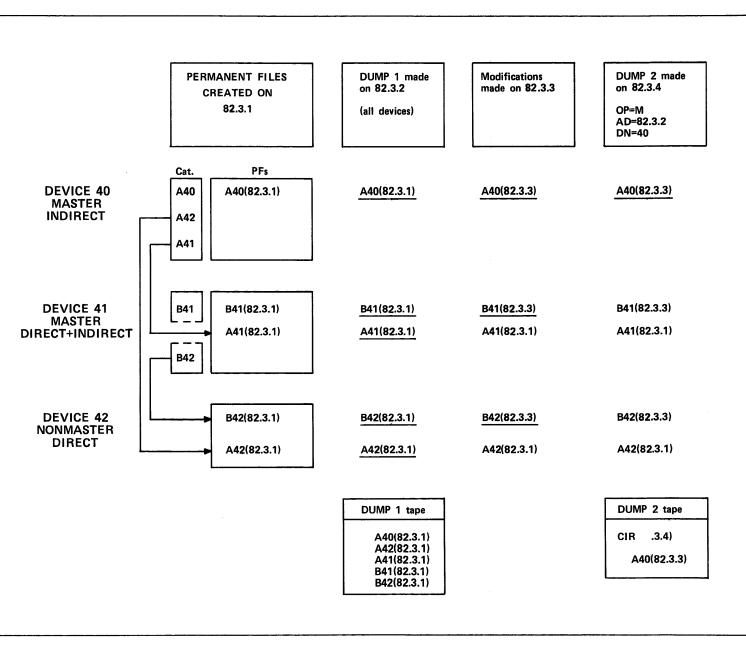


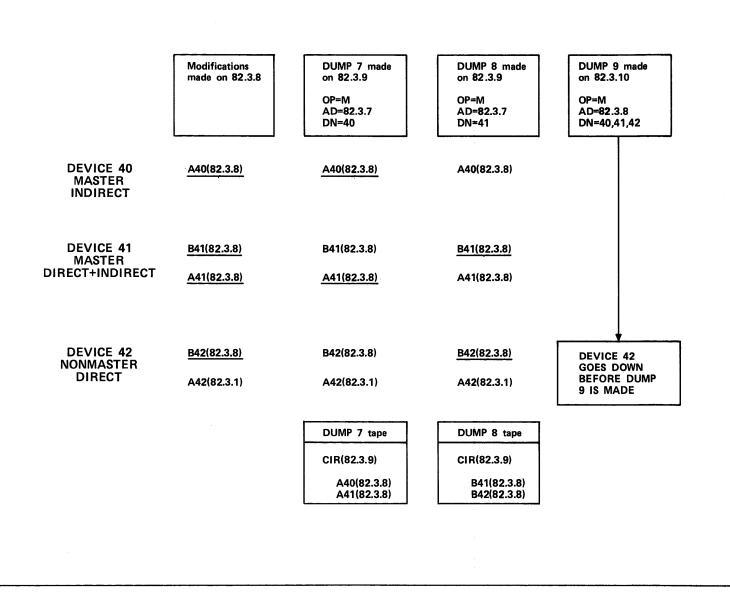
Figure 17-17. PFDUMP/PFLOAD Example (Sheet 1 of 3)

DUMP 3 made DUMP 4 made DUMP 5 made DUMP 6 made Modifications on 82.3.4 on 82.3.4 made on 82.3.5 on 82.3.6 on 82.3.7 OP=M OP=M OP=M OP=M AD=82.3.2 AD=82.3.2 AD=82.3.4 AD=82.3.4 DN=41 DN=42 DN=42 (all devices) **DEVICE 40** A40(82.3.3) A40(82.3.3) A40(82.3.5) A40(82.3.5) A40(82.3.5) MASTER INDIRECT **DEVICE 41** B41(82.3.3) B41(82.3.3) B41(82.3.5) B41(82.3.5) B41(82.3.5) MASTER DIRECT+INDIRECT A41(82.3.1) A41(82.3.1) A41(82.3.1) A41(82.3.1) A41(82.3.1) B42(82.3.3) B42(82.3.3) B42(82.3.5) B42(82.3.5) B42(82.3.5) **DEVICE 42** NONMASTER DIRECT A42(82.3.1) A42(82.3.1) A42(82.3.1) A42(82.3.1) A42(82.3.1) DUMP 3 tape DUMP 4 tape DUMP 5 tape DUMP 6 tape CIR(82.3.4) CIR(82.3.4) CIR(82.3.6) CIR(82.3.7) A40(82.3.5) B41(82.3.3) B42(82.3.3) B41(82.3.5) B42(82.3.5) B42(82.3.3) B42(82.3.5)

Figure 17-17. PFDUMP/PFLOAD Example (Sheet 2 of 3)

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60459300 D



Actions during the 10 days in March in which the dumps and modifications were made run as follows:

| Date   | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 82.3.1 | Five permanent files are created on this date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|        | File A40 (indirect) is written on device 40 and cataloged on device 40.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|        | File A42 (direct) is written on device 42 and cataloged on device $40$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|        | File A41 (direct) is written on device 41 and cataloged on device 40.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|        | File B41 (indirect) is written on device 41 and cataloged on device 41.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|        | File B42 (direct) is written on device 42 and cataloged on device $41.$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 82.3.2 | DUMP 1. A full permanent file system dump. No CIR is written on the archive file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 82.3.3 | Three files (A40, B41, and B42) are modified on this date. This is indicated by the modification date in parentheses following the file name.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 82.3.4 | DUMP 2. This is an incremental dump of device 40 that specifies permanent<br>files modified after 82.3.3. The files for this device are the ones<br>listed on its catalog track. The utility scans this catalog which<br>contains entries for files A40, A42, and A41. File A40 is on device 40<br>and the other two are on the devices indicated by their names. Only file<br>A40, which was modified on 82.3.3, qualifies for this dump. It is written<br>on an archive tape after a CIR for this date (82.3.4). The CIR gives a<br>current description of all five files in the permanent file system. |
| 82.3.4 | DUMP 3. This is an incremental dump of device 41 that specifies all files<br>modified after 82.3.2. The catalog for this device contains entries for<br>files B41 and B42. Both files were modified on 82.3.3 and qualify for<br>this dump. They are written on an archive file after a CIR for this date.                                                                                                                                                                                                                                                                                                |
| 82.3.4 | DUMP 4. This is an incremental dump of device 42 that specifies all files<br>modified after 82.3.2. The PFDUMP utility scans the catalogs on devices<br>40 and 41 to locate the files on 42. One file, B42 (82.3.3), falls in<br>this category.                                                                                                                                                                                                                                                                                                                                                           |
| 82.3.5 | Three files are modified on this date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 82.3.6 | DUMP 5. This is an incremental dump of each of the three devices. All<br>files modified after 82.3.4 are specified by the AD option. Since no DN<br>is specified, all devices are dumped in turn, producing a dump tape with<br>three archive files.                                                                                                                                                                                                                                                                                                                                                      |
| 82.3.7 | DUMP 6. This incremental dump of device 42 specifies all files modified<br>after 82.3.4. Since 42 is nonmaster, the dump routine scans the catalogs<br>of the other two devices.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 82.3.8 | Four files are modified on this date.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 82.3.9 | DUMP 7. An incremental dump of device 40 is made with AD=82.3.7. Two files qualify.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

# Action

- 82.3.9 DUMP 8. An incremental dump of device 41 is made with AD=82.3.7. The catalog on device 41 contains entries for files B41 and B42. File B41 is an indirect access file located on device 41, and file B42 is a direct access file located on device 42. Both files were modified after 82.3.7 and are dumped.
- 82.3.10 DUMP 9. An incremental dump of devices 40, 41, and 42 is specified, but device 42 becomes inoperable before the dump is made.

To reestablish permanent files on device 42 with the most recent modifications available, the device is first initialized and then incrementally loaded, beginning with the most recent incremental dump tape. Archive dump 8 is the most recent incremental dump tape and accordingly contains the most recent CIR. This reel is assigned first and then the CIR read onto a random file. The dump tapes are read in reverse order with each file on each tape being checked against the CIR. Dump tapes 2 and 3 are omitted since they do not involve device 42.

For each catalog track on device 42 that is to receive file entries, PFLOAD builds and maintains an index file. Before each file can be loaded, PFLOAD checks the index file to see if the file has already been loaded. If it has, the archive duplicate is skipped; if not, the archive file is loaded and another entry goes into the index file.

After initialization of device 42, the loading runs as follows:

#### Archive File

Date

The analyst assigns DUMP8 tape and enters the command:

| DUMP8 tape                 |
|----------------------------|
| CIR(82.3.9)                |
| B41(82.3.8)<br>B42(82.3.8) |

DUMP7 tape

CIR(82.3.9)

A40(82.3.8) A41(82.3.8)

DUMP6 tape

CIR(82.3.7)

B42(82.3.5)

PFLOAD, T=DUMP8, DN=42.

The utility reads the CIR from this tape onto a random file. It then looks for files for device 42 on this tape. B42 qualifies, and its entry in the CIR is removed. The file B42 is loaded on device 42. The catalog of this file on device 41 is created. After loading this file, the utility makes an entry in the index file as follows:

Action

| B42 userindex |     |           |
|---------------|-----|-----------|
|               | B42 | userindex |

The utility then requests the next reel.

The analyst assigns this tape, and the utility reads the archive file and checks it against the CIR loaded from DUMP8 above. No match is found. The next reel is requested.

This tape is assigned and then compared with the CIR. B42 is a file from device 42. However, its entry in the CIR was removed when it was read from DUMP8.

| Archive File                              | Action                                                                                                                                   |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| DUMP5 tape                                | This tape is assigned and then compared with the CIR. B42 is from de-                                                                    |
| CIR(82.3.6)                               | vice 42 but it has already been removed from the CIR and the utility skips this version.                                                 |
| A40(82.3.5)<br>B41(82.3.5)<br>B42(82.3.5) |                                                                                                                                          |
| DUMP4 tape                                | This tape is assigned and compared with the CIR originally read from                                                                     |
| CIR(82.3.4)                               | DUMP8 tape. It has been removed from the CIR and this file is skipped.                                                                   |
| B42(82.3.3)                               |                                                                                                                                          |
|                                           |                                                                                                                                          |
| DUMP1 tape                                | This tape, produced by a full dump, contains all the files that were on the permanent file system when the dump was made (82.3.1). These |
| A40(82.3.1)                               | files are checked against CIR (82.3.9). A match is found with A42.<br>This file is loaded.                                               |
| A42(82.3.1)                               | This file is loaded.                                                                                                                     |
| A41(82.3.1)                               | Device 42 now has the same files with the same update status that they                                                                   |
| B41(82.3.1)<br>B42(82.3.1)                | had on 82.3.9 when the last incremental dump was made.                                                                                   |

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)

# **QUEUE/DAYFILE UTILITIES**

Several utility programs control queued input and output files and system, account, error log, and binary maintenance log dayfiles. The utility programs are divided into the following two groups, according to the type of selective processing they do.

- The queue file utilities are 10 utilities under the control of the queue file supervisor program QFSP. These utilities select for processing queued files or dayfiles that share certain characteristics you specify such as device residence, file destination, and job sequence name.
- The dayfile dumping utilities are five independent utilities that dump all or selected parts of the active system dayfile, account dayfile, error log, or binary maintenance log. These utilities each process the contents of a single file according to criteria you specify.

# **QUEUE FILE UTILITIES**

The names and functions of the queue file utilities follow. The rest of this section includes detailed information about the call and operation of each utility.

| Utility | Description                                                                                 |
|---------|---------------------------------------------------------------------------------------------|
| DFLIST  | Lists dayfiles that have been made permanent files by the DFTERM utility.                   |
| DFTERM  | Terminates an active or inactive dayfile and retains it as a direct access permanent file.  |
| LDLIST  | Lists queued files present on a QDUMP dump tape.                                            |
| QALTER  | Alters routing information associated with active queued files; purges active queued files. |
| QDUMP   | Dumps queued files to a tape or disk.                                                       |
| QFTLIST | Lists detailed information about active queued files.                                       |
| QLIST   | Lists inactive queued files.                                                                |
| QLOAD   | Loads files dumped by QDUMP as queued files.                                                |
| QMOVE   | Moves queued files from one disk device to another.                                         |
| QREC    | Deactivates or activates selected queued files; purges inactive queued files.               |

### CALLING THE QUEUE FILE UTILITIES

All queue file utility operations, except DFLIST, LDLIST, and QLIST, can be initiated through console input to a K display. All queue utilities except DFLIST, DFTERM, QALTER, and QFTLIST can be initiated through entries made at the system console (under DIS or DSD control, including procedure files), card input (batch), or terminal entries. DFTERM, DFLIST, QALTER, and QFTLIST operation can be initiated only through entries made at the system console. However, in all cases, for batch and terminal input, you must be validated for system origin privileges, the system must be in debug mode, and you must observe certain parameter order dependencies. Since LDLIST, QDUMP, and QLOAD require preassignment of the dump file, only DIS, batch, or terminal input is appropriate for these utilities.

#### **Console Input**

Input from a console through a K display requires the following sequence of entries and responses. These procedures do not apply to DFLIST, QLIST, or LDLIST, because K displays are not available for these utilities.

1. Call QFSP by entering:

X.QFSP.

The B,O display indicates the job sequence name of QFSP. To the right of the entry this message appears:

**REQUEST \*K\* DISPLAY** 

2. Activate the K display for that control point by entering:

K,jsn. (jsn is the job sequence name of QFSP as specified on the B,O display.)

The display shown in figure 18-1 appears on the left screen. Instructions at the bottom of the display describe how to select the desired utility.

\*\*\* QUEUED FILE SUPERVISOR \*\*\*

UTILITY DESCRIPTION QDUMP - QUEUED FILE DUMP PROCESSOR. QLOAD - QUEUED FILE LOAD PROCESSOR. QMOVE - QUEUED FILE MOVE PROCESSOR. QREC - PROCESS QUEUED FILES. DFTERM - TERMINATE DAYFILES. QFTLIST - LIST ACTIVE QUEUED FILES. QALTER - ALTER ACTIVE QUEUED FILES.

SELECT DESIRED UTILITY BY ENTERING K.OPTION WHERE OPTION IS ONE OF THE UILITIES LISTED ABOVE.

Figure 18-1. QFSP K Display (Left Screen)

3. Select the desired utility by entering:

(utility is one of the utilities shown in the K display, figure K.utility. 18 - 1.)

The parameters available under the chosen utility appear on the left screen as the initial K display for the utility. Figures 18-3, 18-9, 18-12, 18-14, and 18-17 exhibit initial K displays for the various utilities. Different parameters are available with the different utilities. (Refer to Description of Queue File Utility Parameters later in this section.)

It is also possible to call each utility directly by substituting the following procedure for steps 1, 2, and 3.

a. Call the desired utility by entering:

X.utility. (utility is one of the utilities shown in figure 18-1.)

The B,O display indicates the job sequence name of the chosen utility. This message also appears:

**REQUEST \*K\* DISPLAY** 

b. Activate the initial K display for the chosen utility by entering:

(jsn is the job sequence name as specified on the B,O display.) K.jsn.

4. Several commands are available to aid in the use of the utilities and direct processing. A right screen display lists and defines each available command. Activate this K display by entering:

KK.

Figure 18-2 shows the resultant display.

Following is a list of the queue file utility commands included on the display and a description of each.

| Command | Description                                                                                                                                                                                                                  |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GO      | Directs the active utility to proceed with the processing of<br>the entered parameters. When the processing is complete,<br>the left screen K display is reset to the default values.                                        |
| STOP    | Terminates the active utility and ends the K-display interaction.                                                                                                                                                            |
| RESET   | Resets all options displayed on the left screen K display to their default values.                                                                                                                                           |
| LIST    | If the DFTERM utility is active, this command displays a<br>list of all permanent dayfiles (refer to figure 18-4). The<br>list of files displayed is also written on the output file<br>specified by the DFTERM L parameter. |

| Command  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | If the QALTER or QFTLIST utility is active, this command<br>displays a list of active queued files on the right screen K<br>display (refer to figure 18-6). The list of files is also<br>written on the output file specified by the QALTER or<br>QFTLIST L parameter.                                                                                                                                                                                                                 |
|          | If the QREC utility is active, this command displays a list<br>of inactive queued files on the right screen K display<br>(refer to figure 18-18). The list of files displayed is<br>also written on the output file specified by the QREC L<br>parameter.                                                                                                                                                                                                                              |
| LIST=qft | Displays detailed information about the active queued file<br>at QFT ordinal qft on the right screen K display (refer to<br>figure 18-7) and writes the information to the output file<br>specified by the QALTER or QFTLIST L parameter. This form<br>of LIST is accepted only by QALTER and QFTLIST.                                                                                                                                                                                 |
| +        | Used in conjunction with the LIST command; displays<br>succeeding pages (screens) of the information listed. This<br>command applies only to the QREC, QALTER, and QFTLIST<br>utilities.                                                                                                                                                                                                                                                                                               |
| *        | Enables you to page the left screen K display. This command applies only to the QREC, QDUMP, QLOAD, QMOVE, QFTLIST, and QALTER utilities.                                                                                                                                                                                                                                                                                                                                              |
| CLEAR    | Used in conjunction with the LIST command; returns the right<br>screen K display to the list of processing commands<br>initially displayed (refer to figure 18-2) and returns the<br>left screen K display to the first page.                                                                                                                                                                                                                                                          |
| OUT      | Sends the output file specified by the L option of each<br>utility to the print queue for immediate printing. Any<br>information that has been or is currently displayed on the<br>right screen K display via the LIST command is also included<br>with the disposed output. In addition, if the LIST command<br>is currently active, the list displayed on the right screen<br>is disposed, and the initial right screen K display shown in<br>figure 18-2 is returned automatically. |
| FAMILY   | Specifies whether or not files are queued when creation or<br>destination families are not active [not in family ordinal<br>table (FOT)]. Default is not to queue these files. When<br>the FAMILY command is specified, entries are made in the FOT<br>for inactive families and the files are queued. This<br>command applies only to the QLOAD, QMOVE, and QREC utilities.                                                                                                           |
| LID      | Specifies whether or not files are queued when the creation<br>logical identifier (LID) is not in the LID table. Default<br>is not to queue these files. When the LID command is<br>specified, entries are made in the LID table and the files<br>are queued. This command applies only to the QLOAD, QMOVE,<br>and QREC utilities.                                                                                                                                                    |

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| Command                                                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| REWIND                                                                           | Rewinds the load or dump file specified by the FN parameter<br>before processing. This command applies only to the QLOAD<br>and QDUMP utilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ERROR                                                                            | If the QDUMP utility is active, enabling this command cause<br>files on which unrecoverable read errors were encountered t<br>be dumped with the errors listed on the output file.<br>Disabling this command causes these files to be ignored.<br>The default under QDUMP is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                  | If the QLOAD utility is active, enabling this command cause<br>such files to be loaded with the errors listed on the outpu<br>file. Disabling the command causes such files to be<br>ignored. The default under QLOAD is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                  | If the QMOVE utility is active, enabling this command cause<br>such files to be moved with errors listed on the output<br>file. Disabling this command causes such files to be<br>ignored. The default under QMOVE is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                  | Entry of this command toggles setting of this command.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| THE FOLLO                                                                        | *** QUEUE FILE UTILITY COMMANDS *** PAGE 1 OF 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| THE FOLLO                                                                        | VING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| G0 -                                                                             | VING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 60 -                                                                             | VING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| GO -<br>STOP -<br>RESET -                                                        | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| GO –<br>STOP –<br>RESET –                                                        | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| GO -<br>STOP -<br>RESET -<br>LIST -                                              | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES<br>ON RIGHT SCREEN. (QREC, DFTERM, QALTER, QFTLIST).<br>PAGE RIGHT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| GO -<br>STOP -<br>RESET -<br>LIST -<br>+ -<br>* -                                | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES<br>ON RIGHT SCREEN. (QREC, DFTERM, QALTER, QFTLIST).<br>PAGE RIGHT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN.<br>(QREC, QDUMP, QLOAD, QMOVE, QFTLIST, QALTER).<br>SET BOTH SCREENS TO FIRST PAGE OF K-DISPLAY.                                                                                                                                                                                                                                                                                                                                                                                                                |
| GO -<br>STOP -<br>RESET -<br>LIST -<br>+ -<br>* -                                | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES<br>ON RIGHT SCREEN. (QREC, DFTERM, QALTER, QFTLIST).<br>PAGE RIGHT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN.<br>(QREC, QDUMP, QLOAD, QMOVE, QFTLIST, QALTER).<br>SET BOTH SCREENS TO FIRST PAGE OF K-DISPLAY.<br>(QREC, DFTERM, QFTLIST, QALTER).<br>RELEASE FILE SPECIFIED BY L PARAMETER TO                                                                                                                                                                                                                                                                                                                                |
| GO -<br>STOP -<br>RESET -<br>LIST -<br>+ -<br>* -<br>CLEAR -<br>OUT -            | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES<br>ON RIGHT SCREEN. (QREC, DFTERM, QALTER, QFTLIST).<br>PAGE RIGHT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN.<br>(QREC, QDUMP, QLOAD, QMOVE, QFTLIST, QALTER).<br>SET BOTH SCREENS TO FIRST PAGE OF K-DISPLAY.<br>(QREC, DFTERM, QFTLIST, QALTER).<br>RELEASE FILE SPECIFIED BY L PARAMETER TO<br>PRINTER. (ALL UTILITIES)<br>IF ENTERED, ENTRIES WILL BE MADE IN THE FOT FOR<br>THE INACTIVE FAMILIES AND THE FILES WILL BE QUEUED.                                                                                                                                                                                          |
| GO -<br>STOP -<br>RESET -<br>LIST -<br>+ -<br>* -<br>CLEAR -<br>OUT -            | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES<br>ON RIGHT SCREEN. (QREC, DFTERM, QALTER, QFTLIST).<br>PAGE RIGHT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN.<br>(QREC, QDUMP, QLOAD, QMOVE, QFTLIST, QALTER).<br>SET BOTH SCREENS TO FIRST PAGE OF K-DISPLAY.<br>(QREC, DFTERM, QFTLIST, QALTER).<br>RELEASE FILE SPECIFIED BY L PARAMETER TO<br>PRINTER. (ALL UTILITIES)<br>IF ENTERED, ENTRIES WILL BE MADE IN THE FOT FOR<br>THE INACTIVE FAMILIES AND THE FILES WILL BE QUEUED.<br>(QREC, QLOAD, QMOVE).<br>IF ENTERED, ENTRIES WILL BE MADE IN THE LID TABLE<br>FOR THE INACTIVE LIDS AND THE FILES WILL BE QUEUED. |
| GO -<br>STOP -<br>RESET -<br>LIST -<br>+ -<br>* -<br>CLEAR -<br>OUT -<br>FAMILY- | WING COMMANDS ARE PROVIDED-<br>PROCEED WITH PROCESSING (FM MUST BE SPECIFIED).<br>(ALL UTILITIES)<br>TERMINATE INPUT, END RUN. (ALL UTILITIES)<br>RESET PARAMETERS TO DEFAULT VALUES.<br>(ALL UTILITIES)<br>DISPLAY JOBNAMES OF ACTIVE/INACTIVE QUEUED FILES<br>ON RIGHT SCREEN. (QREC, DFTERM, QALTER, QFTLIST).<br>PAGE RIGHT SCREEN. (QREC, QALTER, QFTLIST, QFSP).<br>PAGE LEFT SCREEN.<br>(QREC, QDUMP, QLOAD, QMOVE, QFTLIST, QALTER).<br>SET BOTH SCREENS TO FIRST PAGE OF K-DISPLAY.<br>(QREC, DFTERM, QFTLIST, QALTER).<br>SET BOTH SCREENS TO FIRST PAGE OF K-DISPLAY.<br>(QREC, DFTERM, QFTLIST, QALTER).<br>IF ENTERED, ENTRIES WILL BE MADE IN THE FOT FOR<br>THE INACTIVE FAMILIES AND THE FILES WILL BE QUEUED.<br>(QREC, QLOAD, QMOVE).<br>IF ENTERED, ENTRIES WILL BE MADE IN THE LID TABLE<br>FOR THE INACTIVE LIDS AND THE FILES WILL BE QUEUED.<br>(QREC, QLOAD, QMOVE).                |

Figure 18-2. Queue File Utility Commands K Display (Sheet 1 of 2)

\*\*\* QUEUE FILE DIRECTIVE FORMATS \*\*\* PAGE 2 OF 2 THE FOLLOWING DIRECTIVES MAY HAVE ONE OF SEVERAL FORMS-DA=YYMMDD PROCESS THIS DATE ONLY. DA=YYMMDD-YYMMDD PROCESS ALL DATES IN SPECIFIED RANGE. DA=ALL PROCESS ALL DATES. PROCESS THIS USER INDEX ONLY. UI=XXXXXX UI=XXXXXX-YYYYYY PROCESS ALL INDICES IN SPECIFIED RANGE. PROCESS THIS USER INDEX ONLY. TUI=XXXXXX TUI=XXXXXX-YYYYYY PROCESS ALL INDICES IN SPECIFIED RANGE. FS=XXXXXX PROCESS THIS FILE SIZE ONLY. FS=XXXXXX-YYYYYY PROCESS ALL SIZES IN SPECIFIED RANGE. IF 777777B IS SPECIFIED, ALL SIZES LARGER ARE INCLUDED. ID=XX PROCESS THIS ID ONLY. ID=XX-YY PROCESS ALL ID, S IN SPECIFIED RANGE. FC=FORMS CODE. FC=F1/F2/F3 SPECIFY FORMS CODE LIST. FC=F1-F2 SPECIFY FORMS CODE RANGE. DS=DT FILE DESTINATION=DISPOSITION TYPE. FILE DESTINATION TYPES INCLUDE THE FOLLOWING-BC - BATCH RB - REMOTE BATCH DISPOSITION TYPES INCLUDE THE FOLLOWING-IN - INPUT PU - PUNCH PL - PLOT PR - ANY PRINTER P2 - 512 PRINTER LR - 580-12 PRINTER LS - 580-16 PRINTER LT - 580-20 PRINTER WT - WAIT QUEUE SF - SPECIAL QUEUE TYPES ALL - ALL QUEUES PRINT - ALL PRINT QUEUES NONE - NO QUEUES

Figure 18-2. Queue File Utility Commands K Display (Sheet 2 of 2)

5. Select the desired parameters by entering:

 $K \cdot opt_1 = val_1, opt_2 = val_2, \dots, opt_n = val_n$ .

The  $opt_i=val_i$  are selected from the parameter list on the initial K display for the chosen utility.

The option parameter entries are issued to the job dayfile, which is included in the output file specified by the L parameter for each utility (refer to Parameters for the Queue File Utilities later in this section).

If the FM parameter is specified for QDUMP, QMOVE, or QREC (indicating the processing of queue files for only the specified family of devices), the initial left screen display (refer to figures 18-9, 18-14, and 18-17) is replaced by the secondary left screen display (refer to figures 18-10, 18-15, and 18-19). This display closely resembles the initial left screen for the utility but restricts processing to the family of devices specified. Each device in the specified family containing inactive queued files is indicated. In addition, any parameter entered for the utility is reflected in this display. Parameters not entered remain at default values.

If the FM parameter is not specified, the initial K display remains on the left screen. However, the display is modified to reflect the parameters entered. Parameters not entered remain at the default values.

The displays are modified in this manner to provide an opportunity to double-check the entry. If it is necessary to modify the entry, reenter those parameters that are to be changed. Entry of incorrect data causes an error message to appear at the bottom of the left screen K display. In this case, the portion of the entry up to the point where the error was encountered is processed; the remainder of the entry (from left to right) is ignored.

6. Initiate execution by entering:

K.GO.

When processing is complete, the left screen K display is reset to default values, the message

utility COMPLETE (utility is the name of the utility processed)

appears at the bottom of the screen, and the right screen returns to the original display.

7. Terminate use of the chosen utility and end K-display interaction by entering:

K.STOP.

An output file is generated indicating the disposition of queued files or dayfiles processed. Examples of output files generated by each utility are shown in figures 18-4, 18-11, 18-13, 18-16, and 18-20.

It is also possible to call each utility and specify appropriate parameters without using K displays; this is the only way to call DFLIST. You do this using a single keyboard entry in the following format.

X.utility(opt1=val1,opt2=val2,...,optn=valn,I=filename,PO=N)

# ParameterDescriptionutilityAny queue or dayfile utility.opti=valiParameters (refer to Parameters for the Queue File Utilities later in<br/>this section).I=filenameName of alternate input file (optional). This file may contain<br/>K-display utility commands (GO, STOP, RESET, and so on) and parameters.PO=NSpecifies that no K-display input is allowed. The use of the PO=N<br/>parameter and proper parameter selection allows the utility to run<br/>without additional operator intervention. This parameter is not needed<br/>and should not be entered for QLIST, LDLIST, and DFLIST.

The specified utility processes parameters on the command before the alternate input file, if any. If the utility is QLIST, LDLIST, or DFLIST or if PO=N is specified, the requested queue/dayfile processing proceeds after all command and alternate input file parameters have been processed (unless a STOP command is encountered on the alternate input file). If PO=N is omitted from the command and the utility is not one previously mentioned, the utility requests the K display after processing the command and alternate input file (unless a STOP command is encountered on the alternate input file). The K display then reflects the status of all parameters after processing of the command and alternate input file is complete. If the utility encounters an error while processing the command or alternate input file, a request for the K display appears on the DSD B,O display (except for QLIST, LDLIST, and DFLIST). You may then activate the K display, enter the correct parameters, and continue processing. However, if errors are encountered and the utility was invoked by a nonsystem origin job, a message is issued to the dayfile, and utility processing is terminated.

# **Batch Input**

To call the utilities from a batch job, you must be validated for system origin privileges, and the system must be in debug mode. The following sequence of commands is used to call a utility.

ujn. USER,username,password,familyname. utility,opt<sub>1</sub>=val<sub>1</sub>,opt<sub>2</sub>=val<sub>2</sub>,...,opt<sub>n</sub>=val<sub>n</sub>,I=filename,PO=N.

| Parameter                          | Description                                                                                                                                                                                                                                                         |  |  |  |  |  |  |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| utility                            | Any of the following utilities: QREC, QDUMP, QLOAD, QMOVE, QLIST, or LDLIST.                                                                                                                                                                                        |  |  |  |  |  |  |
| opt <sub>i</sub> =val <sub>i</sub> | Parameters (refer to Parameters for the Queue File Utilities later in this section).                                                                                                                                                                                |  |  |  |  |  |  |
| I=filename                         | Name of alternate input file (optional). This file may contain<br>K-display utility commands (GO, STOP, RESET, and so on) and<br>parameters.                                                                                                                        |  |  |  |  |  |  |
| PO=N                               | Specifies that no K-display input is allowed. The use of the PO=N<br>parameter and proper parameter selection allows the utility to run<br>without additional operator intervention. This parameter is not<br>needed and should not be entered for QLIST or LDLIST. |  |  |  |  |  |  |

The DFLIST, DFTERM, QALTER, and QFTLIST utilities cannot be called from a batch job. They must be initiated from the system console.

# **Terminal Input**

The format of terminal input for calling the queue utilities is substantially the same as that for batch input. You must be validated for system origin privileges, and the system must be in debug mode. At login, you enter the batch subsystem, call the desired utility, and enter the appropriate parameters with the command:

utility,opt1=val1,opt2=val2,...,optn=valn,I=filename,PO=N

The utility, opt=val, I=filename, and PO=N parameters are the same as described for batch input.

# PARAMETERS FOR THE QUEUE FILE UTILITIES

Table 18-1 specifies the parameters accepted by each queue file utility. (DFLIST is not included because it does not accept any parameters.) An X indicates that a parameter is accepted; a blank indicates that a parameter is not accepted. Refer to the descriptions of parameters following the table for more information.

|           | Utility |       |       |       |        |        |         |        |       |
|-----------|---------|-------|-------|-------|--------|--------|---------|--------|-------|
| Parameter | QREC    | QDUMP | QLOAD | QMOVE | QALTER | LDLIST | QFTLIST | DFTERM | QLIST |
| BC        | x       | x     | x     | x     | x      | x      | x       |        | x     |
| DA        | x       | x     | x     | x     |        | x      |         |        | х     |
| DD        | · ·     |       | x     | x     | [      | x      |         |        |       |
| DF        |         |       | x     | x     | x      | x      | x       |        |       |
| DN        | x       | x     |       | x     | x      |        | x       | x      | х     |
| FC        | x       | x     | x     | x     | x      | x      | x       |        | x     |
| FM        | x       | x     |       | x     | x      |        | x       | x      | x     |
| FN        |         | x     | x     |       |        | x      |         |        |       |
| FS        | x       | x     | x     | x     |        | x      |         |        | x     |
| FT        |         |       |       |       |        |        |         | x      |       |
| FU        | x       | x     | х     | x     |        | x      |         |        | x     |
| ID        | x       | x     | x     | x     | x      | x      | x       |        | x     |
| J SN      | x       | x     | x     | x     | x      |        | x       |        | X     |
| L         | x       | х     | х     | x     | x      | x      | x       | х      | x     |
| LA        | x       | x     | x     | x     | x      | x      | x       |        | х     |
| LD        | x       | x     | x     | x     | x      | x      | x       |        | x     |
| LO        |         |       |       |       | x      |        | x       |        |       |
| MI        | x       | x     | x     | x     |        | x      |         |        | х     |
| NAL       |         |       |       |       | x      |        |         |        |       |
| NDC       |         |       |       |       | x      |        |         |        |       |
| ND F      |         |       |       |       | x      |        |         |        |       |
| NEC       |         |       |       |       | x      |        |         |        |       |
| NF        |         | x     | x     |       |        | x      |         |        |       |
| NFC       |         |       |       |       | x      |        |         |        |       |
| NID       |         | -     |       |       | x      |        |         |        |       |
| NLD       |         |       | r     |       | x      |        |         |        |       |
| NM        |         |       |       |       |        |        |         | x      |       |
| NPR       |         |       |       |       | x      |        |         |        |       |
| NRC       |         |       |       |       | x      |        |         |        |       |
| NUN       |         |       |       |       | x      |        |         |        |       |
| OP        | x       |       | x     | x     | x      |        |         | х      |       |
| PO        | x       | x     | x     | x     | x      |        | x       | x      |       |
| RB        | x       | x     | x     | x     | x      | x      | x       |        | x     |
| SC        |         |       | x     |       |        | х      |         |        | (     |
| TF        | x       | x     | x     | x     |        |        |         |        |       |
| TP        |         | x     |       | x     |        |        |         |        |       |
| TUI       | х       | x     | x     | x     |        | x      |         |        | x     |
| UA        | x       | x     | x     | x     | x      | x      | x       | 1      | x     |
| UI        | х       | x     | x     | x     | [      | x      |         |        | x     |
| WN        |         |       |       |       | x      |        | x       | 1      |       |
| UN        |         |       |       |       | x      |        | x       |        |       |

| Table 18-1. Queue File Utility | Parameters |
|--------------------------------|------------|
|--------------------------------|------------|

# Description of Queue File Utility Parameters

| Parameter           | -                                                                                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|---------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| BC=dt               | Queued files destined for local batch devices can be selected for processing by disposition type (dt). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|                     | dt                                                                                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|                     | ALL                                                                                                    | Files of all disposition types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|                     | IN                                                                                                     | Input files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                     | LR                                                                                                     | 580-12 printer files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|                     | LS                                                                                                     | 580-16 printer files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|                     | LT                                                                                                     | 580-20 printer files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|                     | NONE                                                                                                   | No files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|                     | PH,PU                                                                                                  | Punch files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                     | PL                                                                                                     | Plot files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|                     | PR                                                                                                     | Files that can print on any printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|                     | PRINT                                                                                                  | All printer files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|                     | P2                                                                                                     | 512 printer files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|                     | SF                                                                                                     | Installation-defined special files; cannot be used with QALTER or QFTLIST.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|                     | WT                                                                                                     | Queued files with a wait disposition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|                     | entry rever<br>all disposi<br>automatic s<br>punch files                                               | ry can be specified more than once, with each successive<br>rsing the previously established condition. By default,<br>tion types are selected; so any entry actually clears the<br>selection. For example, BC=PU means local batch-destined<br>are not to be processed. However, a second BC=PU entry<br>processing of local batch-destined punch files.                                                                                                                                                                       |  |
|                     | types is ei<br>dispositior                                                                             | or BC=NONE is specified, processing of all disposition<br>ther enabled or disabled, respectively. If all<br>a types are currently enabled, entering BC=ALL has no<br>kewise, entering BC=NONE has no effect if all disposition<br>disabled.                                                                                                                                                                                                                                                                                     |  |
| D <b>A=y ymm</b> dd | specified,<br>two dates,<br>820130-8202<br>(including<br>all queued<br>utilities o<br>the current      | date in the form year month day. If one date is<br>only queued files created on that day are processed. If<br>separated by a hyphen, are specified (for example,<br>13), all queued files created within the specified range<br>the end dates) are processed. If DA=ALL is specified,<br>files are processed. If this parameter is omitted with<br>ther than QLIST, queued files created five days prior to<br>date are processed. If this parameter is omitted with<br>inactive queued files, regardless of creation date, are |  |

.

4

| Parameter     |                                                                                                                                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| DD=dn         | parameter must be s                                                                                                                                             | to which files are to be loaded or moved. The DF<br>specified before the DD parameter. If DF is<br>also be specified. Since QMOVE requires DF, DD<br>fied.                                                                                                                                                                                                                                                                                                    |  |  |  |  |
| DF=familyname | -                                                                                                                                                               | o which files are to be loaded or moved. With er must be specified.                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |
|               | With QALTER or QFTLIST, DF must be used with the UN parameter. The utility will process files belonging to the remote terminal identi-fied by these parameters. |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |
| DN=dn         | other than DFTERM, processed, dumped,                                                                                                                           | evice number (1 through 778). With utilities<br>this parameter specifies the device to be<br>or loaded. The FM parameter must be specified<br>meter. Default is all devices.                                                                                                                                                                                                                                                                                  |  |  |  |  |
|               | inactive dayfile re                                                                                                                                             | arameter specifies the device on which the<br>sides or on which the new dayfile will reside if<br>is terminated. Default is the device on which<br>resides.                                                                                                                                                                                                                                                                                                   |  |  |  |  |
| FC=fc         | -                                                                                                                                                               | ut files considered for processing. This<br>deselect input files.                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |
|               | fc                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |
|               | ALL                                                                                                                                                             | All files are considered for processing regard-<br>less of forms codes.                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |
|               | fc <sub>1</sub> /fc <sub>2</sub> /fc <sub>3</sub>                                                                                                               | fci is 2 alphanumeric characters or **,<br>indicating null forms codes. Up to three<br>forms codes or ** can be specified; files with<br>the specified forms code(s) are considered for<br>processing.                                                                                                                                                                                                                                                        |  |  |  |  |
|               | fc <sub>l</sub> -fc <sub>2</sub>                                                                                                                                | fc <sub>1</sub> is 2 alphanumeric characters or **. The<br>6-bit display code value of fc <sub>1</sub> must be less<br>than or equal to the 6-bit display code value<br>of fc <sub>2</sub> . fc <sub>2</sub> can be ** only if fc <sub>1</sub> is<br>also **. Files in the range fc <sub>1</sub> through<br>fc <sub>2</sub> are considered for processing; if fc <sub>1</sub><br>equals **, files with no forms code are (also)<br>considered for processing. |  |  |  |  |
|               |                                                                                                                                                                 | ry replaces any FC entry previously made.<br>der all files for processing regardless of forms                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |
| FM=familyname | Name of family to b<br>files on all device                                                                                                                      | e processed. Default is to process all queued<br>s in all families.                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |
|               | the inactive dayfil<br>if the active dayfi                                                                                                                      | arameter specifies the family of devices on which<br>e resides or on which the new dayfile will reside<br>le is terminated. If an active dayfile is<br>is the same family as that in which the dayfile<br>sides.                                                                                                                                                                                                                                              |  |  |  |  |
|               |                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |

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| Parameter     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FN=filename   | File name of dump or load file. Default is FN=QFILES.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| FS=x          | File size in PRUs. The value can be entered as a single file size (FS=100) or as a range of file sizes (FS=10-400). $x \leq 777777_8$ . Default is to consider all files for processing regardless of file size.                                                                                                                                                                                                                                                                             |
| FT=t          | Type of dayfile to be terminated by the DFTERM utility.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|               | t Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|               | ACCOUNT Account dayfile.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|               | DAYFILE System dayfile.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|               | ERRLOG Error log.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|               | MAINLOG Binary maintenance log.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|               | This parameter causes the FM and DN parameters to be updated to reflect the current family and device number of the dayfile specified by FT. Default is FT=DAYFILE.                                                                                                                                                                                                                                                                                                                          |
| FU=familyname | Name of family under which the queued files to be processed were<br>created. Queued files created by users of one family can reside on<br>nonremovable devices of another family. The FM parameter specifies<br>the family of devices that will be searched for queued files created<br>by users validated in the family specified by the FU parameter.<br>Default is to process queued files created by users in all families.                                                              |
| ID=id         | The 1- or 2-digit octal number (0 through 678) specifying that<br>only local batch-destined queued files assigned to that identifier<br>are to be processed. This parameter does not deselect remote batch-<br>destined files. If two identifiers, separated by a hyphen, are<br>specified (for example, ID=6-30), any queued file with an identifier<br>in the specified range (including the end points) is processed.<br>Default is to process all queued files regardless of identifier. |
| JSN=jsn .     | The 4-character job sequence name of queued files to be processed,<br>dumped, loaded, or moved. At most, five job sequence names can be<br>specified. If a job sequence name is specified more than once, it<br>is removed from the list. Default is to process all queued files<br>regardless of job sequence name.                                                                                                                                                                         |
| L=outfile     | The 1- to 7-character name of the file to receive output. Default is L=OUTPUT.                                                                                                                                                                                                                                                                                                                                                                                                               |
| LA=level      | The 1- to 7-character name that specifies the lower limit of the<br>range of access levels to process. If this parameter is specified,<br>the UA parameter must also be specified. If neither LA nor UA is<br>specified, the default is that all access levels are selected.                                                                                                                                                                                                                 |

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |  |  |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--|--|
| LD=lid         | The 3-character logical identifier of the mainframe with which the file is associated. LD=0 means process all files without LIDs. A subsequent LD entry replaces any LD entry previously made. Default is to process all queued files regardless of logical identifier.                                                                                                                                                                                                                                                     |   |  |  |
| LO=opt         | List option associated with the output file specified by the L parameter.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |  |  |
|                | opt Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |  |  |
|                | F All routing information for each file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |  |  |
|                | S Condensed listing of each selected queued file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |  |  |
| MI=id          | The 2-character machine identifier indicating the mainframe on which<br>the queued files to be processed currently reside. If MI=ALL is<br>specified, any queued file residing on any mainframe is processed.<br>The MI entry is cleared if previously specified; that is, specifying<br>two identical MI entries is the same as not specifying any at all.<br>If the MI entry is cleared on the K display, the id is not checked.<br>Default is the machine identifier of the mainframe where the utility<br>is being run. | ç |  |  |
| NAL=1evel      | QALTER can change the access level of a queued file. The new access<br>level must be within the origin type limits for the file and within<br>the device limits of the device on which the file resides. This<br>parameter is restricted to users with security administrator<br>privileges.                                                                                                                                                                                                                                |   |  |  |
| NDC=dt         | QALTER can change a print file's disposition type while the file is<br>in the queue. New disposition types that can be selected include<br>the following.                                                                                                                                                                                                                                                                                                                                                                   |   |  |  |
|                | dt Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |  |  |
|                | LP Any printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |  |  |
|                | LR 580-12 printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |  |  |
|                | LS 580-16 printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |  |  |
|                | LT 580-20 printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |  |  |
|                | NONE No device code specified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |  |  |
|                | PR Any printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |  |  |
|                | P2 512 printer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |  |  |
| NDF=familyname | New destination family name associated with selected output files.<br>This parameter is meaningful only when altering files routed to or                                                                                                                                                                                                                                                                                                                                                                                    |   |  |  |

NDF=familyname New destination family name associated with selected output files. This parameter is meaningful only when altering files routed to or changed to remote batch. A subsequent NDF entry replaces any previous NDF entry. Default is no change in destination family name.

# Parameter

# Description

| rarameter | Description                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| NEC=ex    | QALTER can change an output file's external characteristics. New external characteristics that can be selected include the following.                                                                                                                                                                                                                                                                           |  |  |
|           | For print files:                                                                                                                                                                                                                                                                                                                                                                                                |  |  |
|           | <ul> <li>A4 ASCII graphic 48-character set.</li> <li>A6 ASCII graphic 63/64-character set.</li> <li>A9 ASCII graphic 95-character set.</li> </ul>                                                                                                                                                                                                                                                               |  |  |
|           | <ul> <li>B4 BCD graphic 48-character set.</li> <li>B6 BCD graphic 63/64-character set.</li> </ul>                                                                                                                                                                                                                                                                                                               |  |  |
|           | For punch files:                                                                                                                                                                                                                                                                                                                                                                                                |  |  |
|           | AS Punch ASCII.<br>PB Punch system binary.<br>PH Punch 026 mode.<br>P8 Punch 80-column binary.                                                                                                                                                                                                                                                                                                                  |  |  |
|           | P9 Punch 029 mode.                                                                                                                                                                                                                                                                                                                                                                                              |  |  |
|           | For plot files:                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |
|           | T6 Transparent 6 bit.<br>T8 Transparent 8 bit.                                                                                                                                                                                                                                                                                                                                                                  |  |  |
| NF=n      | Decimal number of media files to skip. A media file contains all queued files that are dumped by one QDUMP operation. Each of these dumped queued files exists as a record on the media file. If two QDUMP operations are performed, the dumped queued files exist as records on two files. This parameter can be used in conjunction with the SC parameter. Default is $0$ .                                   |  |  |
| NFC=fc    | Two alphanumeric characters or <b>**</b> (null forms code) specifying the<br>new forms code associated with selected output files. The NFC entry<br>is cleared if previously specified; that is, specifying two<br>identical NFC entries is the same as not specifying any at all.<br>Default is no change in forms code.                                                                                       |  |  |
| NID=id    | The 1- or 2-digit number (0 through 678) specifying the new file<br>identifier associated with selected output files. This parameter is<br>meaningful only when altering files routed to or changed to local<br>batch. The NID entry is cleared if previously specified; that is,<br>specifying two identical NID entries is the same as not specifying<br>any at all. Default is no change in file identifier. |  |  |
| NLD=1id   | The 3-character logical identifier specifying the new logical<br>identifier associated with selected files. NLD=0 will remove the<br>LID from selected files. A subsequent NLD entry replaces any NLD<br>entry previously made. Default is no change in logical identifier.                                                                                                                                     |  |  |

| Parameter    |                                           | Description                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |
|--------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| NM=filename  | which DFTER<br>2-character<br>(AC, DF, ML | The 1- to 5-character name of the direct access permanent file on<br>which DFTERM writes the terminated dayfile. DFTERM adds a<br>2-character prefix indicating the type of dayfile being terminated<br>(AC, DF, ML, or ER). Default is automatic naming of the file by<br>DFTERM as follows:               |  |  |  |  |  |
|              |                                           | first two characters indicate the type of dayfile being minated (AC, DF, ML, or ER).                                                                                                                                                                                                                        |  |  |  |  |  |
|              | • The                                     | third character is a sequence number (A through 9).                                                                                                                                                                                                                                                         |  |  |  |  |  |
|              | • The                                     | next two characters indicate the month.                                                                                                                                                                                                                                                                     |  |  |  |  |  |
|              | • The                                     | last two characters indicate the day of the month.                                                                                                                                                                                                                                                          |  |  |  |  |  |
| NPR=p        | queue prior<br>is cleared<br>identical N  | -digit number (0 through 77778) specifying the new<br>ity associated with selected output files. The NPR entry<br>if previously specified; that is, specifying two<br>PR entries is the same as not specifying any at all.<br>no change in queue priority.                                                  |  |  |  |  |  |
| NRC=c        | count assoc<br>cleared if<br>NRC entries  | The 1- or 2-digit number (0 through 378) specifying the new repeat<br>count associated with selected output files. The NRC entry is<br>cleared if previously specified; that is, specifying two identical<br>NRC entries is the same as not specifying any at all. Default is no<br>change in repeat count. |  |  |  |  |  |
| NUN=username | This parame<br>or changed<br>specified;   | tion user name associated with selected output files.<br>ter is meaningful only when altering any files routed to<br>to remote batch. The NUN entry is cleared if previously<br>that is, specifying two identical NUN entries is the same<br>ifying any at all. Default is no change in destination         |  |  |  |  |  |
| 0P=opt       | Processing<br>utility.                    | option specifying the function to be performed by each                                                                                                                                                                                                                                                      |  |  |  |  |  |
|              | With QREC,                                | opt can be any of the following. Default is OP=RI.                                                                                                                                                                                                                                                          |  |  |  |  |  |
|              | opt                                       | Description                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |
|              | DI                                        | Selected active queued files are made inactive and the remaining active queued files are ignored.                                                                                                                                                                                                           |  |  |  |  |  |
|              | PI                                        | Selected inactive queued files are purged, and the remaining inactive queued files are ignored.                                                                                                                                                                                                             |  |  |  |  |  |
|              | RI                                        | Selected inactive queued files are activated (requeued), and the remaining inactive queued files are ignored.                                                                                                                                                                                               |  |  |  |  |  |
|              | RP                                        | Selected inactive queued files are activated (requeued),<br>and the remaining inactive queued files are purged.                                                                                                                                                                                             |  |  |  |  |  |
|              |                                           |                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |

# Parameter

# Description

With QALTER, opt specifies the destination to which the selected queued files should be changed; it can be one of the following. Default is OP=NC.

- opt Description
- BC Change to local batch.
- NC Do not change file destination.
- PR Purge files.

opt

RB Change to remote batch.

With DFTERM, opt specifies whether active or inactive dayfiles will be terminated. With QLOAD and QMOVE, opt specifies whether the loaded or moved queued files will be active or inactive. With these utilities, opt can be one of the following. Default is OP=A.

# opt Description

- A Active queues/dayfiles are specified.
- I Inactive queues/dayfiles are specified.

Processing option specifying the function to be performed.

P0=opt

#### Description

- N Only command directives are processed. The K display is available to monitor utility progress, but no K-display input is allowed. The N option is implied on all nonsystem origin jobs.
- R The dump or load file is rewound before processing begins.
- E Errored file processing status is toggled. Default conditions for queue utilities include:

| Default           | Utility |
|-------------------|---------|
| Dump file.        | QDUMP   |
| Do not load file. | QLOAD   |
| Do not move file. | QMOVE   |

- F Entries are made in FOT for inactive families and the files are queued.
- L Entries are made in the LID table for inactive LIDs and the files are queued.

| Parameter     |                                                                                                                                                                                                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                       |  |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| RB=dt         | Queued files destined for remote batch devices can be selected for processing by disposition type (dt).                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                   |  |
|               | dt                                                                                                                                                                                                                                                                                                                                           | Description                                                                                                                                                                                                                                                                                                                                       |  |
|               | ALL                                                                                                                                                                                                                                                                                                                                          | Files of all disposition types.                                                                                                                                                                                                                                                                                                                   |  |
|               | IN                                                                                                                                                                                                                                                                                                                                           | Input files.                                                                                                                                                                                                                                                                                                                                      |  |
|               | LR                                                                                                                                                                                                                                                                                                                                           | 580-12 printer files.                                                                                                                                                                                                                                                                                                                             |  |
|               | LS                                                                                                                                                                                                                                                                                                                                           | 580-16 printer files.                                                                                                                                                                                                                                                                                                                             |  |
|               | LT                                                                                                                                                                                                                                                                                                                                           | 580-20 printer files.                                                                                                                                                                                                                                                                                                                             |  |
|               | NONE                                                                                                                                                                                                                                                                                                                                         | No files.                                                                                                                                                                                                                                                                                                                                         |  |
|               | PH,PU                                                                                                                                                                                                                                                                                                                                        | Punch files.                                                                                                                                                                                                                                                                                                                                      |  |
|               | PL                                                                                                                                                                                                                                                                                                                                           | Plot files.                                                                                                                                                                                                                                                                                                                                       |  |
|               | PR                                                                                                                                                                                                                                                                                                                                           | Files that can print on any printer.                                                                                                                                                                                                                                                                                                              |  |
|               | PRINT                                                                                                                                                                                                                                                                                                                                        | All printer files.                                                                                                                                                                                                                                                                                                                                |  |
|               | P2                                                                                                                                                                                                                                                                                                                                           | 512 printer files.                                                                                                                                                                                                                                                                                                                                |  |
|               | SF                                                                                                                                                                                                                                                                                                                                           | Installation-defined special files; cannot be used with QALTER or QFTLIST.                                                                                                                                                                                                                                                                        |  |
|               | WT                                                                                                                                                                                                                                                                                                                                           | Queued files with a wait disposition.                                                                                                                                                                                                                                                                                                             |  |
|               | entry reversi<br>all dispositi<br>automatic sel<br>punch files a                                                                                                                                                                                                                                                                             | can be specified more than once, with each successive<br>and the previously established condition. By default,<br>con types are selected; so any entry actually clears the<br>section. For example, RB=PU means remote batch-destined<br>are not to be processed. However, a second RB=PU entry<br>pressing of remote batch-destined punch files. |  |
|               | types is eith<br>disposition t                                                                                                                                                                                                                                                                                                               | RB=NONE is specified, processing of all disposition<br>her enabled or disabled, respectively. If all<br>ypes are currently enabled, entering RB=ALL has no<br>wise, entering RB=NONE has no effect if all disposition<br>sabled.                                                                                                                  |  |
| SC=n          | to be skipped<br>the point on<br>parameter all                                                                                                                                                                                                                                                                                               | er of queued files (and hence records on the dump file)<br>I before the queue selection begins. Skipping begins at<br>the dump file indicated by the NF parameter. This<br>ows a restart load to begin from the last aborted queue<br>DAD. Default is SC=0.                                                                                       |  |
| TF=familyname | loaded by QLOAD. Default is SC=0.<br>Name of family for remote batch-destined files to be selected. By<br>using the TF parameter with the TUI parameter, files destined for a<br>particular remote batch terminal can be selected. Local batch-<br>destined files are not deselected by this parameter. Default is all<br>families selected. |                                                                                                                                                                                                                                                                                                                                                   |  |

| Parameter     | Description                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TP=t          | Type of files to move or dump. Default is TP=ALL.                                                                                                                                                                                                                                                                                                                                    |
| ×.            | t Description                                                                                                                                                                                                                                                                                                                                                                        |
|               | A Active files.                                                                                                                                                                                                                                                                                                                                                                      |
|               | ALL Active and inactive files.                                                                                                                                                                                                                                                                                                                                                       |
|               | I Inactive files.                                                                                                                                                                                                                                                                                                                                                                    |
| TUI=userindex | The 1- to 6-digit value plus a radix that specifies the destination<br>terminal user index for remote batch destined output files. If one<br>userindex is specified (xxxxxx), only that user index is processed.<br>If a range is specified (xxxxxx-yyyyy), all indexes in the<br>specified range are processed. If TUI=0, no terminal user index is<br>specified. Default is TUI=0. |
| UA=level      | The 1- to 7-character name that specifies the upper limit of the<br>range of access levels to process. If this parameter is specified,<br>the LA parameter must also be specified. If neither LA nor UA is<br>specified, the default is that all access levels are selected.                                                                                                         |
| UI=userindex  | User index under which queued files to be processed were created.<br>If two user indexes, separated by a hyphen, are specified (for<br>example, 75-162), all queued files created by all users having<br>indexes within this range (including the end points) are processed.<br>Default is to process all queued files regardless of user index.                                     |
| UJN=ujn       | The 1- to 7-character user job name specified on Job commands<br>associated with queued files being listed or altered. Only one name<br>can be specified. A subsequent UJN entry replaces any UJN entry<br>previously made. This parameter in conjunction with the JSN<br>parameter uniquely describes which files are to be processed.<br>Default is no UJN specified.              |
| UN=username   | Destination user name within the family specified by the DF option.<br>UN and DF must be specified together. The utility (QALTER or<br>QFTLIST) will process files belonging to the remote terminal<br>identified by these parameters. The UN entry is cleared if<br>previously specified; that is, specifying two identical UN entries<br>is the same as not specifying any at all. |
|               | NOTE                                                                                                                                                                                                                                                                                                                                                                                 |

If the currently displayed value for JSN, NFC, NID, NPR, NRC, NUN, or UN is reentered, the value for the specified parameter is cleared.

.

#### **File Preassignment**

When using the LDLIST, QDUMP, and QLOAD utilities, the dump or load file must be preassigned. This can be done by using a LABEL or an ASSIGN command. For example, the following commands can be used.

LABEL, QFILES, VSN=DMP1, D=HY.

or

ASSIGN, MS, QFILES.

If no dump file is present, QDUMP will write on a local mass storage file; LDLIST and QLOAD will attempt to read an empty file and terminate.

# Active and Inactive Queued Files

A queued file can be active or inactive. All queued files are originally active upon entering a queue. A queued file is deactivated (made inactive) when its entry is removed from the queued file table (QFT) and a corresponding entry is created in the inactive queued file table (IQFT) on the mass storage device where the queued file resides. An inactive queued file is activated when the entry from the IQFT is removed and a corresponding entry is created in the QFT. Inactive queued files are not considered for processing (other than by the queue utilities), nor do they appear on any DSD display.

Three queue file utilities can deactivate or activate queued files (QLOAD, QMOVE, and QREC). QLOAD and QMOVE each transfer queued files from either tape or disk to a disk device. Upon completion of the transfer, the utility leaves the queued files active or inactive according to the parameters you have specified. QREC does not perform any file transfer but only adjusts table entries as described in the preceding paragraph. These three utilities have uses other than deactivation and activation of queued files (refer to the description of the appropriate utility and parameters).

Queued files are also deactivated when they are recovered during a level 0 deadstart. Such files can be activated automatically by an IPRDECK entry that invokes QREC during a level 0 deadstart. Refer to section 3, Deadstart Decks, for further information on IPRDECK.

# QUEUE FILE UTILITY ROUTINES

The queue file utility routines are described next. The parameters available for each of the routines are listed in table 18-1. The K displays (if any) for each utility are shown and contain lists of applicable parameters. The output formats for each utility are also shown.

# DFLIST

DFLIST generates a printer listing of all permanent files created by the DFTERM utility.

DFLIST can be initiated only from the system console directly through this command:

X.DFLIST.

The output generated by DFLIST is the same as that produced by the LIST command available under the DFTERM utility (refer to figure 18-4).

# DFTERM

DFTERM terminates an active or inactive dayfile and retains it as a direct access permanent file on user name SYSTEMX for later interrogation or processing. When an active dayfile (that is, the current system dayfile, account dayfile, error log, or binary maintenance log) is terminated, information in the central memory buffer for that dayfile is written to mass storage to be included with the permanent file, and a new active dayfile is started. The new dayfile can reside on the same device, or a new device can be specified.

Terminating an inactive dayfile has no effect on the currently active dayfiles. Inactive dayfiles are not used by the system. Furthermore, the presence of an inactive dayfile in the system is possible only under unusual conditions. For example, if the system is deadstarted and the device that previously contained the account dayfile is turned off, a new account dayfile is started on another device. Two devices in the system now contain account dayfiles. If both devices are turned on when the system is next deadstarted, two account dayfiles are recovered. The most recent account dayfile is made active and is used by the system. The remaining account dayfile is made inactive.

The DFTERM utility can be initiated only from the system console through a K display or directly through the DFTERM command. No batch or terminal input is allowed.

When DFTERM is selected at the system console, the DFTERM K display appears on the left screen. This display contains a list of all applicable options associated with DFTERM, their default values, and a short description of each (refer to figure 18-3).

A list of the permanent dayfiles is displayed on the right screen when you enter this command:

K.LIST.

When this command is processed, the right screen K display is automatically replaced with the dayfile list K display (refer to figure 18-4). The information presented in this display is the same as that generated by the DFLIST utility.

If there are more files than can be displayed on one screen (page), a message appears at the bottom of the screen indicating that more files exist. When the LIST command is entered, a complete list of permanent dayfiles is written to the output file specified by the DFTERM L parameter; thus, a complete printer listing is provided when the DFTERM utility is terminated. If it is necessary to obtain the output listing immediately, enter this command:

K.OUT.

When this command is processed, the initial right screen K display (a list of the queue file utility commands) is automatically returned. However, if the OUT command is not entered, the original right screen K display can be returned by entering the CLEAR command.

After DFTERM processing is completed, an output file indicating the results of this processing is generated if the LIST command has been entered at any time during DFTERM operations. (Refer to figure 18-4, which shows essentially the same format.) If the LIST command was not entered, no output file is generated.

| <del>k</del>                                      | ** DAYFILE                                  | E TERMINATION ***                                                                                                                                                                                                                        |
|---------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACTIVE DAYFILES                                   | -                                           |                                                                                                                                                                                                                                          |
| TYPE                                              | FAMILY                                      | DN                                                                                                                                                                                                                                       |
| DAYFILE                                           | SYST72                                      | 1B                                                                                                                                                                                                                                       |
| ACCOUNT                                           | SYST72                                      | 1B                                                                                                                                                                                                                                       |
| ERRLOG                                            | SYST72                                      | 1B                                                                                                                                                                                                                                       |
| MAINLOG                                           | SYST72                                      | 1в                                                                                                                                                                                                                                       |
| INACTIVE DAYFIL                                   | ES-                                         |                                                                                                                                                                                                                                          |
| TYPE                                              | FAMILY                                      | DN -                                                                                                                                                                                                                                     |
| OPTIONS<br>FT = DAYFILE<br>FM = SYST72<br>DN = 1B | (DAYF)<br>FAMILY<br>DAYFI<br>DEVICE<br>FM A | PTION<br>TYPE TO BE TERMINATED.<br>FILE, ACCOUNT, ERRLOG, MAINLOG)<br>Y FOR NEW DEVICE NUMBER THAT NEW<br>ILE IS TO RESIDE ON (1-7 CHARACTERS).<br>E NUMBER OF NEW DEVICE (1-77B).<br>AND DN DENOTE RESIDENT DEVICE<br>FILE IS INACTIVE. |
|                                                   |                                             |                                                                                                                                                                                                                                          |
| OP = A                                            | ACTIVE<br>(A OR                             | E OR INACTIVE FILE TO BE TERMINATED<br>R I).                                                                                                                                                                                             |
| 0P = A<br>NM =                                    | (A OR                                       |                                                                                                                                                                                                                                          |

Figure 18-3. DFTERM Display

|     | *       | ** PERMAN | ENID | ATFILE CA | IALUG *** |          |        |
|-----|---------|-----------|------|-----------|-----------|----------|--------|
| NO. | TYPE    | FM/PN     | DN   | PFNAME    | DATE      | TIME     | LENGTH |
| 1.  | DAYFILE | SYST72    | 01   | DFA0331   | 80/03/31  | 13.35.33 | 1171   |
| 2.  | ACCOUNT | SYST72    | 01   | ACA0331   | 80/03/31  | 13.35.42 | 402    |
| 3.  | ERRLOG  | SYST72    | 01   | ERA0331   | 80/03/31  | 13.35.49 | 55     |
| 4.  | MAINLOG | SYST72    | 01   | MLA0331   | 80/03/31  | 13.35.52 | 1032   |

Figure 18-4. DFTERM Dayfile List

# LDLIST

LDLIST generates a printer listing of queued files present on a QDUMP dump tape.

Since LDLIST requires a QDUMP dump tape to be preassigned, it should be entered from DIS or in a batch or terminal job in the form

LDLIST, opt1=val1, opt2=val2, ..., optn=valn.

opt<sub>i</sub>=val<sub>i</sub> are parameters available for LDLIST.

The output generated by LDLIST is the same as that produced by QLOAD (refer to figure 18-13).

# QALTER

QALTER displays, lists, and/or alters routing and other information about active queued files. The utility selects files for processing according to criteria you specify. QALTER purges selected files from the system when you specify OP=PR.

You may alter the following information associated with the selected files.

- Access level (requires security administrator privileges).
- File destination.
- File identifier (local batch-destined files).
- Destination family (remote batch-destined files).
- Destination user name (remote batch-destined files).
- Forms code.
- Priority of a queued file.
- Repeat count.
- Disposition type.
- External characteristics.
- Destination LID.

When QALTER is selected at the system console, the QALTER K display appears on the left screen. This display contains a list of all applicable parameters associated with QALTER, their default values, and a short description of each (refer to figure 18-5). Follow this procedure to alter active queued files:

- 1. Enter the selection criteria specifying which files are to be altered (parameters FM, DN, JSN, LD, UJN, ID, DF, UN, FC, LA, UA, BC, and RB).
- 2. Ensure that the desired files are selected by inspecting the list of files produced by the K-display commands LIST or OUT (refer to figures 18-6, 18-7, and 18-8). If the file produced by OUT is to be other than OUTPUT or contain a detailed listing of the selected files, specify such with the L and/or LO parameters before entering K.OUT.
- 3. Enter the new information to be associated with the selected files (parameters OP, NDC, NEC, NLD, NDF, NUN, NID, NFC, NPR, NRC, and NAL). QALTER changes only information specified via parameter entry.
- 4. Enter K.GO. QALTER makes the requested changes, issues the message \*QALTER COMPLETE.\*, and resets the K-display parameters to their default values.
- 5. Repeat steps 1 through 4 to alter additional files, or enter K.STOP. to terminate QALTER activity.

| ***                                                                    | LIST ACTIVE QUEUED FILES *** PAGE 1 OF 2                                                                                                                                                            |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OPTIONS<br>FM = ALL<br>DN = ALL<br>JSN=                                | DESCRIPTION<br>FAMILY FOR DEVICES (1-7 CHARACTERS).<br>DEVICE NUMBER (1-77B,ALL).<br>JOB SEQUENCE NUMBER (1-4 CHARACTERS).<br>JOB SEQUENCE NUMBER WILL BE CLEARED IF<br>PREVIOUSLY ENTERED.         |
| LD =<br>UJN=<br>ID = 0B<br>67B<br>LA =<br>UA =                         | DESTINATION LID (3 CHARACTERS).<br>USER JOB NAME (1-7 CHARACTERS).<br>ID OF FILE TO LIST (0-67B).<br>LOWER SECURITY ACCESS LEVEL (1-7 CHARACTERS).<br>UPPER SECURITY ACCESS LEVEL (1-7 CHARACTERS). |
| DF =<br>UN =<br>FC =<br>L = OUTPUT<br>LO = S                           | DESTINATION FAMILY (1-7 CHARACTERS).<br>DESTINATION USER (1-7 CHARACTERS).<br>FORMS CODE.                                                                                                           |
| OP = NC<br>NAL =<br>NDC =<br>NEC =<br>NLD =<br>NDF =<br>NUN =<br>NID = | OPTION (BC,RB,NC,PR).<br>New Access Level.<br>New device code.<br>New external characteristics.                                                                                                     |
| NID =<br>NFC =<br>NPR =<br>NRC =                                       | NEW FILE IDENTIFIER (0-078).<br>NEW FORMS CODE (AA-99,**).<br>NEW PRIORITY FOR OUTPUT (0-7760B).<br>NEW REPEAT COUNT (0-37B).                                                                       |

\*\*\* LIST ACTIVE QUEUED FILES \*\*\* PAGE 2 OF 2
(DS=DT) SELECT BY FILE DESTINATION AND
DISPOSITION TYPE.
OPTION WILL BE CLEARED
S I P P P P L L L W IF PREVIOUSLY SELECTED.
F N U L R 2 R S T T \*= OPTION SELECTED.
BC \*\*\*\*\*\*\*\*
RB \*\*\*\*\*\*\*\*

Figure 18-5. QALTER/QFTLIST Left K Display

| ORD. | JSNS. D   | T LID | FAMILY | USERNAM | TUI/ID | FC | EXTCH | LENGTH |  |
|------|-----------|-------|--------|---------|--------|----|-------|--------|--|
| 1.   | AAAOS. PI | L     |        |         | 55     |    | т6    | 4      |  |
| 2.   | AAAPB. L  | s     |        |         | 22     |    | A9    | 6      |  |
| 3.   | AAAQR. L  | Р     | SYS964 | GAK1234 | 1234   | AX | LP    | 41     |  |
| 4.   | AAARB. L  | s     |        |         | 22     |    | A9    | 5      |  |
| 5.   | AAASB. L  | s     |        |         | 22     |    | A9    | 4      |  |
| 6.   | AAATR. L  | Р     | SYS964 | GAK1234 | 1234   | AX | LP    | 41     |  |
| 7.   | AAAUR. L  | P     | SYS964 | GAK1234 | 1234   | AX | LP    | 41     |  |
| 10.  | AAAVB. L  | Р     |        |         | 55     |    | LP    | 7      |  |
| 11.  | AAAWR. L  | Р     | SYS964 | GAK1234 | 1234   | AX | LP    | 41     |  |
| 12.  | AAAXB. L  | S M64 |        |         | 22     |    | A9    | 5      |  |
| 13.  | AAAYR. L  | Р     | SYS964 | GAK1234 | 1234   | AX | LP    | 41     |  |
| 16.  | AABBR. L  | P LBK | SYS964 | GAK1234 | 1234   | AX | LP    | 41     |  |
| 17.  | AABCB. L  | S     |        |         | 22     |    | A9    | 3<br>2 |  |
| 20.  | AABDB. L  | S     |        |         | 22     |    | A9    | 2      |  |

Figure 18-6. QALTER/QFTLIST LIST Command Display

| JSN         | = AADU   | ORDINAL   | = 7        |
|-------------|----------|-----------|------------|
| SERVICE     | = SYSTEM | QUEUE     | = PRINT    |
| DESTINATION |          | CREATION  |            |
| FAMILY      | =        | FAMILY    | = SYS964   |
| LID         | = M42    | LID       | = M64      |
| USER        | =        | USER      | =          |
| TUI/ID      | = 0      | USR INDX  | = 0        |
| FORMS       | = AX     | USR JOBNM | = DIS      |
| DISP CODE   | = LP     | DATE      | = 83/08/08 |
| EXT.CHR.    | = LP     | LENGTH    | = 2        |
| INT.CHR.    | = DIS    | REPEAT    | = 0        |
| RESIDENCE   |          | INTERRUPT | = NO       |
| FAMILY      | = SYST64 | PRIORITY  | = 7110     |
| DEVICE      | = 3      | ACCESS LV | =          |

Figure 18-7. QALTER/QFTLIST LIST=qft Command Display

| ALTE | R - ALTER                                                                                                      | /PURGE ACTI                            | VE QUEUED                        | FILES.                               |                                                                                                                             |                                    | 83/07/07.                            | 13.35.42.                                      | PAGE             | 1                                                                           |  |
|------|----------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------------------|------------------------------------------------|------------------|-----------------------------------------------------------------------------|--|
|      | <b>OPTION = NC</b><br><b>NEW FORMS CODE =N/A</b><br><b>NEW PRIORITY = 5103</b><br><b>NEW REPEAT COUNT =N/A</b> |                                        |                                  |                                      | NEW DESTINATION FAMILY NAME =N/A<br>NEW DESTINATION USER NAME =N/A<br>NEW DISPOSITION CODE =N/A<br>NEW DESTINATION LID =N/A |                                    |                                      | NEW EXTH<br>NEW FILI<br>NEW ACCI               |                  | ERNAL CHAR =N/A-<br>E ID =N/A-<br>ESS LEVEL =N/A-                           |  |
|      | CU F                                                                                                           | RENT<br>********                       | ******                           | D EST IN                             | AT ION<br>******                                                                                                            | ******                             | CREAT<br>********                    |                                                | *****            | RESIDENCE                                                                   |  |
| 1.   |                                                                                                                | = ICLASS2<br>= PRINT                   |                                  |                                      | FORMS =<br>DEVICE = LP<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   | USER<br>USR INDX                   | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>NO   | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 55<br>LENGTH = 13<br>ACCESS LV= |  |
| 2.   |                                                                                                                | = TIMESHR<br>= PRINT                   |                                  |                                      | FORMS =<br>DEVICE = LP<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   | USER                               | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>NO   | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 55<br>LENGTH = 5<br>ACCESS LV=  |  |
| 3.   | JSN<br>SERVICE<br>QUEUE<br>ORDINAL                                                                             | = AACJ<br>= REMOTE<br>= PRINT<br>= 6   | FAMILY<br>USER<br>TUI/ID<br>DLID | = SYS964<br>= BMS4247<br>= 4247<br>= | FORMS =<br>DEVICE = LT<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   |                                    | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>NO   | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 56<br>LENGTH = 15<br>ACCESS LV= |  |
| 4.   |                                                                                                                | = BATCH<br>= PRINT                     | FAMILY<br>USER<br>TUI/ID<br>DLID | = SYS964<br>= BMS4247<br>= 4247<br>= | FORMS =<br>DEVICE = LP<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   | FAMILY<br>USER<br>USR INDX<br>SLID | = BMS4247<br>= 4247                  | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>YES  | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 56<br>LENGTH = 13<br>ACCESS LV= |  |
| 5.   |                                                                                                                | = AACY<br>= TIMESHR<br>= PRINT<br>= 25 | USER                             | = SYS964<br>= BMS4247<br>= 4247<br>= | FORMS =<br>DEVICE = LP<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   | USER<br>USR INDX                   | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>Y ES | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 56<br>LENGTH = 5<br>ACCESS LV=  |  |
| 6.   |                                                                                                                | = ICLASS2<br>= PRINT                   |                                  | = SYS964<br>= BMS4247<br>= 4247<br>= | FORMS =<br>DEVICE = LP<br>EXT.CHK. = LP<br>INT.CHR. = DIS                                                                   | USER<br>USR INDX                   | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>Yes  | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 56<br>LENGTH = 13<br>ACCESS LV= |  |
| 7.   | J SN<br>SERVICE<br>QUEUE<br>ORDINAL                                                                            |                                        | FAMILY<br>USER<br>TUI/ID<br>DLID | = SYS964<br>= BMS4247<br>= 4247<br>= | FORMS =<br>DEVICE = LT<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   | USER<br>USR INDX                   | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>Yes  | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 56<br>LENGTH = 15<br>ACCESS LV= |  |
| 8.   | JSN<br>SERVICE<br>QUEUE<br>ORDINAL                                                                             | = PRINT                                | FAMILY<br>USER<br>TUI/ID<br>DLID | = SYS964<br>= BMS4247<br>= 4247<br>= | FORMS =<br>DEVICE = LP<br>EXT.CHR. = LP<br>INT.CHR. = DIS                                                                   | USER                               | = SYS964<br>= BMS4247<br>= 4247<br>= | USR JOBNM=<br>DATE =<br>INTERRUPT=<br>REPEAT = | 83/07/07<br>NO   | FAMILY = SYST64<br>DEVICE = 2<br>PRIORITY = 57<br>LENGTH = 13<br>ACCESS LV= |  |

Figure 18-8. QALTER Printer Listing

#### Example:

Use the QALTER utility to divert output files from the local printers to a remote terminal. The following command alters the routing of all batch output files with a forms code of AD. These files are routed to a remote terminal with family name FAMI and user name USRNAM. The BC and RB parameters explicitly disable input file selection.

QALTER, PO=N, BC=IN, RB=IN, FC=AD, OP=RB, NDF=FAM1, NUN=USERNAM.

The QFTLIST utility can be used in conjunction with QALTER to ensure that the files were properly altered. The following command generates a list of all active queued files belonging to the remote terminal with family name FAMI and user name USRNAM.

QFTLIST, PO=N, LO=F, DF=FAM1, UN=USRNAM, BC=NONE.

# QDUMP

QDUMP dumps selected queued files from a single device, a family of devices, or all devices on the system. These queued files can be dumped to a tape or disk. When active queued files are dumped, the QFT is searched to obtain the proper file. When inactive queues are dumped, the IQFT is searched. QDUMP also provides a listing of all files dumped with information about each file processed.

For a secured system, QDUMP determines the maximum range of access levels that can be dumped. If the LA and UA parameters have been used to select access level limits, these limits will be used. If no access level limits were selected, QDUMP uses the device limits determined by taking the lowest lower access limit and the highest upper access limit of all the devices to be processed. If this range of access levels is not within the system access level limits, QDUMP issues a diagnostic message.

When QDUMP is selected at the system console, the initial QDUMP K display appears on the left screen. This display contains a list of all applicable options associated with QDUMP, their default values, and a short description of each (refer to figure 18-9).

| *** Ql                                                                       | IEUE FILE DUMP *** PAGE 1 OF 2                                                                                                                                                     |
|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              | RESIDE ON FOLLOWING FAMILIES.<br>SYS964 PACKV2                                                                                                                                     |
| OPTIONS<br>MI = 64<br>FM = ALL<br>DN = ALL<br>FU = ALL<br>UI = OB<br>377777B | MACHINE ID (1-2 CHARACTERS,ALL).<br>FAMILY FOR DEVICES (1-7 CHARACTERS).<br>DEVICE NUMBER (1-77B,ALL).<br>FAMILY FOR USER INDEX (1-7 CHARACTERS).<br>USER INDEX RANGE (0-377777B). |
| DA = 83/08/03.<br>83/08/08.<br>FS = 0B<br>777777B<br>JSN=                    | DUMP DATE RANGE (YYMMDD,ALL).<br>FILE SIZE RANGE IN PRUS (O-777777B).<br>JOB SEQUENCE NUMBER (1-4 CHARACTERS).<br>JOB SEQUENCE NUMBER WILL BE CLEARED IF<br>PREVIOUSLY ENTERED.    |
| TUI= OB<br>377777B<br>TF = ALL<br>FC = ALL<br>L = OUTPUT                     | FAMILY FOR TERMINAL (1-7 CHARACTERS).<br>FORMS CODE.<br>FILE TO RECEIVE OUTPUT (1-7 CHARACTERS).<br>DUMP FILE NAME (1-7 CHARACTERS).                                               |

\*\*\* QUEUE FILE DUMP \*\*\* PAGE 2 OF 2
(DS=DT) DUMP BY FILE DESTINATION AND
DISPOSITION TYPE.
OPTION WILL BE CLEARED
S I P P P P L L L W IF PREVIOUSLY SELECTED.
F N U L R 2 R S T T \*= OPTION SELECTED.
BC \*\*\*\*\*\*\*\*
RB \*\*\*\*\*\*\*\*

Figure 18-9. Initial QDUMP Display

If the FM parameter is specified, indicating dumping of queued files from a specified family of devices, the initial QDUMP left screen K display is replaced by the secondary QDUMP K display (refer to figure 18-10). This display closely resembles the initial QDUMP display but restricts QDUMP processing to the family of devices specified. Each device in the specified family containing inactive queued files is indicated. In addition, any parameter entered for the QDUMP utility is reflected in this display. Parameters not entered remain at default values.

| *** QUI                     | EUE FILE DUMP *** PAGE 1 OF 2                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------|
| INACTIVE QUEUES<br>01 02 03 | RESIDE ON FOLLOWING DEVICES IN FAMILY - SYST64                                                         |
| OPTIONS                     | DESCRIPTION (ERRORED FILE DUMPING SET)                                                                 |
| MI = 64<br>FM = SYST64      | MACHINE ID (1-2 CHARACTERS,ALL).                                                                       |
| FM = SYST64                 | FAMILY FOR DEVICES (1-7 CHARACTERS).                                                                   |
| DN = ALL                    | DEVICE NUMBER (1-77B,ALL).                                                                             |
| FU = ALL                    | FAMILY FOR USER INDEX (1-7 CHARACTERS).                                                                |
| UI = 0B<br>377777B          | USER INDEX RANGE (O-377777B).                                                                          |
| DA = 83/08/03.<br>83/08/08. | DUMP DATE RANGE (YYMMDD,ALL).                                                                          |
| FS = OB<br>777777B          | FILE SIZE RANGE IN PRUS (O-777777B).                                                                   |
| J SN=                       | JOB SEQUENCE NUMBER (1-4 CHARACTERS).<br>JOB SEQUENCE NUMBER WILL BE CLEARED IF<br>PREVIOUSLY ENTERED. |
| LD =                        | DESTINATION LID (3 CHARACTERS).                                                                        |
| ID = OB<br>67B              | ID OF FILES TO DUMP (O-67B).                                                                           |
| LA =                        | LOWER SECURITY ACCESS LEVEL (1-7 CHARACTERS).                                                          |
| UA =                        |                                                                                                        |
| TUI= OB<br>377777B          | DESTINATION USER INDEX (0-377777B).                                                                    |
| TF = ALL                    | FAMILY FOR TERMINAL (1-7 CHARACTERS).                                                                  |
| FC = ALL                    |                                                                                                        |
| L = OUTPUT                  |                                                                                                        |
| FN = QFILES                 |                                                                                                        |
| NF = OD                     | NUMBER OF MEDIA FILES TO SKIP.                                                                         |
| TP = ALL                    | TYPE ( A-ACTIVE,I-INACTIVE,ALL).                                                                       |

\*\*\* QUEUE FILE DUMP \*\*\* PAGE 2 OF 2 (DS=DT) DUMP BY FILE DESTINATION AND DISPOSITION TYPE. OPTION WILL BE CLEARED IF PREVIOUSLY SELECTED. SIPPPPLLLW NULR2RSTT **\*** = OPTION SELECTED. F BC \* \* \* \* \* + \* \* RR \* \* \* \* +

Figure 18-10. Secondary QDUMP Display

After QDUMP processing has been completed and K-display interaction has been terminated by

# K.STOP.

an output file is generated, indicating all files dumped. Figure 18-11 is an example of this output.

| QDUMP | PRULES | 30K . |        |     |     |    |          | 3.33.19.     |                 | <b>I</b>         |
|-------|--------|-------|--------|-----|-----|----|----------|--------------|-----------------|------------------|
|       |        |       | ***    | DOW | PED | QU | EUE FILE | DISPOSITIO   |                 |                  |
| NO.   | JSNS   | MID   | FAMILY | DN  | DT  | DS | DATE     |              | ACCESS<br>LEVEL | DISPOSITION ERRO |
| 1.    | AABAB  | 64    | SYST64 | 2   | PR  | BC | 83/07/07 | · <b>.</b> 1 |                 | ACTIVE           |
| 2.    | AABBB  | 64    | SYST64 | 2   | LS  | BC | 83/07/07 | <b>.</b> 12  |                 | ACTIVE           |
| 3.    | AABDB  | 64    | SYST64 | 2   | LT  | BC | 83/07/07 | <b>.</b> 13  |                 | ACTIVE           |
| 4.    | AABGT  | 64    | SYST64 | 2   | LT  | BC | 83/07/07 | . 14         |                 | ACTIVE           |
| 5.    | AABJS  | 64    | SYST64 | 2   | PR  | BC | 83/07/07 | . 15         |                 | ACTIVE           |
| 6.    | AABOB  | 64    | SYST64 | 2   | PR  | BC | 83/07/07 | . 17         |                 | ACTIVE           |
| 7.    | AABCB  | 64    | SYST64 | 3   | PR  | RB | 83/07/07 | . 13         |                 | ACTIVE           |
| 8.    | AABE2  | 64    | SYST64 | 3   | PR  | RB | 83/07/07 | . 13         |                 | ACTIVE           |
| 9.    | AABFT  | 64    | SYST64 | 3   | PR  | RB | 83/07/07 | . 5          |                 | ACTIVE           |
| 10.   | AABHR  | 64    | SYST64 | 3   | LT  | RB | 83/07/07 | . 15         |                 | ACTIVE           |
| 11.   | AABIS  | 64    | SYST64 | 3   | LT  | BC | 83/07/07 | . 1          |                 | ACTIVE           |
| 12.   | AABK2  | 64    | SYST64 | - 3 | LT  | BC | 83/07/07 | . 1          |                 | ACTIVE           |
| 13.   | AABLB  | 64    | SYST64 | 3   | PR  | BC | 83/07/07 | . 1          |                 | ACTIVE           |
| 14.   | AABPB  | 64    | SYST64 | 3   | PR  | BC | 83/07/07 | . 20         |                 | ACTIVE           |

Figure 18-11. QDUMP Output File

QDUMP does not purge files upon completion. If you want to purge files, the following sequence of commands is recommended.

| Command      | Description                                                                                                   |  |  |  |  |  |  |  |  |  |
|--------------|---------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| QREC, OP=DI. | Dequeues the files.                                                                                           |  |  |  |  |  |  |  |  |  |
| QDUMP,TP=I.  | Dumps the inactive files. The dump file (default name = QFILES) should<br>be preassigned before this command. |  |  |  |  |  |  |  |  |  |
| QREC,OP=PI.  | Purges the files.                                                                                             |  |  |  |  |  |  |  |  |  |

### **QFTLIST**

QFTLIST displays and/or lists routing and other information about active queued files. Its operation is similar to that of QALTER, except file alteration or purging is not allowed. When QFTLIST is selected at the system console, the QFTLIST K display appears on the left screen. This display contains a list of all applicable parameters associated with QFTLIST, their default values, and a short description of each (refer to figure 18-5). The output generated by QFTLIST LIST and OUT K-display commands (both printed and right screen K display) is similar or identical to that produced by QALTER.

## Example 1:

Use the QFTLIST utility to determine what actions are necessary to get queued files processed by the RBF or BIO Subsystems. The following QFTLIST entry generates a detailed list of queued files, from which forms code, id, and other destination routing information can be determined. This information indicates what action must be taken to have the files processed.

X.QFTLIST(PO=N,LO=F)

#### Example 2:

Use the QFTLIST utility to determine what queued files are routed to a particular device. The following QFTLIST entry generates a list of all print files with forms code of AA that are routed to a 580-20 (LT) printer. Input file selection is explicitly disabled.

X.QFTLIST(PO=N,FC=AA,RB=IN,BC=NONE,BC=LT)

# QLIST

QLIST lists inactive queued files, which may include all inactive queued files in the system or a selected subset based on parameters specified when the utility is called.

The QLIST utility is not restricted to use from the system console. However, from the system console, QLIST must be called directly with the following command. No K-display interaction is available.

X.QLIST(opt1=val1,opt2=val2,...,optn=valn)

The applicable parameters associated with QLIST are the same as those used with the QREC utility, except for the OP parameter. The OP parameter is not valid with QLIST.

If all current inactive queued files are to be listed, no parameters need be specified. In this case, the format of the QLIST call is:

X.QLIST.

The output generated by QLIST is the same as that produced by the LIST command available under the QREC utility (refer to figure 18-18).

# QLOAD

QLOAD processes the dump files generated by QDUMP or other utilities using the same format. QLOAD can selectively load the queued files from these dump files. QLOAD can also list the contents of a dump file without loading any files.

For secured systems, the access level for each file selected to be loaded must be within the file's origin type limits and the file must be assigned to an appropriate mass storage device. If a selected file cannot be loaded, QLOAD issues a diagnostic message and skips that file.

When QLOAD is selected at the system console, the QLOAD K display appears on the left screen. This display contains a list of all applicable parameters associated with QLOAD, their default values, and a short description of each (refer to figure 18-12).

After QLOAD processing has been completed and K-display interaction has been terminated by

K.STOP.

an output file is generated, indicating all queued files which were contained on the dump file, and whether they were loaded or not. Figure 18-13 contains an example of this output.

|    | *** QU                            | EUE FILE LOAD *** PAGE 1 OF 2                                                                          |
|----|-----------------------------------|--------------------------------------------------------------------------------------------------------|
| 0P | TIONS                             | DESCRIPTION (ERRORED FILE LOADING NOT SET)                                                             |
| M  | I = 64                            | MACHINE ID (1-2 CHARACTERS,ALL).                                                                       |
| D  | F = ALL                           | DESTINATION FAMILY (1-7 CHARACTERS).                                                                   |
| D  | D = ALL                           | DESTINATION DEVICE (1-77B).                                                                            |
| F  | U = ALL                           | FAMILY FOR USER INDEX (1-7 CHARACTERS).                                                                |
| U  | I = OB<br>377777B                 | USER INDEX RANGE (0-377777B).                                                                          |
| D  | $A = \frac{83}{08} \frac{3}{08}.$ | LOAD DATE RANGE (YYMMDD,ALL).                                                                          |
| F  | S = OB<br>777777B                 | FILE SIZE RANGE IN PRUS (0-777777B).                                                                   |
| J  | SN=                               | JOB SEQUENCE NUMBER (1-4 CHARACTERS).<br>JOB SEQUENCE NUMBER WILL BE CLEARED IF<br>PREVIOUSLY ENTERED. |
| L  | .D =                              | DESTINATION LID (3 CHARACTERS).                                                                        |
| I  | D = OB<br>67B                     | ID OF FILES TO LOAD (0-67B).                                                                           |
| L  | .A =                              | LOWER SECURITY ACCESS LEVEL (1-7 CHARACTERS).                                                          |
| U  | A =                               | UPPER SECURITY ACCESS LEVEL (1-7 CHARACTERS).                                                          |
| т  | UI= OB<br>377777B                 | DESTINATION USER INDEX (0-377777B).                                                                    |
| т  | F = ALL                           | FAMILY FOR TERMINAL (1-7 CHARACTERS).                                                                  |
| F  | C = ALL                           | FORMS CODE.                                                                                            |
| L  | = OUTPUT                          | FILE TO RECEIVE OUTPUT (1-7 CHARACTERS).                                                               |
| F  | N = QFILES                        | LOAD FILE NAME (1-7 CHARACTERS).                                                                       |
| N  | F = OD                            | NUMBER OF MEDIA FILES TO SKIP.                                                                         |
| S  | C = OD                            | NUMBER OF QUEUED FILES TO SKIP.                                                                        |
| 0  | P = A                             | LOAD OPTION (1 CHARACTER).                                                                             |
|    | A                                 | -LOAD/ACTIVATE. I-LOAD/INACTIVATE                                                                      |

\*\*\* QUEUE FILE LOAD \*\*\* PAGE 2 OF 2
(DS=DT) LOAD BY FILE DESTINATION AND
DISPOSITION TYPE.
OPTION WILL BE CLEARED
S I P P P P L L L W IF PREVIOUSLY SELECTED.
F N U L R 2 R S T T \*= OPTION SELECTED.
BC \*\*\*\*\*\*\*
RB \*\*\*\*\*\*\*

Figure 18-12. QLOAD Display

|         |         |        |    |    |    |           | LENGTH | ACCESS              |       |
|---------|---------|--------|----|----|----|-----------|--------|---------------------|-------|
| NO. J   | SNS MIC | FAMILY | DN | DT | DS | DATE      | (PRUS) | LEVEL DISPOSITION E | RRORS |
| 1. AA   | BAB 64  | SYST64 | 3  | PR | BC | 83/07/07. | 1      | ACTIVE              |       |
| 2. AAI  | 3BB 64  | SYST64 | 2  | LS | BC | 83/07/07. | 12     | ACTIVE              |       |
| 3. AA   | 3DB 64  | SYST64 | 3  | LT | BC | 83/07/07. | 13     | ACTIVE              |       |
| 4. AA   | 3GT 64  | SYST64 | 2  | LT | BC | 83/07/07. | 14     | ACTIVE              |       |
| 5. AAE  | 3JS 64  | SYST64 | 3  | PR | BC | 83/07/07. | 15     | ACTIVE              |       |
| 6. AAE  | 30B 64  | SYST64 | 2  | PR | BC | 83/07/07. | 17     | ACTIVE              |       |
| 7. AAE  | 3CB 64  | SYST64 | 3  | PR | RB | 83/07/07. | 13     | ACTIVE              |       |
| 8. AAE  | 3E2 64  | SYST64 | 2  | PR | RB | 83/07/07. | 13     | ACTIVE              |       |
| 9. AAE  | 3FT 64  | SYST64 | 3  | PR | RB | 83/07/07. | 5      | ACTIVE              |       |
| 10. AAE | 3HR 64  | SYST64 | 2  | LT | RB | 83/07/07. | 15     | ACTIVE              |       |
| 11. AAE | BIS 64  | SYST64 | 3  | LT | BC | 83/07/07. | 1      | ACTIVE              |       |
| 12. AAE | 3K2 64  | SYST64 | 2  | LT | вс | 83/07/07. | 1      | ACTIVE              |       |
| 13. AAE | 3LB 64  | SYST64 | 3  | PR | BC | 83/07/07. | 1      | ACTIVE              |       |
| 14. AAE | 3PB 64  | SYST64 | 2  | PR | BC | 83/07/07. | 20     | ACTIVE              |       |

Figure 18-13. QLOAD Output File

#### Example:

Use the QDUMP and QLOAD utilities to dump queued files from one machine and load them onto another. The following commands dump all punch files from machine AA. The QREC utility is used to dequeue the files and then purge them, because QDUMP does not purge files.

QREC, PO=N, I=DIRCTVS, OP=DI. REWIND, DIRCTVS. LABEL, QFILES, VSN=QUEUE, MT. QDUMP, PO=N, I=DIRCTVS, TP=I. REWIND, DIRCTVS. QREC, PO=N, OP=PI, I=DIRCTVS.

File DIRCTVS is the input directive file that contains the following directives.

BC=NONE, BC=PH. RB=NONE, RB=PH.

The following commands load the files dumped by the previous QDUMP onto another machine.

LABEL,QFILES,VSN=QUEUE,MT. QLOAD,PO=N,MI=AA,OP=A,DF=ALL.

# QMOVE

QMOVE moves queued files from one disk device to another. It also produces a listing of all files moved with information about each file processed.

For secured systems, the destination device for each file selected to be moved must have access level limits that are appropriate to accept the file. If the file is being reactivated as well as moved, its access level must be within the file's origin type limits. If a selected file cannot be moved, QMOVE issues a diagnostic message and skips that file.

When QMOVE is selected at the system console, the initial QMOVE K display appears on the left screen. This display contains a list of all applicable parameters associated with QMOVE, their default values, and a short description of each (refer to figure 18-14).

If the FM parameter is specified, indicating the loading of queued files to a specified family of devices, the initial QMOVE left screen K display is replaced by the secondary QMOVE K display (refer to figure 18-15). This display closely resembles the initial QMOVE display but restricts QMOVE processing to the family of devices specified. Each device in the specified family containing inactive queued files is indicated. In addition, any parameter entered for the QMOVE utility is reflected in this display. Parameters not entered remain at default values.

\*\*\* QUEUE FILE MOVE \*\*\* PAGE 1 OF 2 INACTIVE QUEUES RESIDE ON FOLLOWING FAMILIES. SYST64 SYS964 PACKV2 OPTIONS DESCRIPTION (ERRORED FILE MOVING NOT SET) MACHINE ID (1-2 CHARACTERS,ALL). MI = 64FM = ALLFAMILY FOR DEVICES (1-7 CHARACTERS). DN = ALLDEVICE NUMBER (1-77B, ALL). DF =DESTINATION FAMILY (1-7 CHARACTERS). DD =DESTINATION DEVICE (1-77B). FU = ALLFAMILY FOR USER INDEX (1-7 CHARACTERS). UI = OBUSER INDEX RANGE (0-377777B). 377777B DA = 83/08/03. DATE RANGE (YYMMDD,ALL). 83/08/08. FS = OBFILE SIZE RANGE IN PRUS (0-777777B). 777778 JSN= JOB SEQUENCE NUMBER (1-4 CHARACTERS). JOB SEQUENCE NUMBER WILL BE CLEARED IF PREVIOUSLY ENTERED. DESTINATION LID (3 CHARACTERS). LD =ID = OBID OF FILE TO MOVE (0-67B). 67B LA =LOWER SECURITY ACCESS LEVEL (1-7 CHARACTERS). UA =UPPER SECURITY ACCESS LEVEL (1-7 CHARACTERS). TUI= OB DESTINATION USER INDEX (0-377777B). 377777B TF = ALLFAMILY FOR TERMINAL (1-7 CHARACTERS). FC = ALLFORMS CODE. L = OUTPUT FILE TO RECEIVE OUTPUT (1-7 CHARACTERS). TP = ALLTYPE (A-ACTIVE, I-INACTIVE, ALL). OP = AOPTION (A-LEAVE ACTIVE, I-LEAVE INACTIVE).

\*\*\* QUEUE FILE MOVE \*\*\* PAGE 2 OF 2
(DS=DT) MOVE BY FILE DESTINATION AND
DISPOSITION TYPE.
OPTION WILL BE CLEARED
S I P P P P L L L W IF PREVIOUSLY SELECTED.
F N U L R 2 R S T T \*= OPTION SELECTED.
BC \* \* \* \* \* \* \* \* \* \*
RB \* \* \* \* \* \* \* \*

Figure 18-14. Initial QMOVE Display

| O1 02 03<br>OPTIONS DESCRIPTION (ERRORED FILE MOVI<br>MI = 64 MACHINE ID (1-2 CHARACTERS,ALL).<br>FM = SYST64 FAMILY FOR DEVICES (1-7 CHARACTERS<br>DN = ALL DEVICE NUMBER (1-77B, ALL).<br>DF = DESTINATION FAMILY (1-7 CHARACTERS<br>DD = DESTINATION DEVICE (1-77B).<br>FU = ALL FAMILY FOR USER INDEX (1-7 CHARACT<br>UI = OB USER INDEX RANGE (0-377777B).<br>377777B<br>DA = 83/08/03. DATE RANGE (YYMMDD,ALL).<br>83/08/08.<br>FS = OB FILE SIZE RANGE IN PRUS (0-777777B)<br>JSN= JOB SEQUENCE NUMBER (1-4 CHARACTER |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| MI = 64MACHINE ID (1-2 CHARACTERS,ALL).FM = SYST64FAMILY FOR DEVICES (1-7 CHARACTERS)DN = ALLDEVICE NUMBER (1-77B, ALL).DF =DESTINATION FAMILY (1-7 CHARACTERS)DD =DESTINATION DEVICE (1-77B).FU = ALLFAMILY FOR USER INDEX (1-7 CHARACTERS)UI = OBUSER INDEX RANGE (0-377777B).377777BDATE RANGE (YYMMDD,ALL).83/08/08.FILE SIZE RANGE IN PRUS (0-777777B)                                                                                                                                                                  |             |
| FM = SYST64FAMILY FOR DEVICES (1-7 CHARACTERSDN = ALLDEVICE NUMBER (1-77B, ALL).DF =DESTINATION FAMILY (1-7 CHARACTERSDD =DESTINATION DEVICE (1-77B).FU = ALLFAMILY FOR USER INDEX (1-7 CHARACTUI = OBUSER INDEX RANGE (0-377777B).377777BJATE RANGE (YYMMDD,ALL).83/08/08.FILE SIZE RANGE IN PRUS (0-777777B)FS = OBFILE SIZE RANGE IN PRUS (0-777777B)                                                                                                                                                                     | NG NOT SET) |
| DN = ALL<br>DF = DESTINATION FAMILY (1-7 CHARACTERS<br>DD = DESTINATION DEVICE (1-77B).<br>FU = ALL FAMILY FOR USER INDEX (1-7 CHARACT<br>UI = OB USER INDEX RANGE (0-377777B).<br>377777B<br>DA = 83/08/03. DATE RANGE (YYMMDD,ALL).<br>83/08/08.<br>FS = OB FILE SIZE RANGE IN PRUS (0-777777B)                                                                                                                                                                                                                            |             |
| DF = DESTINATION FAMILY (1-7 CHARACTERS<br>DD = DESTINATION DEVICE (1-77B).<br>FU = ALL FAMILY FOR USER INDEX (1-7 CHARACT<br>UI = OB USER INDEX RANGE (0-377777B).<br>377777B<br>DA = 83/08/03. DATE RANGE (YYMMDD,ALL).<br>83/08/08.<br>FS = OB FILE SIZE RANGE IN PRUS (0-777777B)<br>777777B                                                                                                                                                                                                                             | ).          |
| DD =       DESTINATION DEVICE (1-77B).         FU = ALL       FAMILY FOR USER INDEX (1-7 CHARACT         UI = OB       USER INDEX RANGE (0-377777B).         377777B       DA = 83/08/03.         DA = 83/08/03.       DATE RANGE (YYMMDD,ALL).         83/08/08.       FILE SIZE RANGE IN PRUS (0-777777B)                                                                                                                                                                                                                  |             |
| FU = ALL       FAMILY FOR USER INDEX (1-7 CHARACT         UI = OB       USER INDEX RANGE (0-377777B).         377777B       DA = 83/08/03.         DA = 83/08/03.       DATE RANGE (YYMMDD,ALL).         83/08/08.       FILE SIZE RANGE IN PRUS (0-777777B)         77777B       FILE SIZE RANGE IN PRUS (0-777777B)                                                                                                                                                                                                        | ).          |
| UI = OB USER INDEX RANGE (0-377777B).<br>377777B<br>DA = 83/08/03. DATE RANGE (YYMMDD,ALL).<br>83/08/08.<br>FS = OB FILE SIZE RANGE IN PRUS (0-777777B<br>777777B                                                                                                                                                                                                                                                                                                                                                            |             |
| 377777B<br>DA = 83/08/03. DATE RANGE (YYMMDD,ALL).<br>83/08/08.<br>FS = OB FILE SIZE RANGE IN PRUS (0-777777B<br>777777B                                                                                                                                                                                                                                                                                                                                                                                                     | ERS).       |
| DA = 83/08/03. DATE RANGE (YYMMDD,ALL).<br>83/08/08.<br>FS = OB FILE SIZE RANGE IN PRUS (0-777777B<br>777777B                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| 777777B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ).          |
| JOB SEQUENCE NUMBER WILL BE CLEA<br>PREVIOUSLY ENTERED.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |
| LD = DESTINATION LID (3 CHARACTERS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |
| $ID = OB \qquad ID OF FILE TO MOVE (O-67B).$ 67B                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |
| LA = LOWER SECURITY ACCESS LEVEL (1-7 C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | HARACTERS). |
| UA = UPPER SECURITY ACCESS LEVEL (1-7 C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | HARACTERS). |
| TUI= OB DESTINATION USER INDEX (0-377777B)<br>377777B                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | •           |
| TF = ALL FAMILY FOR TERMINAL (1-7 CHARACTER)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | s).         |
| FC = ALL FORMS CODE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |
| L = OUTPUT FILE TO RECEIVE OUTPUT (1-7 CHARAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TERS).      |
| TP = ALL TYPE (A-ACTIVE,I-INACTIVE,ALL).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |
| OP = A OPTION (A-LEAVE ACTIVE, I-LEAVE IN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ACTIVES     |

\*\*\* QUEUE FILE MOVE \*\*\* PAGE 2 OF 2 (DS=DT) MOVE BY FILE DESTINATION AND DISPOSITION TYPE. OPTION WILL BE CLEARED SIPPPPLLLW IF PREVIOUSLY SELECTED. FNULR2RSTT **\*** = OPTION SELECTED. BC \* \* \* \* \* \* \* \* \* \* RB \* \* \* \* \* \* \* \* \* \*

Figure 18-15. Secondary QMOVE Display

-

.

After QMOVE processing has been completed and K-display interaction has been terminated by

K.STOP.

an output file is generated, indicating all files moved. Figure 18-16 contains an example of this output.

|     |      |                   | ***    | MOV        | ED  | QUE! | UE FILE | DI  | SPOSITION | ***     |             |       |
|-----|------|-------------------|--------|------------|-----|------|---------|-----|-----------|---------|-------------|-------|
| AC  | TIVE | FILES             | MOVED  | T0 F/      | AMI | LY   | SYST64  | DE  | VICE 2 A  | ND LEFT |             |       |
| NO. | JSN  | IS MID            | FAMILY | DN         | DT  | DS   | DATE    |     | (PRUS)    | LEVEL   | DISPOSITION | ERROR |
| 1.  | AABC | :в 64             | SYST64 | ⊦ 3        | PR  | RB   | 83/07/  | 07. | 13        |         |             |       |
| 2.  | AABE | :2 64             | SYST64 | <b>⊦</b> 3 | PR  | RB   | 83/07/0 | 07. | 13        | i .     |             |       |
| 3.  | AABF | т 64 <sup>:</sup> | SYST64 | , <b>3</b> | PR  | RB   | 83/07/0 | 37. | 5         |         |             |       |
|     |      |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |
| 5.  | AABJ | is 64             | SYST64 | - 3        | LT  | BC   | 83/07/0 | 37. | 1         |         |             |       |
|     |      |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |
|     |      |                   |        |            |     |      | 83/07/0 |     | -         |         |             |       |
|     | AABP |                   |        |            |     |      | 83/07/0 |     | -         |         |             |       |
| 9.  | AABQ |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |
| 10. | AABS |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |
| 11. | AABU |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |
| 12. | AABW |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |
|     |      |                   |        | -          |     |      | 83/07/0 |     |           |         |             |       |
|     |      |                   |        |            |     |      | 83/07/0 |     | -         |         |             |       |
|     |      |                   |        |            |     |      | 83/07/0 |     |           |         |             |       |

Figure 18-16. QMOVE Output File

1

### Example 1:

If there are inactive queued files residing on a removable device, you can activate these files but must first move them to a nonremovable device. This example shows how to use the QMOVE utility to move queued files from the removable device with family name SYSTEM and device number 45 to the nonremovable device with family name FAM1 and device number 5. The following entries are made from DSD.

```
X.QFSP.

K,jsn. (jsn is the job sequence name of QFSP)

K.QMOVE.

K.FM=SYSTEM,DN=45.

K.DF=FAM1,DD=5.

K.OP=A. (the moved files are active)

K.GO,STOP.
```

Example 2:

This example exhibits the relationships among the ID, TF/TUI, and FC parameters. (Refer to the descriptions of these parameters for the types of files affected by them.) The following command moves all local batch-destined output files with ID=6 and all remote batch-destined output files to device 3 in family SYS. The BC and RB parameters explicitly disable input file processing.

QMOVE, PO=N, DF=SYS, DD=3, ID=6, BC=IN, RB=IN.

The following command performs the same function as the previous command except that no remote batch files are moved.

QMOVE, PO=N, DF=SYS, DD=3, ID=6, BC=IN, RB=NONE.

# QREC

QREC deactivates or activates selected queued files and purges selected inactive queued files.

For secured systems, the access level for any file selected to be reactivated must be within the file's origin type limits. If a selected file cannot be processed, QREC issues a diagnostic message and skips that file.

When QREC is selected at the system console, the initial QREC K display appears on the left screen. This display contains a list of all applicable parameters associated with QREC, their default values, and a short description of each (refer to figure 18-17).

A complete list of current inactive queued files is displayed on the right screen when you enter this command:

K.LIST.

When this command is processed, the right screen K display is automatically replaced with the inactive queues K display (refer to figure 18-18). The information presented in this display is the same as that generated by the QLIST utility. The list of files displayed is also written to the output file specified by the QREC L parameter.

\*\*\* QUEUED FILE REQUEUING \*\*\* PAGE 1 OF 2 INACTIVE QUEUES RESIDE ON FOLLOWING FAMILIES. SYST64 SYS964 PACKV2 OPTIONS DESCRIPTION MACHINE ID (1-2 CHARACTERS,ALL). MI = 64FAMILY FOR DEVICES (1-7 CHARACTERS). FM = ALL DN = ALLDEVICE NUMBER (1-77B, ALL). FAMILY FOR USER INDEX (1-7 CHARACTERS). FU = ALLUI = OBUSER INDEX RANGE (0-377777B). 377777В DA = 83/08/03. QUEUED DATE RANGE (YYMMDD, ALL). 83/08/08. FILE SIZE RANGE IN PRUS (0-777777B). FS = OB777777B JSN= JOB SEQUENCE NUMBER (1-4 CHARACTERS). JOB SEQUENCE NUMBER WILL BE CLEARED IF PREVIOUSLY ENTERED. LD =DESTINATION LID (3 CHARACTERS). ID = OBID OF FILES TO PROCESS (0-67B). 67B LA =LOWER SECURITY ACCESS LEVEL (1-7 CHARACTERS). UPPER SECURITY ACCESS LEVEL (1-7 CHARACTERS). UA = TUI= OB DESTINATION TUI (0-377777B). 377777B TF = ALLFAMILY FOR TERMINAL (1-7 CHARACTERS). FC = ALLFORMS CODE. L = OUTPUT FILE TO RECEIVE OUTPUT (1-7 CHARACTERS). OP = RIPROCESS OPTION (2 CHARACTERS). PROCESS OPTION (RP/RI/PI/DI).

\*\*\* QUEUED FILE REQUEUING \*\*\* PAGE 2 OF 2
(DS=DT) REQUEUE BY FILE DESTINATION AND
DISPOSITION TYPE.
OPTION WILL BE CLEARED
S I P P P L L L W IF PREVIOUSLY SELECTED.
F N U L R 2 R S T T \*= OPTION SELECTED.
BC \* \* \* \* \* \* \* \* \* \*
RB \* \* \* \* \* \* \* \*

Figure 18-17. Initial QREC Display

|     |       |     |        |    |    |    |           | LENGTH | ACCESS |
|-----|-------|-----|--------|----|----|----|-----------|--------|--------|
| NO. | JSNS  | MID | FAMILY | DN | DT | DS | DATE      | (PRUS) | LEVEL  |
| 1.  | AABEB | 64  | SYST64 | 2  | LS | BC | 83/08/08. | 5      |        |
| 2.  | AABFR | 64  | SYST64 | 2  | PR | RB | 83/08/08. | 41     |        |
| 3.  | AABG1 | 64  | SYST64 | 2  | PR | RB | 83/08/08. | 41     |        |
| 4.  | AABH2 | 64  | SYST64 | 2  | LS | BC | 83/08/08. | 5      |        |
| 5.  | AABIR | 64  | SYST64 | 2  | PR | RB | 83/08/08. | 41     |        |
| 6.  | AABJ2 | 64  | SYST64 | 2  | PR | BC | 83/08/08. | 7      |        |
| 7.  | AABKR | 64  | SYST64 | 2  | PR | RB | 83/08/08. | 41     |        |
| 8.  | AABLR | 64  | SYST64 | 2  | PR | RB | 83/08/08. | 41     |        |
| 9.  | AABM2 | 64  | SYST64 | 2  | LS | BC | 83/08/08. | 4      |        |
| 10. | AABN2 | 64  | SYST64 | 2  | LS | BC | 83/08/08. | 5      |        |
| 11. | AAB01 | 64  | SYST64 | 2  | PR | RB | 83/08/08. | 41     |        |
| 12. | AABPB | 64  | SYST64 | 2  | LS | BC | 83/08/08. | 6      |        |
| 13. | AABDB | 64  | SYST64 | 2  | LS | BC | 83/08/08. | 2      |        |

Figure 18-18. Inactive Queues List

If the FM parameter is specified, indicating processing of queued files for a specified family of devices, the initial QREC left screen K display is replaced by the secondary QREC K display (refer to figure 18-19). This display closely resembles the initial QREC display but restricts QREC processing to the family of devices specified. Each device in the specified family containing inactive queued files is indicated. In addition, any parameter entered for the QREC utility is reflected in this display. Parameters not entered remain at default values.

After QREC processing has been completed and K-display interaction has been terminated by

K.STOP.

an output file is generated, indicating the disposition of all queued files processed. Figure 18-20 is an example of this output.

Example 1:

If the QFT is becoming full, you can enter QREC from DSD to dequeue active queued files and free up QFT space. This QREC entry dequeues all queued files:

X.QREC(OP=DI,PO=N)

If RBF is not active, you are still able to dequeue remote batch files by using QREC. This QREC entry dequeues all remote batch files:

X.QREC(OP=DI, BC=NONE, PO=N)

If these are queued files that previously had been dequeued, you can activate these files with QREC. This QREC entry requeues all inactive queued files:

X.QREC(OP=RI,PO=N)

\*\*\* QUEUED FILE REQUEUING \*\*\* PAGE 1 OF 2 INACTIVE QUEUES RESIDE ON FOLLOWING DEVICES IN FAMILY - SYS964 40 OPTIONS DESCRIPTION MI = 64MACHINE ID (1-2 CHARACTERS, ALL). FM = SYS964FAMILY FOR DEVICES (1-7 CHARACTERS). DN = ALLDEVICE NUMBER (1-77B, ALL). FU = ALLFAMILY FOR USER INDEX (1-7 CHARACTERS). UI = OBUSER INDEX RANGE (0-377777B). 377777B DA = 83/08/03.QUEUED DATE RANGE (YYMMDD, ALL). 83/08/08. FS = OBFILE SIZE RANGE IN PRUS (0-777777B). 77777B JSN= JOB SEQUENCE NUMBER (1-4 CHARACTERS). JOB SEQUENCE NUMBER WILL BE CLEARED IF PREVIOUSLY ENTERED. LD =DESTINATION LID (3 CHARACTERS). ID = OBID OF FILES TO PROCESS (0-67B). 67B LA =LOWER SECURITY ACCESS LEVEL (1-7 CHARACTERS). UA = UPPER SECURITY ACCESS LEVEL (1-7 CHARACTERS). TUI= OB DESTINATION TUI (0-377777B). 377777В TF = ALLFAMILY FOR TERMINAL (1-7 CHARACTERS). FC = ALLFORMS CODE. L = OUTPUT FILE TO RECEIVE OUTPUT (1-7 CHARACTERS). OP = RIPROCESS OPTION (2 CHARACTERS). PROCESS OPTION (RP/RI/PI/DI).

\*\*\* QUEUED FILE REQUEUING \*\*\* PAGE 2 OF 2
(DS= DT) REQUEUE BY FILE DESTINATION AND
DISPOSITION TYPE.
OPTION WILL BE CLEARED
S I P P P P L L L W IF PREVIOUSLY SELECTED.
F N U L R 2 R S T T \*= OPTION SELECTED.
BC \*\*\*\*\*\*\*
RB \*\*\*\*\*\*\*

Figure 18-19. Secondary QREC Display

| QREC/Q |       |     |        | *: | ** |    | /07/07. 13.<br>UE DISPOSIT |        |                   |
|--------|-------|-----|--------|----|----|----|----------------------------|--------|-------------------|
|        |       |     |        |    |    |    |                            |        | ACCESS            |
| NO.    | JSNS  | MID | FAMILY | ÐN | DT | DS | DATE                       | (PRUS) | LEVEL DISPOSITION |
| 1.     | AABAB | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 1      | ACTIVATE          |
| 2.     | AABBB | 64  | SYST64 | 2  | LS | BC | 83/07/07.                  | 12     | ACTIVATE          |
| 3.     | AABE2 | 64  | SYST64 | 2  | PR | RB | 83/07/07.                  | 13     | ACTIVATE          |
| 4.     | AABDB | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 13     | ACTIVATE          |
| 5.     | AABFT | 64  | SYST64 | 2  | PR | RB | 83/07/07.                  | 5      | ACTIVATE          |
| 6.     | AABHR | 64  | SYST64 | 2  | LT | RB | 83/07/07.                  | 15     | ACTIVATE          |
| 7.     | AABGT | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 14     | ACTIVATE          |
| 8.     | AABIS | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 1      | ACTIVATE          |
| 9.     | AABK2 | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 1      | ACTIVATE          |
| 10.    | AABJS | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 15     | ACTIVATE          |
| 11.    | AABLB | 64  | SYST64 | 2  | PR | вс | 83/07/07.                  | 1      | ACTIVATE          |
| 12.    | AABPB |     | SYST64 | 2  | PR | BC | 83/07/07.                  | 20     | ACTIVATE          |
| 13.    | AABOB | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 17     | ACTIVATE          |
| 14.    | AABQB | 64  | SYST64 | 2  | PR | вс | 83/07/07.                  | 2      | ACTIVATE          |
| 15.    | AABSB | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 13     | ACTIVATE          |
| 16.    | AABRB | 64  | SYST64 |    |    |    | 83/07/07.                  | 12     | ACTIVATE          |
| 17.    | AABUS | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 15     | ACTIVATE          |
| 18.    | AABTT | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 14     | ACTIVATE          |
| 19.    | AABWB | 64  | SYST64 | 2  | PR | RB | 83/07/07.                  | 13     | ACTIVATE          |
| 20.    | AABVB | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 17     | ACTIVATE          |
| 21.    | AABYT | 64  | SYST64 | 2  | PR | RB | 83/07/07.                  | 5      | ACTIVATE          |
| 22.    | AABX2 | 64  | SYST64 | 2  | PR | RB | 83/07/07.                  | 13     | ACTIVATE          |
| 23.    | AACAS | 64  | SYST64 | 2  | LT | BC | 83/07/07.                  | 2      | ACTIVATE          |
| 24.    | AABZR | 64  | SYST64 | 2  | LT | RB | 83/07/07.                  | 15     | ACTIVATE          |
| 25.    | AACCB | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 2      | ACTIVATE          |
| 26.    | AACB2 | 64  | SYST64 | 2  | LT | вс | 83/07/07.                  | 2      | ACTIVATE          |
| 27.    | AACDB | 64  | SYST64 | 2  | PR | BC | 83/07/07.                  | 20     | ACTIVATE          |
| 28.    | AABCB | 64  | SYST64 |    |    |    | 83/07/07.                  | 13     | ACTIVATE          |

Figure 18-20. QREC Output File

Example 2:

Purge all queued files (active and inactive) on a particular device by using QREC either with or without an input directive file. The first method involves two calls to QREC. The first QREC call dequeues (makes inactive) all active files on the device with family name SYSTEM and device number 1, and the second QREC call purges all inactive (and hence all) queued files on that same device.

QREC,PO=N,OP=DI,FM=SYSTEM,DN=1. QREC,PO=N,OP=PI,FM=SYSTEM,DN=1.

The second method involves only one command call to QREC to perform the same function as the first method:

QREC,I=DIR.

File DIR is the input directive file that contains the following directives.

```
OP=DI,FM=SYSTEM,DN=1.
GO.
OP=PI,FM=SYSTEM,DN=1.
GO,STOP.
```

Example 3:

This example exhibits the relationships among the ID, TF/TUI, and FC parameters. It is important to observe the following restrictions regarding these parameters and QREC.

- ID pertains only to local batch-destined output files.
- TF/TUI pertain only to remote batch-destined output files.
- FC pertains to all output files.
- When you specify the OP parameter, all queued files are processed unless the ID, TF/TUI, and FC parameters restrict output file selection or the BC or RB parameter restricts input or output file selection.

The following command activates all local batch-destined output files with ID=6 and FC=AD, all remote batch-destined files with TF=SYSTAA, TUI=3751 and FC=AD, and all input files.

QREC, PO=N, OP=RI, ID=6, TF=SYSTAA, TUI=3751, FC=AD.

The following command performs the same functions as the previous command except that no input files are processed.

QREC, PO=N, OP=RI, ID=6, TF=SYSTAA, TUI=3751, FC=AD, BC=IN, RB=IN.

# **DAYFILE DUMPING UTILITIES**

The dayfile dumping utilities (AFD, DFD, ELD, GETLOG, MAINLOG) write all or selected parts of the account dayfile, system dayfile, error log, or binary maintenance log to a file. AFD, DFD, and ELD produce a listing (output) file. GETLOG writes the error log, binary maintenance log, and an image of the equipment status table to files. GETLOG is used to provide input to the Hardware Performance Analyzer (HPA). MAINLOG produces its output in a binary format. A job using any of these utilities must be of system origin, or you must have system origin privileges and the system must be in debug mode. The following format is used to call the dayfile dumping utilities.

utility,L=listfile,FR=string,OP=op,PD=pd,PL=p1,I=infile,B=binfile,E=estfile.

or

utility, listfile, string, op, pd, pl, infile, binfile, estfile.

# Description

Parameter utility

| Utility called to perform the dayfile dum |
|-------------------------------------------|
|-------------------------------------------|

| <u>Utility</u> | Description                                    |
|----------------|------------------------------------------------|
| AFD            | Dump account dayfile.                          |
| DFD            | Dump system dayfile.                           |
| ELD            | Dump error log.                                |
| GETLOG         | Dump error log, binary maintenance log, image. |
| MAINLOG        | Dump binary maintenance log.                   |

L=listfile Output file containing the dayfile dump produced by AFD, DFD, or ELD. For GETLOG, listfile is the file containing the error log. The utility also places diagnostic messages in this file when various error conditions occur. These messages begin with NOTICE\*\*\* to distinguish them from the lines of the dayfile being processed; they are described in the NOS 2 Operations Handbook.

The default name of listfile is OUTPUT for AFD, DFD, and ELD. The default name is ERR for GETLOG. If L=0 is specified, no file is written. L=listfile is not used with MAINLOG. The utility paginates listfile if it is OUTPUT or if print density and page length are specified.

FR=string Search string for selective dayfile dumping. The utility searches the dayfile for this string in the starting position of the field specified by the OP=op parameter.

OP=op Dump option. If neither FR=string nor the OP dump option is specified, default is OP=F for nonterminal output files. For terminal output files, the default is OP=I. If FR is specified but OP is not, default is OP=M.

### Description

F Full dayfile dump is taken.

<u>op</u>

- I Incremental dump is taken. The dayfile is dumped starting from the point of the last dayfile dump. AFD does not process the I option when executed within a job with system origin privileges that is not system origin.
- J The job sequence name field in the dayfile is searched for the string specified by FR=string. The dump begins from that point.
- M The message field in the dayfile is searched for the string specified by FR=string. The dump begins from that point. OP=M cannot be used with MAINLOG.
- P Incremental dump is taken. The dayfile is dumped starting from the point of the last dayfile dump with this job name.
- T The time field in the dayfile is searched for the string specified by FR=string. The dump begins from that point.

and EST

| PL=pl    |             | in pl lines per page. Default is based on<br>ties. PL cannot be used with MAINLOG.                                                     | n the following |
|----------|-------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------|
|          | pd          | Default pl                                                                                                                             |                 |
|          | 3           | 30                                                                                                                                     |                 |
|          | 4           | 40                                                                                                                                     |                 |
|          | 6           | 60                                                                                                                                     |                 |
|          | 8           | 80                                                                                                                                     |                 |
| I=infile | GETLOG, ind | , terminated dayfile is to be used for inpution is an attached terminated binary mainter the utility uses the active dayfile for input | enance log. If  |

PD=6. PD cannot be used with MAINLOG.

Description

Print density in pd lines per inch (3, 4, 6, or 8). Default is

B=binfile File on which GETLOG and MAINLOG write the binary maintenance log. These utilities write binfile with W-type records having C-type blocking (refer to the CYBER Record Manager Basic Access Methods Reference Manual for further information on record types and record blocking). GETLOG and MAINLOG assume B=BML if this parameter is omitted. If B=0 is specified, no file is written.

E=estfile File on which GETLOG writes an image of the equipment status table. GETLOG assumes E=EST if this parameter is omitted. If E=O is specified, no file is written.

Parameter

PD=pd

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SYSEDIT

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# SYSEDIT

After the system is loaded, you can use the SYSEDIT command to modify the system library. A job containing a SYSEDIT command must either be a system origin job, or you must be validated for system origin privileges and the system must be in debug mode. In addition, to prevent unauthorized modification of the operating system on a secured system, SYSEDIT will be allowed only from jobs with security administrator privileges.

# NOTE

Using SYSEDIT in a production environment may cause unpredictable results and is not recommended. The system should be idle to ensure predictable results.

The format of the command is:

SYSEDIT, p<sub>1</sub>, p<sub>2</sub>,..., p<sub>n</sub>. directive<sub>1</sub>, directive<sub>2</sub>,..., directive<sub>n</sub>

Pi is either a keyword or a keyword equated to a value.

| <sup>p</sup> i | Description                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B=repfile      | Replacement records are on file repfile.                                                                                                                                      |
| В              | Same as B=LGO.                                                                                                                                                                |
| B=0            | No replacement file.                                                                                                                                                          |
| B omitted      | Same as B=LGO.                                                                                                                                                                |
| С              | Checkpoint of the system follows SYSEDIT. This parameter is required if changes made to the system library are to be recovered during a level 3 recovery deadstart.           |
| C omitted      | No checkpoint is performed unless the system was generated using the alternate system library residency feature; in that case, the check-point automatically follows SYSEDIT. |
| I=infile       | Directive input is on file infile.                                                                                                                                            |
| I              | Same as I=INPUT.                                                                                                                                                              |
| I=0            | No directive input.                                                                                                                                                           |
| I omitted      | Same as I=INPUT.                                                                                                                                                              |
| L=outfile      | List output is on file outfile.                                                                                                                                               |
| L              | Same as L=OUTPUT.                                                                                                                                                             |

19-1

## Description

L=0 No list output. L omitted Same as L=0. SYSEDIT does not abort if the system file is busy. Execution continues NA when the system file is no longer busy. Restoration is made to copy n of the system. The system copy number is R=n printed on the output listing. R Restoration is made to initial deadstart system. R=0 No system file restoration. R omitted Same as R=0. Z Directive input follows the terminator on the command. The I option is ignored. Z omitted The system uses the I option for directive input.

# NOTE

If the Z option is specified, a terminator must not be placed after the input directives.

# DIRECTIVES

P<sub>i</sub>

Discussed next are input directives to SYSEDIT. The directives \*CM, \*MS, \*AD, \*PROC, \*SC, \*FL, and \*/ can be placed on LIBDECK. A list of valid record types follows the directive descriptions.

# \*CM DIRECTIVE

The \*CM directive specifies the system library routines that are to reside in central memory resident (CMR). These routines will reside in the resident peripheral library (RPL) and resident central library (RCL).

The format of the directive is:

 $CM, ty_1/rec_1, ty_2/rec_2, \dots, ty_n/rec_n$ 

Parameter

## Description

ty<sub>i</sub>/rec<sub>i</sub> Record type and record name of the routine.

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Central memory is the most accessible of all storage devices for PP programs. The following programs will automatically reside in CMR.

- Mass storage drivers.
- Programs specified in the internal tables of SLL (SYSEDIT service routine), such as 1DD and ODF.
- Some DSD overlays, such as the 9Cx overlays. A site may make additional DSD overlays reside in CMR.

In addition, it is suggested that high usage PP programs (such as lMT, lMS, and PFM) reside in CMR.

Any addition to central memory allows less space for user jobs.

REL type records cannot reside in CMR.

## \*MS DIRECTIVE

The \*MS directive identifies which system library routines will reside on the system device. It is the default residence for routines; any routine not specified as \*CM will automatically reside on the system device, even if \*MS is not entered in the LIBDECK.

The format of the directive is:

\*MS,ty1/rec1,ty2/rec2,...,tyn/recn

Parameter

#### Description

ty<sub>i</sub>/rec<sub>i</sub> Record type and record name of the routine.

## **\*AD DIRECTIVE**

The \*AD directive places copies of specific system library routines on particular mass storage devices so that they will be accessed from a device other than the system device. For example, it is advantageous to:

- Place frequently used system library routines in extended memory for faster access than is possible from the system device. Notice that CPU programs residing in extended memory can be accessed faster than CPU programs residing in central memory.
- Place PP routines on a mass storage device that has better latency than does the system device.

Once a routine is on an alternate system device, it is accessed from that device instead of from the system device (\*MS LIBDECK entries), except in the following cases of error recovery.

- If there is an unrecoverable error for a PP routine on an alternate system device, all of the PP routines will subsequently be accessed from the system device instead of from any of the alternate system devices.
- If there is an unrecoverable error for a CPU, ABS, or OVL routine on an alternate system device, only that routine will subsequently be accessed from the system device.
- If there is an unrecoverable error for an REL CPU routine, the alternate system device must be turned off by the operator to prevent further access to the routine. In this case, the system copy will be used for backup. The alternate system device is not used for loads.

The devices that are to be used as alternate system devices are specified with the ASR entry in the EQPDECK (refer to section 3, Deadstart Decks); the routines that are to reside on each alternate system device are specified in LIBDECK.

The format of the directive is:

\*AD,xx,ty1/rec1,ty2/rec2,...,tyn/recn

#### Parameter

### Description

xx

The 1- or 2-digit EST ordinal or 2-character equipment type of the equipment to be used as an alternate system device. The equipment can be any nonremovable mass storage device (including extended memory) except for a system device. The EST ordinal specified cannot be larger than  $37_8$ .

If the equipment is not specified in the EQPDECK with the ASR entry, the \*AD entry is ignored without an error indication when the system is loaded.

ty<sub>i</sub>/rec<sub>i</sub>

ty<sub>i</sub> Record type of routine:

Record type and record name of the routine.

| Record |  |
|--------|--|
| Туре   |  |
|        |  |

ABS CPU multiple entry point overlay. OVL CPU overlay.

Description

- PP PP absolute.
- REL Relocatable CPU routine.

If a record type other than ABS, OVL, PP, or REL is specified, the message ILLEGAL CM/AD RESIDENCE. is issued to the output device; the run is aborted.

reci Record name of routine. A routine is allowed on only one
alternate system device.

Additional qualifications:

- Once a routine is placed on an alternate system device, SYSEDIT may be used to prohibit access to the routine; however, the space for that routine is not released until LIBDECK is modified and the system is reloaded.
- If extended memory is an alternate system device, all ABS, OVL, or REL routines residing there will be loaded from extended memory directly to the load address.
- If DDP is available, PP programs residing in extended memory will be loaded using DDP, and CPU programs will be loaded using the CPU access to extended memory.

## \*PROC DIRECTIVE

The \*PROC directive identifies a record as a procedure. It can be treated as any command, with parameters as required by the procedure itself. Further information on procedure creation and execution can be found in the NOS 2 Reference Set, Volumes 2 and 3.

The format of the directive is:

\*PROC, rec1, rec2, ..., recn

Parameter

reci

Description

Record name of routine to be defined as a procedure file.

# **\*SC DIRECTIVE**

The \*SC directive specifies the commands in a certain program that are to be processed in product set format rather than in NOS format (refer to the NOS 2 Reference Set, Volume 3).

The format of the directive is:

```
*SC,ty1/rec1,ty2/rec2,...,tyn/recn
```

Parameter

ty<sub>i</sub>/rec<sub>i</sub> Record type and record name of the routine to be processed in product set format.

Description

## \*FL DIRECTIVE

The \*FL directive specifies the field length that routines to be loaded require to begin execution.

The format of the directive is:

\*FL, $ty_1/rec_1-fl_1$ , $ty_2/rec_2-fl_2$ ,..., $ty_n/rec_n-fl_n$ 

#### Parameter

# Description

ty<sub>i</sub>/rec<sub>i</sub> Record type and record name of the routine.

 $f1_i$ Field length divided by 100g required by the routine.

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The actual field length obtained is subject to the rules governing RFL= and MFL= entry points, since the specified  $fl_i$  field is placed in the library directory. The system uses this information to determine field length in the following manner.

- 1. If bit ll is not set, an RFL= entry point is indicated. The field length is set to the value in the entry.
- 2. If bit 11 is set (indicating a value of 4000008), an MFL= entry point is indicated. The field length is determined in one of two ways:
  - If bit 10 is also set, the field length is set to the maximum of the value of the last RFL command and the value in the entry after masking off these upper 2 bits.
  - If bit 10 is not set, the field length is set to the maximum of the existing field length and the value in the entry after masking off these upper 2 bits.

# \*/ DIRECTIVE

The \*/ directive specifies comment lines that are listed on the output file. Other than being listed on the output file, comment lines are ignored. They can occur any place in the directives file or on LIBDECK.

The format of the directive is:

\*/ comment

Parameter

#### Description

comment A comment line can contain any valid characters and be used for any purpose.

# \*DELETE DIRECTIVE

The \*DELETE directive deletes a record from the system. It cannot, however, delete a user library (ULIB type record).

The format of the directive is:

\*DELETE, ty1/rec1, ty2/rec2, ..., tyn/recn

or

**\***D,ty<sub>1</sub>/rec<sub>1</sub>,...,ty<sub>n</sub>/rec<sub>n</sub>

#### Parameter

# Description

ty<sub>i</sub>/rec<sub>i</sub>

Record type and record name to be deleted from the system. ty<sub>1</sub> must not be ULIB.

#### \*FILE DIRECTIVE

The \*FILE directive declares an additional file containing records to be added to the system or to logically replace records on the system.

The format of the directive is:

\*FILE,filename

or

**\*FILE**, filename, NR

Parameter

filename Name of local file containing addition or replacement records to be placed on the system. File filename is rewound before processing if NR is omitted.

Description

NR Optional parameter that inhibits rewinding of file filename before processing.

#### **\*IGNORE DIRECTIVE**

The \*IGNORE directive specifies that records on a replacement file are to be ignored. If no \*FILE directive precedes an \*IGNORE directive, SYSEDIT ignores the records named on this directive on the replacement file specified by the B parameter. If one or more \*FILE directives precede an \*IGNORE directive, SYSEDIT ignores the records on the file specified in the most recent \*FILE directive.

The format of the directive is:

```
*IGNORE,ty1/rec1,ty2/rec2,...,tyn/recn
```

Parameter

Description

ty\_/reci Record type and record name to be ignored on the current replacement
file.

#### \*PPSYN DIRECTIVE

The \*PPSYN directive specifies one or more names to be synonymous with the name of an existing PP routine.

The format of the directive is:

\*PPSYN, name/name1, name2, ..., namen

Parameter

Description

name<sub>i</sub> Additional (synonymous) name for name.

# **RECORD TYPES**

The following record types may be specified in SYSEDIT directives.

| Туре | Description                             |
|------|-----------------------------------------|
| ABS  | Multiple entry point overlay.           |
| CAP  | Fast dynamic load capsule.              |
| OPL  | Modify old program library deck.        |
| OPLC | Modify old program library common deck. |
| OPLD | Modify old program library directory.   |
| OVL  | Central processor overlay.              |
| PP   | Peripheral processor program.           |
| PPU  | Peripheral processor unit program.      |
| PROC | Procedure record.                       |
| REL  | Relocatable central processor program.  |
| TEXT | Unrecognizable as a program.            |
| ULIB | User library.                           |

ISF Deadstart Sequencing 20-1 20-3

# SYSTEM FILE INITIALIZATION

This section describes the system mechanisms used to initialize the fast-attach files used by MODVAL, PROFILE, and RESEX.

ISF

The ISF command initializes the fast-attach system files VALIDUS, PROFILa, RSXDid, and RSXVid.  $\dagger$  A fast-attach file is a special direct-access file under user index 377778 that is initialized with the E parameter on the ISF command and released with the R parameter on the ISF command. However, in order to release a fast-attach file, an idle family situation must be present. That is, the job containing the ISF,R=filename command must be the only job in the family (family count is zero, and the direct-access file count equals the number of fast-attach files). Therefore, the DSD command IDLEFAMILY must be used to clear the system of all other jobs, and when the above conditions have been met [refer to the family status display (E,F) in the NOS 2 Operations Handbook], the IDLEFAMILY command must be used again to allow the ISF command to be entered.

The fast-attach file mechanism should be used by special system jobs for files that are to be retained as permanent files but have a high enough access rate to make permanent file ATTACHs excessively time-consuming. When a permanent file is activated as a fast-attach file, an entry in the system FNT is made that retains the basic data normally kept in the catalog entry and system sector of the file (interlocks and file name). This eliminates the catalog search and system sector read normally necessary to attach a permanent file.

If the file is a shared (global) fast-attach file for a multimainframe network, additional information is also maintained in the fast-attach table (FAT) on the link device. The type of file determines whether it is entered as global fast attach or local fast attach. This criterion is kept internal to ISF. Basically, VALIDUS and PROFILa are entered as global fast-attach files if they reside on a shared device. The resource files are always entered as local fast attach. A limit of 778 exists on the number of files that can be entered as global fast attach in a multimainframe environment.

Because of the special nature of fast-attach files, a job containing an ISF command must be a system origin job. Processing the command causes a search of the system permanent file catalog (UI=3777778) for files with the predefined names previously listed. They are defined in a table internal to ISF. The format of the ISF command is:

ISF, option, FM=familyname, SJ=filename, SP=filename.

<sup>&</sup>lt;sup>†</sup>The resource files are generated and maintained separately for each machine id in a multimainframe or single mainframe system by appending the machine id to the file name (for example, RSXVid becomes RSXVAB on the machine with an id of AB).

| Parameter | Description                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
|-----------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| option    | Specifies whether to initialize or release system files. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
|           | option                                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |
|           | E=filename                                               | System file that is initialized. If E=0 or no<br>filename is specified (neither E nor R appear), all<br>files defined in the ISF table are initialized<br>(refer to table 20-1).                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |
|           | R=filename                                               | Currently active system file that is released from<br>fast-attach status. If R=0, all of the files in the<br>ISF table for the specified family that are<br>currently active are released. When this parameter<br>is specified, an idle family situation (family count<br>is zero, and the direct-access file count equals the<br>number of fast-attach files) must first be created<br>with the DSD command IDLEFAMILY. When the family is<br>idle, the IDLEFAMILY command must be entered again<br>so that the system will accept the ISF command.<br>To release fast-attach system files, you must use |  |  |  |

this format of the ISF command:

X.ISF(R=filename)

# NOTE

Since initialization and release are mutually exclusive, E and R cannot appear on the same command.

| FM=familyname | Family of devices. If FM is not specified, the calling job's current |
|---------------|----------------------------------------------------------------------|
|               | family is used. The calling job's family will be restored upon exit  |
|               | from ISF.                                                            |

- SJ=filename Job file that ISF submits as a system origin job. The file must be an indirect access permanent file stored under the system user index (3777778). If SJ is specified without =filename, ISF assumes SJ=SYSJOB. If SJ=0 is specified, no job is submitted.
- SP=filename Procedure file that ISF calls with system origin. The file must be an indirect-access permanent file stored under the system user index. If SP is specified without =filename, ISF assumes SP=SYSPROC. If SP=0 is specified, no procedure is called.

ISF is automatically executed at each deadstart (refer to Deadstart Sequencing later in this section). This enables the use of SYSJOB and/or SYSPROC to SYSEDIT local modifications into the system.

ISF can also be entered as a command from the console with the DSD X command or from any system origin job.

The matrix in table 20-1 shows how the initialize (E) and release (R) parameters affect individual fast-attach files.

| Name of                    | Parameter                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                              |  |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Fast-Attach<br>System File | Initialize (E)                                                                                                                                                                                                                                                                                                                                                          | Release (R)                                                                                                                                                  |  |
| VALIDUs<br>PROFILa         | Make global fast-attach file.                                                                                                                                                                                                                                                                                                                                           | Return from fast-attach status to normal direct access.                                                                                                      |  |
| RSXDid<br>RSXVid           | Make local fast-attach file. If<br>the file does not exist in the<br>system catalog (UI=3777778),<br>ISF creates the file and makes<br>it a fast-attach file. The file<br>is created with the backup require-<br>ment set to none (BR=N). This pre-<br>vents PFDUMP from dumping the file.<br>If either RSXDid or RSXVid is spec-<br>ified, ISF initializes both files. | Return from fast-attach status to<br>normal direct access. If either<br>RSXDid or RSXVid is specified, ISF<br>returns both files to normal direct<br>access. |  |

Table 20-1. Initialize and Release Parameters of Fast-Attach Files

One use of the R parameter is to release fast-attach files activated on a device to be initialized or unloaded. Device initialization is not initiated as long as any directaccess files are active on the device (an activated fast-attach file is treated the same as an active direct-access file). Until these files are released, the system will reply to an attempted device initialization with the error message:

ACTIVE FILES ON DEVICE

Similarly, a device cannot be unloaded until all its fast-attach files are released.

# DEADSTART SEQUENCING

During a level 0 deadstart, a job is queued for input using the service class DSSC. This job executes the PP routine CMS, whose normal functions include mass storage initialization and recovery. After completing these functions, CMS checks its service class. If the service class is DSSC (indicating a deadstart sequencing call), CMS places one of the following ISF commands in its command buffer and causes the system to execute it.

| ISF,FM=0,SJ.    | (recovery deadstarts) |
|-----------------|-----------------------|
| ISF,FM=0,SJ,SP. | (other deadstarts)    |

The CMS deadstart sequencing job begins execution only after job processing has been enabled by the DSD AUTO or MAINTENANCE command. The job scheduler prohibits scheduling of all other jobs until the CMS job completes, thereby ensuring that all system files in the default family are initialized and that a SYSPROC procedure (if any) is executed before normal job processing begins (refer to ISF earlier in this section).

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| PROBE Utility                 | 21-33 |

# **TRACER/PROBE UTILITIES**

The TRACER and PROBE utilities described in this section provide data for statistical analysis of the system. The data is used to determine where problems occur and where improvements in design might be made, and to perform system tuning. The TRACER utility monitors the system's activity and gathers data periodically. The PROBE utility traps and measures particular internal events in the system. Both utilities capture valuable data that may not be obtainable any other way.

# TRACER UTILITY

The TRACER utility monitors these conditions:

- Channel activity by channel.
- Channel reserved.
- Channel requested.
- Requests pending.
- Number of active PPs.
- Buffered input/output list parameters.
- Buffered input/output channel busy.
- CPU use (idle, system, subsystem, system-related activity, or user activity).
- Subsystem CPU use.
- Storage moves pending.
- PP saturation.
- Extended memory transfer in progress.
- MTR cycle time.
- CPUO or CPU1 is or is not in monitor mode.
- Same storage move request is pending.
- Control points in automatic recall (I) status.
- Control points in periodic or automatic recall (X) status.
- Control points in waiting (W) status.
- Amount of available memory.

- Amount of memory at control points by service class.
- Amount of memory in queue by service class.
- Amount of memory at control points by subsystem.
- Number of noninteractive jobs.
- Number of detached interactive jobs.
- Number of online jobs.
- Number of preinitial jobs by service class.
- Number of executing jobs by service class.
- Number of jobs rolled out by job scheduler for each service class.
- Number of jobs rolled in or out by system control point processing for each service class.
- Number of jobs in a timed/event rollout queue by service class.
- Number of jobs rolled out by interactive input/output processing for each service class.
- Number of disabled jobs rolled out by service class.
- Number of suspended jobs rolled out by service class.
- Number of jobs with rollout file errors by service class.
- Number of EST entries in use.
- Number of FNT entries in use.
- Number of EJT entries in use.
- Number of queued files assigned to jobs at control points.
- Number of input files by service class.
- Number of print and punch files by service class.
- Number of other queued files not assigned to jobs at control points.
- Number of QFT entries in use.
- Number of FOT entries in use.
- Number of control points in use.
- Number of IAF active users.
- Number of IAF pots available.
- Number of IAF pots in use.

- Number of tape drives in use.
- Number of tracks available by mass storage device.
- Number of segment table reads.
- Number of missed clock updates.
- Number of extended memory moves.
- Number of central memory moves.
- Number of all rollouts.
- Number of rollouts to secondary rollout devices.
- Number of all sectors rolled.
- Number of sectors rolled out to secondary rollout devices.
- Number of rollouts/user limits.
- Number of time slices.
- Number of PP priority exchanges.
- Number of times communication buffer not available.
- Number of EJT scans.
- Number of schedulable jobs.
- Number of jobs preempted.
- Number of jobs scheduled.
- Number of jobs scheduled with no constraints.
- Number of insufficient CM scans.
- Number of insufficient EM scans.
- Number of no control point scans.

The TRACER utility includes the following programs:

| Program | Description                                                                                                                                                                                                        |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICPD    | A CPU program that initiates system monitoring by CPD.                                                                                                                                                             |
| CPD     | A PP program that monitors any of the system activities just listed.<br>CPD is dedicated to a PP while it is monitoring system activity. Data<br>is written to a direct access permanent file for future analysis. |
| ACPD    | A postprocessor program that generates an output report from the direct access permanent file written by CPD.                                                                                                      |
| ENDCPD  | A CPU program that terminates system monitoring by CPD.                                                                                                                                                            |

## TRACER COMMANDS

TRACER commands are described next.

## ICPD Command

ICPD defines a mass storage file to which CPD will write statistical data and then initiates system monitoring by CPD.

## Format:

| ICPD,p <sub>1</sub> ,p <sub>2</sub> , | p•<br>n                                        |                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |
|---------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| <sup>p</sup> i                        |                                                | Description                                                                                                                                                                              |  |  |  |  |  |  |  |  |  |
| FL=f1                                 |                                                | Fast loop sampling frequency, in milliseconds, during which items such<br>as PPs active and move request pending are sampled. Default is 5<br>milliseconds.                              |  |  |  |  |  |  |  |  |  |
| ML=m1                                 | as control points in                           | edium loop sampling frequency, in milliseconds, during which items such<br>s control points in I, X, and W status and field length available are<br>ampled. Default is 100 milliseconds. |  |  |  |  |  |  |  |  |  |
| SL=s1                                 |                                                | requency, in milliseconds, during which items such<br>e drives in use are sampled. Default is 1000                                                                                       |  |  |  |  |  |  |  |  |  |
| FW=fw                                 | Snapshot loop samplin                          | Snapshot loop sampling frequency, in seconds. Default is 5 seconds.                                                                                                                      |  |  |  |  |  |  |  |  |  |
| FN=filename                           | attach a direct acces<br>defined. If a file i  | File. Default is SAMPLE. ICPD will attempt to<br>as file by this name. If no file exists, it will be<br>as found, ICPD will skip to EOI and write an EOF.<br>writing data after the EOF. |  |  |  |  |  |  |  |  |  |
| M=mode                                | Permanent file mode f<br>have one of these val | or sample data file. Default is M=WRITE. mode can<br>Lues:                                                                                                                               |  |  |  |  |  |  |  |  |  |
|                                       | mode                                           | Description                                                                                                                                                                              |  |  |  |  |  |  |  |  |  |
|                                       | WRITE or W                                     | Sample data file attached in write mode.                                                                                                                                                 |  |  |  |  |  |  |  |  |  |
|                                       | APPEND or A                                    | Sample data file attached in append mode.                                                                                                                                                |  |  |  |  |  |  |  |  |  |
|                                       | MODIFY or M                                    | Sample data file attached in modify mode.                                                                                                                                                |  |  |  |  |  |  |  |  |  |

....

# NOTE

If the sample data file is attached in write mode, the file cannot be accessed until ENDCPD is run. If the sample data file is to be accessed while data is being collected, append or modify mode must be specified. In this situation, the file may be attached in read/allow modify (RM) mode. (Attaching the file in write mode rather than in modify or append mode expends less overhead when interlocking and writing the data file.)

If a loop time is set to 0 (zero), no samples for that loop will be taken. If the data block sample time is set to 0 (zero), the data file will be written only when the sampling interval terminates.

All numeric data should lie within the range 0 through 4095 (0 through  $7777_8$ ).

## ACPD Command

ACPD reads the sample data file produced by CPD and generates reports, in both user-readable and machine-readable formats, for further analysis. The sample data file must be attached before ACPD is called. If ICPD is called with the M=A or M=M parameters, the sample data file can be accessed while CPD is still active.

ACPD assumes a continuity of the sample data file. Therefore, the uncollected information during the time gap separating two consecutive files is assumed to be present, although the information is not reported. As a result, if the consecutive files on the sample data file are not in chronological order, ACPD terminates and issues an error message.

Format:

| <sup>p</sup> i | Description                                                                                                                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FN=datafile    | Name of sample file. Default is SAMPLE. This file is not rewound before or after processing.                                                                                                                                                       |
| L=outfile      | Name of output file generated by ACPD. Default is OUTPUT.                                                                                                                                                                                          |
| S=sumfile      | Name of machine-readable summary file generated by ACPD. If this parameter is omitted, no summary file is generated. If S is specified without sumfile, SUMMARY is assumed.                                                                        |
| IC=nn          | Select the report interval by specifying the number of CPD sample<br>file records. This allows selection of report intervals of less<br>than 1 minute. You can specify the report interval by using eithe<br>the IC or IN parameter, but not both. |

| ₽ <sub>1</sub>     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IN=nn              | Time span of report interval, in minutes. Default value is 6<br>minutes. ACPD generates a report for each report interval. You can<br>specify the report interval by using either the IN or IC parameter,<br>but not both.                                                                                                                                                                                                                                    |
| LO=Z               | Report data items with zero values. Default is to suppress data items with zero values.                                                                                                                                                                                                                                                                                                                                                                       |
| N≕nn               | Number of files on the sample data file to be analyzed and<br>reported. Default is only one file processed. If N is not<br>equivalenced, all files are processed until EOI is reached on the<br>sample data file. The sample data file is not rewound before<br>processing.                                                                                                                                                                                   |
| BT=hhmmss          | Beginning time in the form hour minute second. If BT=hhmmss is<br>specified, only data collected after this time on the date specified<br>by BD=yymmdd is reported. If BT is omitted or no time is specified,<br>BT=0 is assumed.                                                                                                                                                                                                                             |
| ET=hhmmss          | Ending time in the form hour minute second. If ET=hhmmss is<br>specified, only data collected before this time on the date<br>specified by ED=yymmdd is reported. If ET is omitted or no time is<br>specified, ET=0 is assumed.                                                                                                                                                                                                                               |
| BD=y ymmdd         | Beginning date in the form year month day. If BD=yymmdd is<br>specified, only data collected on or after this date is reported.<br>If BD is omitted or no date is specified, the beginning date is the<br>date of the current file on the sample data file.                                                                                                                                                                                                   |
| ED <b>≕</b> yymmdd | Ending date in the form year month day. If ED=yymmdd is specified,<br>only data collected on or before this date is reported. If ED is<br>omitted or no date is specified, but ET=hhmmss is specified, the<br>ending date is the same as the beginning date. If neither ED nor ET<br>is specified, ACPD terminates when the number of files specified by<br>the N parameter are processed, or end-of- information is<br>encountered, whichever happens first. |

ACPD begins by processing the command parameters. If the beginning time (BT) and beginning date (BD) are specified, ACPD first locates the correct file and then processing begins. Processing continues until the ending time (ET) and ending date (ED) are encountered, the number of files specified by the N parameter have been processed, or end-of-information is encountered, whichever happens first.

If the BT and BD parameters are not specified, ACPD starts at the current position of the sample data file. The sample data file is not rewound before processing starts.

## ENDCPD Command

The ENDCPD command terminates all CPD data gathering.

Format:

ENDCPD.

## **OUTPUT FILE FORMAT**

The first three pages of the output report produced by ACPD contain the header block information. Next the data items are reported for fast, medium, and slow loop samples. The report ends with the snapshot data items.

Figure 21-1 is an example showing the format of the output report. The example has been simplified and condensed to reduce the amount of output. Also, supporting text has been added to the example.

Data items monitored at successive time intervals are listed in the same row. For each data item, the average, standard deviation, and percentage are listed in successive rows. Up to 10 intervals can be listed per page in successive vertical columns. If the output file contains more than 10 columns per row, the output report lists the first 10 columns for all rows of data items and then resumes listing subsequent intervals following the snapshot data items.

The SUBTOTAL column contains the values of the data items for the time spanned by the preceding intervals on the current page; that is, the time spanned by the preceding intervals is considered one interval. The TOTAL column appears after the last interval reported and contains the statistical values of the data items for the entire run. The SUBTOTAL column is not listed if the subtotal data and total data are identical and would appear on the same page. In this case, only the TOTAL column is listed. The SUBTOTAL and TOTAL columns are not reported for the snapshot data items. The \*MAX\* and \*MIN\* columns appear at the end of the report and contain the maximum and minimum interval values of the data items for the entire run. The maximum and minimum interval values on each page are indicated by brackets and parentheses, respectively.

The average is not reported for data items that have a weighting factor of 1, and the percentage is not reported for data items that have a weighting factor of 100, since this information is redundant.

| A C P | D - VER 8.0 CDC NETWORK 0                                           | PERATING SYSTEM. | NOS 2                         | yy/mm/dd.hh.mm.ss. PAGE '             |
|-------|---------------------------------------------------------------------|------------------|-------------------------------|---------------------------------------|
|       | START DATE         83/05/25.           START TIME         23.50.13. | }                | Start of sampling interval    |                                       |
|       | DATA FILE NAME SAMPLE<br>REPORT INTERVAL (MINUTES) 2                | }                | ACPD command parameters (FN,  | IC, IN)                               |
|       | CPD VERSION                                                         | 8.0 }            |                               |                                       |
|       | FAST LOOP INTERVAL (MSECS)                                          | 10               |                               |                                       |
|       | MEDIUM LOOP INTERVAL (MSECS)<br>SLOW LOOP INTERVAL (MSECS)          | 100 }<br>1000    | ICPD command parameters (FL,  | ML, SL, FW)                           |
|       | SNAPSHOT LOOP INTERVAL (MSELS)                                      | 60               |                               |                                       |
|       | NUMBER OF CPUS                                                      | 1)               |                               |                                       |
|       | NUMBER OF PPUS                                                      | 20               |                               |                                       |
|       |                                                                     | 7777В            | Hardware configuration at be  | ginning of sampling interval          |
|       | USER EM / 1000B                                                     | 2008             |                               |                                       |
|       | MAGNETIC TAPE UNITS                                                 | 6)               |                               |                                       |
|       | NUMBER OF EST ENTRIES                                               | 618              |                               |                                       |
|       | NUMBER OF FNT ENTRIES                                               | 23B<br>11008     |                               |                                       |
|       | NUMBER OF EJT ENTRIES<br>NUMBER OF QFT ENTRIES                      | 6208             |                               |                                       |
|       | NUMBER OF FOT ENTRIES                                               | 106              |                               |                                       |
|       | NUMBER OF CONTROL POINTS                                            | 34B }            | Software configuration at be  | ginning of sampling interval          |
|       | CHRSIZE / 100B                                                      | 6228             |                               |                                       |
|       | LIBDECK NUMBER<br>RECOVERY LEVEL                                    |                  |                               |                                       |
|       | NUMBER OF IAF TERMINALS                                             | 2008             |                               |                                       |
|       | MACHINE ID                                                          | 64 1             |                               |                                       |
|       | CPU USAGE CATEGORIES (CTCUL)                                        | 5B               |                               |                                       |
|       | CHANNEL TABLE LENGTH (CTALL)                                        | 368              |                               |                                       |
|       | LENGTH OF AN EST ENTRY (ESTE)                                       | 28<br>28         |                               |                                       |
|       | LENGTH OF AN FNT ENTRY (FNTE)<br>Length of an ejt entry (ejte)      | 28<br>48         |                               |                                       |
|       | LENGTH OF A QFT ENTRY (QFTE)                                        | 4B               |                               |                                       |
|       | NUMBER OF SERVICE CLASSES (MXSC)                                    | 178              | System statistics; the symbol | ls are assembly constants used in NOS |
|       | NUMBER OF JOB STATUSES (MXJS)                                       | 138              |                               |                                       |
|       | NUMBER OF CONNECTION STATUSES (MXC:<br>NUMBER OF FILE TYPES (MXFT)  | 5) 38<br>218     |                               |                                       |
|       | MAXIMUM ORIGIN TYPES (MXFT)                                         | 68               |                               |                                       |
|       | NUMBER OF MASS STORAGE DEVICES                                      | 148              |                               |                                       |
|       | LENGTH OF MSAL TABLE (MXRS)                                         | 14B 🖠            |                               |                                       |
|       | CPU RECALL DELAY                                                    | 308              |                               |                                       |
|       | PP AUTO RECALL DELAY                                                | 1750B            | <b>6</b>                      |                                       |
|       | MAXIMUM JOB SWITCH DELAY<br>Minimum Job Switch Delay                | 208<br>48        | System delay parameters at be | eginning of sampling interval         |
|       | INPUT FILE SCHEDULING INTERVAL                                      | 28               |                               |                                       |
|       | SCHEDULER CYCLE INTERVAL                                            | 18               |                               |                                       |
|       | HIGH SPEED DISK BUFFERS                                             | 08 )             | System buffers at beginning o | of sampling interval                  |
|       | EM/PP BUFFERS                                                       | 18               | system parters at segunning ( | - compared furction                   |

Figure 21-1. Example of TRACER Output (Sheet 1 of 10)

| ACPD-VI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | R 8.0                                                                           |                                                              | CDC NETW                                                                                                                | ORK OPERATING SYSTEM.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | NOS 2                                                                                                     | yy/mm                   | /ddi.hh.mmn.ss. PAGE |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------|----------------------|
| EQUIPMENT<br>NO. TYPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | STATUS<br>STAT                                                                  |                                                              | CHANNELS                                                                                                                | EST ENTRY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           | TRACK FILES             |                      |
| O         RD           0         RD           1         DS           2         NE           3         TE           5         DE           6         DQ           7         DQ           10         DJ           11         DJ           13         DI           14         DI           15         DI           16         DJ           20         DJ           21         CR           220         CJ           23         LT           34         NP           35         NP           36         NP           37         TT           51         NT           52         NT           53         NT           55         NT           560         NC | ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>ON<br>O | 1 11 0 0 0 1 2 3 4 6 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0<br>10<br>0<br>0<br>13<br>13<br>26<br>32<br>26<br>26<br>26<br>32<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22<br>22 | 0000000000022041271<br>000001000004237000<br>200000000016050000<br>2000000002450000<br>20000000024240200<br>401000000002424020<br>4010000000004051274<br>62100013137704211302<br>42103226137704211300<br>47002632137704211310<br>47003226137704111321<br>47002632137704111321<br>47002526137704111324<br>470003131377042121327<br>47000013137704121332<br>47000013137704121332<br>47000013137704121332<br>470000012000013205000<br>00000012000014246000<br>200000000064246210<br>000000012000014246000<br>200000000064246210<br>000000000064246210<br>0000000000656207101<br>0000000000065207101<br>00000000000056207101<br>00000000000056207101<br>00000000000056207101<br>0000000040003240000<br>0000000040003240000<br>0000000040003240000<br>0000000040003240000<br>20203331000016240002<br>02203331000016240002 |                                                                                                           | 770                     |                      |
| EST<br>ordinal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | A<br>ON/OFF<br>status<br>ment                                                   | Ĭ                                                            | uni                                                                                                                     | Octal representati<br>at beginning of sa<br>ipment numbers for mass<br>t numbers for nonremova<br>rices are not listed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | mpling interval<br>storage devices and                                                                    |                         |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                 |                                                              | d here are<br>ed as follo                                                                                               | order dependent and ind<br>ws.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | licate file types that                                                                                    | can reside on a given o | levice. The order is |
| Let                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ter                                                                             | File                                                         | Туре                                                                                                                    | Letter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | File Type                                                                                                 |                         |                      |
| (<br>)<br>]<br>[<br>[<br>[<br>]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                 | Check<br>Syste<br>Tempo<br>Input<br>Outpu<br>Rollo<br>Dayfi  | m<br>rary<br>t<br>ut                                                                                                    | P<br>L<br>B<br>S<br>R<br>R<br>N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Primary<br>Local<br>LGO<br>Secondary rollout<br>Reserved for CDC<br>Reserved for CDC<br>Temporary on nons |                         |                      |

Figure 21-1. Example of TRACER Output (Sheet 2 of 10)

P.

| A C P | D - VER 8 | -0       | CD        | C NETWO   | RK OPER      | TING | SYSTEM. |              | NOS 2         |        |            |      | yy/mm/dd.hh.mmt.ss.PAGE 3                            |
|-------|-----------|----------|-----------|-----------|--------------|------|---------|--------------|---------------|--------|------------|------|------------------------------------------------------|
|       | SYSTEM C  | ONTROL 1 | INF ORMAT | ION       |              |      |         |              |               |        |            |      |                                                      |
|       | SERVICE   | QUEUE    |           | ,         | PRIORITI     | ES   |         |              | SER           | ICE LI | MITS       |      |                                                      |
| • •   | CLASS     |          |           |           |              |      |         | PR           | CP            | CH     | NJ         | TD   |                                                      |
|       |           |          | IL        | LP        | UP           | WF   | IP      | FL<br>EC     | AN<br>EN      | DS     | TP<br>FC C | S FS |                                                      |
|       | SY        | IN       |           | 7770      | 7776         | 0    |         | 30           | 100           | 20     | 7777       | 341  |                                                      |
|       |           | EX       | 4000      | 2000      | 7000         | Ó    | 7000    | 3777         | 77777         |        | 4004       |      |                                                      |
|       |           | OT       |           | 7000      | 7776         | 0    |         | 3777         | 7777          | 0      | 0          | 0 0  |                                                      |
|       | BC        | IN       |           | 10        | 4000         | 0    |         | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX       | 2000      | 1000      | 4004         | 0    | 2000    | 3777         | 77777         |        | 4004       |      |                                                      |
|       |           | от       |           | 1         | 7000         | 0    |         | 3777         | 7777          | 0      | 0          | 0 0  |                                                      |
|       | RB        | IN       |           | 10        | 4000         | 0    |         | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX<br>OT | 2000      | 1000      | 4004         | 0    | 2000    | 3777         | 77777         | •      | 4004       |      |                                                      |
|       | 1         | 101      |           | 1         | 7000         | 0    |         | 3777         | 7777          | 0      | 0          | 0 0  |                                                      |
|       | TS        | IN       |           | 7000      | 7770         | 0    |         | 30           | 40            | 10     | 7777       | 341  | This page shows the status                           |
|       |           | EX       | 3770      | 3700      | 7000         | 0    | 4000    | 3777         | 77777         | •      | 4004       | 0 0  | of the job control area at                           |
|       |           | •••      |           | 1         | 7000         | -    |         | 3777         | 7777          | 0      | •          |      | the beginning of the sampling interval. The          |
|       | DI        | IN       |           | 10        | 4000         | 0    |         | 30           | 100           | 20     | 7777       | 341  | values are set either by the                         |
|       |           | EX       | 2000      | 1000      | 4000         | 0    | 2000    | 3777         | 77777         |        | 4004       |      | IPRDECK entries QUEUE and<br>SERVICE or by the DSD   |
|       |           | OT       |           | 1         | 7000         | 0    |         | 3777         | 7777          | 0      |            | 0 0  | SERVICE or by the DSD<br>commands QUEUE and SERVICE. |
|       | NS        | IN       |           | 7770      | 7776         | Q    |         | 74           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX       | 7772      | 7770      | 7776         | 0    | 7772    | 3777         | 77777         |        | 4004       |      |                                                      |
|       |           | от       |           | 1         | 7000         | 0    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |
|       | SS        | IN       |           | 7770      | 7776         | 0    |         | 70           | 100           | 20     | 7777       | 341  |                                                      |
|       |           | EX<br>OT | 7772      | 7770      | 7776         | 0    | 7772    | 3777         | 77777         |        | 4004       |      |                                                      |
|       |           |          |           | 7400      | 7776         | 0    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |
|       | MA        | IN       |           | 1         | 10           | 0    |         | 2            | 100           | 20     | 7777       | 341  |                                                      |
|       |           | EX       | 4         | 7000      | 10           | 0    | 10      | 3777         | 77777         |        | 4004       |      |                                                      |
|       |           | от       |           | 7000      | 7776         | U    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |
|       | CT        | IN       |           | 7770      | 7776         | 0    |         | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX       | 4004      | 4000      | 7000         | 0    | 7000    | 3777         | 77777         | •      | 4004       |      |                                                      |
|       |           | OT       |           | 7000      | 7776         | 0    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |
|       | 10        | IN       |           | 10        | 4000         | 0    |         | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX       | 2000      | 1000      | 4004         | 0    | 2000    | 3777         | 77777         | ~      | 4004       |      |                                                      |
|       |           | OT       |           | 1         | 7000         | 0    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |
|       | 11        | IN       |           | 10        | 4000         | 0    |         | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX       | 2000      | 1000      | 4004         | 0    | 2000    | 3777         | 77777         | •      | 4004       |      |                                                      |
|       |           | OT       |           | 1         | 7000         | U    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |
|       | 12        | IN       | 2000      | 10        | 4000         | 0    | 2002    | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX<br>OT | 2000      | 1000<br>1 | 4004<br>7000 | 0    | 2000    | 3777<br>3777 | 77777<br>7777 | 0      | 4004       | 0 0  |                                                      |
|       |           | 01       |           | '         | 1000         | U    |         | 2111         |               | U      | υι         | 5 0  |                                                      |
|       | 13        | IN       |           | 10        | 4000         | 0    |         | 30           | 400           | 200    | 7777       | 341  |                                                      |
|       |           | EX       | 2000      | 1000      | 4004         | 0    | 2000    | 3777         | 77777         |        | 4004       | _    |                                                      |
|       |           | OT       |           | 1         | 7000         | 0    |         | 3777         | 7777          | 0      | 0 (        | 0 0  |                                                      |

Figure 21-1. Example of TRACER Output (Sheet 3 of 10)

.

| ACPD-VER 8.0                              |           | CDC N          | ETWORK OP         | ERATING SY | STEM.                 | NOS        | 2               |            | yy/m             | m/dd. hh.m         | m.ss. PAG  | E             | 4 |
|-------------------------------------------|-----------|----------------|-------------------|------------|-----------------------|------------|-----------------|------------|------------------|--------------------|------------|---------------|---|
| 2 MINS INTERVAL                           | 2         |                |                   |            | 23.58.12<br>INTERVAL  |            |                 |            |                  |                    |            | (5)           | 6 |
| FAST LOOP SAMPLES                         |           | 10480          | 10519             | 10525      | 10517                 | 10528      | 10524           | 10516      | 10507            | 10517              | 94633      | -             | - |
| PPUS ACTIVE                               | ( AV      | (4.236)        | 6.272             | 4.987      | 7.186                 | [7.708]    | 4.552           | 4.504      | 4.250            | 6.154              | 5.539      |               |   |
| (4)                                       | SD        | (0.014)        | 0.139             | 0.118      | 0.151                 | [0.363]    | 0.238           | 0.034      | 0.021            | 0.143              | 1.261      |               |   |
| •                                         | PC        | (21.180)       | 31.359            | 24.933     | 35.931                | [38,538]   | 22.760          | 22.519     | 21.250           | 30.770             | 27.693     |               |   |
| MOVE REQUEST PENDING                      | SD        | (0.000)        | 0.000             | 0.000      | 0.000                 | 0.000      | 0.000           | 0.000      | 0.000            | £0.0013            | 0.001      |               |   |
|                                           | PC        | (0.000)        | 0.010             | 0.067      | 0.000                 | [0.124]    | 0.048           | 0.000      | 0.000            | 0.067              | 0.035      |               |   |
| NO PPU AVAILABLE                          | SD        | 0.000          | 0.000             | 0.000      | 0.000                 | 0.000      | 0.000           | 0.000      | 0.000            | 0.000              | 0.000      |               |   |
| EM TRANSFER IN PROG                       | PC<br>Sd  | 0.000          | 0.000             | 0.000      | 0.000                 | 0.001      | 0.000           | [0.001]    | (0.000)          | 0.000              | 0.001      |               |   |
| EN INANGTER IN PRUS                       | PC        | (0.048)        | 0.152             | 0.105      | 0.095                 | 0.209      | 0.162           | [0.209]    | 0.086            | 0.057              | 0.125      |               |   |
| MTR CYCLE TIME                            | AV        | 0.371          | 0.393             | 0.372      | [0.436]               | 0.412      | 0.372           | 0.370      | (0.364)          | 0.433              | 0.392      |               |   |
| eret tine                                 | SD        | 0.010          | _ 0.007           | 0.008      | (0.000)               | 0.013      | 0.007           | 0.001      | 0.004            | E0.0233            | 0.029      |               |   |
| MONITOR MODE - CPU D                      |           | CO.0133        |                   | 0.012      | 0.009                 | 0.003      | (0.002)         | 0.010      | 0.002            | 0.005              | 0.020      |               |   |
|                                           | PC        | (7.887)        | 12.358            | 8.608      | E13.6053              | 10.961     | 8.200           | 9.870      | 8.376            | 9.186              | 9.895      |               |   |
| MONITOR MODE - CPU 1                      | SD        | 0.000          | 0.000             | 0.000      | 0.000                 | 0.000      | 0.000           | 0.000      | 0.000            | 0.000              | 0.000      |               |   |
|                                           | PC        | 0.000          | 0.000             | 0.000      | 0.000                 | 0.000      | 0.000           | 0.000      | 0.000            | 0.000              | 0.000      |               |   |
| SCHEDULER ACTIVE                          | SD        | (0.001)        |                   | 0.006      | 0.041                 | 0.022      | 0.019           | 0.001      | 0.001            | CO.0693            | 0.057      |               |   |
|                                           | PC        | 5.114          | (5.067)           | 7.335      | 15.915                | [19.136]   | 7.051           | 5.696      | 5.805            | 12.110             | 9.248      |               |   |
| CHANNEL RESERVED                          |           |                |                   |            |                       |            |                 |            |                  |                    |            |               |   |
| CH 12                                     | SD        | 0.000          | 0.000             | (0.000)    |                       | 0.036      | 0.000           | 0.001      | 0.000            | [0.068]<br>[6.898] | 0.034      |               |   |
| cu 47                                     | PC        | 0.105          | 0.076             | 0.076      | 0.095                 | 3.776      | 0.095           | 0.095      | (0.038)<br>0.005 | [0.275]            | 0.168      |               |   |
| CH 13                                     | S D<br>PC | 0.010<br>7.781 | 0.262<br>[39.808] | 0.012      | (0.003)<br>16.810     | 0.033      | 0.059<br>19.718 | 25.217     | (7.434)          |                    | 19.383     |               |   |
| (2) The interval end                      |           |                |                   |            |                       | 1          |                 |            |                  | <br>J bar sha Ti   | C on TN    |               |   |
| parameter of the                          |           |                | own at the        | cop or ea  | ch report             | column. I  | ne report       | interval 1 | s specifie       | a by the 1         | L OF IN    |               |   |
| (3) The sampling free<br>all fast loop it |           |                |                   |            |                       |            |                 |            |                  | fer to tab         | le 21-1 fo | r             |   |
| 4 The statistics minterval.               | epor      | ted for ea     | ch data it        | em are the | average (             | AV), stand | ard deviat      | ion (SD),  | and percen       | tage (PC)          | for the re | port          |   |
| 5 The SUBTOTAL col<br>the subtotal dat    |           |                |                   |            |                       |            |                 |            | age. This        | column is          | not liste  | d if          |   |
| (6) This example has                      |           |                |                   |            | h row of d<br>report. | ata items. | However,        | only 10 c  | olumns can       | be shown p         | per page,  | so            |   |
| the remaining co                          |           |                |                   |            |                       |            |                 |            |                  |                    |            | $\sim$        |   |
|                                           | sed :     | in bracket:    | s are the         | maximum in | terval val            | ues for ea | ch row of       | data items | on each p        | age. Refe          | r to note  | <u>(14</u> ). |   |

Figure 21-1. Example of TRACER Output (Sheet 4 of 10)

| ~ ************************************ | r#r |          |         |         |          |           |         |          |         |         |         |
|----------------------------------------|-----|----------|---------|---------|----------|-----------|---------|----------|---------|---------|---------|
| (9) MEDIUM LOOP SAMPLES                |     | 1170     | 1175    | 1175    | 1173     | 1175      | 1175    | 1175     | 1173    | 1175    | 10566   |
| ✓ CPS IN W STATUS                      | AV  | (0.225)  | 0.339   | 0.889   | 1.868    | [2.494]   | 1.699   | 2.085    | 1.282   | 1.278   | 1.351   |
|                                        | SD  | 0.043    | 0.144   | [0.320] | 0.113    | 0.293     | (0.002) | 0.122    | 0.134   | 0.137   | 0.747   |
|                                        | PC  | (0.805)  | 1.209   | 3.175   | 6.671    | [8.907]   | 6.067   | 7.446    | 4.579   | 4.566   | 4.825   |
| CPS IN X STATUS                        | AV  | (5.787)  | 6.452   | 5.894   | [6.802]  | 6.078     | 5.906   | 6.080    | 5.827   | 6.079   | 6.101   |
|                                        | SD  | 0.020    | 0.014   | (0.003) | 0.044    | 0.101     | 0.009   | 0.162    | [0.190] | 0.159   | 0.328   |
|                                        | PC  | (20.669) | 23.043  | 21.052  | [24.293] | 21,705    | 21.091  | 21.714   | 20.811  | 21.712  | 21.788  |
| CPS IN I STATUS                        | AV  | (0.067)  | 0.130   | 0.083   | CO.1853  | 0.177     | 0.091   | 0.095    | 0.075   | 0.141   | 0.116   |
|                                        | SD  | (0.001)  | 0.016   | 0.015   | 0.004    | 0.005     | 0.011   | 0.008    | 0.002   | [0.075] | 0.049   |
|                                        | PC  | (0.238)  | 0.465   | 0.295   | [0.661]  | 0.632     | 0.325   | 0.340    | 0.268   | 0.505   | 0.414   |
| SAME MOVE REQUEST                      | SD  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | PC  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
| FL AVAILABLE                           | AV  | [43478]  | 4236B   | 3363B   | 2675B    | 2471B     | 3017B   | (24128)  | 3375B   | 3140B   | 32 50B  |
|                                        | SD  | (1.227)  | 7.470   | 22.167  | 82,904   | [126.210] | 5.241   | 60.961   | 9.916   | 117.505 | 337.642 |
|                                        | PC  | [61.730] | 59.740  | 48.185  | 39.794   | 36.213    | 42.016  | (34.957) | 48.459  | 44.193  | 46.143  |
| USER EM AVAILABLE                      | AV  | 0B       | 0B      | 08      | 0B       | 08        | 08      | OB       | 0B      | 0B      | 08      |
|                                        | SD  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | PC  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
| NON INTERACTIVE JOBS                   | ÂŶ  | (1.022)  | 2.096   | 2.668   | 4.243    | [6.591]   | 2.603   | 2.351    | 2.191   | 3.598   | 3.040   |
|                                        | SD  | 0.136    | (0.023) | 0.456   | [0.619]  | 0.139     | 0.462   | 0.258    | 0.033   | 0.178   | 1.556   |
|                                        | PC  | (0.177)  | 0.364   | 0.463   | 0.737    | [1.144]   | 0.452   | 0.408    | 0.380   | 0.625   | 0.528   |
| DETACHED JOBS                          | ÂV  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | SD  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | PC  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
| ON-LINE JOBS                           | ÂV  | 1.000    | 1.000   | 1.000   | 1.000    | 1.000     | 1.000   | 1.000    | 1.000   | 1.000   | 1.000   |
|                                        | SD  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | PC  | 0.174    | 0.174   | 0.174   | 0.174    | 0.174     | 0.174   | 0.174    | 0.174   | 0.174   | 0.174   |
| PRE-INITIAL JOB STEP                   |     |          |         |         |          |           |         |          |         |         | ••••    |
| SY                                     | AV  | (1.000)  | 1.000   | 1.001   | 1.029    | 1.000     | 1.000   | 1.000    | 1.001   | [1.344] | 1.042   |
|                                        | SD  | (0.000)  | 0.000   | 0.001   | 0.029    | 0.000     | 0.000   | 0.000    | 0.001   | E0.344] | 0.157   |
| •                                      | PC  | (0.174)  | 0.174   | 0.174   | 0.179    | 0.174     | 0.174   | 0.174    | 0.174   | [0.233] | 0.181   |
| BC                                     | AV  | (0.025)  | 1.000   | 0.684   | 1.166    | [1.665]   | 0.094   | 0.236    | 0.092   | 0.462   | 0.603   |
|                                        | SD  | 0.025    | (0.000) | 0.125   | 0.166    | 0.335     | 0.094   | 0.236    | 0.029   | [0.462] | 0.582   |
|                                        | PC  | (0.004)  | 0.174   | 0.119   | 0.202    | [0.289]   | 0.016   | 0.041    | 0.016   | 0.080   | 0.105   |
| RB                                     | ÂV  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | SD  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | PC  | 0.000    | , 0.000 | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
| TŠ                                     | AV  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | SD  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        | PC  | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |
|                                        |     | 0.000    | 0.000   | 0.000   | 0.000    | 0.000     | 0.000   | 0.000    | 0.000   | 0.000   | 0.000   |

The sampling frequency for medium loop items is specified by the ML parameter of the ICPD command. Refer to table 21-1 for all medium loop items that TRACER reports. Medium loop items are described following the table.

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| 10) SLOW LOOP SAMP | LES         | 119         | 119        | 119              | 119        | 119        | 119         | 119              | 119              | 119              | 1071      |
|--------------------|-------------|-------------|------------|------------------|------------|------------|-------------|------------------|------------------|------------------|-----------|
| IAF USERS          | AV          | 1.000       | 1.000      | 1.000            | 1.000      | 1.000      | 1.000       | 1.000            | 1.000            | 1.000            | 1.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.781       | 0.781      | 0.781            | 0.781      | 0_781      | 0.781       | 0.781            | 0.781            | 0.781            | 0.781     |
| IAF POTS ALLOC     | ATED AV     | 455.000     | 455.000    | 455 <b>.00</b> 0 | 455.000    | 455.000    | 455.000     | 455 <b>.00</b> 0 | 455 <b>.00</b> 0 | 455 <b>.00</b> 0 | 455.000   |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| IAF POTS IN US     | E AV        | (193.000)   | 193.000    | 193.017          | 193.008    | 193.017    | [197.297]   | 193.000          | 193.000          | 193.000          | 193.482   |
|                    | SD          | (0.000)     | 0.000      | 0.000            | 0.008      | 0.017      | [4.297]     | 0.000            | 0.000            | 0.000            | 1.967     |
|                    | PC          | (42.418)    | 42.418     | 42.421           | 42.419     | 42.421     | [43.362]    | 42.418           | 42.418           | 42.418           | 42.524    |
| QUEUE FILES AS     | SIGNED AV   | (0.000)     | 0.008      | 0.000            | 0.008      | 0.050      | 0.000       | 0.000            | 0.000            | [0.092]          | 0.018     |
|                    | SD          | (0.000)     | 0.008      | 0.000            | 0.008      | 0.050      | 0.000       | 0.000            | 0.000            | CO.0923          | 0.046     |
|                    | PC          | (0.000)     | 0.002      | 0.000            | 0.002      | 0.012      | 0.000       | 0.000            | 0.000            | [0.023]          | 0.004     |
| INPUT FILES        |             |             |            |                  |            |            |             |                  |                  |                  |           |
| SY                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| BC                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| RB                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| TS                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0_000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| PRINT FILES        |             |             |            |                  |            |            |             |                  |                  |                  |           |
| SY                 | AV          | (0.000)     | 0.000      | 0.000            | 0.000      | [0.008]    | 0.000       | 0.000            | 0.000            | 0.000            | 0.001     |
|                    | SD          | (0.000)     | 0.000      | 0.000            | 0.000      | E0.0081    | 0.000       | 0.000            | 0.000            | 0.000            | 0.004     |
|                    | PC          | (0.000)     | 0.000      | 0.000            | 0.000      | CO.0023    | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| BC                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| RB                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
| TS                 | AV          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | SD          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       |            | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    | PC          | 0.000       | 0.000      | 0.000            | 0.000      | 0.000      | 0.000       | 0.000            | 0.000            | 0.000            | 0.000     |
|                    |             |             |            |                  |            |            |             |                  |                  |                  |           |
| (10) The same      | mpling freq | uency for s | low loop i | tems is sp       | ecified by | the SL pa  | rameter of  | the ICPD         | command.         | Refer to ta      | able 21-1 |
| for all            | l slow loop | items that  | TRACER re  | ports. Sl        | ow loop it | ems are de | scribed fol | lowing th        | e table.         |                  |           |

| Figure 21-1. | Example of | TRACER | Output | (Sheet | 6 | of | 10) |
|--------------|------------|--------|--------|--------|---|----|-----|
|--------------|------------|--------|--------|--------|---|----|-----|

| 0000 | 0000                                                        | 0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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Figure 21-1. Example of TRACER Output (Sheet 7 of 10)

| ATR MXN TIME              | 743  | 743  | 743  | 743  | 743  | 743  | 743   | 743   | 743   | }                   |
|---------------------------|------|------|------|------|------|------|-------|-------|-------|---------------------|
| WORST CASE MTR CYCLE TIME | 6    | 6    | 6    | 6    | 6    | 6    | 6     | 6     | 6     |                     |
| ISSED CLOCK UPDATES       | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| EM MOVES                  | 0    | υ    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| M MOVES                   | 243  | 243  | 276  | 276  | 315  | 344  | 344   | 344   | 377   |                     |
| TOTAL ROLLOUTS            | 54   | 56   | 70   | 74   | 77   | 85   | 90    | 96    | 97    | 4                   |
| ECONDARY ROLLOUTS         | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| TOTAL SECTORS ROLLED      | 6046 | 6100 | 7168 | 7240 | 7783 | 8862 | 10029 | 10119 | 10146 |                     |
| SECONDARY SEC ROLLED      | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| OLLOUTS/USER LIMITS       | 0    | 0    | 0    | 0    | 1    | 1    | 3     | 3     | 3     | Statistical data ar |
| IME SLICES                | 20   | 22   | 40   | 45   | 46   | 49   | 51    | 51    | 52    | from CMR            |
| PP PRIORITY EXCHANGES     | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| O COMM BUFFER AVAIL       | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| EJT SCANS                 | 112  | 114  | 190  | 334  | 714  | 781  | 786   | 797   | 846   |                     |
| CHEDULABLE JOBS           | 1024 | 1171 | 1357 | 1498 | 1633 | 1795 | 1946  | 2101  | 2238  |                     |
| JOBS PREEMPTED            | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| IOBS SCHEDULED            | 72   | 74   | 98   | 104  | 106  | 115  | 120   | 127   | 130   |                     |
| SCHEDULED NO CONSTRAINTS  | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| INSUFFICIENT CM SCANS     | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| INSUFFICIENT EM SCANS     | - 0  | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
| NO CONTROL POINT SCANS    | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0     | 0     |                     |
|                           |      |      |      |      |      |      |       |       | · .   |                     |

Figure 21-1. Example of TRACER Output (Sheet 8 of 10)

| SNAP SHOT OF CPTW - CPO |       |       |      |       |      |        |        |       |        |                      |
|-------------------------|-------|-------|------|-------|------|--------|--------|-------|--------|----------------------|
|                         | 0000  | 0000  | 0000 | 0000  | 0000 | 0000 1 | 0000   | 0000  | 0000   |                      |
|                         | 0104  | 01 04 | 0104 | 01 04 | 0104 | 0104   | 0104   | 01 04 | 0104   |                      |
|                         | 7475  | 7475  | 7475 | 7475  | 7475 | 7475   | 7475   | 7475  | 7475   |                      |
|                         | 0005  | 0005  | 0005 | 0005  | 0005 | 0005   | 0005   | 0005  | 0005   |                      |
|                         | 7750  | 7750  | 7750 | 7750  | 7750 | 7750   | 7750   | 7750  | 7750   |                      |
| SNAP SHOT OF CPTW - CPN |       |       |      |       |      |        |        |       |        | CP accumulator area  |
|                         | 0000  | 0000  | 0000 | 0000  | 0000 | 0000   | 0000   | 0000  | 0000   | from CMR             |
|                         | 0000  | 0000  | 0000 | 0000  | 0000 | 0000   | 0000   | 0000  | 0000   |                      |
|                         | 1141  | 1342  | 1406 | 1616  | 1672 | 1752   | 2072   | 2120  | 2163   |                      |
|                         | 5056  | 1115  | 6704 | 4124  | 5014 | 4315   | 7132   | 4576  | 5100   | 1                    |
|                         | 2400  | 4000  | 1000 | 1400  | 2000 | 2400   | 7000   | 0400  | 6000   |                      |
| SNAP SHOT OF RTCL       |       |       |      |       |      |        |        | 2100  | j      |                      |
|                         | 0040  | 0040  | 0040 | 0040  | 0040 | 0040   | 0040   | 0040  | 0040 \ |                      |
|                         | 1551  | 1741  | 2131 | 2321  | 2511 | 2701   | 3071   | 3261  | 3451   |                      |
|                         | 0000  | 0000  | 0000 | 0000  | 0000 | 0000   | 0000   | 0000  | 0000   | Real time clock area |
|                         | 0325  | 0362  | 0417 | 0455  | 0512 | 0547   | 0605   | 0642  | 0677   | from CMR             |
|                         | 3020  | 5320  | 7620 | 2120  | 4420 | 6721   | 1220   | 3520  | 6020   |                      |
| SNAP SHOT OF PDTL       |       |       |      |       |      |        |        | 3320  | ,      |                      |
|                         | 0000  | 0000  | 0000 | 0000  | 0000 | 0000   | 0000 ' | 0000  | 0000 ) |                      |
|                         | 0000  | 0000  | 0000 | 0000  | 0000 | 0000   | 0000   | 0000  | 0000   |                      |
| •                       | -1505 | 1505  | 1505 | 1505  | 1505 | 1505   | 1505   | 1505  | 1505   | Packed date/time are |
|                         | 3127  | 3127  | 3127 | 3127  | 3200 | 3200   | 3200   | 3200  | 3200   | from CMR             |
|                         | 6415  | 6615  | 7015 | 7214  | 0014 | 0215   | 0414   | 0615  | 1015   |                      |

| Figure 21-1. | Example of | TRACER Output | t (Sheet | 9 of 10) |
|--------------|------------|---------------|----------|----------|
|              |            |               |          |          |

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|      |                      |          |            |            |                | N N N D                           |                                                |
|------|----------------------|----------|------------|------------|----------------|-----------------------------------|------------------------------------------------|
|      | ACPD-VER 8.0         |          | C DC       | NETWORK OF | PERATING SYSTE | 1. NOS 2                          | yy/mm/dd.hh.mm.ss. PAGE 30                     |
|      | 2 MINS INTERVAL      |          | 00:18 HR   |            | 5 TO 83/05/26  |                                   |                                                |
| (12) | FAST LOOP SAMPLES    |          | 94633      |            |                |                                   |                                                |
|      | PPUS ACTIVE          | ·AV      | 5.539      | 7.708      | 4.236          |                                   |                                                |
|      |                      | SD       | 1.261      | 0.363      | 0.014          |                                   |                                                |
|      |                      | PC       | 27.693     | 38.538     | 21.180         |                                   |                                                |
|      | MOVE REQUEST PENDING | SD       | 0.001      | 0.001      | 0.000          |                                   |                                                |
|      |                      | PC       | 0.035      | 0.124      | 0.000          |                                   |                                                |
|      | NO PPU AVAILABLE     | SD       | 0.000      | 0.000      | 0.000          |                                   |                                                |
|      |                      | PC       | 0.000      | 0.000      | 0.000          |                                   |                                                |
|      | EM TRANSFER IN PROG  | SD       | 0.001      | 0.001      | 0.000          |                                   |                                                |
|      |                      | PC<br>AV | 0.125      | 0.209      | 0.048<br>0.364 |                                   |                                                |
|      | MTR CYCLE TIME       | SD       | 0.029      | 0.023      | 0.000          |                                   |                                                |
|      | MONITOR MODE - CPU D | SD       | 0.020      | 0.013      | 0.002          |                                   |                                                |
|      | HONITOR HODE CTO D   | PC       | 9.895      | 13.605     | 7.887          |                                   |                                                |
|      | MONITOR MODE - CPU 1 | SD       | 0.000      | 0.000      | 0.000          |                                   |                                                |
|      |                      | PC       | 0.000      | 0,000      | 0.000          |                                   |                                                |
|      | SCHEDULER ACTIVE     | SD       | 0.057      | 0.069      | 0.001          |                                   |                                                |
|      |                      | PC       | 9.248      | 19.136     | 5.067          |                                   |                                                |
|      | CHANNEL RESERVED     |          |            |            |                |                                   |                                                |
|      | CH 12                | SD       | 0.034      | 0.068      | 0.000          |                                   |                                                |
| · ·  |                      | PC       | 1.250      | 6.898      | 0.038          |                                   |                                                |
|      | CH 13                | SD       | 0.168      | 0.275      | 0.003          |                                   |                                                |
| 1    |                      | PC       | 19.383     | 39.808     | 7.434          |                                   |                                                |
|      |                      |          |            |            |                |                                   |                                                |
|      |                      |          |            |            |                |                                   | 0                                              |
| (12) | These fast loop iter | ns a     | re the rem | aining col | umns from page | 4 of the example. Refer to note   | e (6).                                         |
|      |                      |          |            |            |                |                                   | •                                              |
| 13   | The TOTAL column con | ntai     | ns the tot | al samples | , average, sta | ndard deviation, and percentage f | or the entire ACPD run.                        |
| 14   | The *MAX* column con | ntai     | ns the max | imum inter | val value for  | each row of preceding intervals f | for the entire ACPD run. Refer to note $(7)$ . |
| 15   | The *MIN* column con | ntai     | ns the min | imum inter | val value for  | each row of preceding intervals f | for the entire ACPD run. Refer to note $(8)$ . |
|      |                      |          |            |            |                |                                   |                                                |

Figure 21-1. Example of TRACER Output (Sheet 10 of 10)

## SUMMARY FILE FORMAT

The machine-readable summary file has two types of records, the header block record and the data block record. An \*EOR\* separates consecutive records.

The header block record contains the header data in an unpacked format.

Each data block record is divided into two equal length parts. The first part contains the average values of the data items. The second part contains the corresponding standard deviations of the data items.

Total and subtotal data and interval percentage data does not appear on the summary file. The loop sample times and snapshot data items have 0 standard deviations to simplify the summary file format.

## DATA ITEMS REPORTED BY TRACER

The data items reported by TRACER are described in the following paragraphs and are summarized in table 21-1. TRACER increments each item's counter when the item is in a given state, and periodically writes the contents of the counters to the data file for future processing by ACPD. When and how the counter for a given item is incremented is also discussed.

Suggestions are given to help you determine system performance. Performance may be affected by several areas within the system; therefore, a full analysis should be done prior to making any changes.

| Fast Loop Items           | Weighting Factor        |
|---------------------------|-------------------------|
| Fast loop samples         | None                    |
| PPs active                | Number of PPs available |
| Move request pending      | 1†                      |
| No PP available           | 1                       |
| EM transfer in progress   | 1                       |
| MTR cycle time            | 100 ††                  |
| Monitor mode - CPU0       | 1                       |
| Monitor mode - CPU1       | 1                       |
| Scheduler active          | 1                       |
| Channel reserved          | 1                       |
| Channel active            | 1                       |
| Channel requested         | 1                       |
| Requests pending          | 100                     |
| Buffered I/O lists        | Number of I/O buffers   |
| Buffered I/O channel busy | 1                       |
| CPU usage - CPU0          | 1                       |
| CPU usage - CPU1          | 1                       |
| Subsystem CPU usage       | 1                       |

## Table 21-1. Data Items (Sheet 1 of 2)

| Table 21-1. | Data Items | (Sheet | 2 of | 2) |
|-------------|------------|--------|------|----|
|-------------|------------|--------|------|----|

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| Medium Loop Items    | Weighting Factor                                            |
|----------------------|-------------------------------------------------------------|
| Medium loop samples  | None                                                        |
| CPS in W status      | Number of control points                                    |
| CPS in X status      | Number of control points                                    |
| CPS in I status      | Number of control points                                    |
| Same move request    | 1                                                           |
| FL available         | Available field length                                      |
| User EM available    | (machine size - CMR size)<br>Available user extended memory |
|                      | field length                                                |
| Noninteractive jobs  | Number of EJT entries                                       |
| Detached jobs        | Number of EJT entries                                       |
| Online jobs          | Number of EJT entries                                       |
| Preinitial job step  | Number of EJT entries                                       |
| Executing            | Number of EJT entries                                       |
| Scheduler rollout    | Number of EJT entries                                       |
| SCP rollin           | Number of EJT entries                                       |
| SCP rollout          | Number of EJT entries                                       |
| Timed/event rollout  | Number of EJT entries                                       |
| Interactive rollout  | Number of EJT entries                                       |
| Disabled rollout     | Number of EJT entries                                       |
| Suspended rollout    | Number of EJT entries                                       |
| Rollout file error   | Number of EJT entries                                       |
| EJT entries in use   | Number of EJT entries                                       |
| FL at control points | Available field length                                      |
| FL in rollout queue  | Available field length                                      |
| EM memory at CP      | User extended memory size/10008                             |
| EM in rollout queue  | User extended memory size/1000g                             |
| Subsystem FL         | Available field length                                      |
| Slow Loop Items      | Weighting Factor                                            |
| Slow loop samples    | None                                                        |
| IAF users            | Number of terminals defined                                 |
| IAF pots allocated   | 100                                                         |
| IAF pots in use      | IAF pots allocated                                          |
| Queue files assigned | Number of QFT entries                                       |
| Input files          | Number of QFT entries                                       |
| Print files          | Number of QFT entries                                       |
| Punch files          | Number of QFT entries                                       |
| Other queue files    | Number of QFT entries                                       |
| QFT entries in use   | Number of QFT entries                                       |
| Tape drives in use   | Number of available tape drives                             |
| Tracks available     | Maximum number of tracks for monitored device               |
| Tracks available     |                                                             |

#### **Fast Loop Items**

The following paragraphs describe fast loop items. Fast loop items are continuously changing, so they should be sampled frequently.

#### Fast Loop Samples

TRACER increments the fast loop samples counter each time the fast loop items are sampled.

## PPs Active

TRACER increments the PP active counter for each active PP it finds when scanning the PP communication area. Disabled PPs (those turned off at deadstart time) are not considered active. An active PP is one that has a nonzero input register. MTR (PPO) and DSD (PP1) are always counted as active PPs.

If this counter's percentage exceeds 80 percent and the no PP available counter is greater than 20 percent, you may need more PPs. Check the channel active counters for disks. If the disk channels range from 35 to 40 percent, you may not need additional PPs; instead, look at what is causing your disk channels to be so busy. If you can reduce their activity to below 30 percent, the percentages should also drop for the PPs active counter and the no PP available counter.

Examine which PPs are dedicated. If the percentage of floating PPs is low (about 20 percent of the total PPs configured), you may need more PPs.

#### Move Request Pending

TRACER increments the move request pending counter whenever it determines, from word CMCL of CMR, that a storage move request is outstanding.

If this counter's percentage ranges from 30 to 40 percent, the system is degrading. The following items could cause excessive storage movements.

- Are subsystems at the highest or lowest control points? If not, NOS may be moving them up or down in memory frequently in order to satisfy other user job memory requests. If a subsystem like NAM is being moved, its users may experience slow response time since a subsystem cannot execute while it is moving in memory.
- Try to stabilize the field lengths of your subsystems. For example, if TAF is not built correctly for your site's use, it may roll out and roll in quite often. Depending on your CM constraints, you may want TAF to roll out less frequently. You should evaluate each subsystem and place it at the correct control point.
- Are some user jobs changing their field length excessively? For example, jobs that open and close many files repeatedly cause CMM to adjust the user's field length, which causes other job movement within memory. This may save on field length but takes resources from the sytem, which increases system overhead. This type of job should be changed to be more efficient.

#### No PP Available

TRACER increments the no PP available counter each time it determines, from word PPAL of CMR, that there are no PPs available.

The percentage for this counter should be examined with the percentage for the PP active counter. If the PP active percentage is low (less than 50 percent) but you have counts of no PPs available, it means that you have peaks in your work load and this may be acceptable. However, if the PP active percentage is high (from 80 to 90 percent) and you have counts of no PPs available, you may need more PPs.

#### EM Transfer in Progress

TRACER increments the extended memory transfer in progress counter whenever the S/C register (maintenance register for models 865 and 875) indicates an extended memory transfer is active. This data is available for CYBER 170 Computer Systems except models 176, 815, 825, 835, 845, and 855.

#### MTR Cycle Time

TRACER increments the MTR cycle time counter by the cycle time for the last MTR cycle. This item indicates how fast MTR is completing one complete scan of all PP output registers and processing those functions present.

The MTR cycle time should not exceed 0.5 seconds. If it does, MTR could miss updating the real time clock. Refer to MTR MXN TIME reported in the statistical data area from CMR (figure 21-1) for the worst case.

## Monitor Mode - CPU0/CPU1

TRACER increments the monitor mode counter for CPU0/CPU1 whenever the S/C register (maintenance register for models 865 and 875) indicates that the CPU0/CPU1 is in monitor mode. This data is available for CYBER 170 Computer Systems except models 815, 825, 835, 845, and 855.

During monitor mode, the CPU is executing the code of CPUMTR, which performs NOS overhead. During program mode, CPUMTR is executing to perform a function that a user job requested and only CPUMTR has the capability or security to do.

When the monitor mode counter reaches 20 percent for each CPU on a dual CPU configuration or 30 percent for a single CPU machine, you should examine the data provided by PROBE. PROBE reports each monitor request for both monitor mode and program mode. Examine the requests to determine what functions were called in excess. As a basis of comparison, use a PROBE report for which system performance was good and the monitor mode statistics were normal.

#### Scheduler Active

TRACER increments the scheduler active counter whenever it determines that the job scheduler (1SJ) is active. The job scheduler is considered active when the scheduler active flag in word JSCL is set.

The job scheduler is called to process input queues and rollout queues. The scheduler searches all of the corresponding queues, starting with the last EJT or QFT entry scheduled to a control point. It schedules the highest priority jobs into execution. Queue length and decision processing determines the amount of time the scheduler spends. Limit the size of the queues to the amount shown in the EJT entries in use and the QFT entries in use statistics.

If the scheduler active counter reaches 70 to 90 percent, you may notice problems. The reason is that ISJ is called to process EJT entries or QFT entries, not both. For example, if ISJ spends all of its time processing EJT entries, no input queue jobs are processed. In this case, interactive users entering the system for the first time will never get started. Also, excessive rollin/rollout because of central memory constraints or CM/CP time slice expirations could cause the scheduler to be busy. Examine the SERVICE parameters; you might have to do some tuning.

#### Channel Reserved

TRACER maintains a channel reserved counter for each available channel and increments a counter whenever its channel is logically reserved by the operating system. TRACER samples the channel status table for this data.

A PP program may have a channel reserved without actually using it to transfer data. This can cause a problem only if the channel has a high reserve percentage (from 80 to 100 percent) and the corresponding activity for the channel is low (less than 20 percent). The exceptions are those channels that are dedicated to PPs such as DSD, PIP, and 1HP.

#### Channel Active

TRACER maintains a channel active counter for each available channel and increments a counter whenever it detects that the channel is not inactive, as determined by an IJM PP instruction.

System performance is affected most by disk channel activity. A percentage of from 10 to 30 percent is considered normal. When this percentage reaches 35 to 40 percent, your system may experience performance degradation. High channel activity could be caused by the following factors. If you can scale down these problems, you may decrease channel activity and improve system performance; otherwise, you may need more disk controllers.

• Do all the disk channels show similar activity levels? If not, examine the attributes you have described for each disk unit. For example, what units contain permanent files, rollout files, a copy of the system, and temporary files? You may have to redistribute the work load by changing attributes. Determine which files are busy and the devices on which they reside using the PFCAT utility. You may find that altering device masks and/or moving files will lower the channel activity. You are looking for an even percentage of work performed by each of the disk channels.

The system selects file residency based on several factors. If the file is a permanent file, the system uses the device masks you have set for your family. If it is a temporary file or rollout file, the system looks at the attributes set for each device and selects the best candidate based on the following.

- First, the system looks at the number of tracks available on each potential device. It records which devices have at least 1/8 of their track capacity available for use.
- Second, the system picks the device with the least activity. If all potential devices have less than 1/8 of their tracks available, then the system chooses the least active device.
- Are there an excessive number of rollouts? User jobs may be reaching the CM or CP time slice limits. Check your SERVICE parameters and examine the number of time slices reported in the statistical data area from CMR. The system may be rolling jobs in and out of the control points if your SERVICE limits are too small. By adjusting the limits, you should improve system performance.
- Are large user jobs or subsystems rolling in or out? This can be determined by watching the DSD rollout status display (R). One large job can cause problems if it uses too many resources. Redesigning or rescheduling the job may help.
- Examine the PROBE utility output. PROBE reports the PP programs that were loaded (program name, residency, and number of loads). Any program that is loading more than once per second, should be made central memory resident. If you are short of central memory, place these programs in extended memory.

#### Channel Requested

TRACER maintains a channel requested counter for each available channel and increments a counter whenever there is an outstanding request for that channel. TRACER uses the channel status table to determine the channel requested status.

This counter tells you how often PP programs have requested a channel but were unable to reserve it because another PP program had it reserved. A normal count is from 20 to 50 percent. The exceptions are those channels that are dedicated to PPs such as DSD, PIP, and 1HP.

This can be used for debugging purposes when developong your own PP programs that require channels. Be sure that you follow the rules governing channel dialog.

#### Requests Pending

TRACER maintains a request pending counter for each mass storage device available and increments a counter by the number of outstanding requests on that device when the sampling occurs. The MST provides this information.

Ensure that the number of requests pending is evenly distributed between all units. If not, you may have to redistribute files (permanent, system, temporary, and rollout files) for the devices to obtain a more even distribution. Adding more disk units to a configuration will also aid in reducing the number of requests outstanding.

## Buffered I/O Lists

TRACER maintains a counter for each type of buffered I/O buffer list (Empty, Data Written, Read, Write). The number of buffers assigned to each list is incremented based on the buffered I/O data tables.

An average of 25 percent of the buffers on the Empty and Data Written lists is normal. The Write list should contain from 2 to 3 percent of the buffers, but a higher percentage is acceptable. The Read list is normal at from 65 to 75 percent. If there seems to be a shortage of Empty and Data Written buffers, you can add more extended memory for I/O buffer space.

## Buffered I/O Channel Busy

TRACER maintains a channel busy counter for each buffered I/O channel and increments a counter whenever a data transfer is in progess on that channel. TRACER uses the buffered I/O channel control table to determine the channel busy status.

The normal percentage is from 15 to 20 percent for a model 760 with two channels. This percentage may be higher for machines with slower CPUs.

#### CPU Usage

TRACER maintains a set of CPU usage counters for each CPU. There is a counter for each type of CPU use.

| Counter | CPU Use                                                                                 |
|---------|-----------------------------------------------------------------------------------------|
| IDLE    | CPU is not currently being used.                                                        |
| SYSTEM  | CPU is being used by CPUMTR.                                                            |
| SUB-SYS | CPU is being used by a subsystem.                                                       |
| SYS ORG | CPU is being used by a system origin job (subsystems are not considered system origin). |

CPU is being used by a user program. USER

Each time the CPU status is sampled (in words CPAL and CPAL+1 in CMR), TRACER increments one of the CPU usage counters. It determines which counter to update by investigating the control point area to which the CPU is assigned.

Tune your system to get the most CPU usage for your users. Following are suggestions on how to do this.

If you run a mixture of jobs, such as interactive and batch jobs, set the limit of executing batch jobs to a number that minimally impacts interactive users with respect to central memory and control points. You may have to assign batch jobs a higher queue priority so they essentially will be locked into the control points. Since interactive jobs tend to use the CPU for short durations, the batch jobs will be there using up whatever CPU time is left from the interactive jobs.

- On machines with big memories, it is advantageous to assign most of the memory to the users instead of using UEM as a rollout device. This helps in two ways: 1) rolling jobs to disk takes less CPU overhead than rolling jobs to UEM; 2) with more memory for the users, NOS performs less storage moves.
- If you run site-developed subsystems, examine the possibility of performing more of the work as disk activity rather than manipulating the data in central memory.

## Subsystem CPU Usage

Subsystem CPU usage is a further breakdown of subsystems of the SUB-SYS CPU usage data. TRACER maintains a CPU usage counter for every subsystem. Whenever the SUB-SYS CPU usage counter is incremented, TRACER also increments the appropriate subsystem CPU usage counter.

#### Medium Loop Items

The following paragraphs describe medium loop items.

## Medium Loop Samples

TRACER increments the medium loop samples counter each time the medium loop items are sampled.

#### CPS in W Status

TRACER increments the control points in waiting (W) status counter whenever a control point is found in W status (determined by STSW word of control point area). TRACER scans all control points during each medium loop cycle.

## CPS in X Status

TRACER increments the control points in periodic or automatic recall (X) status counter whenever it finds a control point in X status (determined by STSW word of control point area). TRACER scans all control points during each medium loop cycle.

## CPS in I Status

TRACER increments the control points in automatic recall (I) status counter whenever a control point is found in I status (determined by STSW word of control point area). TRACER scans all control points during each medium loop cycle.

## Same Move Request

TRACER increments the same move request counter every time the move request pending for the current medium loop cycle is the same as the previous medium loop cycle. Word CMCL of CMR is used to determine this status.

Use this counter to determine if NOS is having trouble moving jobs in central memory. A value of from 5 to 10 percent is not unreasonable. A higher percentage indicates that you probably are short of memory. Examine the FL available counter.

## FL Available

TRACER increments the FL available counter by the amount of available FL during the current medium loop cycle. Word ACML of CMR determines the available FL.

Compare this counter with the average FL in the rollout queue (FL in the rollout queue divided by the average number of jobs in the queue). On a busy system, the average amount of FL available should be less than that required for the average job in the rollout queue. You may need to consider any jobs that are in the rollout queue but are not schedulable, such as NAM supervisory applications (CS, NS, and NVF). On a system that is not heavily used, the FL available counter is of little value since there should always be memory available.

#### User EM Available

TRACER increments the user extended memory available counter by the amount of available user extended memory FL during the current medium loop cycle. Word AECL of CMR determines the available user extended memory FL.

Compare this number to the amount of extended memory at control points and rollout queues to determine if you have enough user extended memory.

#### Noninteractive Jobs

TRACER maintains a count of noninteractive jobs by monitoring the number of EJT entries with a connection status of NICS.

#### Detached Jobs

TRACER maintains a count of detached interactive jobs by monitoring the number of EJT entries with a connection status of DTCS.

### Online Jobs

TRACER maintains a count of online jobs by monitoring the number of EJT entries with a connection status of OLCS.

## Preinitial Job Step

TRACER maintains a count of preinitial jobs for each service class by monitoring the number of EJT entries with a job status of PRJS. A job is in this state after it has been assigned to an EJT entry but before it has been assigned to a control point for the first time.

#### Executing

TRACER maintains a count of executing jobs for each service class by monitoring the number of EJT entries with a job status of EXJS.

### Scheduler Rollout

TRACER maintains a count of jobs rolled out by the job scheduler for each service class by monitoring the number of EJT entries with a job status of ROJS.

#### SCP Rollin

TRACER maintains a count of jobs rolled in by system control point processing for each service class by monitoring the number of EJT entries with a job status of SIJS.

#### SCP Rollout

TRACER maintains a count of jobs rolled out by system control point processing for each service class by monitoring the number of EJT entries with a job status of SOJS.

#### Timed/Event Rollout

TRACER maintains a count of jobs in a timed/event rollout queue for each service class by monitoring the number of EJT entries with a job status of TOJS.

#### Interactive Rollout

TRACER maintains a count of jobs rolled out by interactive input/output processing for each service class by monitoring the number of EJT entries with a job status of IOJS.

## Disabled Rollout

TRACER maintains a count of disabled jobs rolled out for each service class by monitoring the number of EJT entries with a job status of DOJS.

#### Suspended Rollout

TRACER maintains a count of suspended jobs rolled out for each service class by monitoring the number of EJT entries with a job status of SUJS.

### Rollout File Error

TRACER maintains a count of jobs with rollout file errors for each service class by monitoring the number of EJT entries with a job status of ERJS.

#### EJT Entries in Use

TRACER maintains a count of the number of EJT entries in use for all jobs during the specified time interval. Each EJT entry is four central memory words long. If you are short of memory, you can gain some memory by decreasing the number of EJT entries.

#### FL at Control Points

TRACER maintains an FL at control point counter for each service class. When an active control point is found, the service class is determined and the appropriate counter is incremented by the amount of FL assigned to that control point (determined by FLSW of control point area). TRACER scans all control points during the medium loop cycle.

Use this count to determine which service class of jobs is using the most memory. For example, if you have poor interactive job response and notice that the batch service class is using the most memory, it may help to restrict batch jobs to a smaller central memory time slice using the CM parameter of the SERVICE entry in the IPRDECK.

## FL in Rollout Queue

TRACER maintains an FL in rollout queue counter for each service class. When a rollout file is found in the queue, and it is not assigned to a control point, the amount of FL it will require (determined from the EJT) when it is rolled into a control point is added to the appropriate counter. TRACER scans all EJT entries during the medium loop cycle.

Use this count in conjunction with the FL available counter to determine if you have a central memory shortage.

#### EM Memory at CP

TRACER maintains an extended memory at control point counter for each service class. When an active control point is found, the service class is determined and the appropriate counter is incremented by the amount of extended memory assigned to that control point (determined by ECSW of control point area). TRACER scans all control points during the medium loop cycle.

Use this count in conjunction with the user EM available counter and the EM in rollout queue counter to determine if you have an extended memory shortage.

## EM in Rollout Queue

TRACER maintains an extended memory in rollout queue counter for each service class. When a rollout file is found in the queue, and it is not assigned to a control point, the amount of extended memory FL it will require when rolled in (determined from the EJT) is added to the appropriate counter. TRACER scans all EJT entries during the medium loop cycle.

Use this count in conjunction with the user EM available counter and the EM memory at CP counter to determine if you have an extended memory shortage.

#### Subsystem FL

TRACER maintains a subsystem FL counter for every possible subsystem. When a subsystem is found at a control point, the amount of FL assigned to that subsystem is added to the appropriate counter. TRACER scans all control points during the medium loop cycle.

## **Slow Loop Items**

The following paragraphs describe slow loop items.

## Slow Loop Samples

TRACER increments the slow loop samples counter each time the slow loop items are sampled.

#### IAF Users

TRACER increments the IAF users counter by the number of users connected to IAF during the slow loop cycle. IAF must be active for this data to be collected. Word VANL of IAF FL determines the number of users.

#### IAF Pots Allocated

TRACER increments the pots allocated counter by the number of pots that are currently available for use, whether they are being used or not. Word VPAL of IAF FL determines the number of pots allocated.

#### IAF Pots in Use

TRACER increments the pots in use counter by the number of pots currently assigned to a connection. Word VPUL of IAF FL determines the number of pots in use.

## Queue Files Assigned

TRACER maintains a count of the number of queued files assigned to control points by monitoring QFT entries.

#### Input Files

TRACER maintains a count of the number of input files for each service class by monitoring QFT entries.

#### **Print Files**

TRACER maintains a count of the number of print files for each service class by monitoring QFT entries.

## Punch Files

TRACER maintains a count of the number of punch files for each service class by monitoring QFT entries.

## Other Queue Files

TRACER maintains a count of the number of other queued files not assigned to control points for each service class by monitoring QFT entries. This includes any queued file that is not an input, print, or punch file.

## QFT Entries in Use

TRACER maintains a count of the number of QFT entries in use for all jobs during the specified time interval. Each QFT entry is four central memory words long. If you are short of memory, you can gain some memory by decreasing the number of QFT entries.

#### Tape Drives in Use

TRACER maintains two tape drives in use counters; one for 7-track and one for 9-track drives. A tape drive is considered to be in use if an EST entry indicates it is logically turned on, and it is assigned to a job. TRACER increments the appropriate counter for each drive found in use.

## Tracks Available

TRACER maintains a tracks available counter for each mass storage equipment and adds the number of available tracks (tracks not currently assigned to a file) for a device to the appropriate counter for each mass storage device found in the EST. TRACER obtains this information from TDGL of the MST.

#### Statistical Summary

The following paragraphs describe various statistics collected by TRACER.

#### MTR Maximum Time

TRACER reports the maximum time, in microseconds, that MTR waits for a CPU exchange to occur after being initiated by a monitor exchange jump (MXN).

#### Worst Case MTR Cycle Time

TRACER reports the maximum time, in milliseconds, that it takes MTR to make a complete cycle; processing all PP output register requests and performing its other system functions.

## Missed Clock Updates

TRACER reports the number of times MTR was not able to update the clock.

## Extended Memory Moves

TRACER reports the number of storage moves of extended memory performed by CPUMTR.

## Central Memory Moves

TRACER reports the number of storage moves of central memory performed by CPUMTR.

## Total Rollouts

TRACER reports the total number of jobs rolled out by the job rollout routine (1R0).

## Secondary Rollouts

TRACER reports the number of jobs rolled out to secondary rollout devices by the job rollout routine (IRO).

#### Total Sectors Rolled

TRACER reports the total number of sectors of mass storage used by the job rollout routine (1RO) for rollouts.

## Secondary Sec Rolled

TRACER reports the number of sectors of mass storage used by the job rollout routine (1RO) for rollouts to secondary rollout devices.

## Rollouts/User Limits

TRACER reports the number of jobs rolled out due to a time limit or SRU limit detected by the job scheduler (ISJ).

## Time Slices

TRACER reports the number of jobs whose scheduling is set to the lower bound for its service class due to an expired CPU or CM time slice.

# PP Priority Exchanges

TRACER reports the number of priority exchange requests issued by PPs. A priority exchange is issued after three unsuccessful attempts to perform a monitor exchange jump (MXN).

#### No Comm Buffer Avail

TRACER reports the number of times CPUMTR could not use a communications buffer because all buffers were full.

## EJT Scans

TRACER reports the number of times the job scheduler (1SJ) scans the executing job table (EJT) to schedule a job to a control point.

## Schedulable Jobs

TRACER reports the total number of schedulable jobs. This is determined by adding the number of schedulable jobs in EJT on each EJT scan.

## Jobs Preempted

TRACER reports the number of jobs rolled out so the job scheduler (1SJ) could schedule a higher priority job.

## Jobs Scheduled

TRACER reports the number of jobs scheduled to a control point.

## Scheduled No Constraints

TRACER reports the number of jobs scheduled with no service class, central memory, or extended memory constraints imposed.

## Insufficient CM Scans

TRACER reports the number of EJT scans for which a schedulable job was found, but could not be scheduled due to insufficient central memory.

#### Insufficient EM Scans

TRACER reports the number of EJT scans for which a schedulable job was found, but could not be scheduled due to insufficient extended memory.

## No Control Point Scans

TRACER reports the number of EJT scans for which a schedulable job was found, but could not be scheduled because all control points were busy.

# **PROBE UTILITY**

The PROBE utility measures the following:

- The number of times a PP routine was loaded.
- The number of CIO RA+1 requests by function number.
- The number of PP requests to CPUMTR by function number.
- The number of MTR requests to CPUMTR by function number.
- The statistical data accumulated in CMR includes items such as number of sectors rolled and number of rollouts.

PROBE data gathering is selectable at deadstart time by an IPRDECK entry. SYSEDIT resets the PROBE data tables to zeros.

The PROBE utility generates a report from the data collected by the system. PROBE analyzes data either from system tables or from a binary file containing data from a previous PROBE run. An IPRDECK entry ENABLE, PROBE must be specified at deadstart time to allow the system to collect the data. (Refer to section 3, Deadstart Decks, for more information.)

#### Format:

| $\frac{p_{\text{ROBE}}, p_1, p_2, \dots, p_n}{\frac{p_i}{2}}$ |                                 | Description                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B=readfile                                                    | Binary file                     | to be read. Default is STATS.                                                                                                                                                                                                                                                                                    |
| L=outfile                                                     | Report file                     | • Default is OUTPUT.                                                                                                                                                                                                                                                                                             |
| L=0                                                           | No report i                     | s to be generated.                                                                                                                                                                                                                                                                                               |
| LO=opt                                                        | Sort option                     | for PP program load information. Default is F.                                                                                                                                                                                                                                                                   |
|                                                               | opt                             | Description                                                                                                                                                                                                                                                                                                      |
|                                                               | Α                               | Sort data in alphabetic order.                                                                                                                                                                                                                                                                                   |
|                                                               | F                               | Sort data by frequency of loads.                                                                                                                                                                                                                                                                                 |
|                                                               | R                               | Sort data by location and frequency of loads.                                                                                                                                                                                                                                                                    |
| OP=opt                                                        | Processing                      | option. Default is P.                                                                                                                                                                                                                                                                                            |
|                                                               | opt                             | Description                                                                                                                                                                                                                                                                                                      |
|                                                               | С                               | Perform R option functions and clear system tables after                                                                                                                                                                                                                                                         |
|                                                               |                                 | they are read.                                                                                                                                                                                                                                                                                                   |
|                                                               | Р                               |                                                                                                                                                                                                                                                                                                                  |
|                                                               | P<br>R                          | they are read.<br>Generate report from binary file specified by the B<br>parameter. This binary file has been created by a                                                                                                                                                                                       |
| P=writefile                                                   | R                               | they are read.<br>Generate report from binary file specified by the B<br>parameter. This binary file has been created by a<br>previous PROBE run with OP=C or OP=R specified.<br>Read system tables, and write binary file and report                                                                            |
| P=writefile<br>P=0                                            | R<br>Binary file                | they are read.<br>Generate report from binary file specified by the B<br>parameter. This binary file has been created by a<br>previous PROBE run with OP=C or OP=R specified.<br>Read system tables, and write binary file and report<br>file as specified.                                                      |
|                                                               | R<br>Binary file<br>No binary f | <pre>they are read.<br/>Generate report from binary file specified by the B<br/>parameter. This binary file has been created by a<br/>previous PROBE run with OP=C or OP=R specified.<br/>Read system tables, and write binary file and report<br/>file as specified.<br/>to be written. Default is STATS.</pre> |

# NOTE

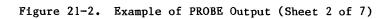
The file names must be unique. If you specify OP=C or OP=R, then you may not specify P=O.

Figure 21-2 is an example of the PROBE output file format.

| E VERSION 1.0.          |                      |                   |              | yy/mm/dd.hh.mm.ss. PAG | Æ |
|-------------------------|----------------------|-------------------|--------------|------------------------|---|
| PROBE VERSION           |                      | 84/09/15.         | 10.09.16.    |                        |   |
| START OF SAME           |                      | 84/09/18.         | 07.19.13.    |                        |   |
| END OF SAMPLE           |                      | 84/09/18.         | 14.57.20.    |                        |   |
| MONITOR REQUE           |                      |                   |              |                        |   |
| HUNITOR READE           |                      |                   |              |                        |   |
|                         | PROGRAM MODE<br>CPUO | MONITOR<br>CPUD   | MODE<br>CPU1 |                        |   |
| AFAM(21)                | 0                    | 7177              | 0            |                        |   |
| DL.KM( 22)              | 0                    | 0                 | 0            |                        |   |
| DTKM(23)                | 131214               | 189955            | 0            |                        |   |
| RTCM( 24)               | 129969               | 129969            | 0            |                        |   |
| STBM(25)                | 0<br>9108            | 121 555           | 0<br>0       |                        |   |
| VMSM(26)                | 1133                 | 9108<br>20059     | 0            |                        |   |
| ACTM(27)<br>BFMM(30)    | 0                    | 20039             | 0            |                        |   |
| CKSM(31)                | 435                  | 435               | 0            |                        |   |
| CSTM( 32)               | 34405                | 34670             | 0            |                        |   |
| EC SM ( 33)             | 0                    | 0                 | 0            |                        |   |
| PIOM( 34)               | 0                    | 0                 | 0            |                        |   |
| RDCM( 35)               | 31 70                | 3170              | 0            |                        |   |
| (36)                    | 0<br>0               | 0                 | 0<br>0       |                        |   |
| ABTM(37)<br>BIOM(40)    | 0                    | 76<br>0           | 0            |                        |   |
| BM IN( 41)              | 0                    | 0                 | 0            |                        |   |
| CCAM( 42)               | ŏ                    | 77321             | ŏ            |                        |   |
| CEFM( 43)               | Ō                    | 832               | 0            |                        |   |
| DC PM( 44)              | 0                    | 25696             | 0            |                        |   |
| DE QM( 45)              | 0                    | 41425             | 0            |                        |   |
| DFMM(46)                | 0                    | 36827             | 0            |                        |   |
| DPPM( 47)               | 0                    | 1108876<br>48694  | 0<br>0       |                        |   |
| EATM( 50)<br>JACM( 51)  | 0                    | 59846             | 0            |                        |   |
| LDAM( 52)               | ŏ                    | 844 946           | õ            |                        |   |
| MTRM(53)                | Ō                    | 2495              | 0            |                        |   |
| PLFM( 54)               | 0                    | 76738             | 0            |                        |   |
| RCLM( 55)               | 0                    | 447037            | 0            |                        |   |
| RCPM( 56)               | 0<br>0               | 1110<br>46638     | 0<br>0       |                        |   |
| RECM( 57)<br>REQM( 60)  | 0                    | 40030             | 0            |                        |   |
| RJSM(61)                | õ                    | 675               | õ            |                        |   |
| RLNM( 62)               | ō                    | 30666             | Ō            |                        |   |
| ROCM( 63)               | 0                    | 15092             | 0            |                        |   |
| R PNM( 64)              | 0                    | 0                 | 0            |                        |   |
| RPPM( 65)               | 0                    | 106311            | 0            |                        |   |
| RSJM(66)<br>SCDM(67)    | 0<br>0               | 1 5481<br>62387   | 0<br>0       |                        |   |
| SFBM (70)               | 0                    | 70802             | 0            |                        |   |
| SJCM(71)                | 0                    | 22237             | ŏ            |                        |   |
| SPLM( 72)               | Ō                    | 1358228           | 0            |                        |   |
| TDAM( 73)               | 0                    | 17566             | 0            |                        |   |
| TGPM( 74)               | 0                    | 11532             | 0            |                        |   |
| TIOM( 75)               | 0                    | 21228             | 0            | -                      |   |
| TSEM( 76)               | 0                    | 37099<br>583735   | 0<br>0       |                        |   |
| UADM (77)<br>UTEM (100) | 0                    | 585755<br>1473766 | 0            |                        |   |
| VFLM(101)               | 0                    | 0                 | ő            |                        |   |
| VF PM(102)              | õ                    | 14518             | õ            |                        |   |
| VSAM(103)               | 0                    | 13180             | 0            |                        |   |
| (104)                   | 0                    | 0                 | 0            |                        |   |
| (105)                   | 0                    | 0                 | 0            |                        |   |
| SUBTOTAL                | 700/7/               | 7230584           | 0            |                        |   |
| TOTAL                   | 309434               |                   | 7230584      |                        |   |

Figure 21-2. Example of PROBE Output (Sheet 1 of 7)

| BE VERSION 1.0.                                                                                            |               | yy/mm/dd. hh.mm.ss. | . PAGE |  |
|------------------------------------------------------------------------------------------------------------|---------------|---------------------|--------|--|
| MTR REQUESTS                                                                                               |               |                     |        |  |
| CPUO CPU1                                                                                                  |               | •                   |        |  |
| ARTF(1) 27487 0                                                                                            |               |                     |        |  |
| IARF(2) 0 0                                                                                                |               |                     |        |  |
| CSLF(3) 23220 0                                                                                            |               |                     |        |  |
| RCLF(4) 6134559 0<br>MFLF(5) 66297 0                                                                       |               |                     |        |  |
| SCSF(6) 0 0                                                                                                |               |                     |        |  |
| SMSF(7) 0 0                                                                                                |               |                     |        |  |
| CMSF(10) 0 0                                                                                               |               |                     |        |  |
| PRQF(11) 41638 0                                                                                           |               |                     |        |  |
| ACSF(12) 93425 0                                                                                           |               |                     |        |  |
| PCXF(13) 0 0                                                                                               |               |                     |        |  |
| ARMF(14) 0 0<br>(15) 0 0                                                                                   |               |                     |        |  |
| MFEF(16) 0 0                                                                                               |               |                     |        |  |
| SUBTOTAL 6386626 0                                                                                         |               |                     |        |  |
| TOTAL 6386626                                                                                              |               |                     |        |  |
|                                                                                                            |               |                     |        |  |
| PROGRAM MODE                                                                                               |               |                     |        |  |
| CPU O                                                                                                      |               | ۰.                  |        |  |
| MSTF( 1) 23220                                                                                             |               |                     |        |  |
| PDMF(2) 0                                                                                                  |               |                     |        |  |
| PMRF(3) 0                                                                                                  |               |                     |        |  |
| MECF( 4) 0                                                                                                 |               |                     |        |  |
| TOTAL 23220                                                                                                |               |                     |        |  |
| MTR PERFORMANCE PARAMETERS<br>Worst case *MXN* TIME =<br>Worst case cyclé time =<br>Missed clock updates = | 751<br>6<br>2 |                     |        |  |
| CPUMTR PERFORMANCE PARAMETERS                                                                              | _             |                     |        |  |
| EM STORAGE MOVES =<br>CM STORAGE MOVES ≕                                                                   | 0<br>24173    |                     |        |  |
| COMMUNICATIONS BUFFER NOT AVAILABLE =                                                                      | 24175         |                     |        |  |
| PP PRIORITY EXCHANGE REQUESTS =                                                                            | 0             |                     |        |  |
| 1RO PERFORMANCE PARAMETERS                                                                                 |               |                     |        |  |
| NUMBER OF ROLLOUTS =                                                                                       | 18393         |                     |        |  |
| ROLLOUTS TO SECONDARY DEVICES =<br>NUMBER OF SECTORS ROLLED =                                              | 0<br>2918049  |                     |        |  |
| SECTORS ROLLED TO SECONDARY DEVICES =                                                                      | 0             |                     |        |  |
| 1SJ PERFORMANCE PARAMETERS                                                                                 |               |                     |        |  |
| EJT SCANS =                                                                                                | 761 93        |                     |        |  |
| SCHEDULABLE JOBS=                                                                                          | 21917         |                     |        |  |
| JOBS PREEMPTED =<br>Jobs Scheduled =                                                                       | 95<br>17866   |                     |        |  |
| JOBS SCHEDULED =<br>JOBS SCHEDULED NO CONSTRAINTS =                                                        | 17866         |                     |        |  |
| EJT SCANS WITH INSUFFICIENT CM =                                                                           | 130           |                     |        |  |
| EJT SCANS WITH INSUFFICIENT EM =                                                                           | 0             |                     |        |  |
| EJT SCANS WITH NO CONTROL POINT =                                                                          | 2             |                     |        |  |
| ROLLOUTS FOR RESOURCE LIMITS =                                                                             | 1             |                     |        |  |
| TIME SLICES =                                                                                              | 460           |                     |        |  |



|                |        |                 |        | yy/mm/dd.hh.mm.ss. PAGE |
|----------------|--------|-----------------|--------|-------------------------|
| CIO REQUESTS   |        |                 |        |                         |
| FUNCTION       | CALLS  | FUNCTION        | CALLS  |                         |
| R PHR (000)    | 3015   | READ (010)      | 154978 |                         |
| WRITE(014)     | 83438  | REA DS KP (020) | 4907   |                         |
| WRITER(024)    | 53751  | WRITEF(034)     | 5237   |                         |
| BKS P (040)    | 465    | REWIND (050)    | 55857  |                         |
| ****(54)       | 128    | UNLOAD (060)    | 459    |                         |
| RETURN (070)   | 30345  | OPEN(100)       | 2200   |                         |
| OPEN (104)     | 2643   | EVICT (114)     | 1653   |                         |
| OPEN (120)     | 2602   | CLOSE (130)     | 1356   |                         |
| 0PEN (140)     | 753    | OPEN (144)      | 4885   |                         |
| CLOSE (150)    | 582    | 0PEN(160)       | 543    |                         |
| C LOSE (170)   | 5339   | CLOSE (174)     | 465    |                         |
| REA DCW (200)  | 15476  | WRITECW(204)    | 7361   |                         |
| READLS (210)   | 1235   | REWRITE (214)   | 13111  |                         |
| REWRITER (224) | 11 907 | RPHRLS (230)    | 25137  |                         |
| SKIPF(240)     | 9784   | READNS (250)    | 400    |                         |
| READEI(600)    | 5893   | SKIPB(640)      | 4386   |                         |

Figure 21-2. Example of PROBE Output (Sheet 3 of 7)

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| PR | OBE VERS       | ION 1.0    | D.               |            |            |        |
|----|----------------|------------|------------------|------------|------------|--------|
|    | 001 0          | ROGRAM     |                  |            |            |        |
|    |                |            |                  |            |            |        |
|    | NAME           | LOC        | LOA DS           | NAME       | LOC        | LOA DS |
|    | CPM            | CMR        | 605181           | PIP        | DSK        | 0      |
|    | 1MS            | CMR        | 460275           | PNC<br>SBP | DSK        | 0      |
|    | 4MB            | CMR        | 243588           | SBP<br>SLL | DSK<br>DSK | 0      |
|    | 4 M D<br>4 M E | CMR<br>CMR | 169670<br>155651 | SMP        | DSK        | Ő      |
|    | QAC            | CMR        | 83410            | TMG        | DSK        | 0<br>0 |
|    | 393            | CMR        | 83372            | VEJ        | DSK        | ŏ      |
|    | 1SJ            | CMR        | 73838            | VER        | DSK        | ŏ      |
|    | 3AE            | CMR        | 70341            | WRM        | DSK        | ŏ      |
|    | LFM            | CMR        | 69611            | XIS        | DSK        | ŏ      |
|    | 1AJ            | CMR        | 47141            | x26        | DSK        | ŏ      |
|    | 3LB            | CMR        | 46964            | 001        | DSK        | ŏ      |
|    | TCS            | CMR        | 46406            | OIP        | DSK        | ŏ      |
|    | 390            | DSK        | 46381            | OMC        | DSK        | õ      |
|    | LDR            | CMR        | 43575            | OMD        | DSK        | ō      |
|    | 1NA            | CMR        | 39939            | OSD        | CMR        | Ō      |
|    | OBF            | CMR        | 37181            | OSI        | DSK        | ŏ      |
|    | 395            | CMR        | 36988            | OTD        | DSK        | 0      |
|    | 4MC            | CMR        | 31223            | 1FA        | DSK        | 0      |
|    | 3NW            | CMR        | 29968            | 1HP        | DSK        | 0      |
|    | 3 SB           | CMR        | 27491            | 1 IE       | ÐSK        | 0      |
|    | 3SD            | CMR        | 27491            | 11P        | DSK        | 0      |
|    | 110            | CMR        | 27405            | 1 IS       | DSK        | Ō      |
|    | NDR            | CMR        | 26489            | 1KB        | DSK        | 0      |
|    | RHH            | DSK        | 25371            | 1LC        | DSK        | 0      |
|    | 1M T           | CMR        | 24435            | 1LT        | CMR        | Ō      |
|    | 34 E           | CMR        | 24435            | 1MF        | DSK        | . 0    |
|    | ODF            | CMR        | 24317            | 1MR        | DSK        | 0      |
|    | 3MF            | CMR        | 23257            | 1PC        | DSK        | Ō      |
|    | 3C D           | CMR        | 21 678           | 1PD        | DSK        | 0      |
|    | 3AF            | CMR        | 19990            | 1PL        | DSK        | 0      |
|    | 3MJ            | CMR        | 19709            | 1PR        | DSK        | Ō      |
|    | QFM            | DSK        | 19637            | 184        | DSK        | Ō      |
|    | RPV            | CMR        | 18598            | 1RP        | DSK        | Ō      |
|    | 1RO            | CMR        | 18282            | 1RU        | DSK        | Ō      |
|    | 1RI            | CMR        | 18262            | 1TM        | DSK        | Ō      |
|    | 1M I           | CMR        | 14294            | 1TN        | DSK        | 0      |
|    | 3LD            | CMR        | 12765            | 1TP        | DSK        | 0      |
|    | SFM            | CMR        | 12584            | 1 TS       | DSK        | 0      |
|    | 3S X           | CMR        | 10536            | 1VP        | DSK        | 0      |
|    | . STD          | DSK        | 9223             | 2DC        | DSK        | 0      |
|    | 4S D           | DSK        | 9222             | 2DD        | ÐSK        | 0      |
|    | 3AD            | DSK        | 8614             | 2 I E      | DSK        | 0      |
|    | 2MA            | DS K       | 8501             | 21M        | DSK        | 0      |
|    | TLX            | CMR        | 8444             | 21N        | DSK        | 0      |
|    | 3SC            | CMR        | 8245             | 210        | DSK        | 0      |
|    | 100            | CMR        | 7995             | 21P        | DSK        | 0      |
|    | 4MF            | CMR        | 7600             | 210        | DSK        | 0      |
|    | 3R P           | CMR        | 7357             | 2KA        | DSK        | 0      |
|    | 3RH            | CMR        | 7342             | 2KB        | DSK        | 0      |
|    | PFM            | CMR        | 6961             | 2KC        | DSK        | 0      |
|    | 3PA            | CMR        | 5122             | 2LD        | DSK        | 0      |
|    | 3LC            | CMR        | 5085             | 2MB        | DSK        | 0      |
|    | 3A I           | CMR        | 4722             | 2ME        | DSK        | 0      |
|    |                |            |                  |            |            |        |
|    |                |            |                  |            |            |        |

Figure 21-2. Example of PROBE Output (Sheet 4 of 7)

|            |            |              |            |              | _      |  |  |
|------------|------------|--------------|------------|--------------|--------|--|--|
| 3LE        | CMR        | 4024         | 2MF        | DSK          | 0      |  |  |
| 3PC        | CMR        | 3960         | 2MN        | DSK          | 0<br>0 |  |  |
| 3QD<br>LDQ | DSK<br>CMR | 3959<br>3790 | 2MR<br>2MZ | DS K<br>DS K | 0      |  |  |
| 3PD        | CMR        | 3619         | 2M2<br>2NT | DSK          | 0      |  |  |
| 3QA        | DSK        | 2800         | 2N1<br>2NU | DSK          | 0      |  |  |
| 3CR        | CMR        | 2749         | 2PT        | DSK          | ŏ      |  |  |
| 305        | CMR        | 2748         | 2PV        | DSK          | ŏ      |  |  |
| 1T0        | CMR        | 22.96        | 2PX        | DSK          | õ      |  |  |
| 2T 0       | CMR        | 2203         | 2RP        | DSK          | 0      |  |  |
| 3PE        | CMR        | 2080         | 2RU        | DSK          | 0      |  |  |
| OAV        | CMR        | 1887         | 2 SB       | DSK          | 0      |  |  |
| 1TA        | DSK        | 1867         | 2SC        | DS K         | 0      |  |  |
| 3CB        | CMR        | 1822         | 2SE        | DSK          | 0      |  |  |
| 10K        | DSK        | 1699         | 2SF        | DSK          | 0      |  |  |
| 3PR        | CMR        | 1682         | 256        | DSK          | 0      |  |  |
| 3MQ<br>3CC | CMR<br>DSK | 1670<br>1643 | 251        | DS K<br>DS K | 0      |  |  |
| 35 V       | DSK        | 1598         | 21M<br>21N | DSK<br>DSK   | 0      |  |  |
| 3PN        | CMR        | 1489         | 21N<br>3AG | DSK          | 0      |  |  |
| ORP        | CMR        | 1325         | 3AH        | CMR          | Ö      |  |  |
| LDD        | CMR        | 1301         | 368        | DSK          | ŏ      |  |  |
| 3TC        | DSK        | 1200         | 380        | DSK          | ŏ      |  |  |
| OFA        | CNR        | 11.62        | 380        | DSK          | Ō      |  |  |
| DS P       | DSK        | 1161         | 38 E       | DSK          | 0      |  |  |
| 308        | DSK        | 1120         | 3BF        | DSK          | 0      |  |  |
| Opq        | DSK        | 1086         | 3CA        | DSK          | 0      |  |  |
| 3R G       | DSK        | 1029         | 3CV        | DSK          | 0      |  |  |
| 2NW        | DS K       | 995          | 3FB        | DSK          | 0      |  |  |
| 311        | CMR        | 981          | 310        | DSK          | 0      |  |  |
| OAU        | DSK        | 947          | 31D        | DSK          | 0      |  |  |
| 3AK<br>3AA | DSK<br>DSK | 941<br>934   | 31E<br>31M | DSK<br>DSK   | 0      |  |  |
| 3PQ        | CMR        | 923          | 3IN        | DSK          | 0      |  |  |
| 2NR        | DSK        | 922          | 310        | DSK          | Ő      |  |  |
| 3A J       | DSK        | 918          | 31P        | DSK          | ŏ      |  |  |
| 398        | ĐSK        | 904          | 319        | DSK          | ŏ      |  |  |
| 3QX        | DSK        | 903/         | 3KA        | DSK          | õ      |  |  |
| 390        | DSK        | 903          | 3KB        | DSK          | 0      |  |  |
| 3PH        | CMR        | 791          | 3KC        | DSK          | 0      |  |  |
| CVL        | DSK        | 747          | 3LA        | DS K         | 0      |  |  |
| 360        | DSK        | 685          | 3MA        | DSK          | 0      |  |  |
| SFP        | CMR        | 605          | 3MB        | DSK          | 0      |  |  |
| 3AB        | DSK        | 596          | 3MD -      | DSK          | 0      |  |  |
| 1 D S      | CMR        | 521<br>491   | 3MK        | CMR          | 0      |  |  |
| 3DA<br>1ML | DSK<br>DSK | 491          | 3MM<br>3MR | DSK<br>CMR   | 0<br>0 |  |  |
| 3TE        | DSK        | 490          | 3MU        | DSK          | 0      |  |  |
| 3PI        | DSK        | 479          | 3PM        | DSK          | Ő      |  |  |
| 1DL        | CMR        | 454          | 3PP        | DSK          | õ      |  |  |
| CMS        | DSK        | 429          | 3QR        | DSK          | ŏ      |  |  |
| 40B        | DSK        | 426          | 361        | DSK          | ō      |  |  |
| 4DD        | DSK        | 426          | 3RF        | DSK          | ŏ      |  |  |
| 3 SA       | DSK        | 425          | 3RU        | DSK          | õ      |  |  |
| 3M 0       | CMR        | 383          | 3S U       | DŚK          | 0      |  |  |
| 3NM        | DSK        | 382          | 3sz        | DSK          | 0      |  |  |
| 3ML        | DSK        | 354          | 3TA        | DSK          | 0      |  |  |
| 3MH        | DSK        | 350          | 4DF        | DSK          | 0      |  |  |

Figure 21-2. Example of PROBE Output (Sheet 5 of 7)

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|             | ION 1.0      |            |              |            |        | yy/mm/dd.hh.mm.ss. PAGE |
|-------------|--------------|------------|--------------|------------|--------|-------------------------|
| 3PF         | CMR          | 348        | 4 <b>D</b> I | DSK        | 0      | ·                       |
| 2MD         | DS K         | 338        | 4DJ          | DSK        | 0      |                         |
| 4MA         | CMR          | 313        | 4DK          | DSK        | 0      |                         |
| OVJ         | DSK          | 310        | 4DZ          | DSK        | 0      |                         |
| OVU         | DSK          | 310        | 4 IM         | DSK        | 0      |                         |
| ЗРК         | DSK          | 245        | 410          | DSK        | 0      |                         |
| 3MC         | CMR          | 237        | 41P          | DSK        | 0      |                         |
| 3AL         | DSK          | 235        | 419          | DSK        | 0      |                         |
| 2MC         | DSK          | 216        | 4KB          | DSK        | 0      |                         |
| 9AA         | DSK          | 215        | 4KC          | DSK        | 0      |                         |
| SSH         | DSK          | 210        | 4KD          | DSK        | 0<br>0 |                         |
| 3MG         | DSK          | 193        | 4MG          | DSK        | 0      |                         |
| 3TB         | DSK          | 188        | 4NB          | DSK        | 0      |                         |
| PFU<br>9EA  | DS K<br>DS K | 177<br>168 | 4NC<br>4NM   | DSK<br>DSK | Ö      |                         |
|             | DS K         |            | 4RA          | DSK        | Ö      |                         |
| ORF<br>2SD  | DSK          | 163<br>141 | 4RA<br>4RB   | DSK        | 0      |                         |
| 250<br>3MT  | DSK          | 138        | 4 RC         | DSK        | Ö      |                         |
| 2115        | DSK          | 136        | 4RD          | DSK        | ő      |                         |
| 3MP         | CMR          | 133        | 4RE          | DSK        | Ö      |                         |
| 3PB         | DSK          | 129        | 4RF          | DSK        | ŏ      |                         |
| 3PJ         | DSK          | 126        | 4RG          | DSK        | ŏ      |                         |
| 3AM         | ÐSK          | 91         | 5BA          | DSK        | õ      |                         |
| 9BA         | DSK          | 83         | 588          | DSK        | ŏ      |                         |
| 3MN         | DSK          | 82         | 5BC          | DSK        | Ō      |                         |
| ORT         | DSK          | 74         | 5BD          | DSK        | õ      |                         |
| 3MS         | DSK          | 67         | 5CU          | DSK        | Ō      |                         |
| 2NQ         | DSK          | 63         | 5C V         | DSK        | 0      |                         |
| ť76         | DSK          | 58         | 5D 1         | DSK        | 0      |                         |
| 6DI         | CMR          | 58         | 5D2          | DSK        | 0      |                         |
| OPT         | CMR          | 51         | 5D 3         | DSK        | 0      |                         |
| QAP         | DSK          | 48         | 5 F F        | DSK        | 0      |                         |
| NLD         | DSK          | 46         | 5FH          | DSK        | 0      |                         |
| 3dc         | DS K         | 36         | 51A          | DSK        | 0      |                         |
| 3FA         | DSK          | 35         | 510          | DSK        | 0      |                         |
| 395         | DSK          | 32         | 51D          | DSK        | 0      |                         |
| DIS         | DSK          | 29         | 51G          | DSK        | 0      |                         |
| 38A         | DSK          | 24         | 51H          | DSK        | 0      |                         |
| 3BG         | DSK          | 24         | 510          | DSK        | 0      |                         |
| 31A         | DSK          | 24         | 5LL          | DSK        | 0      |                         |
| 318<br>51E  | DSK<br>DSK   | 24<br>24   | 5MA<br>5MB   | DSK<br>DSK | 0      |                         |
| 30B         | DSK          | 24<br>22   | SMC          | DSK        | 0      |                         |
| 3085<br>1CD | DSK          | 21         | 5M D         | DSK        | 0      |                         |
| 3PL         | DSK          | 19         | 5ME          | DSK        | 0      |                         |
| 3AC         | DSK          | 15         | 5MG          | DSK        | 0      |                         |
| 2DA         | DSK          | 13         | 5MR          | DSK        | 0      |                         |
| 2SA         | DSK          | 13         | 5MS          | DSK        | Ö      |                         |
| 701         | CMR          | 13         | 5MT          | DSK        | õ      |                         |
| 7DI         | CMR          | 13         | 5MU          | DSK        | Ö      |                         |
| 7E1         | CMR          | 13         | 5MW          | DSK        | ŏ      |                         |
| 7EL         | CMR          | 13         | 55E          | DSK        | ŏ      |                         |
| 7EM         | CMR          | 13         | 550          | DSK        | ŏ      |                         |
| 7EN         | CMR          | 13         | 55 V         | DSK        | ŏ      |                         |
| 7E0         | CMR          | 13         | 551          | DSK        | õ      |                         |
| 7EP         | CMR          | 13         | 552          | DSK        | Ō      |                         |
| 751         | CMR          | 13         | 5 X A        | DSK        | ō      |                         |
| 4MH         | DSK          | 12         | 5XB          | DSK        | Ō      |                         |

Figure 21-2. Example of PROBE Output (Sheet 6 of 7)

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| OBE VERSI | UN 1.U.    |            |              |       |   | yy/mm/dd. hh.mm.ss. PA | GE |
|-----------|------------|------------|--------------|-------|---|------------------------|----|
| IMS       | ÐSK        | 10         | 5XC          | DS K  | 0 |                        |    |
| 3PG       | DSK        | 10         | 5XD          | DSK   | 0 |                        |    |
| 3QY       | DSK        | 9          | 5XE          | DSK   | 0 |                        |    |
| 3qz       | DSK        | 9          | 5XF          | DSK   | 0 |                        |    |
| 2SH       | DSK        | 8          | 5XG          | DSK   | 0 |                        |    |
| 3CE       | DSK        | 8          | 541          | DSK   | Ō |                        |    |
| OPI       | DSK        | 7          | 55X          | DSK   | ō |                        |    |
| 1MB       | DSK        | ,<br>7     | 56X          | DSK   | õ |                        |    |
| 1MP       | CMR        | 7          | 57X          | DSK   | õ |                        |    |
| 208       | DSK        | 6          | 58F          | DSK   | Ő |                        |    |
| 300       | DSK        | 6          | 58H          | DSK   | Ö |                        |    |
| 4DA       | DSK        | 6          | 58X          | DSK   | 0 |                        |    |
|           |            |            |              |       | 0 |                        |    |
| 4DC       | DSK        | 6          | 7ER          | CMR   |   |                        |    |
| 40G       | DSK        | 6          | 7F I         | CMR   | 0 |                        |    |
| · 026     | DSK        | 5          | 7GI          | CMR   | 0 |                        |    |
| 9GA       | DSK        | 5          | 7HI          | CMR   | 0 |                        |    |
| 3RI       | DSK        | 4          | 711          | CMR   | 0 |                        |    |
| 2NX       | DSK        | 3          | 7JI          | CMR   | 0 |                        |    |
| 2NY       | DSK        | 3          | 7KI          | CMR   | 0 |                        |    |
| 3AN       | DSK        | 3          | 7LI          | CMR   | 0 |                        |    |
| 3P0       | DSK        | 3          | 7SE          | CMR   | 0 |                        |    |
| 3QT       | DSK        | 3          | 7WI          | CMR   | 0 |                        |    |
| 3QV       | DSK        | 3          | 8XA          | DSK   | 0 |                        |    |
| 7E Q      | CMR        | 3          | 8 XB         | DSK   | 0 |                        |    |
| 7ES       | CMR        | 3          | 8XC          | DSK   | 0 |                        |    |
| OST       | DSK        | 2          | 9CA          | CMR   | 0 |                        |    |
| 35 Y      | DSK        | 2          | 9CB          | CMR   | 0 |                        |    |
| OTI       | DSK        | 1          | 900          | CMR   | 0 |                        |    |
| OTJ       | DSK        | 1          | 9C D         | CMR   | 0 |                        |    |
| 3CK       | DSK        | 1          | 9CE          | CMR   | Ō |                        |    |
| 3R J      | DSK        | 1          | 9CF          | CMR   | Ō |                        |    |
| 3SW       | DSK        | 1          | 9C G         | CMR   | õ |                        |    |
| 3TD       | DSK        | 1          | 9CH          | CMR   | õ |                        |    |
| A DC      | DSK        | Ō          | 901          | CMR   | ō |                        |    |
| BAT       | DSK        | õ          | 9C J         | CMR   | ŏ |                        |    |
| C PD      | DSK        | õ          | 9CK          | CMR   | ŏ |                        |    |
| CUX       | DSK        | õ          | 90 L         | CMR   | õ |                        |    |
| DDF       | DSK        | õ          | 90H          | CMR   | ŏ |                        |    |
| DOG       | DSK        | 0          | 90M          | - CMR | 0 |                        |    |
| DS1       | DSK        | 0          | 900          | CMR   | Ö |                        |    |
| ELM       |            | 0          |              |       |   |                        |    |
| EYE       | DSK<br>DSK | , n        | 9C P<br>9C Q | CMR   | 0 |                        |    |
|           |            |            |              | CMR   | 0 |                        |    |
| FDP       | DSK        | 0          | 9CR          | CMR   | 0 |                        |    |
| HFM       | DSK        | 0          | 905          | CMR   | 0 |                        |    |
| LIF       | DSK        | 0          | 9JN          | DSK   | 0 |                        |    |
| MDD       | DSK        | 0          | 9VA          | DSK   | 0 |                        |    |
| MLD       | DSK        | 0          | 9WA          | DSK   | 0 |                        |    |
| MP3       | DSK        | 0          |              |       |   |                        |    |
| PIM       | DS K       | 0          |              |       |   |                        |    |
|           |            | PROGRAMS = | 0            |       |   |                        |    |
|           |            | PROGRAMS = | 123          |       |   |                        |    |
|           |            | PROGRAMS = | 313          |       |   |                        |    |
|           |            | ENTRIES =  | 436          |       |   |                        |    |

Figure 21-2. Example of PROBE Output (Sheet 7 of 7)

When looking at the PP program load information reported on the PROBE output, check to see if it meets these suggested performance requirements:

- PP programs called at least once every second should be central memory resident.
- PP programs called at least once every 2 seconds are good candidates for alternate residency using extended memory.
- PP programs called every 3 seconds or less should be disk resident.

You can change a PP program's residency using the SYSEDIT command (refer to section 19, SYSEDIT).

# **APPENDIXES**

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# **CHARACTER SETS**

A character set is composed of graphic and control characters. A code set is a set of codes used to represent each character within a character set.

A graphic character may be displayed at a terminal or printed by a line printer. Examples are the characters A through Z and the digits 0 through 9. A control character initiates, modifies, or stops a control operation. An example is the backspace character that moves the terminal carriage or cursor back one space. Although a control character is not a graphic character, a terminal may produce a graphic representation when it receives a control character.

All references within this manual to the ASCII character set or the ASCII code set refer to the character set and code set defined in the American National Standard Code for Information Interchange (ASCII, ANSI Standard X3.4-1977). References in this manual to the ASCII character set do not necessarily refer to the ASCII code set.

NOS supports the following character sets.

- CDC graphic 64- (or 63-) character set.
- ASCII 128-character set.
- ASCII graphic 64- (or 63-) character set.
- ASCII graphic 95-character set.

Each installation selects either the 64-character set or the 63-character set. The differences between the two are described next, under Character Set Anomalies. Any reference in this appendix to the 64-character set implies either the 63- or 64-character set, unless otherwise stated.

NOS supports the following code sets.

- 6-bit display code.
- 6/12-bit display code.
- 7-bit ASCII code.

Display code is a set of 6-bit codes from 00g to 77g.

The 6/12-bit display code is a combination of 6-bit codes and 12-bit codes. The 6-bit codes are 008 through 778, excluding 748 and 768. (Refer to Character Set Anomalies, next, for the interpretation of the 008 and 638 codes.) The 12-bit codes begin with either 748 or 768 and are followed by a 6-bit code. Thus, 748 and 768 are considered escape codes and are never used as 6-bit codes within the 6/12-bit display code set. The 12-bit codes are 74018, 74028, 74048, 74078, and 76018 through 76778. All other 12-bit codes (74xx8 and 76008) are undefined.

Α

The 7-bit ASCII code (as defined by ANSI Standard X3.4-1977) is right-justified in a 12-bit byte. Assuming that the bits are numbered from the right starting with 0, bits 0 through 6 contain the ASCII code, bits 7 through 10 contain zeros, and bit 11 distinguishes the 0000g code from the end-of-line byte. The 7-bit codes are 0001g through 0177g and 4000g.

# **CHARACTER SET ANOMALIES**

NOS interprets two codes differently when the installation selects the 63-character set rather than the 64-character set. In tables A-1, A-2, and A3, the codes for the colon and percent graphic characters in the 64-character set are unshaded; the codes for the colon and percent graphic characters in the 63-character set are shaded.

If an installation uses the 63-character set, the colon graphic character is always represented by a 638 code, and the 008 code is undefined. However, if the installation uses the 64-character set, output of 6/12-bit display codes 74048 or 6-bit display code 008 produces a colon. In ASCII mode for interactive jobs, a colon can be input only as a 74048 6/12-bit display code.

When using either the 63- or 64-character set, the use of undefined 6/12-bit display codes in output files produces unpredictable results and should be avoided.

On input, NOS recognizes alternate 029 punch codes of 11-0 for the right bracket (]) and 12-0 for the left bracket ([). The alternate codes support the COBOL sign overpunch convention and are not recommended for other uses. Refer to the COBOL 5 Reference Manual.

Also, two  $00_8$  codes may be confused with an end-of-line byte and should be avoided (refer to the NOS 2 Reference Set, Volume 3 for further explanation).

Translation of 7-bit ASCII to 6-bit display code causes character set folding from the 128-character ASCII set to the 63- or 64-character ASCII subset. The following special character substitutions occur:

| 7-B  | Lt ASCII  | 6-Bit | Display Code | 7-в  | it ASCII  |
|------|-----------|-------|--------------|------|-----------|
| Code | Character | Code  | Character    | Code | Character |
| 0140 | •         | 74    | @            | 0100 | 0         |
| 0173 | {         | 61    | [            | 0133 | Ι         |
| 0174 |           |       | \            | 0134 | ١         |
| 0175 | }         | 62    | ]            | 0135 | ]         |
| 0176 | ~         | 76    | ~            | 0136 | ^         |

# **CHARACTER SET TABLES**

This appendix includes character set tables for interactive jobs, batch jobs, and jobs involving magnetic tapes. Table A-1 is for interactive jobs, and table A-2 is for batch jobs. Table A-3 is a conversion table used to cross-reference 7-bit ASCII codes and 6/12-bit display codes and to convert ASCII codes from octal to hexadecimal.

Tables A-4, A-5, and A-6 list the magnetic tape codes and their display code equivalents.

The character set tables are designed so that you can find the character represented by a code (such as in a dump) or find the code that represents a character. To find the character represented by a code, look up the code in the column listing the appropriate code set and then find the character on that line in the column listing the appropriate character set. To find the code that represents a character, you first look up the character and then find the same line in the appropriate column.

# **INTERACTIVE JOBS**

Table A-1 shows the character sets and code sets available to you at an ASCII code terminal. When in NORMAL mode (specified by the NORMAL command), NOS displays the ASCII graphic 64-character set and interprets all input and output as display code. When in ASCII mode (specified by the ASCII command), NOS displays the ASCII 128-character set and interprets all input and output as 6/12-bit display code.

To determine the octal or hexadecimal ASCII code for a character, refer to table A-3. (Certain terminal definition commands require specification of an ASCII code.)

On output, the US code is reserved for network use and defined as an end-of-line. Use of this character, except in transparent mode, causes incorrect formatting and possible loss of output characters.

# **BATCH JOBS**

Table A-2 lists the CDC graphic 64-character set, the ASCII graphic 64-character set, and the ASCII graphic 95-character sets. It also lists the code sets and card punch codes (026 and 029) that represent the characters.

The 64-character sets use display code as their code set; the 95-character set uses 7-bit ASCII code. The 95-character set is composed of all the characters in the ASCII 128-character set that can be printed at a line printer (refer to Jobs Using Line Printers, next). Only 7-bit ASCII code files can be printed using the ASCII graphic 95-character set. To print a 6/12-bit display code file (usually created by an interactive job in ASCII mode), you must convert the file to 7-bit ASCII code. To do this, you enter the FCOPY command (refer to the NOS 2 Reference Set, Volume 3). The 95-character set is represented by 7-bit ASCII codes 0040g through 0176g.

# **JOBS USING LINE PRINTERS**

The batch character set printed depends on the print train used on the line printer to which the file is sent (refer to the ROUTE command in the NOS 2 Reference Set, Volume 3). The following are the print trains corresponding to each of the batch character sets.

| Character Set                  | Print Train | PSU Printer Print Band |
|--------------------------------|-------------|------------------------|
| CDC graphic 64-character set   | 596-1       | -                      |
| ASCII graphic 64-character set | 596-5       | 530-1                  |
| ASCII graphic 95-character set | 596-6       | 530-2                  |

The characters of the default 596-1 print train are listed in the table A-2 column labeled CDC Graphic (64 Character); the 596-5 print train characters are listed in the table A-2 column labeled ASCII Graphic (64 Character); and the 596-6 print train characters are listed in the table A-2 column labeled ASCII Graphic (95 Character).

If a transmission error occurs when printing a line, the system prints the line again. The CDC graphic print train prints a concatenation symbol  $(\sqcap)$  in the first printable column of the repeated listing of the line. The ASCII print trains print an underline (\_) instead of the concatenation symbol.

If an unprintable character exists in a line (that is, a 7-bit ASCII code outside the range 00408 through 01768), the number sign (#) appears in the first printable column of a print line, and a space replaces the unprintable character.

To route and correctly print a 6/12-bit display code file on a line printer with the ASCII graphic 95-character set, you must convert the 6/12-bit display code file to a 7-bit ASCII code file with the FCOPY command (refer to the NOS 2 Reference Set, Volume 3). The resulting 7-bit ASCII file can be routed to a line printer (refer to the ROUTE command in the NOS 2 Reference Set, Volume 3) but cannot be output at an interactive terminal.

| ASCII<br>Graphic<br>(64 Character) | ASCII<br>Character<br>(128 Character) | 6-Bit<br>Display<br>Code | 6/12-<br>Bit<br>Display<br>Code | 7-Bit<br>ASCII<br>Code | ASCII<br>Graphic<br>(64 Character) | ASCII<br>Character<br>(128 Character) | 6-Bit<br>Display<br>Code | 6/12-<br>Bit<br>Display<br>Code | 7-B:<br>ASC<br>Code |
|------------------------------------|---------------------------------------|--------------------------|---------------------------------|------------------------|------------------------------------|---------------------------------------|--------------------------|---------------------------------|---------------------|
| : colon                            |                                       | 00                       |                                 |                        | # number sign                      | # number sign                         | 60                       | 60                              | 004                 |
| Display code CO is us              | defined at eites using                | the 63-                  | character                       | act.                   | [ opening bracket                  | [ opening bracket                     | 61                       | 61                              | 013                 |
| A                                  | A                                     | 01                       | 01                              | 0101                   | ] closing bracket                  | ] closing bracket                     | 62                       | 62                              | 013                 |
| в                                  | В                                     | 02                       | 02                              | 0102                   | % percent sign                     | % percent sign                        | 63                       | 63T                             | 004                 |
| с                                  | с                                     | 03                       | 03                              | 0103                   | t colen                            | s colon                               | 63                       | 6                               |                     |
| D                                  | D                                     | 04                       | 04                              | 0104                   | " quote                            | " quote                               | 64                       | 64                              | 004                 |
| E                                  | E                                     | 05                       | 05                              | 0105                   | underline                          | underline                             | 65                       | 65                              | 013                 |
| F                                  | F                                     | 06                       | 06                              | 0106                   | ! exclamation point                | ! exclamation point                   | 66                       | 66                              | 004                 |
| C .                                | G                                     | 07                       | 07                              | 0107                   | & ampersand                        | & ampersand                           | 67                       | 67                              | 004                 |
|                                    |                                       |                          |                                 |                        | apost rophe                        | apostrophe                            | 70                       | 70                              | 004                 |
| H                                  | н                                     | 10                       | 10                              | 0110                   | ? question mark                    | ? question mark                       | 71                       | 71<br>72                        | 007                 |
| IJ                                 | I                                     | 11                       | 11                              | 0111                   | < less than                        | < less than                           | 72                       | 73                              | 007                 |
| ĸ                                  | J                                     | · 12                     | 12                              | 0112                   | > greater than                     | > greater than                        | 74†                      | 7401                            | 1                   |
| L                                  | K<br>L                                | 13                       | 13<br>14                        | 0113<br>0114           | @ commercial at                    | C commercial at                       | 75                       | 7401                            | 010                 |
| M                                  | L<br>M                                | 14<br>15                 | 14                              | 0114                   | \ reverse slant                    | \ reverse slant                       | 761                      | 7402                            | 013                 |
| N                                  | N                                     | 16                       | 15                              | 0115                   | circumflex<br>; semicolon          | circumflex<br>; semicolon             | 77                       | 7402                            | 007                 |
| 0                                  | 0                                     | 17                       | 17                              | 0117                   | , semicoron                        | , semicoron                           | ''                       | 1 ''                            |                     |
|                                    |                                       |                          |                                 |                        |                                    | : colon                               |                          | 7404                            | 007                 |
| P                                  | P                                     | 20                       | 20                              | 0120                   |                                    | I percent                             |                          | 7606                            |                     |
| Q                                  | Q                                     | 21                       | 21                              | 0121                   |                                    | ' grave accent                        | 74                       | 7407                            | 014                 |
| R                                  | R                                     | 22                       | 22                              | 0122                   |                                    | -                                     | 1                        |                                 |                     |
| S                                  | s                                     | 23                       | 23                              | 0123                   |                                    | а                                     |                          | 7601                            | 014                 |
| T                                  | т                                     | 24                       | 24                              | 0124                   |                                    | ь                                     |                          | 7602                            | 014                 |
| U                                  | ប                                     | 25                       | 25                              | 0125                   |                                    | c                                     | 1                        | 7603                            | 014                 |
| v                                  | v                                     | 26                       | 26                              | 0126                   | 11                                 | d                                     |                          | 7604                            | 014                 |
| W                                  | W                                     | 27                       | 27                              | 0127                   |                                    | e                                     |                          | 7605                            | 014                 |
|                                    |                                       |                          |                                 |                        | 1                                  | f                                     |                          | 7606                            | 014                 |
| x                                  | x                                     | 30                       | 30                              | 0130                   |                                    | g                                     |                          | 7607                            | 014                 |
| Y                                  | Y                                     | 31                       | 31                              | 0131                   |                                    |                                       |                          |                                 |                     |
| Z                                  | Z                                     | 32                       | 32                              | 0132                   |                                    | h                                     |                          | 7610                            | 015                 |
| 0                                  | 0                                     | 33                       | 33                              | 0060                   |                                    | 1                                     | 1                        | 7611                            | 015                 |
| 1                                  | 1                                     | 34                       | 34                              | 0061                   |                                    | j                                     | 1                        | 7612                            | 015                 |
| 2                                  | 2                                     | 35                       | 35                              | 0062                   | <u></u>                            | k                                     |                          | 7613                            | 015                 |
| 3                                  | 3                                     | 36<br>37                 | 36<br>37                        | 0063                   |                                    | 1                                     | 1                        | 7614                            | 015                 |
| 4                                  | 4                                     | /د                       | 37                              | 0064                   |                                    | m                                     |                          |                                 | 015                 |
|                                    |                                       |                          |                                 |                        |                                    | n<br>o                                | 1                        | 7616<br>7617                    | 015                 |
| 5                                  | 5                                     | 40                       | 40                              | 0065                   | 11                                 |                                       |                          |                                 |                     |
| 6                                  | 6                                     | 41                       | 41                              | 0066                   | 11                                 | P                                     | 1                        | 7620                            | 016                 |
| 7                                  | 7                                     | 42                       | 42                              | 0067                   | 11                                 | ٩                                     |                          | 7621                            | 016                 |
| 8                                  | 8                                     | 43                       | 43                              | 0070                   | 1                                  | г                                     |                          | 7622                            | 016                 |
| 9                                  | 9                                     | 44                       | 44                              | 0071                   | 1)                                 | 8                                     |                          | 7623                            | 016                 |
| + plus                             | + plus                                | 45                       | 45                              | 0053                   | 11                                 | t                                     | 1                        | 7624                            | 016                 |
| - dash                             | - dash                                | 46                       | 46                              | 0055                   | 11                                 | u                                     | 1                        | 7625                            | 016                 |
| * asterisk                         | * asterisk                            | 47                       | 47                              | 0052                   |                                    | v<br>w                                |                          | 7626                            | 016                 |
| / slant                            | / slant                               | 50                       | 50                              | 0057                   |                                    | x                                     | 1                        | 7630                            | 017                 |
| opening parenthesis                | ( opening parenthesis                 | 50                       | 51                              | 0050                   | 11                                 | y y                                   | 1                        | 7631                            | 017                 |
| ) closing parenthesis              | ) closing parenthesis                 | 52                       | 52                              | 0051                   | 11                                 | z                                     | 1                        | 7632                            | 017                 |
| \$ dollar sign                     | \$ dollar sign                        | 53                       | 53                              | 0044                   | 11                                 | { opening brace                       | 61†                      | 7633                            | 017                 |
| = equal                            | = equal                               | 54                       | 54                              | 0075                   | 11                                 | vertical line                         | 75 +                     | 7634                            | 017                 |
| space                              | space                                 | 55                       | 55                              | 0040                   | 11                                 | } closing brace                       | 621                      | 7635                            | 017                 |
| , comma                            | , comma                               | 56                       | 56                              | 0054                   |                                    | ~ tilde                               | 76†                      | 7636                            | 017                 |
|                                    | <ul> <li>period</li> </ul>            | 57                       | 57                              | 0056                   | 11                                 | DEL                                   | 1                        | 7637                            | 017                 |

# Table A-1. Character Sets for Interactive Jobs (Sheet 1 of 2)

,

| ASCII<br>Graphic<br>(64 Character) | ASCII<br>Character<br>(128 Character) | 6-Bit<br>Display<br>Code | 6/12-<br>Bit<br>Display<br>Code | 7-Bit<br>ASCII<br>Code | ASCII<br>Graphic<br>(64 Character) | ASCII<br>Character<br>(128 Character) | 6-Bit<br>Display<br>Code | 6/12-<br>Bit<br>Display<br>Code | 7-Bit<br>ASCII<br>Code |
|------------------------------------|---------------------------------------|--------------------------|---------------------------------|------------------------|------------------------------------|---------------------------------------|--------------------------|---------------------------------|------------------------|
|                                    | NUL                                   |                          | 7640                            | 4000                   |                                    | DLE                                   |                          | 7660                            | 0020                   |
|                                    | SOH                                   |                          | 7641                            | 0001                   |                                    | DC1                                   | 1                        | 7661                            | 0021                   |
|                                    | STX                                   |                          | 7642                            | 0002                   |                                    | DC2                                   |                          | 7662                            | 0022                   |
|                                    | ETX                                   |                          | 7643                            | 0003                   |                                    | DC3                                   |                          | 7663                            | 0023                   |
|                                    | EOT                                   |                          | 7644                            | 0004                   |                                    | DC4                                   |                          | 7664                            | 0024                   |
|                                    | ENQ                                   |                          | 7645                            | 0005                   |                                    | NAK                                   |                          | 7665                            | 0025                   |
| 1                                  | ACK                                   | [                        | 7646                            | 0006                   |                                    | SYN                                   | [                        | 7666                            | 0026                   |
|                                    | BEL                                   |                          | 7647                            | 0007                   |                                    | ETB                                   |                          | 7667                            | 0027                   |
|                                    | BS                                    |                          | 7650                            | 0010                   |                                    | CAN                                   |                          | 7670                            | 0030                   |
|                                    | нт                                    |                          | 7651                            | 0011                   |                                    | EM                                    |                          | 7671                            | 0031                   |
|                                    | LF                                    |                          | 7652                            | 0012                   |                                    | SUB                                   |                          | 7672                            | 0032                   |
|                                    | VT                                    |                          | 7653                            | 0013                   |                                    | ESC                                   |                          | 7673                            | 0033                   |
|                                    | FF                                    |                          | 7654                            | 0014                   |                                    | FS                                    |                          | 7674                            | 0034                   |
|                                    | CR                                    |                          | 7655                            | 0015                   |                                    | GS                                    |                          | 7675                            | 0035                   |
|                                    | SO                                    |                          | 7656                            | 0016                   |                                    | RS                                    |                          | 7676                            | 0036                   |
|                                    | SI                                    |                          | 7657                            | 0017                   |                                    | ust                                   |                          | 7677                            | 0037                   |
| TReserved for network              | use. Refer to Charac                  | ter Set Ta               | bles in t                       | his appendi:           | x.                                 |                                       | L,                       | L                               | L                      |

Table A-1. Character Sets for Interactive Jobs (Sheet 2 of 2)

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| (64 Character)       |                | Graphic                |       | Display  | ASCII        | Punch Co |       |
|----------------------|----------------|------------------------|-------|----------|--------------|----------|-------|
|                      | (64 Character) | (95 Character)         | Code  | Code     | Code         | 026      | 029   |
| : colon <sup>†</sup> | : colon†       |                        | 001   |          |              | 8-2      | 8-:   |
|                      |                | defined at sites using |       |          | Pet.         | 1 12-1   | 12-   |
| A<br>B               | A<br>B         | A<br>B                 | 01 02 | 01<br>02 | 0101<br>0102 | 12-1     | 12-   |
| в<br>С               | C              | C                      | 02    | 02       | 0102         | 12-2     | 12-   |
| D                    | D              |                        | 04    | 03       | 0103         | 12-3     | 12-   |
| E                    | E              | E                      | 04    | 04       | 0104         | 12-4     | 12-   |
| F                    | F              | F                      | 06    | 06       | 0105         | 12-5     | 12-   |
| G                    | G              | G                      | 07    | 07       | 0100         | 12-0     | 12-   |
| 5                    |                | 6                      | 07    | 07       | 0107         | 12-7     | 12-   |
| H                    | н              | н                      | 10    | 10       | 0110         | 12-8     | 12-   |
| I                    | I              | I                      | 11    | 11       | 0111         | 12-9     | 12-   |
| J                    | J              | J                      | 12    | 12       | 0112         | 11-1     | 11-   |
| ĸ                    | ĸ              | K                      | 13    | 13       | 0113         | 11-2     | 11-   |
| L                    | L              | L                      | 14    | 14       | 0114         | 11-3     | 11-   |
| М.                   | м              | м                      | 15    | 15       | 0115         | 11-4     | 11-   |
| N                    | N              | N                      | 16    | 16       | 0116         | 11-5     | 11-   |
| 0                    | 0              | 0                      | 17    | 17       | 0117         | 11-6     | 11-   |
| P                    | Р              | P                      | 20    | 20       | 0120         | 11-7     | 11-   |
| Q                    | Q              | Q                      | 21    | 21       | 0121         | 11-8     | 11-   |
| R                    | R              | R                      | 22    | 22       | 0122         | 11-9     | 1 11- |
| S                    | S              | s                      | 23    | 23       | 0123         | 0-2      | 0-    |
| r                    | Т              | Т                      | 24    | 24       | 0124         | 0-3      | 0-    |
| U                    | U              | U                      | 25    | 25       | 0125         | 0-4      | 0-    |
| v                    | v              | v                      | 26    | 26       | 0126         | 0-5      | 0-    |
| W                    | W              | W                      | 27    | 27       | 0127         | 0-6      | 0-    |
| x                    | x              | x                      | 30    | 30       | 0130         | 0-7      | 0-    |
| Y                    | Y              | Y                      | 31    | 31       | 0131         | 0-8      | o-    |
| -                    | z              | z                      | 32    | 32       | 0132         | 0-9      | 0-    |
| _<br>D               | Ī              |                        | 33    | 33       | 0060         | Ó        | ľ     |
| l                    | 1              | 1 1                    | 34    | 34       | 0061         | 1        | ]     |
| 2                    | 2              | 2                      | 35    | 35       | 0062         | 2        |       |
| 3                    | 3              | 3                      | 36    | 36       | 0063         | 3        |       |
| 4                    | 4              | 4                      | 37    | 37       | 0064         | 4        |       |
| 5                    | 5              | 5                      | 40    | 40       | 0065         | 5        |       |
| 6                    | 6              | 6                      | 40    | 40       | 0066         | 6        | 1     |
| ,<br>1               | 7              | 7                      | 42    | 42       | 0067         | 7        |       |
| ,<br>B               | 8              | 8                      | 43    | 43       | 0070         | 8        |       |
| )<br>)               | 9              | 9                      | 44    | 44       | 0071         | 9        |       |
| ,<br>⊦plus           | + plus         | + plus                 | 45    | 45       | 0053         | 12       | 12-8- |
| - dash               | - dash         | - dash                 | 46    | 46       | 0055         | 11       | 12-8- |
| asterisk             | * asterisk     | * asterisk             | 47    | 47       | 0052         | 11-8-4   | 11-8- |
|                      |                |                        |       |          |              |          |       |

# Table A-2. Character Sets for Batch Jobs (Sheet 1 of 3)

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| Table A-2. | Character | Sets | for | Batch | Jobs | (Sheet | 2 | of | 3) |
|------------|-----------|------|-----|-------|------|--------|---|----|----|
|            |           |      |     |       |      |        |   |    |    |

| CDC<br>Graphic<br>(64 Character)             | ASCII<br>Graphic<br>(64 Character)      | ASCII<br>Graphic<br>(95 Character)           | 6-Bit<br>Display<br>Code | 6/12-Bit<br>Display<br>Code | 7-Bit<br>ASCII<br>Code | Punch C          | ode<br>029       |
|----------------------------------------------|-----------------------------------------|----------------------------------------------|--------------------------|-----------------------------|------------------------|------------------|------------------|
|                                              |                                         |                                              |                          |                             |                        |                  |                  |
| / slant                                      | / slant                                 | / slant                                      | 50                       | 50                          | 0057                   | 0-1              | 0-1              |
|                                              |                                         | ( opening parenthesis                        | 51                       | 51                          | 0050                   | 0-8-4            | 12-8-5           |
| ) closing parenthesis                        | ) closing parenthesis                   | ) closing parenthesis                        | 52                       | 52                          | 0051                   | 12-8-4           | 11-8-5           |
| \$ dollar sign                               | \$ dollar sign                          | \$ dollar sign                               | 53                       | 53                          | 0044                   | 11-8-3           | 11-8-3           |
| = equal                                      | = equal                                 | = equal                                      | 54                       | 54                          | 0075                   | 8-3              | 8-6              |
| space                                        | space                                   | space                                        | 55                       | 55                          | 0040                   | no punch         | no punch         |
| , comma                                      | , comma                                 | , comma                                      | 56                       | 56                          | 0054                   | 0-8-3            | 0-8-3            |
| • period                                     | • period                                | • period                                     | 57                       | 57                          | 0056                   | 12-8-3           | 12-8-3           |
| ≡ equivalence                                | # number sign                           | # number sign                                | 60                       | 60                          | 0043                   | 0-8-6            | 8-3              |
| opening bracket                              | [ opening bracket                       | [ opening bracket                            | 61                       | 61                          | 0133                   | 8-7              | 12-8-27          |
| ] closing bracket                            | ] closing bracket                       | ] closing bracket                            | 62                       | 62                          | 0135                   | 0-8-2            | 11-8-27          |
| % percent sign <sup>†</sup>                  | % percent sign <sup>†</sup>             | % percent sign <sup>†</sup>                  | 63†                      | 63†                         | 0045                   | 8-6              | 0-8-4            |
| ; calon                                      | : colon                                 | : colon                                      | 63                       | 63                          | 0072                   | 8-2              | 8-2              |
| ≠ not equal                                  | " quote                                 | " guote                                      | 64                       | 64                          | 0042                   | 1 8-4            | 8-7              |
| r concatenation                              | underline                               | underline                                    | 65                       | 65                          | 0137                   | 0-8-5            | 0-8-5            |
| v logical OR                                 | exclamation point                       | exclamation point                            | 66                       | 66                          | 0041                   | 11-0             | 12-8-7           |
| ∧ logical AND                                | & ampersand                             | & ampersand                                  | 67                       | 67                          | 0046                   | Ú-8-7            | 12 12            |
| ↑ superscript                                | ′ apostrophe                            | ' apostrophe                                 | 70                       | 70                          | 0047                   | 11-8-5           | 8-5              |
| <pre>↓ subscript</pre>                       | ? question mark                         | ? question mark                              | 70                       | 71                          | 0077                   | 11-8-6           | 0-8-7            |
| < less than                                  | <pre>&lt; less than</pre>               | <pre>&lt; question mark &lt; less than</pre> | 72                       | 72                          | 0074                   | 12-0             | 12-8-4           |
| > greater than                               | > greater than                          | > greater than                               | 72                       | 72                          | 0074                   | 11-8-7           | 0-8-6            |
|                                              | commercial at                           | / greater than                               | 74                       | 13                          | 0076                   |                  |                  |
| $\leq$ less of equal $\geq$ greater or equal | \ reverse slant                         | \                                            | 74                       | 76                          | 012/                   | 8-5              | 8-4              |
| - logical NOT                                | <pre>^ reverse slant ^ circumflex</pre> | \ reverse slant                              | 75                       | 75                          | 0134                   | 12-8-5<br>12-8-6 | 0-8-2            |
| ; semicolon                                  | ; semicolon                             | ; semicolon                                  | 76<br>77                 | 77                          | 0073                   | 12-8-6           | 11-8-7<br>11-8-6 |
|                                              |                                         | ¢ commercial at                              | 74†                      | 7401                        | 0100                   |                  |                  |
|                                              |                                         | circumflex                                   | 761                      | 7401                        | 0100                   |                  |                  |
|                                              |                                         | circumilex<br>: colont                       | 101                      | 7402<br>7404†               | 0136                   |                  |                  |
| 1                                            |                                         |                                              |                          | 74041                       | 00/2                   |                  |                  |
| 1                                            |                                         | <b>percent sign</b><br>grave accent          | 74 <b>†</b>              | 7404                        | 0140                   | , I              |                  |
|                                              |                                         | grave accent                                 | 741                      | 7407                        | 0140                   |                  |                  |
|                                              |                                         | a                                            |                          | 7601                        | 0141                   |                  |                  |
|                                              |                                         | Ъ                                            |                          | 7602                        | 0142                   |                  |                  |
|                                              |                                         | с                                            |                          | 7603                        | 0143                   |                  |                  |
|                                              |                                         | d                                            |                          | 7604                        | 0144                   |                  |                  |
|                                              |                                         | e                                            |                          | 7605                        | 0145                   |                  |                  |
|                                              |                                         | f                                            |                          | 7606                        | 0146                   |                  |                  |
|                                              |                                         | g                                            |                          | 7607                        | 0147                   |                  |                  |
| 1                                            |                                         | -                                            |                          |                             |                        |                  |                  |

elsewhere in this appendix.

| CDC<br>Graphic                                 | ASCII<br>Graphic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ASCII<br>Graphic      |            | 6/12-Bit<br>Display | 7-Bit<br>ASCII | Punch      | Code        |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------|---------------------|----------------|------------|-------------|
| (64 Character)                                 | (64 Character)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (95 Character)        | Code       | Code                | Code           | 026        | 029         |
| ·····                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | h                     |            | 7610                | 0150           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                     |            | 7611                | 0151           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                     |            | 7612                | 0152           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | k                     |            | 7613                | 0153           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                     |            | 7614                | 0154           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | n                     |            | 7615                | 0155           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | n                     | 1          | 7616                | 0156           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0                     |            | 7617                | 0157           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Р                     |            | 7620                | 0160           |            |             |
|                                                | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | q                     |            | 7621                | 0161           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | r                     | 4          | 7622                | 0162           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | s                     |            | 7623                | 0163           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | t                     |            | 7624                | 0164           | 1          | ļ           |
|                                                | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | u                     |            | 7625                | 0165           | 1          |             |
|                                                | a de la companya de | t v s s               |            | 7626                | 0166           | - <b>1</b> | 1. A. A. A. |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | W                     |            | 7627                | 0167           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | x                     |            | 7630                | 0170           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | T Y                   |            | 7631                | 0171           |            |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | z                     |            | 7632                | 0172           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | { opening brace       | 61†        | 7633                | 0173           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | vertical line         | 75†        | 7634                | 0174           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | } closing brace       | 621        | 7635                | 0175           | 1          |             |
|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ~ tilde               | 76†        | 7636                | 0176           |            |             |
| The interpretation of<br>elsewhere in this app |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | code may depend on it | s context. | Refer t             | o Chara        | ter Set    | Anomali     |

# Table A-2. Character Sets for Batch Jobs (Sheet 3 of 3)

| ASCII                        |       | -Bit<br>II Code | 6/12-Bit        | ASCII<br>Character |       | -Bit<br>II Code | 6/12-Bit<br>Display |
|------------------------------|-------|-----------------|-----------------|--------------------|-------|-----------------|---------------------|
| Character<br>(128 Character) | Octal | Hexadecimal     | Display<br>Code | (128 Character)    | Octal | Hexadecimal     | Code                |
|                              |       |                 |                 |                    | 1     |                 |                     |
| NUL                          | 4000  | 00              | 7640            | 0                  | 0060  | 30              | 33                  |
| SOH                          | 0001  | 01              | 7641            |                    | 0061  | 31              | 34                  |
| STX                          | 0002  | 02              | 7642            | 2                  | 0062  | 32              | 35                  |
| ETX                          | 0003  | 03              | 7643            | 3                  | 0063  | 33              | 36                  |
| EOT                          | 0004  | 04              | 7644            | 4                  | 0064  | 34              | 37                  |
| ENQ                          | 0005  | 05              | 7645            | 5                  | 0065  | 35              | 40                  |
| ACK                          | 0006  | 06              | 7646            | 6                  | 0066  | 36              | 41                  |
| BEL                          | 0007  | 07              | 7647            | 7                  | 0067  | 37              | 42                  |
|                              | 0010  |                 | 7050            |                    | 0070  | 20              | 43                  |
| BS                           | 0010  | 08              | 7650            | 8                  | 0070  | 38              | 43                  |
| HT                           | 0011  | 09              | 7651            | 9                  | 0071  | 39              | 740477              |
| LF                           | 0012  | 0 <b>A</b>      | 7652            | : colon#           | 0072  | 3A              |                     |
| VT                           | 0013  | OB              | 7653            | : colon            | 0072  | 34              | 63                  |
| FF                           | 0014  | 00              | 7654            | ; semicolon        | 0073  | 3B              | 77                  |
| CR                           | 0015  | 0D              | 7655            | < less than        | 0074  | 3C              | 72                  |
| SO                           | 0016  | OE              | 7656            | = equal            | 0075  | 3D              | 54                  |
| SI                           | 0017  | OF              | 7657            | > greater than     | 0076  | 3E              | 73                  |
|                              |       |                 |                 | ? question mark    | 0077  | 3F              | 71                  |
| DLE                          | 0020  | 10              | 7660            | -                  |       |                 |                     |
| DC1                          | 0021  | 11              | 7661            | @ commercial at    | 0100  | 40              | 7401                |
| DC2                          | 0022  | 12              | 7662            | A                  | 0101  | 41              | 01                  |
| DC3                          | 0023  | 13              | 7663            | B                  | 0102  | 42              | 02                  |
| DC4                          | 0024  | 14              | 7664            |                    | 0103  | 43              | 03                  |
| NAK                          | 0024  | 15              | 7665            | D                  | 0104  | 44              | 04                  |
| SYN                          | 0025  | 15              | 7666            | E                  | 0104  | 45              | 05                  |
|                              | •     |                 |                 | F                  | 0105  | 45              | 06                  |
| ETB                          | 0027  | 17              | 7667            | G                  | 1     | 40              | 07                  |
| <b>G</b> 137                 | 0000  | 10              | 7/70            | G                  | 0107  | 4/              | 0/                  |
| CAN                          | 0030  | 18              | 7670            |                    | 0110  | 10              | 10                  |
| EM                           | 0031  | 19              | 7671            | Н                  | 0110  | 48              | 10                  |
| SUB                          | 0032  | 1A              | 7672            | I                  | 0111  | 49              | 11                  |
| ESC                          | 0033  | 1 <b>B</b>      | 7673            | J                  | 0112  | 4A              | 12                  |
| FS                           | 0034  | 1C              | 7674            | K                  | 0113  | 4B              | 13                  |
| GS                           | 0035  | 1D              | 7675            | L                  | 0114  | 4C              | 14                  |
| RS                           | 0036  | 1E              | 7676            | м                  | 0115  | 4D              | 15                  |
| us†                          | 0037  | 1F              | 7677†           | N                  | 0116  | 4E              | 16                  |
|                              |       |                 |                 | 0                  | 0117  | 4F              | 17                  |
| space                        | 0040  | 20              | 55              |                    | 1 • · |                 |                     |
| ! exclamation point          | 0041  | 21              | 66              | Р                  | 0120  | 50              | 20                  |
| " quote                      | 0042  | 22              | 64              | Q                  | 0121  | 51              | 21                  |
| # number sign                | 0043  | 23              | 60              | R                  | 0122  | 52              | 22                  |
| \$ dollar sign               | 0044  | 24              | 53              | S                  | 0123  | 53              | 23                  |
| % percent signt              | 0045  | 25              | 6311            | T                  | 0124  | 54              | 24                  |
| I percent algn .             | 0045  | 25              | 7404            | Ū Ū                | 0125  | 55              | 25                  |
| & ampersand                  | 0046  | 26              | 67              | v                  | 0125  | 56              | 26                  |
| ' apostrophe                 | 0040  | 20              | 70              | W                  | 0127  | 57              | 27                  |
| apoblicpic                   | 004/  | 2,              |                 |                    |       |                 |                     |
| ( opening parenthesis        | 0050  | 28              | 51              | x                  | 0130  | 58              | 30                  |
| ) closing parenthesis        | 0051  | 29              | 52              | Y                  | 0131  | 59              | 31                  |
| * asterisk                   | 0052  | 2 <b>A</b>      | 47              | Z                  | 0132  | 5A              | 32                  |
| + plus                       | 0053  | 2B              | 45              | [ opening bracket  | 0133  | 5B              | 61                  |
| , comma                      | 0054  | 2C              | 56              | \ reverse slant    | 0134  | 5C              | 75                  |
| - dash                       | 0055  | 2D              | 46              | ] closing bracket  | 0135  | 5D              | 62                  |
| • period                     | 0056  | 2E              | 57              | circumflex         | 0136  | 5E              | 7402                |
| / slant                      | 0057  | 2F              | 50              | underline          | 0137  | 5F              | 65                  |
|                              |       |                 |                 |                    |       |                 | 1                   |

Table A-3. ASCII to 6/12-Bit Display Code Conversion (Sheet 1 of 2)

TReserved for network use. Refer to Character Set Tables in this appendix. TThe interpretation of this character or code may depend on its context. Refer to Character Set Anomalies in this appendix.

| ASCII<br>Character |      | 7-Bit<br>ASCII Code |                 | ASCII<br>Character | 7<br>ASC    | 6/12-Bit<br>Display |      |
|--------------------|------|---------------------|-----------------|--------------------|-------------|---------------------|------|
| (128 Character)    |      |                     | (128 Character) | Octal              | Hexadecimal | Code                |      |
| ' grave accent     | 0140 | 60                  | 7407            | р                  | 0160        | 70                  | 7620 |
| 8                  | 0141 | 61                  | 7601            | Q                  | 0161        | 71                  | 7621 |
| Ъ                  | 0142 | 62                  | 7602            | r                  | 0162        | 72                  | 7622 |
| c                  | 0143 | 63                  | 7603            | 8                  | 0163        | 73                  | 7623 |
| đ                  | 0144 | 64                  | 7604            | t                  | 0164        | 74                  | 7624 |
| e                  | 0145 | 65                  | 7605            | u                  | 0165        | 75                  | 7625 |
| f                  | 0146 | 66                  | 7606            | v                  | 0166        | 76                  | 7626 |
| 8                  | 0147 | 67                  | 7607            | W                  | 0167        | 77                  | 7627 |
| h                  | 0150 | 68                  | 7610            | x                  | 0170        | 78                  | 7630 |
| i                  | 0151 | 69                  | 7611            | у                  | 0171        | 79                  | 7631 |
| i                  | 0152 | 6A                  | 7612            | z                  | 0172        | 7A                  | 7632 |
| k                  | 0153 | 6B                  | 7613            | { opening brace    | 0173        | 7B                  | 7633 |
| 1                  | 0154 | 6C                  | 7614            | vertical line      | 0174        | 70                  | 7634 |
| -<br>D             | 0155 | 6D                  | 7615            | } closing brace    | 0175        | 7D                  | 7635 |
| n                  | 0156 | 6E                  | 7616            | ~ tilde            | 0176        | 7E                  | 7636 |
| 0                  | 0157 | 6F                  | 7617            | DEL                | 0177        | 7F                  | 7637 |

• \*

| Table A-3. | ASCII to 6/12-Bit | Display Code | Conversion | (Sheet 2 | ! of 2) |
|------------|-------------------|--------------|------------|----------|---------|

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`.,

# JOBS USING MAGNETIC TAPE

Coded data to be copied from disk to magnetic tape is assumed to be represented in display code. NOS converts the data to external BCD code when writing a coded 7-track tape and to ASCII or EBCDIC code (as specified on the tape assignment command) when writing a coded 9-track tape.

Because only 63 characters can be represented in 7-track even parity, one of the 64 display codes is lost in conversion to and from external BCD code. Figure A-1 shows the differences in conversion depending on the character set (63 or 64) that the system uses. The ASCII character for the specified character code is shown in parentheses. The output arrow shows how the 6-bit display code changes when it is written on tape in external BCD. The input arrow shows how the external BCD code changes when the tape is read and converted to 6-bit display code.

|                           |          | 63-Character Set |                   |                    |
|---------------------------|----------|------------------|-------------------|--------------------|
| <u>6-Bit Display Code</u> | <u>1</u> | External BCD     |                   | 6-Bit Display Code |
| 00                        |          | 16 (%)           |                   | 00                 |
| 33 (0)                    | Output   | 12 (0)           | Input             | 33 (0)             |
| 63 (:)                    |          | 12 (0)           |                   | 33 (0)             |
|                           |          | 64-Character Set |                   |                    |
| 6-Bit Display Code        | <u>.</u> | External BCD     |                   | 6-Bit Display Code |
| 00 (:)                    |          | 12 (0)           |                   | 33 (0)             |
| 33 (0)                    | Output   | 12 (0)           | Input             | 33 (0)             |
| 63 (%)                    | >        | 16 (%)           | $\longrightarrow$ | 63 (%)             |
|                           |          |                  |                   |                    |

Figure A-1. Conversion Differences

If a lowercase ASCII or EBCDIC code is read from a 9-track coded tape, it is converted to its uppercase 6-bit display code equivalent. To read or write lowercase ASCII or EBCDIC characters, you must assign the tape in binary mode and use FCOPY to read or write the tape.

Tables A-4 and A-5 show the character set conversion for 9-track tapes. Table A-4 lists the conversions to and from the 7-bit ASCII character code and 6-bit display code. Table A-5 lists the conversions between the EBCDIC character code and the 6-bit display code. Table A-6 shows the character set conversions between external BCD and 6-bit display code for 7-track tapes.

| 20     space     00     NUL     space       21     1     7D     }     1       22     "     02     STX     "       23     #     03     ETX     #       24     \$     04     EOT     \$       25     X     05     ENQ     X       25     X     05     ENQ     X       26     6     06     ACK     \$       27     '     07     BEL     '       28     (     08     BS     (       29     )     09     HT     )       2A     *     0A     LF     *       28     +     0B     VT     +       20     -     0C     FF     ,       20     -     0D     CR     -       21     -     0E     SO     .       25     .     0E     SO     .       26     .     0C     FF     ,       27     .     0D     CR     -       28     +     0B     VT     +       27     .     0C     FF     ,       28     .     0E     SO <t< th=""><th>-Bit<br/>splay<br/>ode</th><th colspan="3">7-bit ASCII</th><th colspan="2">6-Bit<br/>Display<br/>Code</th></t<> | -Bit<br>splay<br>ode | 7-bit ASCII   |       |               | 6-Bit<br>Display<br>Code |      |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------|-------|---------------|--------------------------|------|-----------------|
| 21       1       7D       }       1         22       "       02       STX       "         23       #       03       ETX       #         24       \$       04       EOT       \$         25       Z       05       ENQ       Z         25       Z       05       ENQ       Z         25       Z       05       ENQ       Z         26       6       06       ACK       \$         27       '       07       BEL       '         28       (       08       BS       (         29       )       09       HT       )         24       *       0A       LF       *         28       (       08       BS       (         29       )       09       HT       )         24       *       0A       LF       *         29       )       09       HT       )         24       *       0A       LF       *         25       .       0C       FF       .         20       -       0D       CR       -                                              | Code<br>(Octal)      | Code<br>(Hex) | Chart | Code<br>(Hex) | Chartt                   | Char | Code<br>(Octal) |
| 21       1       7D       }       1         22       "       02       STX       "         23       #       03       ETX       #         24       \$       04       EOT       \$         25       X       05       ENQ       X         25       X       05       ENQ       X         25       X       05       ENQ       X         26       6       06       ACK       &         27       '       07       BEL       '         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         28       +       0B       VT       +         20       -       0C       FF       ,         21       -       0C       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3                                           | 55                   | 3E            | >     | 1E            | RS                       | >    | 73              |
| 23       #       03       ETX       #         23       #       03       ETX       #         24       \$       04       EOT       \$         25       X       05       ENQ       X         25       X       05       ENQ       X         25       X       07       BEL       *         26       6       06       ACK       &         27       '       07       BEL       '         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         28       +       0B       VT       +         20       -       0C       FF       ,         21       -       0D       CR       -         22       .       0E       SO       ,         21       11       DC1       1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4                                          | 66                   | 3F            | ?     | 1F            | US                       | ?    | 71              |
| 24       \$       04       EOT       \$         25       Z       05       ENQ       Z         25       Z       06       ACK       \$         26       6       06       ACK       \$         27       '       07       BEL       '         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         28       +       0B       VT       +         20       -       0D       CR       -         21       -       0D       CR       -         20       -       0D       CR       -         21       -       0D       CR       -         22       .       0E       SO       .         21       11       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         45       55       NAK       5       36                                        | 64                   | 40            | e     | 60            |                          | e    | 74              |
| 25       Z       05       ENQ       Z         25       Z       03       ENQ       z         26       6       06       ACK       6         27       7       07       BEL       7         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         2B       +       0B       VT       +         2C       ,       0C       FF       ,         2D       -       OD       CR       -         2E       .       0E       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         45       5       5       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7                                             | 60                   | 41            | Ā     | 61            | a                        | Ā    | 01              |
| 25     Z     05     ENQ     Z       25     Z     05     STM     space fff       26     6     06     ACK     5       27     '     07     BEL     '       28     (     08     BS     (       29     )     09     HT     )       2A     *     0A     LF     *       2B     +     0B     VT     +       2C     ,     0C     FF     ,       2D     -     0D     CR     -       2E     .     0E     SO     .       2F     /     0F     SI     /       30     0     10     DLE     0       31     1     11     DC1     1       32     2     12     DC2     2       33     3     13     DC3     3       34     4     14     DC4     4       45     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM                                                                                                                            | 53                   | 42            | B     | 62            | b                        | В    | 02              |
| 26       6       06       ACK       5         27       '       07       BEL       '         28       (       08       BS       (         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         2B       +       0B       VT       +         2C       ,       0C       FF       ,         2D       -       0D       CR       -         2E       .       0E       SO       .         2F       /       0F       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         35       5       15       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7                                              | 63                   | 43            | Ċ     | 63            | c                        | c    | 03              |
| 26       6       06       ACK       8         27       '       07       BEL       '         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         2B       +       0B       VT       +         2C       ,       0C       FF       ,         2D       -       0D       CR       -         2E       .       0E       SO       ,         2F       /       0F       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         35       5       15       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8                                             | 55                   | 44            | D     | 64            | d                        | D    | 04              |
| 27       07       BEL         28       (       08       BS       (         29       )       09       HT       )         2A       *       0A       LF       *         2B       +       0B       VT       +         2C       ,       0C       FF       ,         2D       -       0D       CR       -         2E       .       0E       SO       .         2F       /       0F       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         45       5       5       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A                                                    | 67                   | 45            | E     | 65            | e                        | Ē    | 05              |
| 29       )       09       HT       )         2A       *       0A       LF       *         2B       +       0B       VT       +         2C       ,       0C       FF       ,         2D       -       0D       CR       -         2E       .       0E       SO       .         2F       /       0F       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         45       5       5       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A       :       1A       SUB       :       :         6-Wit display code CO       is undefined at gits                           | 70                   | 46            | F     | 66            | f                        | F    | 06              |
| 2A       *       OA       LF       *         2B       +       OB       VT       +         2C       ,       OC       FF       ,         2D       -       OD       CR       -         2E       .       OE       SO       .         2F       /       OF       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         45       5       5       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A       :       1A       SUB       :       :         6-#it       finplay       code GO       is undefined at size       size         6-#it       1a                          | 51                   | 47            | G     | 67            | 8                        | G    | 07              |
| 2B     +     0B     VT     +       2C     ,     0C     FF     ,       2D     -     0D     CR     -       2E     ,     0E     SO     ,       2F     /     0F     SI     /       30     0     10     DLE     0       31     1     11     DC1     1       32     2     12     DC2     2       33     3     13     DC3     3       34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Pit display code OF is undefined at site     site     site       4     14     SUB     :     i                                                                                                                                                                                                                                             | 52                   | 48            | н     | 68            | h                        | н    | 10              |
| 2C       ,       OC       FF       ,         2D       -       OD       CR       -         2E       ,       OE       SO       .         2F       /       OF       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         35       5       15       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A       :       1A       SUB       :       6         6-Pitt display code OF       is undefined at site.       site.         th       63-character set.       sup       i                                                                                              | 47                   | 49            | I     | 69            | 1                        | I    | 11              |
| 2D       -       OD       CR       -         2E       .       OE       SO       .         2F       /       OF       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         35       5       15       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A       :       1A       SUB       :       :         6-Bit display code OF is undefined at site       site       site       site         th       63-character set.       stub       t       site                                                                                                                  | 45                   | 44            | J     | 6A            | Ē                        | Ĵ    | 12              |
| 2D       -       OD       CR       -         2E       .       OE       SO       .         2F       /       OF       SI       //         30       0       10       DLE       O         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         35       5       15       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A       :       1A       SUB       :         6-Bit display code OF is undefined at site       site       site         th       63-character set.       sub       i                                                                                                                                                | 56                   | 4B            | ĸ     | 6B            | k                        | ĸ    | 13              |
| 2F       /       OF       SI       /         30       0       10       DLE       0         31       1       11       DC1       1         32       2       12       DC2       2         33       3       13       DC3       3         34       4       14       DC4       4         35       5       15       NAK       5         36       6       16       SYN       6         37       7       17       ETB       7         38       8       18       CAN       8         39       9       19       EM       9         3A       :       1A       SUB       :       :         6-Bit display code CO       is undefined at site       site         tha       63-character set.       superit       it                                                                                                                                                                                                                                  | 46                   | 4C            | L     | 60            | l ï                      | L    | 14              |
| 30     0     10     DLE     0       31     1     11     DC1     1       32     2     12     DC2     2       33     3     13     DC3     3       34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Hit display code OF     is undefined at site     site       3A     :     1A     SUB     :                                                                                                                                                                                                                                                                                                                                                                                                                                | 57                   | 4D            | M     | 6D            | m                        | M M  | 15              |
| 31     1     11     DC1     1       32     2     12     DC2     2       33     3     13     DC3     3       34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Mit display code 00 is undefined at size     5     5       34     :     1A     SUB     :                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 50                   | 4E            | N     | 6E            | n                        | N ·  | 16              |
| 32     2     12     DC2     2       33     3     13     DC3     3       34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code 00 is undefined at size the 63-character set.       3A     :     1A     SUB     :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 33                   | 4F            | 0     | 6F            | 0                        | Ö    | 17              |
| 33     3     13     DC3     3       34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code 00 is undefined at site     the site       th     63-character set.     34     :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 34                   | 50            | P     | 70            | p                        | P    | 20              |
| 33     3     13     DC3     3       34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code 00 is undefined at size the 63-character set.     34     :     14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 35                   | 51            | Q     | 71            | P<br>P                   | Q    | 21              |
| 34     4     14     DC4     4       35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code 90 is undefined at site     the site       the 63-character set.     34     :     1A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 36                   | 52            | R     | 72            | r                        | R    | 22              |
| 35     5     15     NAK     5       36     6     16     SYN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code OO is undefined at site       tha 63-character set.       3A     :     1A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 37                   | 53            | s     | 73            | s                        | ŝ    | 23              |
| 36     6     16     SVN     6       37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code OO is undefined at site     :     :       5A     :     1A     SUB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 40                   | 54            | T     | 74            | t                        | T    | 23              |
| 37     7     17     ETB     7       38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code OO is undefined at site<br>the 63-character set.     30     14     SUB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 41                   | 55            | Ū     | 75            | u u                      | U U  | 24              |
| 38     8     18     CAN     8       39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code OO is undefined at site<br>the 63-character set.     3A     :     1A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 42                   | 56            | v     | 76            | v                        | v    | 26              |
| 39     9     19     EM     9       3A     :     1A     SUB     :       6-Bit display code OO is undefined at site<br>the 63-character set.     3A     :     1A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 43                   | 57            | W     | 77            | w                        | w    | 26              |
| 3A     :     1A     SUB     :       6-Bit display code OO is undefined at site<br>the 63-character set.       3A     :     1A     SUB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 44                   | 58            | x     | 78            | x                        | x    | 30              |
| 6-Bit display code OO is undefined at site<br>the 63-character set.<br>34                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 00                   | 59            | Y     | 79            | y                        | Ŷ    | 31              |
| the 63-cherecter set.<br>34 1 14 SUB    t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      | 54            | z     | 7A            | z                        | z    | 32              |
| 3A : 1A 503 :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      | 5B            | Ĩ     | 10            | FS                       | ñ II | 61              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 63                   | 5C            | 1     | 70            |                          |      | 75              |
| 3B ; 1B ESC ; ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 77                   | 5D            | ì     | 01            | SOH                      |      | 62              |
| $3C \langle 7B \rangle \{$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 72                   | 5E            |       | 7E            | ~                        |      | 76              |
| 3D = 1D GS =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 54                   | 5F            |       | 7F            | DEL                      |      | 65              |

# Table A-4. Nine-Track ASCII Coded Tape Conversion

TWhen these characters are copied from/or to a tape, the characters remain the same but the codes change from one code set to the other.

ifom one code set to the other.
ifom one code set to the other.
ifom one code set to the other.
ifom a tape, each 7-bit ASCII character is changed to an alternate 6-bit display code character. The
corresponding codes are also changed. Example: When the system copies a lowercase a, 6116, from tape,
it writes an uppercase A, 018.
if the dealer of the dealer of the dealer of the system copies a lowercase a, 6116, from tape,

tttA 6-bit display code space always translates to a 7-bit ASCII space.

|               | EBC   | DIC           |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Bit<br>olay<br>le |               | EBO   | CDIC          |           | Di   | -Bit<br>splay<br>ode |
|---------------|-------|---------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|-------|---------------|-----------|------|----------------------|
| Code<br>(Hex) | Char† | Code<br>(Hex) | Char <b>††</b> | Char ††                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Code<br>(Octal)   | Code<br>(Hex) | Char† | Code<br>(Hex) | Char††    | Char | Code<br>(Octal)      |
| 40            | space | 00            | NUL            | space                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 55                | C4            | D     | 84            | d         | D    | 04                   |
| 4 <b>A</b>    | é     | ic            | IFS            | Ĩ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 61                | C5            | E     | 85            | e         | Е    | 05                   |
| 4B            | 1.    | 0E            | SO             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 57                | C6            | F     | 86            | f         | F    | 06                   |
| 4C            | l č   | co            | {              | < A constraint of the second s | 72                | C7            | G     | 87            | g         | G    | 07                   |
| 4D            | l i   | 16            | BS             | Ċ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 51                | C8            | н     | 88            | ĥ         | н    | 10                   |
| 4E            | +     | OB            | VT             | +                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 45                | C9            | I     | 89            | l i l     | I    | 11                   |
| 4F            | 1 1   | DO            | }              | 1 !                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 66                | D1            | J     | 91            | j         | J    | 12                   |
| 50            | 6     | 2E            | ÁCK            | δ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 67                | D2            | ĸ     | 92            | ĸ         | ĸ    | 13                   |
| 5A            | l :   | 01            | SOH            | ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 62                | D3            | L     | 93            | 1         | L    | 14                   |
| 5 <b>B</b>    | \$    | 37            | EOT            | \$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 53                | D4            | м     | 94            | m         | м    | 15                   |
| 5C            | *     | 25            | LF             | *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 47                | D5            | N     | 95            | n         | N    | 16                   |
| 5D            |       | 05            | HT             | )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 52                | D6            | 0     | 96            | 0         | 0    | 17                   |
| 5E            |       | 27            | ESC            | ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 77                | D7            | Р     | 97            | р         | P    | 20                   |
| 5F            | -     | A1            | ~              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 76                | D8            | Q     | 98            | Q.        | Q    | 21                   |
| 60            | - 1   | 0D            | CR             | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 46                | D9            | R     | 99            | r         | R    | 22                   |
| 61            | 1 /   | OF            | SI             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 50                | EO            | ۱ (   | 6A            |           |      | 75                   |
| 6B ·          | ι,    | 0C            | FF             | ,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 56                | E2            | S     | A2            | s         | S    | 23                   |
| 6C            | z     | 2D            | ENQ            | Z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 63                | E3            | Т     | A3            | t         | Т    | 24                   |
| 60            |       | 20            | 9999           | space                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   | E4            | U     | A4            | u         | U    | 25                   |
| 6D            | _     | 07            | DEL            | _                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 65                | E5            | v     | A5            | v         | v    | 26                   |
| 6E            | 2     | IE            | IRS            | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 73                | E6            | W     | A6            | w         | W    | 27                   |
| 6F            | ?     | 1 <b>F</b>    | IUS            | ?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 71                | E7            | X     | A7            | x         | X    | 30                   |
| 7A            | :     | 3F            | SUB            | <u> </u> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 00                | E8            | Y     | A8            | у         | Y    | 31                   |
|               |       | Acc OK        | is under       | land at els                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | es using          | E9            | Z     | A9            | z         | Z    | 32                   |
|               |       |               |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   | FO            | 0     | 10            | DLE       | 0    | 33                   |
| 74            |       |               | sun            | •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 63                | Fl            | 1     | 11            | DC1       | 1    | 34                   |
| 7B            | #     | 03            | ETX            | #                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 60                | F2            | 2     | 12            | DC 2      | 2    | 35                   |
| 7C            | 6     | 79            | \              | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 74                | F3            | 3     | 13            | TM<br>DG( | 3    | 36                   |
| 7D            |       | 2F            | BEL            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 70                | F4            | 4     | 3C            | DC4       | 4    | 37                   |
| 7E            | =     | 1D            | IGS            | =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 54                | F5            | 5     | 3D            | NAK       | 5    | 40                   |
| 7F            |       | 02            | STX            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 64                | F6            | 6     | 32            | SYN       | 6    | 41<br>42             |
| C1            | A     | 81            | a              | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 01                | F7            | 7     | 26            | ETB       |      |                      |
| C2            | В     | 82            | Ъ              | В                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 02                | F8            | 8     | 18            | CAN       | 8    | 43<br>44             |
| C3            | С     | 83            | с              | С                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 03                | F9            | 9     | 19            | EM        | y    | 44                   |

Table A-5. Nine-Track EBCDIC Coded Tape Conversion

Twhen these characters are copied from/or to a tape, the characters remain the same (except EBCDIC codes 4A, 4F, 5A, and 5F) but the codes change from one code set to the other. TThese characters do not exist in 6-bit display code. Therefore, when the characters are copied from a

These characters do not exist in b-bit display code. Inerefore, when the characters are copied from a tape, each EBCDIC character is changed to an alternate 6-bit display code character. The corresponding codes are also changed. Example: When the system copies a lowercase a, 81<sub>16</sub>, from tape, it writes an uppercase A, 018.
 THAIL EBCDIC codes not listed translate to 6-bit display code 558 (space). A 6-bit display code space always translates to an EBCDIC space.

| External<br>BCD                                                                                                                             | ASCII<br>Character | 6-Bit<br>Display<br>Code<br>(Octal) | External<br>BCD | ASCII<br>Character | 6-Bit<br>Display<br>Code<br>(Octal) |  |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------|-----------------|--------------------|-------------------------------------|--|--|--|
| 01                                                                                                                                          | 1                  | 34                                  | 40              | _                  | 46                                  |  |  |  |
| 02                                                                                                                                          | 2                  | 35                                  | 41              | J                  | 12                                  |  |  |  |
| 03                                                                                                                                          | 3                  | 36                                  | 42              | ĸ                  | 13                                  |  |  |  |
| 04                                                                                                                                          | 4                  | 37                                  | 43              | L                  | 14                                  |  |  |  |
| 05                                                                                                                                          | 5                  | 40                                  | 44              | м                  | 15                                  |  |  |  |
| 06                                                                                                                                          | 6                  | 41                                  | 45              | N                  | 16                                  |  |  |  |
| 07                                                                                                                                          | 7                  | 42                                  | 46              | 0                  | 17                                  |  |  |  |
| 10                                                                                                                                          | 8                  | 43                                  | 47              | Р                  | 20                                  |  |  |  |
| 11                                                                                                                                          | 9                  | 44                                  | 50              | Q                  | 21                                  |  |  |  |
| 12†                                                                                                                                         | 0                  | 33                                  | 51              | R                  | 22                                  |  |  |  |
| 13                                                                                                                                          | =                  | 54                                  | 52              | !                  | 66                                  |  |  |  |
| 14                                                                                                                                          | а. — <u>М</u> .,   | 64                                  | 53              | \$<br>*            | 53                                  |  |  |  |
| 15                                                                                                                                          | 0                  | 74                                  | 54              |                    | 47                                  |  |  |  |
| 16†                                                                                                                                         | 1 %                | 63                                  | 55              |                    | 70                                  |  |  |  |
| 17                                                                                                                                          | ] [                | 61                                  | 56              | ?                  | 71                                  |  |  |  |
| 20                                                                                                                                          | space              | 55                                  | 57              |                    | 73                                  |  |  |  |
| 21                                                                                                                                          | - /                | 50                                  | 60              | +                  | 45                                  |  |  |  |
| 22                                                                                                                                          | S                  | 23                                  | 61              | A                  | 01                                  |  |  |  |
| 23                                                                                                                                          | Т                  | 24                                  | 62              | В                  | 02                                  |  |  |  |
| 24                                                                                                                                          | U                  | 25                                  | 63              | С                  | 03                                  |  |  |  |
| 25                                                                                                                                          | v                  | 26                                  | 64              | D                  | 04                                  |  |  |  |
| 26                                                                                                                                          | W                  | 27                                  | 65              | Е                  | 05                                  |  |  |  |
| 27                                                                                                                                          | x                  | 30                                  | 66              | F                  | 06                                  |  |  |  |
| 30                                                                                                                                          | Y                  | 31                                  | 67              | G                  | 07                                  |  |  |  |
| 31                                                                                                                                          | Z                  | 32                                  | 70              | н                  | 10                                  |  |  |  |
| 32                                                                                                                                          | ]                  | 62                                  | 71              | I                  | 11                                  |  |  |  |
| 33                                                                                                                                          | . ,                | 56                                  | 72              | <                  | 72                                  |  |  |  |
| 34                                                                                                                                          | (                  | 51                                  | 73              | •                  | 57                                  |  |  |  |
| 35                                                                                                                                          |                    | 65                                  | 74              |                    | 52                                  |  |  |  |
| 36                                                                                                                                          | #                  | 60                                  | 75              | 1                  | 75                                  |  |  |  |
| 37                                                                                                                                          | &                  | 67                                  | 76              | ^                  | 76                                  |  |  |  |
| l                                                                                                                                           |                    |                                     | 77              | ;                  | 77                                  |  |  |  |
| <sup>†</sup> As explained previously in this section, conversion<br>of these codes depends on whether the tape is being<br>read or written. |                    |                                     |                 |                    |                                     |  |  |  |

Table A-6. Seven-Track Coded Tape Conversions

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# GLOSSARY

Access Category

See File Access Category and System Access Categories.

Access Code

A hardware/software security code assigned to each NAD on the network. A NAD may communicate only with other NADs having matching codes.

# Access Level

A property of each file, job, and equipment on a secured system that is used to indicate the sensitivity of information in the file or job, or the sensitivity of information that can be processed by the equipment. On a secured system, there are up to eight access levels corresponding to increasing levels of sensitivity; you are authorized to access some or all of those levels. Refer also to Equipment Access Levels, File Access Level, Job Access Level, and System Access Levels.

Access Level Limits

See Job Access Level Limits.

Account Dayfile

A dayfile that provides a history of system usage over the life of the account. It provides information necessary for accurate billing and system usage analysis.

#### ACN

See Application Connection Number.

AFD Utility

A dayfile dumping utility that dumps all or selected parts of the account dayfile to produce a listing. AIP Trace Utility

See Application Interface Program Trace Utility.

Allocation Summary Table (AST)

A table that contains information used by the allocation algorithm to select the cartridges on which a file will reside in an MSAS environment.

Allocation Unit (AU)

In an MSS environment, an allocation unit is the name that is given to each of the 16 data streams that make up a cartridge.

In an MSAS environment, an allocation unit is the smallest allocatable portion of a cartridge. Each AU consists of 14 data strips; each cartridge has 1931 AUs.

#### Application

See Application Program.

Application Connection Number (ACN)

A number assigned by the NAM program to identify a particular logical connection within an application.

Application Interface Program (AIP) Trace Utility

A utility that produces a trace file of the messages transferred between IAF and NAM. The information contained in this trace can be useful in tracking network problems and in debugging application programs.

#### Application Program

A program resident in a host computer that provides an information storage, retrieval, and/or processing service to a remote user via the data communication network and the Network Access Method. Application programs use the system control point feature of NOS to communicate with the Network Access Method.

In the context of network software, an application program is not an interactive job, but rather a terminal servicing facility that provides terminal users with a specific processing capability such as remote job entry from batch terminals, transaction processing, entry and execution of interactive jobs, and so forth. For example, the standard CDC Interactive Facility IAF makes terminal input and output appear the same to an executing program as file input and output; IAF is a network application program, but the executing program using IAF is an interactive job.

#### Archive Files

A dump of permanent files accumulated on disk that are dumped as a whole or in part to a backup tape (or other type of backup medium) to protect the files from loss in case of a device malfunction or to free a device for temporary use during preventive maintenance.

### asa

The alternate storage address.

# ASCII

American National Standard Code for Information Interchange. The standard character set and code used for information interchange between systems. It is a 7-bit code representing a prescribed set of 128 characters.

#### ASDEBUG Utility

A utility that allows an analyst to update appropriate entries in the CSU maps and/or MSF catalogs and thereby resolve inconsistencies reported by the ASVAL utility. ASDEBUG can also be used to copy data from selected MSF files or cartridges to disk.

# ASDEF Utility

A utility that creates the system files (CSU maps and MSF catalogs) that are necessary for MSS processing.

#### ASLABEL Utility

A utility that manages cartridge assignment and cubicle allocation in a cartridge storage unit.

# ASMOVE Utility

A utility that manages disk and Mass Storage Facility residence. ASMOVE determines which files to leave on disk, which files to release from disk and move to MSF, and which files should reside both on disk and on MSF.

#### AST

See Allocation Summary Table and Available Stream Table.

#### ASUSE Utility

A utility that reads data in the MSF catalogs and CSU maps and produces reports on the availability of space on MSF cartridges and the allocation of cubicle space within a CSU.

#### ASVAL Utility

A utility that either performs release processing or reports on problems with the current MSS system files.

#### Attach

The process of making a direct access permanent file accessible to a job by specifying the proper permanent file identification and passwords.

#### AU

See Allocation Unit.

# Auto Recall

The act of a program releasing control of the CPU until a requested function is complete. Refer to Recall.

# Auxiliary Device

A disk device that is not part of a permanent file family. Auxiliary devices can contain direct or indirect access permanent files.

# Available Stream Table (AST)

A table that contains information used by the allocation algorithm to select the cartridges on which a file will reside in an MSS environment.

#### Backup Tape

See Archive Files.

# Batch Job

The instructions and data that are submitted as a complete unit without further user intervention. The job can be punched on cards or created and submitted from a terminal.

#### Beginning-of-Information (BOI)

The start of the first programmer record in a file is known as the beginning-of-information. System information, such as tape labels on sequential files or indexes, does not affect the beginning-of-information.

# **Binary File**

A noneditable file that contains a precompiled program.

# BOI

See Beginning-of-Information.

# Breakpoint

A designated location in a program where, if reached during program execution, a break or suspension in execution occurs.

# Buffer

An intermediate storage area used to compensate for a difference in rates of data flow, or times of event occurrences, when transmitting data between central memory and an external device during input/output operations.

# Byte

A group of bits. Unless prefixed (for example, a 6-bit byte), the term means 8-bit groups. When used for encoding character data, a byte represents a single character.

# Cache

A high-speed memory that resides in the central processor.

# Cartridge

A component of the MSF or 7990. The cartridge consists of a plastic housing that encloses a strip of magnetic tape on which data is stored under program control.

Cartridge Storage Unit (CSU)

An MSS device that includes storage cells (cubicles) for 2052 cartridges and a selector that moves cartridges among the mass storage transport, the cubicles, and the input/output drawers of the CSU.

#### Cassette

The magnetic tape device in an NPU used for bootstrap loading of offline diagnostics and (in remote NPUs) the bootstrap load/dump operation. Catalog Image Record (CIR)

A record written at the beginning of the archive file on which the permanent files are dumped for each incremental dump. When a file is loaded, this CIR information is placed in the permanent file catalog of the device being loaded.

#### Catalog Track

A track on a user's master device containing the catalog entries that define and specify the location of each permanent file created by that user. Users are assigned by groups to catalog tracks according to user index and number of catalog tracks on the master device.

#### CCP

See Communications Control Program.

Central Memory Resident (CMR)

The low address area of central memory reserved for tables, pointers, and subroutines necessary for operation of the operating system. It is never accessible to a user's central processor program. The monitor allocates the remainder of central memory to jobs as they are selected on a priority basis for execution.

# Channel Number

The number of the data channel on which a peripheral device controller can be accessed.

### Character

Unless otherwise specified, references to characters in this manual are to 7-bit ASCII code.

# Charge Number

An alphanumeric identifier the installation uses to allocate charges to individual users for system usage.

#### Checkpoint

The process of writing a copy of your job's central memory, the system

information used for job control, and the names and contents of all assigned files that are identified in a CHECKPT request to a magnetic tape or disk.

#### CIO

See Combined Input/Output

# CIR

See Catalog Image Record.

```
CLA
```

See Communications Line Adapter.

CMR

See Central Memory Resident.

# CMRDECK

The central memory resident deck that resides on the deadstart file. It defines central memory, table sizes, and configuration information not oriented to equipment.

Coldstart

Procedure used to deadstart if the tape or disk controller has not yet been loaded with controlware, or the controlware is not running.

Combined Input/Output (CIO)

A system routine that performs NOS I/O.

Common Testing and Initialization (CTI)

Common deadstart process that resides on the deadstart file and the maintenance system library.

Communication Line

A complete communication circuit between a terminal and its network processing unit.

Communications Control Program (CCP)

A portion of the network software that resides in a 255X series network processing unit. This software can include routines such as the terminal interface program. Communications Line Adapter (CLA)

Hardware that provides the interface between NPUs and modems.

Communications Supervisor (CS)

A portion of the network software written as an application program; the CS coordinates the network-oriented activities of the host computer and of the lines and terminals logically linked to it.

# COMPASS

COMPrehensive ASsembly System. The standard assembly language used with CYBER 180, CYBER 170, CYBER 70, and 6000 Computer Systems. Also, the command used to assemble a program written in the COMPASS assembly language.

#### Connection Number

A number assigned to an IAF terminal by the system when the terminal is logged in and an entry is made for the job in the executing job table.

# Connection Status

A job attribute kept in the job's executing job table (EJT) entry. The system uses it to determine the job's relationship with IAF.

#### Control Point

The portion of central memory that is assigned to a job. When a job is allocated a portion of central memory, it becomes eligible for assignment to the central processor for execution.

#### Control Point Number

The number of the control point to which a job is assigned while the job resides in central memory. The actual number of control points is an installation parameter. Before the job can execute, each central processor program must be assigned to a control point.

# Controller

Hardware device that connects channels to peripheral devices. For example, a tape controller might connect up to eight tape units to one channel.

#### Controlling NOP

An NPU operator (NOP) who is allowed to change the status of network elements (lines, logical links, terminals, and trunks) connected to an NPU.

# Controlware

A special type of software that resides in a peripheral controller. The controlware defines the functional characteristics of the controller.

#### Coupler

A component of the MSF. The coupler interfaces between the peripheral processor and the mass storage adapter.

CS

See Communications Supervisor.

CSU

See Cartridge Storage Unit.

CSU Map

A direct access permanent file that contains information indicating how cubicles in a CSU are assigned to a family and identifying the cartridges that reside in the CSU.

CTI

See Common Testing and Initialization.

#### CYBERLOG

A program initiated after deadstart that requests data about the previous service interruption.

#### DAT

See Device Access Table.

Data Channel

One of the 9 to 24 channels (12-bit) by which information passes between the peripheral processors and peripheral devices. Refer to Channel Number.

Data Recording Drive (DRD)

A component of the 7991 Storage Module. The DRD reads data from and writes data to the cartridges.

# Dayfile

A chronological file created during job execution that forms a permanent accounting and job history record. Dayfile messages are generated by operator action or when commands are processed. A copy of the dayfile is printed with the output for each job. The user must explicitly request it in an interactive job.

#### DDP

The distributive data path.

Deadstart

The process of initializing the system by loading the operating system library programs and any of the product set from magnetic tape or disk. Deadstart recovery is reinitialization after system failure.

Deadstart Sequencing

The execution of a selected set of commands before normal system job scheduling is enabled.

Debug Log File Processor (DLFP)

A processor that analyzes trace files produced by the application interface program trace utility.

#### Detached Job

An interactive service class job removed from control of the Interactive Subsystem. It may or may not continue to execute, depending on the presence of commands in the command buffer or an active job step. Control is regained by recovering the EJT entry for the job. Device Access Table (DAT)

A table that contains the logical description (family name/pack name and device number) of each disk device (shared or nonshared) that is accessible by any machine in a linked shared device multimainframe complex.

Device Index Table (DIT)

A table that is used to determine device usage in an independent shared device multimainframe complex.

Device Mask

An 8-bit quantity that identifies the group of users who have the particular device as their master device; that is, it identifies the device that contains their file catalogs, all their indirect access files, and possibly some or all of their direct access files.

DFD Utility

A dayfile dumping utility that dumps all or selected parts of the system dayfile to produce a listing.

DFLIST Utility

A utility that generates a printer listing of all permanent files created by the DFTERM utility.

### DFTERM Utility

A utility that terminates an active or inactive dayfile and retains it as a direct access permanent file for later use.

Diagnostic Operator (DOP)

An NPU operator who resides at a terminal and has permission only to check status and test the network.

Direct Access File

A NOS permanent file that can be attached to the your job. All changes to this file are made on the file itself rather than a temporary copy of the file (compare with Indirect Access File).

#### DIS (Job Display)

A system peripheral processor program similar to the system display (DSD) that provides communication between a job in central memory and the operator at the console, and permits the operator to control execution of the program through the console keyboard.

# Disabled Job

An interactive service class job temporarily rolled out due to user break processing or encountering the end of its command stream. The job scheduler ignores disabled jobs.

#### Display Code

A 6-bit character code set that represents alphanumeric and special characters.

#### Disposition Code

A 2-character mnemonic indicating the destination queue and format for processing a file named on a ROUTE function.

# DIT

See Device Index Table.

# DLFP

See Debug Log File Processor.

#### DMPNAD

See Dump NAD Memory.

#### DOP

See Diagnostic Operator.

#### Downline

The direction of output flow, from host to terminal.

# DRD

See Data Recording Drive.

#### DSD (System Display)

The operating system program that provides communication between the operator and the system by accepting control information typed on the console keyboard and by displaying information pertinent to all jobs known to the system. DSD is permanently assigned to peripheral processor 1.

# DSDI Utility

A deadstart dump interpreter utility that is called by a batch command to convert selected portions of the binary information on an express deadstart dump file into reports to be listed.

Dump NAD Memory (DMPNAD)

A utility that reads the NAD memory and formats the data into an output file.

# ECS

See Extended Core Storage.

EDD File

See Express Deadstart Dump File.

EDD Utility

See Express Deadstart Dump Utility.

# EJT

See Executing Job Table.

# **EJT Ordinal**

An index into the executing job table (EJT). It uniquely identifies an EJT entry. The acceptable range is from 0001 to 4095.

# ELD Utility

A dayfile dumping utility that dumps all or selected parts of the error log dayfile to produce a listing.

#### End-of-Chain Flag (EOC)

In an MSS environment, EOC is a flag in the MSF catalog that identifies the last allocation unit in a chain of allocated data streams.

In an MSAS environment, EOC is a flag in the 7990 catalog that identifies the last volume in a chain of allocated AUs.

#### End-of-File (EOF)

A boundary within a sequential file, but not necessarily the end of a file that can be referenced by name. The actual end of a named file is defined by EOI. For labeled tape, EOF and EOI (denoted by the EOF1 label) are the same. For multifile tape files, EOF and EOI do not correspond. In the product set manuals, an end-of-file is also referred to as an end-of-partition.

#### End-of-Information (EOI)

The end of data on a file. Information appearing after this point is not considered part of file data. In card decks, a card with a 6/7/8/9 multiple punch in column 1. On mass storage devices, the position of the last written data. On labeled tape, it is the EOF1 label. CYBER Record Manager defines end-of-information in terms of file residency and organization.

End-of-Record (EOR)

An indicator that marks the end of a logical record. Also referred to as end-of-section.

# Entry Point

A location within a program or procedure that can be referenced from other programs. Each entry point has a unique name with which it is associated.

#### EOC

See End-of-Chain Flag.

#### EOF

See End-of-File.

# EOI

See End-of-Information.

EOR

```
See End-of-Record.
```

Equipment Access Levels

A range of access levels specified for each equipment on a secured system. In order for a file to be stored or output on a given equipment, the file's access level must be within the equipment access levels for that equipment.

# EQPDECK

The equipment description deck used during deadstart to define the system equipmet configuration.

#### Equipment Number

A number from 0 to 7 that identifies the setting on a peripheral device controller.

Equipment Status Table (EST)

A central memory resident table listing all the defined equipments, parameters affecting their operation, and the status of the equipments.

# EST

See Equipment Status Table.

#### EST Ordinal

The number designating the position of an entry within the equipment status table (EST) established at each installation. Devices are identified in operator commands by EST ordinals. The EST ordinal is sometimes referred to as equipment number.

#### Exchange Package

A table that contains information used during job execution. It is printed as part of the output when a job aborts.

### Executing Job Table (EJT)

A central memory resident table that contains a 4-word entry for all executing jobs including interactive service class jobs. It is used to control jobs that are executing at a control point and jobs that are rolled out. Every executing job in the system has an EJT entry.

#### Execution

An input job is in execution after it is selected by the operating system and assigned to a control point. A job remains in execution until terminated, but it can be temporarily swapped or rolled out by the operating system.

Express Deadstart Dump (EDD) File

A file that is generated on magnetic tape by the express deadstart dump utility. This file contains a dump of memory, executing exchange packages, hardware registers, and controller memory.

Express Deadstart Dump (EDD) Utility

A utility that may be run at deadstart time after a system malfunction has occurred. It generates the express deadstart dump file on magnetic tape.

Extended Core Storage (ECS)

ECS provides optional additional memory. ECS contains 60-bit words; it has a large amount of storage and fast transfer rates. ECS can be used only for program and data storage, not for program execution. Special hardware instructions exist for transferring data between central memory and ECS.

Extended Memory

An extension to central memory that is physically located outside of the machine.

Facility Interface Program (FIP)

A program consisting of routines and buffers that are loaded into each application program's field length. This program is the interface between the application program and RHF.

#### Family Device

A mass storage permanent file device associated with a specific system. A family may consist of from 1 to 63 logical devices. Normally, a system runs with one family of permanent file devices available. However, additional families may be introduced during normal operation. This enables users associated with the additional families to access their permanent files via the alternate family.

Family Name

Name of the permanent file storage device or set of devices on which all of a user's permanent files are stored. When a user requests a permanent file, the system looks for it on this family (group) of devices. Usually a system has only one family of permanent file devices, but it is possible to have alternate families in the system. At login, the user may have to specify which family he/she is using. A user gets a family name from his/her employer, instructor, or computer center personnel.

Family Ordinal Table (FOT)

A table that maintains the relationship between family ordinals and family names.

FCT

See File and Cartridge Table.

FET

See File Environment Table.

Field Length

The area in central memory allocated to a particular job; the only part of central memory that a job can directly access. Also the number of central memory words required to process a job.

# File

A collection of information referred to by a file name (from 1 to 7 alphanumeric characters). You can create a file at the terminal or retrieve a file from permanent file storage for use during a terminal session.

# File Access Category

A property of a permanent file used by the creator of the file on a secured system to restrict access of the file to a particular group of users. A secured system supports up to 32 access categories, and a user is authorized to use some, all, or none of those categories. Refer also to System Access Categories.

#### File Access Level

A property of each file on a secured system used to indicate the sensitivity of information contained on the file. A file is assigned the current job access level by default when it is created or stored; the file creator may specify any access level for that file that is within the set of access levels valid for the job, the system, the file creator, and (for interactive jobs) the communication line to the host mainframe. If a user accesses a file on a secured system, that user must be validated for the access level of the file. Refer also to Access Level, Job Access Level, and Job Access Level Limits.

File and Cartridge Table (FCT)

Table that has an entry for each cubicle assigned to the subfamily from a given CSU or SM.

File Category

Each permanent file is assigned a category of private, semiprivate, or public.

#### File Count

A maximum number of permanent files allowed each user.

File Environment Table (FET)

A table within a program's field length through which the program communicates with operating system input/output routines. One FET exists for each file in use by the program.

#### File Name Table (FNT)

A system-managed table that contains the local file name, the file type, and other job control information. All active files in the system have an FNT entry.

File Status Table (FST)

A system-managed table that contains information pertaining to the file's location in mass storage and other job control information. Each active file in the system has an FST entry. See also File Name Table.

#### FIP

See Facility Interface Program.

First Level Peripheral Processor (FLPP)

The processor that is connected directly to the CYBER 170 Model 176 mainframe and operates synchronously with the mainframe.

# FLPP

See First Level Peripheral Processor.

#### FNT

See File Name Table.

# Forms Code

An attribute of output files and output devices. The user can specify special forms required for output, and then mount the special forms and use the FORM command to let the system process his/her output.

#### FOT

See Family Ordinal Table.

FST

See File Status Table.

### Function Processor

A system CPU or PP program that the user can call by placing a request in location RA+1. Function processors perform input/output, local and permanent file manipulations, and so on.

Hardware Initialization and Verification Software (HIVS)

The software package that assists CTI during deadstart and provides deadstart confidence-level testing (HVS).

Hardware Verification Sequence (HVS)

HVS is a member of HIVS. It tests the ability of memory to hold patterns of data and execute instructions. The user can choose to test central memory, extended memory, PP memory, and central processor memory.

Head-of-Chain Flag (HOC)

Flag that identifies the first allocation unit in a chain of allocated data streams in the MSF catalog.

# Header

A word or set of words at the beginning of a block, record, file, or buffer that contains control information for that unit of data.

# HIVS

See Hardware Initialization and Verification Software.

# HOC

See Head-of-Chain Flag.

#### HOP

See Host Operator.

#### Host

The computer that controls a network, executes the application programs, and processes network messages.

Host Operator (HOP)

The administrative operator who resides at the system console, initiates NAM, and controls NPUs and network related host elements.

HVS

See Hardware Verification Sequence.

IAF

See Interactive Facility.

Inactive Queued File Table (IQFT)

A table of file entries that has been removed from the queued file table. An IQFT file is on each mass storage device on which one or more inactive queued files reside.

# Incremental Dump

An incremental dump copies those permanent files modified after a specified date. Each incremental dump writes a catalog image record at the beginning of the archive file on which the permanent files are dumped.

#### Incremental Load

An incremental load builds up an accumulation of the most recently modified versions of the files extracted from the archive files for loading. A series of archive files is read in reverse order of creation. The CIR is read and checked against the archive files. If a file matches an entry on the CIR, that file is a candidate for loading.

#### Indirect Access File

A NOS permanent file that you access by making a temporary copy of the file (GET or OLD command). You create or alter it by saving or substituting the contents of an existing temporary file (REPLACE or SAVE command).

# Input File

The system-defined file that contains the entire job the user submits for processing. It is also known as the job file.

Input/Output Unit (IOU)

A collection of all PPs, PP channels, and related hardware for models 865 and 875 and CYBER 180-class machines.

#### Interactive Facility (IAF)

An application that provides a terminal operator with interactive processing capability. The Interactive Facility makes terminal input/output and file input/output appear the same to an executing program.

#### Interactive Transfer Facility (ITF)

A network application that allows the user to connect an interactive terminal to a remote CYBER 200 computer system linked to a host mainframe by a loosely coupled network.

#### IOU

See Input/Output Unit.

# IQFT

See Inactive Queued File Table.

# ITF

See Interactive Transfer Facility.

Job Access Level

On a secured system, each job has an access level. This is the default access level that is assigned to files that are created or stored in the job. A job's initial access level is the lower access level limit for the job. The job's access level is automatically raised to the access level of any file from which information is read. The user can also change the job access level. Refer also to Job Access Level Limits.

#### Job Access Level Limits

An upper limit and a lower limit that determine the range of access levels that are valid for a particular job on a secured system. All files used in a given job must have an access level within the job's access level limits.

Job Sequence Name (JSN)

The unique, system-defined name assigned to every executing job or queued file. The JSN is a string of four alphabetic characters.

Job Status

A job attribute kept in the job's executing job table (EJT) entry. It is used by the system to determine if a job is rolled in or rolled out. If the job is rolled out, job status indicates why it was rolled out.

```
JSN
```

See Job Sequence Name.

Large Central Memory Extended (LCME)

A type of extended memory that is an option available for model 176. Refer to Extended Memory.

# LCF

See Local Configuration File.

# LCME

See Large Central Memory Extended.

# LCN

See Loosely Coupled Network.

LDLIST Utility

A utility that generates a printer listing of queued files present on a dump tape produced by the QDUMP utility.

#### LFG

See Load File Generator.

# LID

See Logical Identifier.

# LISTPPM Utility

A PIP dump analyzer program that converts all available PIP dump binary records on th PIP memory dump file into a report to be listed in byte format.

Load File Generator (LFG)

A utility program that reformats communications control program files for subsequent use by the network supervisor of NAM to load network processing units.

# Load Point

Metallic strip marking the beginning of the recordable portion of a magnetic tape. Data, including labels, is written after the load point. A rewind positions a single file volume to the load point.

Load Sequence

A sequence of load operations that encompasses all of the loader's processing from the time that nothing is loaded until the time execution begins. It includes initialization, specification of specified loader requests, and completion of load.

Local Batch Job

A batch job submitted at the central computer site through a card reader or terminal.

Local Configuration File (LCF)

A file in the host computer system containing information on the logical makeup of the communication elements of the host. The file contains a list of the application programs available for execution in the host computer, and the users that can access it. This is a NOS direct access permanent file.

#### Local File

Any file that is currently associated with a job. Local files include all temporary files and attached direct access files. Local File Name

The file name assigned to a file while it is local (assigned) to a job. The name is contained in the local file name table.

Local NAD

A 380-170 NAD connected to the host mainframe using a channel and configured in the EST.

Local NPU

An NPU that is connected to the host via a coupler. A local NPU always contains a host interface program for processing block protocol transfers across the host/local NPU interface.

Logical Identifier (LID)

A 3-character alphanumeric string used to identify a particular mainframe. LIDs are identified by the user's site.

Loosely Coupled Network (LCN)

A network of physically connected computer systems. The LCN environment allows jobs, data files, and messages to be transmitted from one computer system to another.

Machine Identification (MID)

The identifier that associates a specific machine with its access to a shared device.

Machine Recovery Table (MRT)

A table that provides the information needed to recover the mass storage space and interlocks of a machine that shares a mass storage device.

Machine Recovery Utility (MREC)

A utility that clears interlocks held by the machine to be deadstarted that have not been cleared by CPUMTR. It also recovers mass storage space on a shared device that is currently not accessible because of a machine interruption.

### Macro

A sequence of source statements that is saved and then assembled whenever needed through a macro call.

# MAINLOG Utility

A dayfile dumping utility that dumps all or selected parts of the binary maintenance log to produce an output file in binary format.

Maintenance Logging Transfer Utility (MLTF)

A utility that controls logging NAD error logs into the binary maintenance log.

#### Maintenance Register

A hardware register used in error detection, logging, and recovery procedures. Maintenance registers are used on models 865 and 875 instead of status/control registers. Refer to Status/Control (S/C) Register.

### MAP

The Matrix Algorithm Processor.

Mass Storage Adapter (MSA)

A component of the MSF. The adapter interfaces between the coupler and the mass storage transport or the cartridge storage unit. See Mass Storage Facility.

Mass Storage Archival Subsystem (MSAS)

MSAS is the product consisting of the 7990 hardware, the channel interface, the diagnostics, and the operational software. MSAS stores data on the 7990 and moves it to disk upon request for access by an authorized user.

Mass Storage Device

An extended memory or disk unit that has defined logical attributes such as family, file residency, and so on.

# Mass Storage Facility (MSF)

A hardware product that is a large capacity online mass storage device. MSF is a cost-effective extension to the disk file storage system and an alternative to conventional magnetic tape storage.

Mass Storage Facility (MSF) Catalog

A disk-resident direct access permanent file that contains information describing which streams of each cartridge assigned to a particular subfamily are allocated to MSF files and which streams are available for allocation.

Mass Storage Subsystem (MSS)

MSS is the product consisting of the MSF hardware, the CYBER coupler, the diagnostics, and the operational software. MSS stores data on the MSF and moves it to disk upon request for access by an authorized user.

Mass Storage Table (MST)

A table that contains an entry for each logical device in the configuration of mass storage devices currently available to the system.

Mass Storage Transport

A component of the MSF. MST has storage positions for five cartridges: one being read or written, two queued for reading or writing, and two queued for storage by the selector into the CSU.

Master Device

A disk device that contains the user's permanent file catalog entries; all of the user's indirect access files; and all, part, or none of the user's direct access files.

MID

See Machine Identification.

# MLIA

See Multiplex Loop Interface Adapter.

#### Monitor

The system routine that coordinates and controls all activities of the computer system. It occupies peripheral processor 0 and part of central memory. It schedules the use of the central processor and the other peripheral processors.

# MREC

See Machine Recovery Utility.

#### MRT

See Machine Recovery Table.

# MSA

See Mass Storage Adapter.

# MSAS

See Mass Storage Archival Subsystem.

#### MSF

See Mass Storage Facility.

#### MSS

See Mass Storage Subsystem.

## **MSSEXEC** Program

The main processing program that controls MSS activities, such as destaging files from disk to MSF, purging unneeded MSF files, labeling or relabeling cartridges, updating CSU maps, and updating MSF catalogs.

## MSSSLV Program

A program that runs on each slave mainframe and communicates with the MSSEXEC program to retrieve files from MSF in response to ATTACH requests by jobs running on the slave mainframes.

# MST

See Mass Storage Table.

#### Multimainframe Operation

An operation that provides mechanisms by which more than one computer can share mass storage devices. Multiplex Loop Interface Adapter (MLIA)

The hardware portion of the multiplex subsystem that controls the multiplex loops (input and output) as well as the interface between the NPU and the multiplex subsystem.

Multispindle Device

A logical mass storage device that includes from two to eight disk units.

Multiterminal Job

A job that does one specific task for many terminals while being scheduled into the system only once.

#### NAD

See Network Access Device.

#### NAM

See Network Access Method.

#### NCF

See Network Configuration File.

# NCTF

See Network Decription File.

#### NDA

See NPU Dump Analyzer.

#### NDL Processor

See Network Definition Language Processor.

# NDR

See Network Driver.

Negative Field Length (NFL)

Central memory assigned to a control point that physically precedes the job's reference address (RA).

# NETLOG

A program that uses the network configuration file to determine which remote NADs should be logged.

## Network

An interconnected set of network elements consisting of a host and one or more NPUs and terminals.

Network Access Device (NAD)

The primary element in a loosely coupled network. Each NAD connects a computer system to the network.

#### Network Access Method (NAM)

A software package that provides a generalized method of using a communications network for switching, buffering, queuing, and transmitting data. NAM is a set of interface routines used by a terminal servicing facility for shared access to a network of terminals and other applications, so that the facility program does not need to support the physical structures and protocols of a private communication network.

Network Configuration File (NCF)

A network definition file in the host computer containing information on the network elements and permissible linkages between them. The status of the elements described in this file is modified by the NPU operator in the course of managing the network. This is a NOS direct access permanent file.

Network Definition Language (NDL) Processor

The network software module that processes an NDL program as an offline batch job to create the network definition files and other NDL program output.

Network Description File (NCTF)

A file that must be present if the Transaction Facility is used. The file is prepared by the site analyst. Network Driver (NDR)

A program that executes in a dedicated peripheral processor unit. It communicates with the network access devices using a host computer data channel, and is the interface between RHF and the communication network.

Network Invocation Number (NIN)

A 1- to 3-digit decimal number. NIN is incremented by 1 every time NAM is brought up.

Network Load File (NLF)

An output file generated by the load file generator utility for use by the network supervisor.

Network Processing Unit (NPU)

The collection of hardware and software that switches, buffers, and transmits data between terminals and host computers.

Network Supervisor (NS)

A portion of the network software written as a NAM application program. NS dumps and loads NPUs upon request.

Network Terminal

A terminal that communicates with the operating system through the network.

Network Validation Facility (NVF)

A portion of the network software, written as a NAM application program. The network validation facility performs application validation and all connection validation processing and supports login dialog with the terminal user.

#### NFL

See Negative Field Length.

#### NIN

See Network Invocation Number.

NLF

See Network Load File.

Nonincremental Load

A nonincremental load does no CIR checking and uses only parameter options specified on the PFLOAD call, if any, to select candidates for loading.

#### NOP

See NPU Operator.

# NPU

See Network Processing Unit.

NPU Dump Analyzer (NDA)

A utility program that produces a readable printout from the NPU dump files.

NPU Operator (NOP)

The administrative operator who resides at a terminal and controls NPUs.

NS

See Network Supervisor.

# NVF

See Network Validation Facility.

Object Code

The machine language version of a program that has been translated (compiled) from source code written in a higher-level language.

Operating System

The set of system programs that controls the execution of computer programs and provides scheduling, error detection, input/output control, accounting, compilation, storage assignment, and other related services.

#### Origin Type

A job attribute that indicates how a job entered the system. The four origin types are interactive origin, batch origin, remote batch origin, and system origin.

#### Output File

The system-defined file that contains the output from job processing. It is also known as the print or punch file.

# Paging (Screen)

The process of filling a CRT display with data and holding additional data for subsequent displays. Changing the page display is an operator-controlled function if the page-wait option is selected.

## Parity

In writing data, an extra bit is either set or cleared in each byte so that every byte has either an odd number of set bits (odd parity) or an even number of set bits (even parity). Parity is checked on a read for error detection and possible recovery.

#### Partial Dump

A partial dump copies permanent files according to any specified options, except those defining a full or incremental dump.

## Password

A name or word the user enters during login to provide extra security for his/her user name. A unique password ensures that no one else can log into the system with someone else's user name and access that user's files. A user's password is given to him/her by that user's employer, instructor, or computer center personnel. Peripheral Interface Package (PIP)

The interface package between the PPU of the CYBER computer and the network application.

Peripheral Processor (PP)

The hardware unit within the host computer that performs physical input and output through the computer's data channels.

Peripheral Processor Unit (PPU)

First level peripheral processor. A PPU is contained in the mainframe in a multimainframe environment and operates synchronously with the mainframe. Sometimes referred to as FLPP.

## Permanent File

A mass storage file that is cataloged by the system so that its location and identification are always known to the system. Permanent files cannot be destroyed accidentally during normal system operation. They are protected by the system from unauthorized access according to privacy controls specified when they are created.

Permanent File Catalog (PFC)

A 16-word entry that the system maintains and uses to determine attributes of a permanent file.

Permanent File Family

The permanent files that reside on the family devices of a specific system.

Permanent File Manager (PFM)

PFM identifies the master device and catalog track information when a user submits a job.

Permanent File Supervisor (PFS)

The PFS processes parameters in utility commands and loads the correct processing overlays. Permanent File Transfer Facility (PTF)

PTF is an application program initiator started by the user using an MFLINK command. It is responsible for initiating and completing (with the help of its servicing application, PTFS on another host) a permanent file transfer.

Permanent File Transfer Facility Servicer (PTFS)

PTFS is an application program servicer started by RHF or NAM when requested by a PTF on another host. The PTFS application assists the PTF application in completing the file transfer by performing those permanent file functions requested by the user and then transferring the file between PTF and PTFS.

# Permanent File Utility (PFU)

A utility that manages the catalogs, permits, data allocation on a device, and the data transfer between the device and the overlay.

Permission Mode

A mode of operation that a user is allowed for a particular permanent file, such as write, modify, append, read, and so forth.

#### **PFATC Utility**

A utility that produces a cataloged directory of file information derived from an archive file previously created by the PFDUMP utility.

# PFC

See Permanent File Catalog.

# PFCAT Utility

A utility that produces a cataloged directory of file information derived from catalog tracks on a master device.

# **PFCOPY Utility**

A utility that extracts files from an archive file and copies them to one or more files at a control point.

## PFDUMP Utility

A utility that dumps permanent files to an archive file. Dumps can be reloaded by the PFLOAD utility and can be accessed by the PFATC and PFCOPY utilities for cataloging and copying.

PFLOAD Utility

A utility that loads archived files produced by the PFDUMP utility back into the permanent file system. The load can reestablish the permanent file system exactly as it was at the time of the dump, or can load only a desired subset of files on the archive file.

#### PFM

See Permanent File Manager.

#### PFS

See Permanent File Supervisor.

#### PFU

See Permanent File Utility.

Physical Identifier (PID)

The unique 3-character identifier of a specific host.

Physical Record Unit (PRU)

The amount of information transmitted by a single physical operation of a specified device. For mass storage files, a PRU is 64 central memory words (640 characters); for magnetic tape files, the size of the PRU depends upon the tape format. A PRU that is not full of user data is called a short PRU; a PRU that has a level terminator but no user data is called a zero-length PRU.

#### PICB

See Program Initiation Control Block.

# PID

See Physical Identifier.

#### PIP

See Peripheral Interface Package.

# PP

See Peripheral Processor.

# PPS

The Peripheral Processor Subsystem.

PPU

See Peripheral Processor Unit.

#### Primary File

A temporary file created with the OLD, NEW, LIB, (interactive jobs only), or PRIMARY command. The primary file is assumed to be the file on which most system operations are performed unless another file is specified. There can be only one primary file associated with your job.

#### PROBE Utility

A utility that traps and measures particular interval events in the system. PROBE generates a report from the data collected by the system.

#### Procedure

A user-defined set of instructions that can be referenced by name. The instructions consist of procedure directives and system commands.

Program Initiation Control Block (PICB)

A sequence of commands that initiates NPU load and dump operations for a specific NPU variant. Several PICBs may exist on the network load file. Each PICB is a separate record with a unique NPU variant name as its record name.

#### Programmable Format Control

Spacing and format control for 580 line printers provided by the use of software and a microprocessor instead of a carriage control format tape.

#### Project Number

An alphanumeric identifier that may be required at a user's installation for accounting and billing to a specific project. If it is required, the project number is entered during the login procedure. It is given to the user by personnel at his/her installation.

#### PRU

See Physical Record Unit.

Pseudo A Register

A software register used by DSD to function channels and to manipulate peripheral hardware devices from the operator's console.

# PTF

See Permanent File Transfer Facility.

# PTFS

See Permanent File Transfer Facility Servicer.

Public Auxiliary Device

An auxiliary device that is available for access by all validated users knowing the correct pack name. Additional validation is required to create or replace files on an auxiliary device.

#### QALTER Utility

A utility that displays, lists, and/or alters routing and other information about active queued files. It selects files for processing according to specified criteria. QALTER can also purge selected files from the system.

# QDUMP Utility

A utility that dumps selected queued files from a single device, a family of devices, or all devices on the system. These queued files can be dumped either to a tape or disk. QDUMP also provides a listing of all files dumped with information about each file processed.

# QFSP

See Queue File Supervisor Program.

QFT

See Queued File Table.

QFTLIST Utility

A utility that displays and/or lists routing and other information about active queued files. Its operation is similar to that of QALTER, except file alteration or purging is not allowed.

# QLIST Utility

A utility that lists inactive queued files, which may include all inactive queued files in the system or a selected subset based on options specified when the utility is called.

# QLOAD Utility

A utility that processes the dump files generated by QDUMP or other utilities using the same format. QLOAD can selectively load the queued files from these dump files. QLOAD can also list the contents of a dump file without loading any files.

#### QMOVE Utility

A utility that moves queued files from one disk device to another. It also produces a listing of all files moved with information about each file processed.

# QREC Utility

A utility that deactivates or activates selected queued files and purges selected inactive queued files.

# QTF

See Queue File Transfer Facility.

# QTFS

See Queue File Transfer Facility Servicer.

Queue File Supervisor Program (QFSP)

A program that provides control for the queue file utilities.

Queue File Transfer Facility (QTF)

QTF is an applicaton program initiator that periodically scans the I/O queues searching for files to transfer. When it finds a file to transfer, it initiates and completes the queue file transfer with the help of its servicing application, QTFS, on another host.

Queue File Transfer Facility Servicer (QTFS)

QTFS is an application program servicer started by RHF or NAM when requested by a QTF on another host. The QTFS application assists the QTF application in completing the transfer by receiving the queue file and placing it in the I/O queue.

Queue Priority

An attribute associated with input and output files. If all other factors are equal, queue priority is used to select the best file for processing.

Queued File

An input, print, plot, or punch file that has an entry in the QFT, is not assigned to an EJT entry, and is waiting to be selected for processing.

Queued File Table (QFT)

A central memory resident table that contains a 4-word entry for all active input and output queue files.

Random Access

An access method by which any record in a file can be accessed at any time. Random access applies only to mass storage files with an organization other than sequential. Refer to Sequential Access.

# RCFGEN

See RHF Configuration File Generation.

RCL

See Resident Central Library.

RDF

See Release Data File.

Recall

The state of a program when it has released control of the central processor until a fixed time has elapsed (periodic recall) or until a requested function is completed (auto recall). Recall is a system action request as well as an optional parameter of some file action requests.

#### Record

A unit of information. In CYBER Record Manager and its language processors, a record is a unit of information produced by a single read or write request.

Eight different record types exist within CRM. The user defines the structure and characteristics of records within a file by declaring a record format.

#### Regulation Level

A number that indicates to NAM the existence of a logical link and indicates what types of information exchange are possible on that logical link.

Release Data File (RDF)

A file created by PFDUMP that identifies those MSF/7990-resident files that are pointed to by PFC entries at the time of the dump.

Remote Batch Job

A job submitted from a remote batch terminal.

#### Remote Host Facility (RHF)

A central processor program that executes at a system control point. It performs data buffering and switching, and is the intermediary between application programs and the network.

## Remote NAD

Any 380 NAD accessible to a local NAD using a loosely coupled network trunk.

#### Remote NPU

A network processing unit linked to a host computer through other network processing units.

#### Removable Device

A disk storage device that can be physically detached from the disk drive.

Resident Central Library (RCL)

An area in central memory resident that central library routines specified by the \*CM directive reside.

## Resident Peripheral Library (RPL)

An area in central memory resident that peripheral library routines specified by the \*CM directive reside.

RHF

See Remote Host Facility.

RHF Configuration File Generation (RCFGEN)

A utility that reads configuration definition statements to create a permanent file that RHF uses for the network description and access.

# Rollout

The removal of jobs from central memory to mass storage before execution is complete, so the control point and central memory can be assigned to another job. A job is rolled out when it is waiting for an external event, when its control point and/or central memory is needed by a higher priority job, or when it exceeds its central memory time slice.

Rollout File

A file containing a job (and system information) that has been temporarily removed from the main processing area of the system. RPL

See Resident Peripheral Library.

#### SC

See Service Class.

```
S/C Register
```

See Status/Control Register.

Scheduling Priority

An attribute associated with an executing job available for job scheduling. Scheduling priority is used to select the best executing service class job for processing.

## SCOPE 2 Station Facility (SSF)

A NOS subsystem that allows a NOS user to submit jobs (including batch jobs that require interactive I/O) to a linked SCOPE 2 system. The submitted job uses standard SCOPE 2 commands to access NOS files stored on the originating NOS system.

```
SCP
```

See Subcontrol Point.

Screen Management Facility (SMF)

A subsystem that alters the performance characteristics of the Full Screen Editor (FSE). The absence or presence of SMF is not detectable by the FSE user. Performance can be optimized by disabling SMF for small mainframes and interactive work loads, and by enabling SMF for large configurations and heavy work loads.

#### SCRSIM

See Status/Control Register Simulator.

SDF

See System Deadstart File.

# SECDED

See Single Error Correction Double Error Detection.

#### Secondary Mask

An 8-bit quantity used to identify groups of users who can place direct access files on a particular device.

#### Secured System

A system in which a mandatory security mechanism has been enabled during deadstart. A secured system protects information by enforcing restrictions based on access levels and access categories, and restricts many sensitive system functions to security administrators.

# Security Adminstrator

A secured system prevents users and operators from performing certain functions that could result in the unauthorized disclosure or modification of information. These functions can only be performed by someone who is designated a security administrator. A security administrator is always authorized to access the highest level of information stored on the system. This person performs functions in the areas of installation, user validation, system operation, and system maintenance.

# Security Unlock Status

This status of the system console applies only to a secured system and must be set by a security administrator. The console must be in security unlock status in order for the security administrator to perform certain functions that are restricted on a secured system.

# Sequential Access

A method in which only the record located at the current file position can be accessed. Refer to Random Access.

## Sequential (SQ) File

A file in which records are accessed in the order in which they occur. Any file can be accessed sequentially.

#### Service Class (SC)

An attribute associated with a queued file or executing job. The service class determines how the system services the job.

SFS

See Special File Supervisor.

Single Error Correction Double Error Detection (SECDED)

A hardware technique that detects and corrects single bit errors in memory. Double bit errors are detected by not corrected.

SM

See Storage Module.

SM Map

See Storage Module Map.

```
SMF
```

See Screen Management Facility.

#### Source Code

Code input to the computer for later translation into executable machine language instructions (object code).

Special File Supervisor (SFS)

A program that provides routines, table management, data manipulation, and I/O processing for special system jobs.

SQ File

See Sequential File.

# SRU

See System Resource Unit.

#### SSEXEC Program

The main processing program that controls MSAS activities, such as destaging files from disk to the 7990, purging unneeded 7990 files, labeling or relabeling cartridges, updating SM maps, and updating 7990 catalogs.

# SSF

See SCOPE 2 Station Facility.

# SSSLV Program

A program that runs on each slave mainframe and communicates with the SSEXEC program to retrieve files from the 7990 in response to ATTACH requests by jobs running on the slave mainframes.

#### Status

Information relating to the current state of a device, line, and so forth. Service messages are the prncipal carriers of status information. Statistics are a special subclass of status.

Status/Control Register Simulator (SCRSIM)

A program that enables the user to set status/control register bits in order to aid in the testing of error logging and error recovery procedures.

Status/Control (S/C) Register

A hardware register used in error detection, logging, and recovery procedures. This register is present on all CYBER 170 Computer Systems. For models 865 and 875, the S/C register is replaced by a maintenance register. Refer to Maintenance Register.

## Step Mode

A protected or debugging mode for the operating system monitor. The keyboard spacebar must be pressed to process each PP request.

#### Stimulator

A collection of central memory and peripheral processor programs that enters a hypothetical work load into the system to analyze the effects of such a load on response time and system reliability.

## Storage Module (SM)

An MSAS hardware unit that houses up to 312 usable data cartridges, a cartridge accessor unit that picks cartridges from and puts cartridges in their cubicles, and one or two data recording drives. Storage Module (SM) Map

A direct access permanent file that contains information indicating the cartridges that reside in the SM.

## Subcontrol Point (SCP)

A division of a central memory control point. You can set up a control point to contain two or more programs; one of the programs is the executive, and monitors the other programs executing at the subcontrol points.

#### Subfamily

Each permanent file family consists of eight subfamilies, subfamily 0 through subfamily 7. The lower 3 bits of the user index identify the subfamily to which a user belongs.

#### Suspended Job

An interactive job placed in a inactive state. Processing is stopped immediately and recovery information is copied to the rollout file. Processing is resumed as if no interruption took place, if the job's EJT entry is recovered.

#### System Access Categories

On a secured system, a set of access categories are set during level 0 deadstart. This set may consist of some, all, or none of the 32 possible access categories. While the system is running in security mode, you may only use access categories that are within the set of system access categories.

#### System Access Levels

On a secured system, a range of access levels is set during level 0 deadstart. This range may contain some or all of the eight possible access levels. While the system is running, users may only use access levels that are within the range of system access levels.

#### System Deadstart File (SDF)

A file that is a copy of the deadstart tape that resides on a disk storage deadstart device. When the system is deadstarted from disk, this file is read to generate copies of the running system. System Library (SYSTEM)

The collection of tables and object language programs that reside in central memory or on mass storage and are necessary for running the operating system and its product set.

System Origin Job

A job entered at the system console.

System Resource Unit (SRU)

A unit of measurement of system usage. The number of SRUs includes the central processor time, memory usage, and input/output resources used for a given job.

## TAF

See Transaction Facility.

#### TCU

See Trunk Control Unit.

#### Temporary File

A file associated with a job that is not a permanent file. Temporary files no longer exist when the user logs off the system or releases the files.

#### Timed/Event Rollout

A condition in which an executing job has been temporarily removed from central memory but will be rolled back into central memory when a specified event (such as a file is no longer busy) or a specified time period has elapsed.

#### TRACER Utility

A utility that monitors the system's activity and gathers data periodically for statistical analysis of the system.

#### Track Link

An address of the next track that is a logical continuation of a file.

Track Reservation Table (TRT)

A table that describes the physical layout of data on a device and is the key to allocating information on the device.

#### Transaction Facility (TAF)

An application program that provides the transaction terminal with access to a data base. A terminal using TAF can enter, retrieve, and modify information in the data base.

TRT

See Track Reservation Table.

#### Trunk

The communication line connecting two network processing units.

Trunk Control Unit (TCU)

The hardware part of a network access device (NAD) that interfaces with a network trunk.

UDT

See Unit Device Table.

# UEM

See Unified Extended Memory.

Unified Extended Memory (UEM)

A type of extended memory. UEM differs from other types of extended memory in that it is a portion of central memory and not a separate memory unit. See Extended Memory.

Unit Device Table (UDT)

A table that defines the logical mapping of the components within a 7990 configuration.

# Unit Number

The setting of a hardware device. The unit number is used when more than one hardware unit can be connected to a controller.

#### Unsecured System

A system in which the multilevel security mechanism has not been enabled during deadstart. The restrictions based on access levels and access categories are not enforced on an unsecured system.

## Upline

The direction of input flow from terminal to host.

User Break 1 Sequence

The character or sequence of characters that causes an executing program to be interrupted (also called the interruption sequence).

#### User Break 2 Sequence

The character or sequence of characters that causes an executing program to be terminated (also called the termination sequence).

## User Index

A unique 17-bit identifier that is associated with each user name. The user index is used by the permanent file manager to identify the device and catalog track for the user's permanent files.

User Job Name (UJN)

A 1- to 7-character alphanumeric name you specify to replace the system defined JSN for a queued file or executing job.

#### User Name

A name given to the user by his/her employer, instructor, or computer center personnel. A user name has certain resources and privileges assigned to it. When logging in to the system, a user specifies his/her user name as identification, so that it knows that this person is an authorized user and what resources this user is entitled to use. A user name also represents a specific catalog in the permanent file system. All files a user makes permanent are associated with that user's name and this catalog. A file that contains validation information for all users (user names, passwords, resources allowed, and so on).

Volume Serial Number (VSN)

A from 1- to 6-character identifier that identifies the volume of magnetic tape to the system.

VSN

See Volume Serial Number.

# Word

A group of bits (or 6-bit characters) between boundaries imposed by the computer system. A word is 60 bits in length. The bits are numbered 59 through 0 starting from the left. A word is also composed of five 12-bit bytes, numbered 0 through 4 from the left.

#### Write Mode

A mode that allows a user to write, modify, append, read, execute, or purge the file (modify permission applies only to direct access files).

#### Zero-Length PRU

A PRU that contains system information but no user data. Under NOS, a zero-length PRU defines EOF.

## 7**99**0

A hardware product that is a large capacity mass storage device. The 7990 is a cost-effective extension to the disk file storage system and an alternative to conventional magnetic tape storage.

#### 7990 Catalog

A disk-resident direct access permanent file that contains information describing which AUs of each cartridge assigned to a particular subfamily are allocated to 7990 files and which AUs are available for allocation.

# **SCOPE 2 STATION FACILITY**

The SCOPE 2 Station Facility (SSF) is a NOS software subsystem that allows a NOS user to submit jobs and transfer files to a linked SCOPE 2 system residing in a 7000 Computer Systems mainframe. With SSF, a NOS user can route jobs to a linked SCOPE 2 system for processing. While processing the job, the SCOPE 2 system can access permanent files and tape files at the NOS host.

SSF provides these services:

- Provides NOS users with local batch capabilities at a linked SCOPE 2 system.
- Optionally serves as the system operator station for SCOPE 2.
- Provides the NOS user with remote batch capabilities, through RBF, at a linked SCOPE 2 system.
- Allows simultaneous transfer of multiple files.
- Optionally furnishes the deadstart file for SCOPE 2.
- Provides a means of obtaining absolute SCOPE 2 dumps.
- Allows a job executing on a SCOPE 2 system to use SCOPE 2 commands (GETPF, SAVEPF, and PURGE) to access permanent files at a linked NOS system.
- Allows a job executing on a SCOPE 2 system to access magnetic tape files at a linked NOS system.

# EQUIPMENT CONFIGURATION

To establish a NOS-SCOPE 2 link using the SSF Subsystem, the NOS and SCOPE 2 mainframes must be attached to a loosely coupled network (LCN) by a 6683 and 7683 Satellite Coupler, respectively. An equipment status table (EST) device type entry of CC describes the coupler link. The EST table appears on the E,A display.

# SSF FILE TRANSFERS

SSF file transfers between NOS and SCOPE 2 are of two types: staged file transfers and spooled file transfers. Staged file transfers process one file at a time and handle all tape file and permanent file transfers. Spooled file transfers handle multiple I/O file transfers. Normally, operator intervention is not required for either type of transfer.

SSF initiates a special type of job, called a spunoff task (SPOT) job, to perform file transfers. Staged file SPOT jobs differ from spooled file SPOT jobs as described in this appendix. The primary functions of any SPOT job are performing user validation and queuing tasks required to send a file across the link. All SPOT jobs are executed on the NOS system.

Installation parameters or operator commands can be used to limit the number of file transfer activities that can be active concurrently. Independent limits can be set on the following activities:

- Purging NOS files.
- Reading tape files from NOS to SCOPE 2.
- Writing tape files from SCOPE 2 to NOS.
- Reading permanent files from NOS to SCOPE 2.
- Writing permanent files from SCOPE 2 to NOS.
- Reading input files from NOS terminals to SCOPE 2.
- Writing output files from SCOPE 2 to NOS terminals.

The operator commands used to set limits are described in section 8, K-Display Utilities.

# STAGED FILE TRANSFERS

Staged file transfers are essentially the same for both tape and permanent file transfers. In response to an SSF query, SCOPE 2 indicates to SSF that an executing SCOPE 2 job requires access to a NOS file. The SCOPE 2 request can specify either a NOS to SCOPE 2 file transfer, also called a prestaging transfer; or a SCOPE 2 to NOS (poststaging) transfer. In either case, SSF normally responds by creating a SPOT job to perform the file transfer. The SPOT job name is of the form xyyy, where x is the last character of the PID of the SCOPE 2 mainframe, and yyy is the JCB ordinal of the SCOPE 2 job. SSF places the newly created SPOT job into the NOS input queue, and the job executes on NOS in the same manner as any other job.

During execution, the job checks that the user has the appropriate file access permission. If so, the SPOT job initiates the file transfer.

For staged file transfers, each SPOT job terminates upon completion, and the job's dayfile (containing all processing and error messages) is sent to SCOPE 2 to be included in the dayfile of the job that requested the file transfer. SSF initiates a new SPOT job for each staged file transfer request it receives.

SSF periodically queries SCOPE 2 about file staging activities that should be dropped. For example, the SCOPE 2 system operator may have dropped a job for which staging was active. If any file staging activities are to be dropped, SSF requests information to identify the staging activity and then drops the associated SPOT job. No operator intervention is required.

# **SPOOLED FILE TRANSFERS**

Spooled file transfers use a single SPOT job to perform all input/output file transfers between SSF and SCOPE 2. As soon as communications are established between SSF and SCOPE 2, SSF creates a SPOT job to handle input/output file transfers. The job is called xSTA, where x is the PID of the SCOPE 2 mainframe. This SPOT job can be swapped out during periods of low activity, but the job is not terminated until the SSF-SCOPE 2 link is dropped.

An input file transfer begins when the spooling SPOT job selects a file from the NOS input queue that is destined for the SCOPE 2 system. The SPOT job queries SCOPE 2 for a system file table (SFT) entry for the input file to be transferred. When an entry is assigned, the spooling SPOT job transfers the input file to SCOPE 2. Upon completion of the transfer, the SPOT job requests that the input file be removed from the NOS input queue.

For each output file transferred from SCOPE 2, the spooling SPOT job transfers the output file from the SCOPE 2 output queue to a local NOS file. When the transfer is complete, the SPOT job routes the local file to the NOS output queue (with the appropriate disposition code, forms code, or terminal ID). The spooling SPOT job then requests the removal of the output file from the SCOPE 2 output queue.

# **ERROR LOGOUT**

A loss of communications between SSF and SCOPE 2 results in an error logout condition. Error logout occurs as a result of a STOP command entered by the system operator, or a software or hardware error. When SSF detects an interruption in communications, it logs out of the SCOPE 2 system after:

- All partially transmitted files are rewound on the sending end of the link and are deleted at the receiving end.
- All SPOT jobs are dropped.

No files are lost as a result of the communications break. After logging out of the SCOPE 2 system, SSF periodically queries SCOPE 2 to determine if the link has been restored.

Error logging on a CYBER 170 Computer System enables you to detect and log errors identified in the status/control (S/C) register. The status/control register simulator (SCRSIM) allows you to set S/C register bits in order to aid in the testing of error logging and error recovery procedures.

SCRSIM does not run on CYBER 180-class machines. Models 865 and 875 use maintenance registers instead of S/C registers. Throughout this appendix all references to S/C registers also apply to the model 865 and 875 maintenance registers.

SCRSIM runs on CYBER 170 Computer Systems using the S/C register on channel 16 and, if more than 10 PPs are available on the system, the S/C register on channel 36. On CYBER 70 Computer Systems, SCRSIM uses the interlock register on channel 15.

With the aid of a K display, you can specify commands to set and clear bits, set bytes, and set lines and areas in holding registers. This allows both S/C registers to be set up completely. The contents of the holding register can then be transferred to the S/C registers (64 or 128 bits are transferred to the interlock register of a CYBER 70 Computer System).

The bits set through this simulator are logged in the error log if an error bit is set, thus aiding in testing and software checkout. (Refer to the appropriate hardware reference manual for a complete description of the significance of each S/C register bit.) The simulator job dayfile lists all simulator commands entered. This error logging does not occur in a CYBER 70 Computer System, however, unless an ENABLE, SCRSIM IPRDECK entry has been made.

# NOTE

Be careful when using the simulator. Improper use may result in serious system malfunctions.

Refer to the NOS 2 Operations Handbook for descriptions of messages produced by SCRSIM.

# **USING THE SIMULATOR**

Error logging is always enabled on a CYBER 170 Computer System except models 815, 825, 835, 845, and 855. Error logging is enabled on a CYBER 70 Computer System only if the ENABLE, SCRSIM IPRDECK entry is present.

D-1

D

## **CONSOLE OPERATION**

The simulator is called from the console by entering:

X.SCRSIM.

The simulator K display (refer to figure D-1) appears on the left screen after entering:

K,jsn.

jsn The job sequence name of SCRSIM noted on the B,O display.

This K display shows the contents of the temporary holding registers, as well as a central memory buffer. The buffer contains:

- A history of all error status bits since the last level 0 deadstart. If an error status bit has been set in the S/C register, it remains set in the buffer, even though it may have been cleared in the actual S/C register. This history may be useful in diagnosing system malfunctions.
- All other bits in the buffer reflect actual values in the S/C register at the time the last error bit was set. Each time an error bit is set, the entire buffer is updated.

Unless the simulator is running on a CYBER 170 Computer System with more than 10 PPs, the message

CHANNEL 36 NOT AVAILABLE

also appears. This indicates that no channel 36 S/C register is present on the machine, and thus, no simulation need be done for it.

By entering

KK.

the simulator commands K display (refer to figure D-2) appears on the right screen. This display gives a brief description of the commands available.

Commands can be entered on the K display by entering:

K.command.

command One of the commands shown in figure D-2.

# **BATCH INPUT**

The simulator may also be called from batch input by using the SCRSIM command. The input file must have a record containing the commands to be processed, one command per card. The system must be in debug mode and the user must be validated for system origin privileges.

| TEMPORARY | HOLDING | REGISTER | CONTENTS |
|-----------|---------|----------|----------|
|-----------|---------|----------|----------|

CHANNEL 16 REGISTER - LINES 0-3

BITS 59- 0 BYTE OO 0000 0000 0000 0000 0000

BITS 119- 60 BYTE 05 0000 0000 0000 0000 0000

BYTE 10

BITS 179-120 0000 0000 0000 0000 0000

> **BYTE 15** 0000000000 00000000000 0000 0000

BITS 203-180

CHANNEL 36 NOT AVAILABLE

ACTUAL S/C REGISTER ERROR BUFFER

CHANNEL 16 REGISTER - WORDS 113-116 00000000000 000000000000

Figure D-1. Simulator K Display (Left Screen)

|                                                                      | SIMULATOR COMMANDS                       |
|----------------------------------------------------------------------|------------------------------------------|
| COMMAND                                                              | DESCRIPTION                              |
| AREA,A,M,Y.                                                          | SET M BITS FROM A TO OCTAL VALUE Y       |
| BYTE,XX,YYYY.                                                        | SET BYTE XX TO OCTAL VALUE YYYY          |
| CLEAR,A,B,,Z.                                                        | CLEAR BITS A,B,,Z                        |
| CYCLE,X,T,R.                                                         | SET BIT X EVERY 16*T MS. R TIMES         |
| END.                                                                 | END CYCLE COMMAND BEFORE R REACHED       |
| LINE,X,Y.                                                            | SET LINE X TO OCTAL VALUE Y              |
| READ.                                                                | READ S/C REGISTER INTO HOLDING REGISTER  |
| SET,A,B,,Z.                                                          | SET BITS A,B,,Z                          |
|                                                                      | CHANGE REGISTER BEING USED AND K DISPLAY |
| GO.                                                                  | ENTER HOLDING REGISTERS IN S/C REGISTERS |
| STOP.                                                                | END THE SIMULATOR                        |
|                                                                      |                                          |
| ALL BIT, BYTE, AND L<br>TIME VALUES ASSUMED (<br>AND YYYY VALUES MUS |                                          |

Figure D-2. Simulator Commands K Display (Right Screen)

# SIMULATOR COMMANDS

The simulator commands are described next. You must enter the entire command keyword and only one command may be entered at a time. Each command, except +, must end with a terminator. In all cases, a null argument is assumed to be zero.

# HOLDING REGISTER COMMANDS

The following commands, except GO., affect only the holding register currently displayed on the left screen. These commands are used to set up the entire 204 bits in the holding registers. GO. transfers the holding register contents to the actual S/C register. (On a CYBER 70 Computer System, the channel 16 S/C register is simulated by the interlock register. GO. transfers the first 64 of 128 bits of the holding register to the interlock register.) The current contents of the holding register is displayed in binary and octal on the left screen (refer to figure D-1). The contents of the actual S/C register are also displayed in binary on the left screen.

| Command                                                 |                                    | Description                                                                                                           |
|---------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| AREA,a,m,y.                                             | Set m bits in t<br>to the octal va | the holding register, from bit a to bit a+m-l,<br>alue y.                                                             |
|                                                         | Parameter                          | Description                                                                                                           |
|                                                         | a                                  | Starting bit number; from 0 to 203. a is<br>assumed to be decimal, but a postradix of D<br>or B may also be included. |
|                                                         | ш                                  | Number of bits to be set. m is assumed to<br>be decimal, but a postradix of D or B may<br>also be included.           |
|                                                         | У                                  | Value to which the bits are to be set. y may be up to m bits of octal value.                                          |
| BYTE, xx, yyyy.                                         | Set byte xx in                     | the holding register to the octal value yyyy.                                                                         |
|                                                         | Parameter                          | Description                                                                                                           |
|                                                         | xx                                 | Byte number; from 0 to 16. xx is assumed to<br>be decimal, but a postradix of D or B may be<br>included.              |
|                                                         | уууу                               | Value to which byte xx is to be set. yyyy<br>may be up to l2 bits of octal value.                                     |
| CLEAR,a <sub>l</sub> ,a <sub>2</sub> ,,a <sub>n</sub> . | more than 30 bi                    | 2,,a <sub>n</sub> in the holding register. If<br>t numbers are entered, only the first 30 are<br>others are ignored.  |
|                                                         | Parameter                          | Description                                                                                                           |
|                                                         | a <sub>i</sub>                     | Bit number to be cleared; from 0 to 203. A decimal value is assumed, but a postradix of D or B may be included.       |

Command

LINE, x, y.

# Description

Set line x of the holding register to the octal value y. Description

# Parameter

Parameter

- Line number of the holding register shown on х the left display screen (refer to figure D-1); from 0 to 3. Line 0 is positioned at the top and line 3 is positioned at the bottom.
- Value to which line x is to be set. y may У be up to 60 bits of octal value.

Transfer the contents of the actual S/C register to the holding register.

Set bits  $a_1, a_2, \ldots, a_n$  in the holding register. If more than 30 bit numbers are entered, only the first 30 are processed. All others are ignored.

#### Parameter Description

Bit number to be set; from 0 to 203. A ai decimal value is assumed, but a postradix of D or B may be included.

GO .

Transfer the contents of the holding register to the actual S/C register or to the interlock register of a CYBER 70 Computer System. No bits in the holding register are changed by this command.

# **CYCLE COMMANDS**

Command

END.

Set bit x every t periods of time, a total of r times. This command assumes control of the simulator for the total time period specified. During this time, no command is accepted except END. Bit x is set in the holding register by this command.

Description

#### Description

- х Bit number to be set; from 0 to 203.
- t Number of periods of time for each cycle; one period is 16 milliseconds. t=32 is approximately 0.5 second.
- Number of times to set bit x. r may not r exceed 4095.

End CYCLE command processing before r is reached. Control of the simulator is returned to the operator.

READ.

SET, a1, a2, ..., an.

# CYCLE, x, t, r.

# + AND STOP COMMANDS

| Command | Description                                                                                                         |
|---------|---------------------------------------------------------------------------------------------------------------------|
| +       | Toggle the K display between the channel 16 and channel 36 register displays and also change the register currently |
|         | heing worked on, if the simulator is being operated on a                                                            |

CYBER 170 Computer System with two S/C register currently being worked on, if the simulator is being operated on a CYBER 170 Computer System with two S/C registers. If two S/C registers are not present on the machine, no action is taken. The channel 16 register is assumed when the simulator begins. The only holding register that is affected by the holding register and cycle commands is the one currently displayed.

STOP.

End simulator processing.

# **580 PROGRAMMABLE FORMAT CONTROL**

You control the spacing and format on 580 line printers by using carriage control format tapes or programmable format control. The carriage control format tape is punched to indicate particular format channels for each frame. A printer with programmable format control does not use carriage control format tapes; instead, it contains a microprocessor plus memory. Programmable format control arrays are loaded into this memory, performing the same function as the format tape. This appendix describes how to create and load programmable format control arrays. A description of format tapes is included in the NOS 2 Reference Set, Volume 3.

Certain 580 printers are not equipped with a carriage control tape; instead, a microprocessor plus memory called programmable format control is used. Instead of a tape controlling the page format, software is used. This software is called a programmable format control array. A programmable format control array consists of numbers from 0 to 12 and 178. Each nonzero character represents a channel. A 0 (zero) specifies that no channel is selected. An array is similar to a format tape since each number in a programmable format control array corresponds to a line on the print form. As each line of a page is printed, the next number in the programmable format control array buffer is addressed. A carriage control character in column 1 of the output line, indicating a skip to a particular channel, causes the memory in the programmable format control array buffer to be sequentially addressed until the particular number is found. The paper is spaced a similar number of spaces.

A programmable format control array differs from a format tape because only one channel can be specified per line. A number of channels can be specified per line using a format tape. Also, programmable format control arrays are accessed in pairs, one for 6 lines per inch (lpi) printing and one for 8 lpi printing. The 8-lpi array is usually larger, allowing more lines to be printed on the same size page.

# **BUILDING PROGRAMMABLE FORMAT CONTROL ARRAYS**

Observe the following rules when building a programmable format control array.

- Enter only valid numbers (from 0 to 12 and  $17_8$ ) in the programmable format control array.
- A l must be the first number in the programmable format control array, indicating a top-of-form position.
- A 12 should always indicate the last line of the form (bottom of page).
- A 178 should appear as the last number in the array, denoting the end of valid numbers for a given array. This number does not correspond to any particular line on the form.
- Maximum length programmable format control arrays (132 for 6 lpi and 176 or 136 for 8 lpi) must include a 9 only at location 132 for 6 lpi and location 176 or 136 for 8 lpi. Improper paper alignment may occur if a 9 is placed elsewhere.

Ε

To properly load the appropriate programmable format control buffer for a particular form, it is necessary to assemble data that will contain, when transmitted and stored in the programmable format control array buffer, as many numbers as lines on the form. As stored within the programmable format control array buffer, each number is a 4-bit code used to represent channels (1 through 12) or a null code (no channel selected).

# NOTE

Channels 13 and 14 are valid channels but they are not selectable. No programmable format control error occurs when loading these numbers into the programmable format control buffer.

The maximum capacity of the 6-lpi programmable format control buffer is 132 numbers (22-inch form maximum) plus the last line number whereas the 8-lpi programmable format control buffer has a capacity of 176 or 136 numbers (22-inch or 17-inch form maximum) plus the last line number. Fewer than the maximum amount of numbers may be legally loaded into the programmable format control buffer, but an excessive amount of numbers will cause a programmable format control overflow error.

# ADDING PROGRAMMABLE FORMAT CONTROL ARRAYS

Programmable format control arrays must occur in pairs (one 6-lpi array and one 8-lpi array); therefore, when a particular array is specified with the SC option of the ROUTE command, it is possible to switch from 6- to 8-lpi spacing except when using 8.5-inch forms, which are always printed at 8-lpi spacing. Four pairs of arrays are provided with the operating system, two pairs of arrays for 11-inch forms and two pairs of arrays for 8.5-inch forms (refer to table E-1). The numbers are omitted for 6-lpi 8.5-inch forms because this combination is not selectable.

To add additional programmable format control arrays, BIO must be modified to contain these additional arrays as overlays in QAP. The overlay names and corresponding ROUTE command SC parameter options must be added to PFCO, and the programmable format control overlay table in QAP. The first entry in this table specifies the default programmable control format array. This array is used when the SC parameter is not specified. If an added array is to be the default array, the PFCO entry for it should be placed at the beginning of the table. The value that must be specified with the SC parameter is included in this entry. This value can be any 6-bit binary value. The arrays that are also added to QAP must follow the same format, structure, and labeling conventions as the arrays already provided in QAP. To generate the numbers to be loaded into the programmable format control buffer, the DPFC (define programmable format control code) macro is used with the following format. Only the lower 4 bits of each 6 bits are used as programmable format control numbers.

| Location | Operation | Variable |
|----------|-----------|----------|
|          | DPFC      | a,b,c,d  |

# Variable

Description

a, b, c, d Programmable format control numbers for 6 or 8 lpi. These numbers can be any value from 0 to 12 and 178.

# NOTE

In each macro call, all four parameters must be specified (0 denotes no channel is selected). If all four are not required to complete an array (the number of lines on the form is not a multiple of 4), zeros should be used for the remaining parameters.

|          | Defa                   | lpi<br>ault † |          | nate ††  | Def    | lpi<br>ault | Alte    | lpi<br>rnate  |
|----------|------------------------|---------------|----------|----------|--------|-------------|---------|---------------|
| Location |                        | Length        |          | Leng th  |        | Length      |         | Length        |
|          | ll in.                 | 8.5 in.       | ll in.   | 8.5 in.  | ll in. | 8.5 in.     | 11 in.  | 8.5 in.       |
| 1        | 1                      |               | 1        |          | 1      | 1           | 1       | 1             |
| 2        | 6                      |               | 6        |          | 6      | 6           | 6       | 6             |
| 34       | 0<br>2                 |               | 0<br>2   |          | 0<br>0 | 0<br>2      | 0<br>0  | 0             |
| 4<br>5   | 2                      |               | 2<br>0   |          | 2      | 0           | 2       | 0             |
| 6        | 0                      |               | Ő        |          | 0      | Ő           | 0       | Ő             |
| 7        | 3                      |               | 3        |          | 0      | 3           | 0       | 3             |
| 8        | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 9        | 0                      |               | 0        |          | 3      | 0           | 3       | 0             |
| 10       | 4                      |               | 4        |          | 0      | 4           | 0       | 4             |
| 11       | 0                      |               | 0        |          | 0      | 0           | 0       | 0<br>0        |
| 12<br>13 | 0<br>5                 |               | 0<br>5   |          | 0<br>4 | 0<br>5      | 0<br>4  | 5             |
| 13       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 15       | Ő                      |               | Ō        |          | Ő      | Ő           | ŏ       | Ő             |
| 16       | 2                      |               | 7        |          | Ō      | 2           | 0       | 7             |
| 17       | 0                      |               | 0        |          | 5      | 0           | 5       | 0             |
| 18       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 19       | 3                      |               | 8        |          | 0      | 3           | 0       | 8             |
| 20       | 0                      |               | 0        |          | 0      | 0           | 0<br>7  | 0<br>0        |
| 21<br>22 | 0<br>4                 |               | 0<br>10  |          | 2<br>0 | 0<br>4      | 0       | 10            |
| 22       | 4                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 24       | ŏ                      |               | ŏ        |          | ŏ      | Ő           | 0       | Ő             |
| 25       | 5                      |               | 11       |          | 3      | 5           | 8       | 11            |
| 26       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 27       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 28       | 2                      |               | 2        |          | 0      | 2           |         | 2             |
| 29<br>30 | 0<br>0                 |               | 0<br>0   |          | 4<br>0 | 0           | 10<br>0 | 0             |
| 31       | 3                      |               | 3        |          | 0      | 3           | 0<br>0  | 3             |
| 32       | Ő                      |               | Ō        |          | ŏ      | Ō           | ŏ       | Ō             |
| 33       | 0                      |               | 0        |          | 5      | 0           | 11      | 0             |
| 34       | 4                      |               | 4        |          | 0      | 4           | 0       | 4             |
| 35       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 36       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 37<br>38 | 5<br>0                 |               | 5<br>0   |          | 2<br>0 | 5           | 2       | 5<br>0        |
| 38       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 40       | 2                      |               | 7        |          | 0      | 2           | 0       | 7             |
| 41       | ō                      |               | 0<br>0   |          | 3      | ō           | 3       | Ó             |
| 42       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
| 43       | 3                      |               | 8        |          | 0      | 3           | 0       | 8             |
| 44       | 0                      |               | 0        |          | 0      | 0           | 0       | 0             |
|          | t (SC=0)<br>hate (SC=1 |               | <b>.</b> | <b>.</b> | L      |             |         | • • • • • • • |

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| Location | 6 lpi<br>Default † Alternate †† |         | 8 lpi<br>Default |         | 8 lpi<br>Alternate |         |             |         |
|----------|---------------------------------|---------|------------------|---------|--------------------|---------|-------------|---------|
|          | Form 1                          | Length  | Form Length      |         | Form Length        |         | Form Length |         |
|          | ll in.                          | 8.5 in. | ll in.           | 8.5 in. | ll in.             | 8.5 in. | ll in.      | 8.5 in. |
| 45       | 0                               |         | 0                |         | 4                  | 0       | 4           | 0       |
| 46       | 4                               |         | 10               |         | 0                  | 4       | 0           | 10      |
| 47       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 48       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 49       | 5                               |         | 11               |         | 5                  | 5       | 5           | 11      |
| 50       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 51       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 52       | 2                               |         | 2                |         | 0                  | 2       | 0           | 2       |
| 53       | 0                               |         | 0                |         | 2                  | 0       | 7           | 0       |
| 54       | 0                               |         | 0                | · · ·   | 0                  | 0       | 0           | 0       |
| 55       | 3                               |         | 3                |         | 0                  | 3       | 0           | 3       |
| 56       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 57       | 0                               |         | 0                |         | 3                  | 0       | 8           | 0       |
| 58       | 4                               |         | 4                |         | 0                  | 4       | 0           | 4       |
| 59       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 60       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 61       | 5                               |         | 5                |         | 4                  | 5       | 10          | 5       |
| 62       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 63       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 64       | 12                              |         | 12               |         | 0                  | 2       | 0           | 7       |
| 65       | 0                               |         | 0                |         | 5                  | 0       | 11          | 0       |
| 66       | 0                               |         | 0                |         | 0                  | 12      | 0           | 12      |
| 67       | 1                               |         | 1                |         | 0                  | 0       | 0           | 0       |
| 68       | 0                               |         | 0                | ļ       | 0                  | 0       | 0           | 0       |
| 69       | 0                               |         | 0                |         | 2                  | 1       | 2           | 1       |
| 70       | 2                               |         | 2                |         | 0                  | 0       | 0           | 0       |
| 71       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 72       | 0                               |         | 0                |         | 0                  | 2       | 0           | 2       |
| 73       | 3                               |         | 3                |         | 3                  | 0       | 3           | 0       |
| 74       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 75       | 0                               |         | 0                |         | 0                  | 3       | 0           | 3       |
| 76       | 4                               |         | 4                |         | 0                  | 0       | 0           | 0       |
| 77       | 0                               |         | 0                |         | 4                  | 0       | 4           | 0       |
| 78       |                                 |         | 0                |         | 0                  | 4       | 0           | 4       |
| 79       | 0<br>5                          |         | 5                |         | 0                  | 0       | 0           | 0       |
| 80       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 81       | 0                               |         | 0                |         | 5                  | 5       | 5           | 5       |
| 82       | 2                               |         | 7                |         | Ō                  | Ō       | Ō           | Ō       |
| 83       | 0                               |         | 0                |         | 0                  | 0       | 0           | 0       |
| 84       | õ                               |         | Ő                |         | Ő                  | Ő       | Ő           | 7       |
| 85       | 3                               |         | 8                |         | 12                 | Ő       | 12          | 0       |
| 86       | Ō                               |         | Õ                |         | 0                  | Ő       | 0           | ŏ       |
| 87       | Õ                               |         | 0                |         | 0                  | 3       | Õ           | 8       |
| 88       | 4                               |         | 10               |         | Ő                  | 0       | 0<br>0      | 0       |

Table E-1. Released Programmable Format Control Arrays (Sheet 2 of 4)

| T          | Defa                   | lpi<br>ault †     |         | nate ††           | Def    | lpi<br>ault       | Alte                         | lpi<br>rnate    |
|------------|------------------------|-------------------|---------|-------------------|--------|-------------------|------------------------------|-----------------|
| Location   |                        | Length<br>8.5 in. | ll in.  | Length<br>8.5 in. |        | Length<br>8.5 in. | Form Length<br>11 in. 8.5 in |                 |
|            | ll in.                 | 0.J 1n.           | 11 1n.  | 0.J 1n.           | 11 10. | <b>0.</b> 5 11.   | 11 11.                       | <b>0.</b> 5 In. |
| 89         | 0                      |                   | 0       |                   | 1      | 0<br>4            | 1<br>0                       | 0<br>10         |
| 90<br>91   | 0<br>5                 |                   | 0<br>11 |                   | 0      | 4                 | 0                            | 0               |
| 91<br>92   | 0                      |                   | 0       |                   | 0      | 0                 | 0                            | 0               |
| 93         | õ                      |                   | Ő       |                   | 2      | 5                 | 2                            | 11              |
| 94         | 2                      |                   | 2       |                   | 0      | 0                 | 0                            | 0               |
| 95         | 0                      |                   | 0       |                   | 0      | 0                 | 0                            | 0               |
| 96         | 0                      |                   | 0       |                   | 0      | 2                 | 0                            | 2               |
| 97         | 3                      |                   | 3       |                   | 3      | 0                 | 3                            | 0               |
| 98<br>99   | 0                      |                   | 0<br>0  |                   | 0<br>0 | 0<br>3            | 0<br>0                       | 0<br>3          |
| 100        | 4                      |                   | 4       |                   | 0      | 0                 | 0                            | 0               |
| 101        | 0                      |                   | Ō       |                   | 4      | 0                 | 4                            | 0               |
| 102        | Ō                      |                   | 0       |                   | 0      | 4                 | 0                            | 4               |
| 103        | -5                     |                   | 5       |                   | 0      | 0                 | 0                            | 0               |
| 104        | 0                      |                   | 0       |                   | 0      | 0                 | 0                            | 0               |
| 105        | 0                      |                   | 0       |                   | 5      | 5                 | 5                            | 5               |
| 106        | 2                      |                   | 7       |                   | 0      | 0                 | 0                            | 0               |
| 107<br>108 | 0<br>0                 |                   | 0<br>0  |                   | 0<br>0 | 0<br>2            | 0<br>0                       | 0<br>7          |
| 108        | 3                      |                   | 8       |                   | 2      | 0                 | 7                            | 0               |
| 110        | 0                      |                   | 0       |                   | 0      | 0                 | 0                            | 0<br>0          |
| 111        | Õ                      |                   | Ō       |                   | Ő      | 3                 | Ŏ                            | 8               |
| 112        | 4                      |                   | 10      |                   | 0      | 0                 | 0                            | 0               |
| 113        | 0                      |                   | 0       |                   | 3      | 0                 | 8                            | 0               |
| 114        | 0                      |                   | 0       |                   | 0      | 4                 | 0                            | 10              |
| 115        | 5                      |                   | 11      |                   | 0      | 0                 | 0                            | 0               |
| 116<br>117 | 0<br>0                 |                   | 0<br>0  |                   | 0<br>4 | 0<br>5            | 0<br>10                      | 0<br>11         |
| 118        | 2                      |                   | 2       |                   | 0      | 0                 | 0                            | 0               |
| 119        | Ō                      |                   | 0       |                   | Ō      | 0                 | Ō                            | 0               |
| 120        | 0                      |                   | 0       |                   | 0      | 2                 | 0                            | 2               |
| 121        | 3                      |                   | 3       |                   | 5      | 0                 | 11                           | 0               |
| 122        | 0                      |                   | 0       |                   | 0      | 0                 | 0                            | 0               |
| 123        | 0<br>4                 |                   | 0<br>4  |                   | 0      | 3<br>0            | 0                            | 3<br>0          |
| 124<br>125 | 4<br>0                 |                   | 4       |                   | 2      | 0                 | 0<br>2                       | 0               |
| 125        | 0                      |                   | 0       |                   | Ó      | 4                 | 0                            | 4               |
| 127        | 5                      |                   | 5       |                   | 0      | 0                 | ŏ                            | 0               |
| 128        | Ō                      |                   | 0       |                   | Ő      | 0                 | 0<br>0                       | 0               |
| 129        | 0                      |                   | 0       |                   | 3      | 5                 | 3                            | 5               |
| 130        | 12                     |                   | 12      |                   | 0      | 0                 | 0                            | 0               |
| 131<br>132 | 0<br>9                 |                   | 09      |                   | 0      | 02                | 0<br>0                       | 0<br>7          |
|            |                        |                   | L       |                   |        |                   |                              | ,               |
|            | t (SC=0).<br>ate (SC=1 |                   |         |                   |        |                   |                              |                 |

Table E-1. Released Programmable Format Control Arrays (Sheet 3 of 4)

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| Location   | Defa                   | lpi<br>ault†<br>Length |   | pi<br>nate ††<br>Length | Defa   | lpi<br>ault<br>Length | Alte     | lpi<br>rnate<br>Length |
|------------|------------------------|------------------------|---|-------------------------|--------|-----------------------|----------|------------------------|
| Deation    |                        | 8.5 in.                |   | 8.5 in.                 |        | 8.5 in.               |          | 8.5 in.                |
| 1.00       |                        |                        |   |                         |        |                       |          |                        |
| 133<br>134 | 17 <sub>8</sub>        | 178                    |   |                         | 4<br>0 | 0<br>12               | 4<br>0   | 0<br>12                |
| 135        |                        |                        |   |                         | Õ      | 0                     | 0        | 0                      |
| 136        |                        |                        |   |                         | 0      | 9                     | 0        | 9                      |
| 137        |                        |                        |   |                         | 5      | 17 <sub>8</sub>       | 5        | 17 <sub>8</sub>        |
| 138        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 139        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 140<br>141 |                        |                        |   |                         | 0<br>2 |                       | 0<br>7   |                        |
| 141        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 142        |                        | 1                      |   |                         | 0      |                       | 0        |                        |
| 144        |                        |                        | · |                         | ŏ      |                       | Ő        |                        |
| 145        |                        |                        |   |                         | 3      |                       | 8        |                        |
| 146        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 147        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 148        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 149<br>150 |                        |                        |   |                         | 4<br>0 |                       | 10<br>0  |                        |
| 150        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 152        |                        |                        |   |                         | ŏ      |                       | ŏ        |                        |
| 153        |                        |                        |   |                         | 5      |                       | 11       |                        |
| 154        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 155        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 156        | :                      |                        |   |                         | 0      |                       | 0        |                        |
| 157<br>158 |                        |                        |   |                         | 2<br>0 |                       | 2<br>0   |                        |
| 158        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 160        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 161        |                        |                        |   |                         | 3      |                       | 3        |                        |
| 162        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 163        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 164        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 165        |                        |                        |   |                         | 4      |                       | 4        |                        |
| 166<br>167 |                        |                        |   |                         | 0<br>0 |                       | 0<br>0   |                        |
| 168        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 169        |                        |                        |   |                         | 5      |                       | 5        |                        |
| 170        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 171        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 172        |                        |                        |   |                         | 0      |                       | 0        |                        |
| 173<br>174 |                        |                        |   |                         | 12     |                       | 12       |                        |
| 174        |                        |                        |   |                         | 0<br>0 |                       | 0<br>0   |                        |
| 175        |                        |                        |   |                         | 9      |                       | 9        |                        |
| 177        |                        |                        |   |                         | 178    |                       | 178      |                        |
| }L         | t (SC=0).<br>ate (SC=1 |                        | L |                         | 0      |                       | <u> </u> |                        |

| Table E-1. | Released | Programmable | Format | Control | Arrays | (Sheet | 4 of | 4) |
|------------|----------|--------------|--------|---------|--------|--------|------|----|
|------------|----------|--------------|--------|---------|--------|--------|------|----|

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# 881/883 PACK REFORMATTING UTILITY

Each 881 disk pack used in the 844 disk contains factory-recorded flawing information on cylinder 6328 (410), track 0, sectors 0, 1, and 2. Each 883 pack contains this information on cylinder 14668 (822), track 0, sectors 0, 1, and 2. The following information is included on the cylinders.

- Cylinder 6328 (or 14668 for 883 packs), track 0, sector 0 contains the factory-recorded manufacturing data. This data consists of the pack serial number and the manufacturing date.
- Cylinder 6328 (or 14668), track 0, sector 1 contains the factory map. This map contains a list of all factory-detected flaws, both correctable and uncorrectable.
- Cylinder 6328 (or 14668), track 0, sector 2 contains the utility map. This map originally contains all factory-detected uncorrectable flaws. This map is updated by the reformatting utility.

FORMAT is a CPU program that operates in conjunction with FDP, a PP program, to maintain and reformat 881/883 disk packs. It is used to perform the following functions.

- Factory-recorded manufacturing data, factory-recorded flaw data, and utility flaw data can be retrieved from a factory-formatted disk pack.
- Sector and track flaws can be set or cleared on a factory-formatted disk pack.
- Address fields of a previously factory-formatted disk pack can be restored. (This function is used only in the event that addresses on the pack are lost.)

In order to function, FORMAT requires that the factory-recorded data [sectors 0 and 1 of cylinder 632g (or 1466g)] be correct and readable. The pack cannot be processed if this data is unreadable. If packs are available that do not contain this factory-recorded information, consult a customer engineer to have this information placed on the packs. Also, the correct level of controlware must be present in order for FORMAT to function. To determine the controlware level and for procedures to install this controlware, refer to the NOS 2 Installation Handbook. Since the operating system requires that the utility map contain the physical flaw information in order for automatic logical flawing to be performed, it is important that the utility map be properly maintained.

The operating system automatically sets logical flaws when initializing 844 equipment. This is done by reading the utility map of the 844 units involved, and mapping this physical flaw information into the corresponding logical track addresses. Logical track flaw reservations are then made in the track reservation table (TRT) for the 844 equipment being installed. For example, if the 844 equipment being initialized consists of two physical units (such as a DI-2 configuration), the logical flaws set in the TRT are obtained from the physical flaw information recorded in the utility maps of both units making up the DI-2 configuration. This automatic flawing occurs when an equipment is initialized, regardless of whether the initialization is done during deadstart, online, or is the result of running FORMAT. Automatic flawing also occurs when an X.FLAW request is made from the console.

F

The operating system allows for setting and clearing flaw information. The SLF and CLF APRDECK entries set or clear logical track reservations in the TRT of the equipment. (Refer to section 3, Deadstart Decks, for information concerning these entries.) If the device is then checkpointed, this flaw information is preserved in the TRT portion of the device label. The SLF entry can be made<sup>A</sup>during deadstart, during online initialization, or by using the FLAW utility (as described in section 8, K-Display Utilities). In any case, the flawing done via these entries is only logical; the flaw information remains only in the TRT and is discarded on subsequent deadstart initialization. This information is also lost during online initializations if it was not possible to recover the equipment. Using SLF does not cause any additional information to be recorded in the utility map; only FORMAT is capable of updating the utility map data. Caution should be used if attempts are made to cancel a logical flaw that was made during automatic flawing, since the physical disk sector is still marked as flawed and attempts to access that sector yield error conditions.

The use of the FORMAT utility for maintaining and reformatting 881/883 disk packs is described next.

# FORMAT COMMAND

Processing maintenance operations on an 881/883 type disk pack is initiated by the FORMAT command. This program interfaces with you as required. The format of this command is:

FORMAT,  $p_1, p_2, \ldots, p_n$ .

Each  $p_i$  is a keyword or a keyword equated to a value.

| P <sub>i</sub> |                 | Description                                                                                                                                                                                               |  |  |  |  |
|----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| G=m            | validity within | of a multispindle device. This value is checked for<br>n the device. For example, if the device is a DI-2 and<br>ed, an error results.                                                                    |  |  |  |  |
| I=infile       | File on which : | input directives and data are written.                                                                                                                                                                    |  |  |  |  |
| I              | Same as I=INPU  | ſ.                                                                                                                                                                                                        |  |  |  |  |
| L=outfile      | -               | which the information extracted from the disk pack is (Refer to Output Formats later in this appendix.)                                                                                                   |  |  |  |  |
| L              | Same as L=OUTPU | JT.                                                                                                                                                                                                       |  |  |  |  |
| MODE = mod e   | Operational mod | Operational mode for FORMAT.                                                                                                                                                                              |  |  |  |  |
|                | mode            | Description                                                                                                                                                                                               |  |  |  |  |
|                | ALTER           | The input file contains directives to control the set<br>or clear flaw operations (refer to Input Formats<br>later in this appendix).                                                                     |  |  |  |  |
|                | FETCH           | The factory-recorded flawing information contained on<br>cylinder 6328 (or 14668), track 0, sectors 0, 1,<br>and 2 is obtained and copied to the output file (and<br>optional output file, if available). |  |  |  |  |
|                | RESTORE         | The addresses, flawed sectors, and tracks are<br>restored according to information given in the<br>utility flaw map. If the utility flaw map is not<br>intact, the program aborts.                        |  |  |  |  |

I

#### Description

MODE

Same as MODE=FETCH.

0=filename

P<sub>i</sub>

Optional output file to contain the output extracted from the disk pack.

# NOTE

If output files other than OUTPUT or optional output files are specified, they should be created prior to the initiation of FORMAT. If they are not, they are destroyed upon completion of FORMAT processing.

P=serialnumber Pack serial number in decimal of the pack to be processed. If serialnumber does not match the serial number recorded on the disk pack at the factory, processing does not occur. Ρ

Same as P=0.

U=est EST ordinal of the 844 drive on which the disk pack is mounted. The unit is checked to ensure that it is available for formatting (refer to Accessing Disk Devices later in this appendix).

V Specifies that the utility is to verify the addresses recorded on the disk pack. This parameter is valid only if MODE=FETCH or MODE=RESTORE is specified.

If all default values are used, the following call is made.

FORMAT, I=INPUT, L=OUTPUT, MODE=FETCH, P=0.

At least the U and the P parameter must be correctly specified to initiate processing.

# INPUT FORMATS

Input to FORMAT consists of control directives and data statements. Control directives specify the type of operation to be performed. Data statements specify locations on the pack where the operations are to be performed. A number of data statements may follow each control directive. Control directives and data statements are contained on the input file. This file is accessed only when MODE=ALTER has been specified on the FORMAT command. The input file (and therefore, control directives and data statements) has no significance when MODE=FETCH or MODE=RESTORE is specified.

# **CONTROL DIRECTIVES**

Control directives begin in column 1. The format is:

directive

The following are acceptable directives.

| Directive | Description                                                                                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| SET       | Declares that the following data statements contain the addresses of flaws to be set and entered in the utility flaw map.       |
| CLEAR     | Declares that the following data statements contain the addresses of flaws to be cleared and deleted from the utility flaw map. |
| FINIS     | Declares the end of the input. No information following this directive is processed. This directive is optional.                |

SET and CLEAR directives may be intermixed in the input file. However, all CLEAR operations are performed before any SET operation. Any attempt to alter the factory map or to set or clear sector flaws in a previously flawed track results in an error.

# DATA STATEMENTS

Data statements begin in column 1. The format is:

x,cccc,tt,ss

Parameter Description Type of flaw to be set or cleared. Acceptable values are: х Description x S Specifies that the SET or CLEAR directive applies to a sector. т Specifies that the SET or CLEAR directive applies to a track. cccc Octal number specifying the cylinder; from 0 to 6328 (or 14668 for 883 packs). Octal number specifying the track; from 0 to 228. tt Octal number specifying the sector; from 0 to 278. This field is ss ignored for track flaws (x=T).

All input data is checked to ensure that the values are within range. Any errors in input result in the termination of the utility before the disk is accessed. Any attempt to alter the factory map, or to set or clear sector flaws in a previously flawed track results in an error.

A maximum of 157 data statements can appear in the input stream.

1

### **OUTPUT FORMATS**

Output generated by FORMAT is placed on the output file (L=filename on the FORMAT command). This file, for all modes of operation (ALTER, FETCH, and RESTORE), contains:

- A listing of the input stream, if any.
- The pack serial number and date of factory formatting on cylinder 6328 (or 14668), track 0, sector 0.
- A listing of the factory flaw map contained on cylinder 6328 (or 14668), track 0, sector 1.
- A listing of the utility flaw map contained on cylinder 6328 (or 14668), track 0, sector 2.
- A listing of the utility flaw map following any changes resulting from SET or CLEAR directives. This listing appears only when MODE=ALTER is specified on the FORMAT command.
- A listing of the flawed sectors and tracks as read from the disk during address verification. This listing appears only when MODE=FETCH or MODE=RESTORE, and the V parameter are specified on the FORMAT command.

The output generated by FORMAT can be directed to an optional output file (O=filename). This file can then be used as input to another program, or it can be punched or printed.

e.

The following three examples of standard output illustrate a series of reformatting operations performed on the same pack.

Example 1:

A RESTORE operation is performed on an 881 pack. A command similar to the following was entered.

FORMAT,U=est,P=819545,MODE=RESTORE.

Figure F-1 illustrates the resulting output.

DISK PACK REFORMATTING UTILITY -VERSION 1.1 - 82/01/25. MODE = RESTORE DISK PACK SERIAL NUMBER 819545 DATE OF ORIGINAL FACTORY FORMATTING 74/04/30 FACTORY FLAW MAP (C=CORRECTABLE ERROR,S=SECTOR FLAW,T=TRACK FLAW) S,632,00,00 S,632,00,01 S,632,00,02 T,302,16,00 T,362,01,00 T,373, 21, 00 s,626, 15, 15 UTILITY FLAW MAP (S=SECTOR FLAW, T=TRACK FLAW) MAP EMPTY PACK FORMATTING COMPLETE, VERIFICATION FOLLOWS S,632, 00, 00 S,632, 00, 02 S,632, 00, 01 ADDRESS VERIFICATION COMPLETE

Figure F-1. FORMAT Output, MODE=RESTORE

1

Example 2:

The flaws noted in the factory flaw map from example 1 (refer to figure F-1) are now set in the utility flaw map.

Input similar to the following was entered.

```
FORMAT,U=est,P=819545,MODE=ALTER.
--EOR--
SET
S,626,15,15
T,302,16,0
T,362,01,00
T,373,21,00
FINIS
--EOI--
```

Figure F-2 illustrates the resulting output.

```
DISK PACK REFORMATTING UTILITY
                                                     -VERSION 1.1 -
                                                                            82/01/25.
MODE = ALTER
INPUT DATA
SET
S,626, 15, 15
T,302, 16, 00
T,362, 01, 00
T,373, 21, 00
FINIS
                 DISK PACK SERIAL NUMBER
                  819545
                DATE OF ORIGINAL FACTORY FORMATTING
                  74/04/30
                 FACTORY FLAW MAP
                 (C=CORRECTABLE ERROR, S=SECTOR FLAW, T=TRACK FLAW)
                $,632, 00, 00
                $,632, 00, 01
                $,632, 00, 02
                T,302, 16, 00
                T,362, 01, 00
                T,373, 21, 00
                S,626, 15, 15
                UTILITY FLAW MAP
                (S=SECTOR FLAW, T=TRACK FLAW)
                MAP EMPTY
                UTILITY FLAW MAP
                                       (ALTERED)
                (S=SECTOR FLAW, T=TRACK FLAW)
                S,626, 15, 15
                T,302, 16, 00
                T,362, 01, 00
                T,373, 21, 00
```

Example 3:

A FETCH with verification operation is performed to ensure proper reformatting. A command similar to the following was entered.

FORMAT, U=est, P=819545, MODE=FETCH, V.

Figure F-3 illustrates the resulting output.

-VERSION 1.1 -82/01/25. DISK PACK REFORMATTING UTILITY MODE = FETCHDISK PACK SERIAL NUMBER 819545 DATE OF ORIGINAL FACTORY FORMATTING 74/04/30 FACTORY FLAW MAP (C=CORRECTABLE ERROR, S=SECTOR FLAW, T=TRACK FLAW) S,632,00,00 S,632,00,01 S,632,00,02 T,302,16,00 T,362, 01, 00 T,373, 21, 00 S,626, 15, 15 UTILITY FLAW MAP (S=SECTOR FLAW, T=TRACK FLAW) S,626, 15, 15 T,302, 16, 00 T,362, 01, 00 T,373, 21, 00 ADDRESS VERIFICATION FOLLOWS T,302, 16, 00 т,362, 01, 00 T,373, 21, 00 S,626, 15, 15 S,632, 00, 00 \$,632,00,02 \$,632,00,01 ADDRESS VERIFICATION COMPLETE

Figure F-3. FORMAT Output, MODE=FETCH

# **ACCESSING DISK DEVICES**

Special procedures must be used to access the 844 drive used in the reformatting utility. Since certain FORMAT operations (ALTER and RESTORE) can change addresses on the pack, user access to the pack must be restricted.

FORMAT can operate on the pack as follows.

- A read operation (FETCH) obtains formatting information from the pack. The integrity of the pack is maintained.
- Read and write operations (ALTER and RESTORE) can set and clear flaws, and addresses can be rewritten. Users cannot place permanent files on the pack when these operations occur. The integrity of the data on the pack is lost, so a full initialization of the pack must occur before system usage occurs.

#### ACCESS FOR READ OPERATIONS

Accessing the pack for read operations requires that you specify the U parameter on the FORMAT command with the correct EST ordinal of the device containing the pack. In this case, the device must be a single-spindle device unless you also specify the G parameter. You must also specify the P parameter with the correct pack serial number.

In addition, FORMAT must be called from one of the following.

- A system origin job (from the console).
- A system privileged job (in this case, engineering mode must have been selected on the system console).

#### ACCESS FOR READ AND WRITE OPERATIONS

In addition to the information specified for read only operations, the following additional steps must be taken to access a device when write operations (ALTER and RESTORE) are to be performed.

- 1. The pack to be accessed should be mounted on a removable disk device.
- 2. One of the following conditions is required.
  - The device should not be a shared device. (Refer to section 13, Multimainframe Operations.)
  - If the device is shared, a global unload should be set.
- 3. The device must be declared logically off. Use the OFF,est DSD command or the OFF parameter in the EQPDECK EQ entry.
- 4. The disk status display (E,M) must show that the device is not in use.
- 5. One of the following conditions is required.
  - The disk status display (E,M) must show that the device is unavailable for permanent file access.
  - The following conditions are required.
    - The full initialize status and the format pending status must be set. Use the DSD command, INITIALIZE, FP, est.
    - The direct access file user count should be equal to zero. The family status display (E,F) gives this information.

If all the necessary conditions are satisfied, FORMAT is able to access the pack for reformatting purposes. FORMAT repeatedly checks to ensure that these conditions are satisfied throughout the FORMAT operation.

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CUT ALONG LINE

