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DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER



Bethesda, Maryland 20084

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COMPUTER CENTER
MASS STORAGE SYSTEM
USER'S GUIDE

by

Stanley E. Willner

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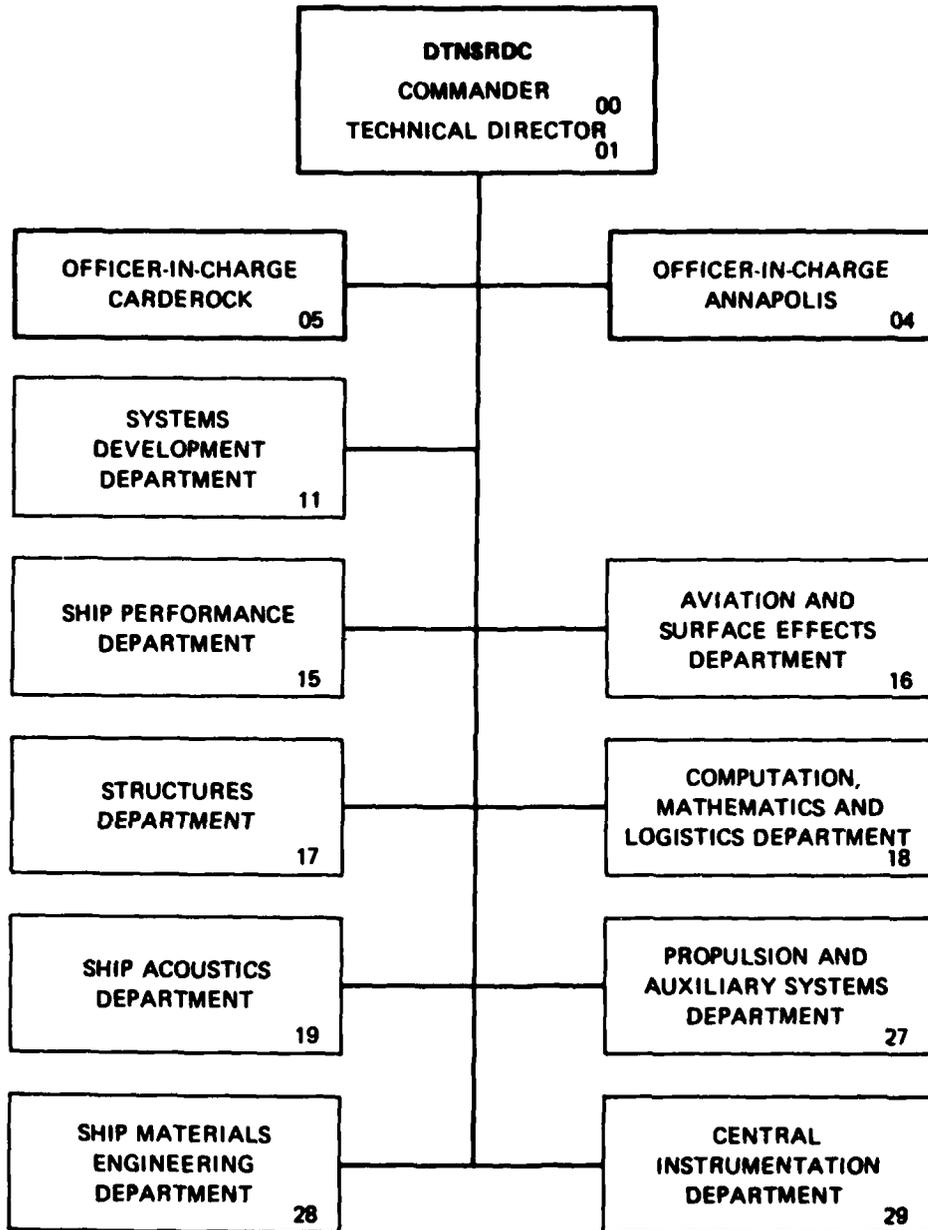
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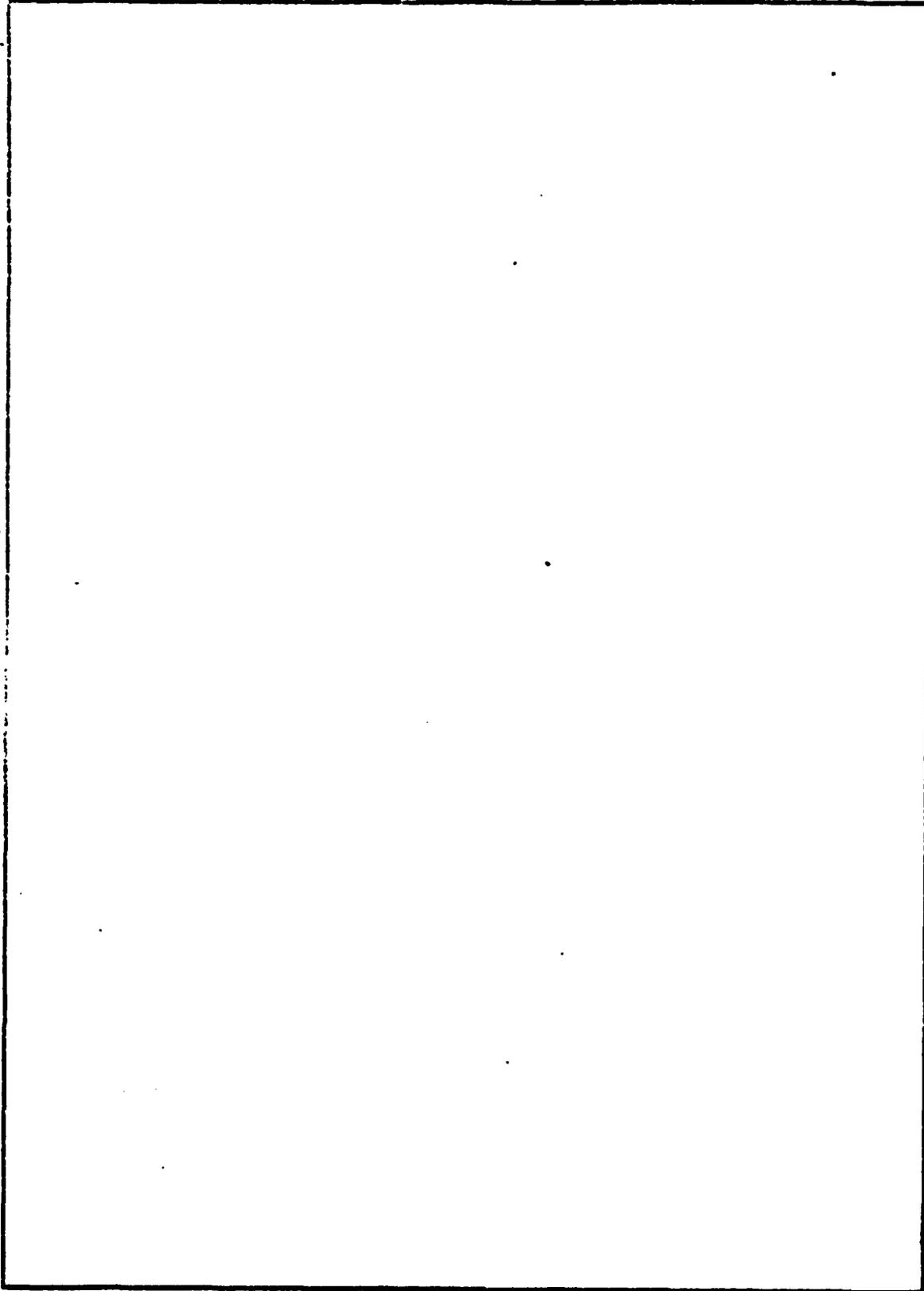
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Computer Center Mass Storage System User's Guide presents an overview, for the User of the CDC NOS/BE Operating System, of the Mass Storage System (MSS) hardware and software. Job control statement syntax and specific examples of job control statements which interface with the MSS are included.			

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OVERVIEW

In January, 1982, the DTNSRDC Computer Center acquired a new hardware and software capability, Control Data Corporation's Mass Storage System (MSS). The MSS hardware, a large capacity on-line mass storage device, is a cost effective extension to the NOS/BE disk file system and an alternative to private packs and conventional magnetic tape storage. Specifically, the MSS offers the Computer Center user community:

- 1- approximately ten times the on-line storage capability of the 6600/6700 and Cyber 74 systems at installation time with additional storage capability expected at a later time.
- 2- on-line access (via INTERCOM) to files that were previously stored on magnetic tape due to size restrictions and/or infrequent use.
- 3- reduced storage charges for these on-line files. Storage charges will depend on file size with large files charged at less than ten percent of the current disk storage rates.

This document describes the MSS hardware and software, introducing the user to eight new NOS/BE job control statements which are used to store, retrieve and remove files from the MSS, control access to MSS files and produce reports on MSS file usage.

MSS HARDWARE AND SOFTWARE CONCEPTS

The MSS consists of a Cyber 170 Model 750 computer system and its associated peripheral equipment - magnetic tape units, disk units and, initially, two Cartridge Storage Units (CSUs) capable of housing 4000 data cartridges. Each cartridge holds up to sixteen streams of data, where a "stream" is approximately equal to 640,000 characters or 1000 PRUS of NOS/BE disk storage. An MSS file is defined as containing one or more data streams, i.e., two files cannot be stored on the same data stream. Hence, the MSS is not a particularly efficient device for storing many small files.

STORING A FILE ON THE MSS

When a NOS/BE user stores a file on the MSS (MSSTORE control statement), the file is copied from the local system (6600, 6700, 6400, Cyber 74) to the MSS disk system. At certain intervals, the MSS system software, considering available disk storage, file sizes and frequency of file access, will copy specific data files to the MSS data cartridges and remove them from its disk system. This operation is transparent to the NOS/BE user who remains unconcerned as to whether his file currently resides on MSS disk or cartridge storage.

RETRIEVING A FILE FROM THE MSS

When a NOS/BE user requests the retrieval of an MSS file (MSFETCH control statement), the file is located either on the MSS disk or data cartridge. If the file resides on a data cartridge, it is first transferred to the MSS disk system, and then copied to the local NOS/BE system. It is important to note that the NOS/BE user is always working with a local copy of an MSS file; i.e., there is no way to directly update an MSS file.

MSS FILE RESIDENCE AND STORAGE CHARGES

As has been noted, at any given time, a user's MSS file may reside on disk or data cartridge storage. The user will, in all cases, be charged as if the file resided on cartridge storage, i.e., "n" dollars per data stream per month (see APPENDIX A for current storage rates). Therefore it will cost as much to store a 100 PRU file on the MSS as it will to store a 700 PRU file.

MSS FILE SECURITY

Access to an MSS file by users other than its owner may be restricted by password and access mode parameters. In addition, before a batch job or INTERCOM session can manipulate files on the MSS, the user must submit his MSS access password.

USER INTERFACE TO THE MSS

The NOS/BE user has, at his disposal, eight job control statements to interface with the MSS. These control statements, which can be executed from within batch jobs or interactively via INTERCOM, are

MSACCES -- gain access to the MSS
 MSPASSU -- change a user's MSS access password
 MSSTORE -- store a file on the MSS
 MSFETCH -- retrieve a copy of an MSS file
 MSPURGE -- remove a file from the MSS
 MSCHANG -- change file attributes of an MSS file
 MSPERMT -- control access to an MSS file
 MSAUDIT -- report on a user's MSS files

In addition, several public-access procedures which combine MSS functions to transfer files between the MSS and the NOS/BE systems and produce sorted MSS audits in various formats are available. Documentation for these procedures may be obtained by executing the following control statement:

```
BEGIN,MSSALL,MSS,<lfn>.      (<lfn> contains printer output)
```

MSS CONTROL STATEMENT PARAMETERS

The following is a description of parameters common to some or all of these control statements. Because the Cyber 170 system, which drives the MSS hardware, will be running under the NOS operating system, several of these parameters have a NOS-like description.

lfn -- NOS/BE local file name (1-7 characters)

pfn -- MSS permanent file name (1-7 alphanumeric characters)

UN=un -- user name. UN is equivalent to the NOS/BE "ID" parameter, however, it is only used when referring to an MSS file in another user's catalog. The file owner need not specify it.

PU=pu -- an optional password (1-7 characters). This password must be specified when retrieving an MSS file in another user's catalog. The file owner need not specify it.

CT=ct -- category type. MSS files fall into three access categories:

P (private) - private files are available for access only by the owner and those to whom the owner has explicitly granted permission (see MSPERMT statement).

S (semi-private) - semi-private files are available for access by all users who know the file name, user name and password and who have not been explicitly denied access by the owner (see MSPERMT statement). Each access to such a file by another user is logged in the file owner's catalog and this information is available to the owner via the MSAUDIT statement.

PU (public) - public files are available for access by all users who know the file name, user name and password.

M=n -- permission mode.

R - read only permission

W - read, write and purge permission. NOTE: Since the NOS/BE user is only gaining access to a copy of the MSS file, the only difference between storing a file with M=R and M=W is in regard to purge permission. The local copy of the MSS file on the NOS/BE system can be read, written, executed, CATALOGed, etc.

N - null permission - used only by MSPERMT to deny permission previously granted.

AC=ac -- account number - a ten character job order number. If omitted, the job order number will be taken from the user's job or interactive session.

MSACCES CONTROL STATEMENT**MSACCES(password)**

Each user has an MSS access password which must be submitted from a batch job or INTERCOM session before any access to the MSS is permitted. The password is a four to seven character alphanumeric string. The first character must be alphabetic. At installation time, each user's password is identical to his four-character user-id.

MSPASSW CONTROL STATEMENT**MSPASSW(oldpw,newpw)**

A user's MSS access password may be changed by this command. It is recommended that all users change their password prior to storing files on the MSS.

MSSTORE CONTROL STATEMENT**MSSTORE(lfn,pfn,PW=pw,CT=ct,M=m,AC=ac,NA=na)**

The NOS/BE local file "lfn" is stored on the MSS as permanent file name "pfn". If "pfn" is omitted, then pfn=lfn. Note that there is no UN parameter for this statement. A user may only store MSS files in his own catalog.

NA=na -- overwrite option. If NA=0, a new MSS file will not be stored if one of the same name already exists. If NA=1, the old copy of an MSS file will be removed and the new one stored.

Defaults

PW - none
 CT - P
 M - R
 NA - 0

Examples of MSSTORE**MSSTORE(F,MYFILE)**

A copy of local file F is stored on the MSS as file MYFILE in the user's catalog. This file may only be accessed by the owner unless explicit file access permission is given to other users via MSPERMT.

MSSTORE(F,MYFILE,CT=PU,PW=SAH)

MYFILE is stored on the MSS with all users permitted access providing they know its password. This file may be removed (MSPURGE) from the MSS only by its owner (M=R by default).

MSFETCH CONTROL STATEMENT

MSFETCH(lfn,pfn,UN=un,PW=pw)

A copy of the MSS file "pfn" is sent to the NOS/BE user as local file "lfn". If "lfn" is omitted, then lfn=pfn. UN and PW are required only if the request is for a file belonging to another user.

Examples of MSFETCH

MSFETCH(F,MYFILE)

MSFETCH(F,HISFILE,UN=XXXX,PW=SAH)

**ATTACH,A,MYFILE,ID=XXXX.
EXIT,U.
IFE,FILE(A,.NOT.PF),L1.
MSFETCH,A,MYFILE.
ENDIF,L1.**

In this last example, the job need not know whether MYFILE exists on NOS/BE permanent file storage or on the MSS. This control statement sequence might be employed by a user who on occasion, anticipating many accesses to his MSS file, brings the file back to NOS/BE permanent file storage so as to avoid transferring his file from the MSS to the local system over and over again.

NOTE: Overall system performance and NOS/BE disk storage availability will be greatly diminished by the occurrence of many jobs which simultaneously bring the same, large MSS file back to the local system.

MSPURGE CONTROL STATEMENT

MSPURGE(pfn,UN=un,PW=pw)

The file "pfn" is removed from the MSS. UN and PW are required only when removing a file in another user's catalog. To do so, the file must have been created (MSSTORE) with M=U.

Examples of MSPURGE

MSPURGE(MYFILE)

MSPURGE(HISFILE,UN=XXXX,PW=SAH)

MSCHANG CONTROL STATEMENT

```
MSCHANG(newpfn=oldpfn,CT=ct,M=m,PU=pw,AC=ac)
```

The MSS file "oldpfn" is renamed "newpfn" and optionally, other file attributes are changed. To simply alter file attributes without changing the file name, the syntax would be

```
MSCHANG(pfn,CT=ct,M=m,PU=pw,AC=ac)
```

To remove the password of an MSS file, PU=0 must be specified.

Examples of MSCHANG

```
MSCHANG(MYFILE=MIFILE)
```

The MSS file is renamed. All file attributes remain unchanged.

```
MSCHANG(MYFILE,CT=PU,M=R)
```

MSS file MYFILE is made a public access file, although purge permission is restricted to its owner.

MSPERMT CONTROL STATEMENT

```
MSPERMT(pfn,UN=un,M=m)
```

Ordinarily, private files (CT=P) may be accessed only by their owner. A public or semi-private file (CT=PU or S) may be accessed by any user knowing its password. The MSPERMT statement is used to grant access to a private file to another user (M=R or M=W). It can also be used to rescind this permission or to deny access to a semi-private file to a particular user (M=N);

Defaults

M - R

Examples of MSPERMT

```
MSPERMT(MYFILE,UN=YYYY)
```

User YYYY may now access MYFILE. Purge permission is restricted to its owner.

```
MSPERMT(MYFILE,UN=YYYY,M=N)
```

Access to MYFILE, previously granted to user YYYY, is rescinded.

MSAUDIT CONTROL STATEMENT

MSAUDIT(L0=lo,PF=pfn,UN=un,LF=lfm)

Information pertaining to a user's MSS files is returned to the NOS/BE user.

L0=lo -- listing option. Choices are

F - an alphabetical listing of a user's MSS files is returned, along with selected file attributes. If an MSAUDIT is requested for files in another user's catalog (UN=un), only information pertinent to those files accessible to the requestor is returned.

0 (zero) - same as L0=F except that only file names (no file attributes) are returned.

FP - a summary, for a particular MSS file (PF=pfn is required), of file accesses by alternate users is generated.

P - same as L0=FP except that only the names of users who have access to the particular file is returned.

PF=pfn -- specified if file information is desired only for a particular file. This parameter is required if L0=P or FP.

UN=un -- specified when information is desired for files in another user's catalog. See L0 option.

LF=lfm -- NOS/BE local file which will contain MSAUDIT output.

Defaults

L0 - 0 (zero)

LF - OUTPUT

Examples of MSAUDIT

MSAUDIT(L0=F)

A full audit of the user's MSS files is returned.

MSAUDIT(L0=FP,PF=MYFILE)

A summary of file access information for MYFILE is returned.

SIMULTANEOUS USE OF AN MSS FILE BY MORE THAN ONE JOB

The NOS/BE permanent file system provides a means of handling requests for simultaneous access to a given file by more than one job or interactive user. By using the MR parameter on the ATTACH statement, many jobs can simultaneously access a NOS/BE permanent file in "read only" mode. A user requesting exclusive access (write permission) must first wait until the file is free. Then, after getting the file, he will cause all other jobs wanting the file to wait until he has returned the file to the system. To effect the same kind of file access control for MSS files is not straightforward.

Unlike a NOS/BE ATTACH, which simply "~~points~~" a user to the beginning of a permanent file, an MSFETCH returns to the user his own copy of an MSS file. This presents a potential problem in that there is no real protection against two user jobs "updating" the same MSS file simultaneously. Although a NOS/BE job cannot really "update" an MSS file, consider a user with two jobs having the same sequence of control statements, submitted seconds apart:

```
MSFETCH,A,MYFILE.      (get a copy of MYFILE)
LGO.                   (a program which "updates" lfn A)
MSSTORE,A,MYFILE,NA=1. (overwrite MYFILE with a new version)
```

Job 1 will get a copy of MYFILE and proceed to modify its contents locally. Job 2, which is not prevented from accessing the same MSS file, will do the same. Job 1, having completed its file manipulations, will store an "updated" version of MYFILE on the MSS. Finally, Job 2, having completed its updates, will store a new version of MYFILE on the MSS, a version containing its updates but not those of Job 1.

Users interacting with MSS files in this manner must effect exclusive file access on their own. This can be done by bringing the MSS file back to the local system as a NOS/BE permanent file and removing the file from the MSS prior to the update jobs:

```
REQUEST,A,*PF.
MSFETCH,A,MYFILE.
CATALOG,A,MYFILE,ID=XXXX.
MSPURGE,MYFILE.
```

File updates would then be done under the protection of the NOS/BE permanent file system and the file would subsequently be put back on the MSS via the MSSTORE control statement.

APPENDIX A

FY83 MONTHLY COST COMPARISON TABLE - HOST ON-LINE STORAGE VS MSS STORAGE

PRUS	MONTHLY HOST ON-LINE COST *	MONTHLY MSS COST **	SAVINGS (LOSSES)
1	0.05	3.30	(3.25)
66	3.30	3.30	----
100	5.00	3.30	1.70
500	25.00	3.30	21.70
1000	50.00	3.30	46.70
1001	50.05	6.60	43.45
3000	150.00	9.90	140.10
3001	150.05	13.20	136.85
5000	250.00	16.50	233.50
10000	500.00	33.00	467.00

* Host on-line storage is \$0.05 per PRU per month.

** MSS on-line storage is \$3.30 per data stream per month.

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