David Taylor Research Center

Bethesda, Maryland 20084-5000

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Computer & Information Services Department

Departmental Report

COMPUTER CENTER REFERENCE MANUAL, VOLUME 1

David V. Sommer
Sharon E. Good

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CISD-90/01 COMPUTER CENTER REFERENCE MANUAL, VOLUME 1

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The Computer Center in the Computer and Information Services Department of the David Taylor Research Center has installed an Integrated Supercomputer Network. This manual provides an introduction to the Network. Some information has been distilled from many individual documents and augmented to reflect usage at DTRC. Control statement examples and descriptions of hardware and software are included, as is information on moving files among the CDC CYBER 860 (with the Mass Storage System), the DEC VAXcluster, the secure DEC VAX, and the CRAY X-MP, creating and executing batch jobs, and using the interactive systems. Volume 1 describes the Cray X/MP, the Mass Storage System and the DEC VAXes. Volume 2 describes the CDC CYBER 860.

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18 (continued)

Hardware
Interactive
Mass Storage System
Programming
Secure computing
Software Documentation
Supercomputer

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David Taylor Research Center
Bethesda, Maryland 20084-5000

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* Computer Center *
* Reference Manual *
* Volume 1: Cray, MSS, DEC *
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* *
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by
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Sharon E. Good

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Abstract

The Computer Center in the Computer and Information Services Department of the David Taylor Research Center has installed an Integrated Supercomputer Network. This manual provides an introduction to the Network. Some information has been distilled from many individual documents and augmented to reflect usage at DTRC. Control statement examples and descriptions of hardware and software are included, as is information on moving files among the CDC CYBER 860A (with the Mass Storage System), the DEC VAXcluster, the secure DEC VAX, and the CRAY X-MP, creating and executing batch jobs, and using the interactive systems. Volume 1 describes the CRAY X-MP, the Mass Storage System, and the DEC VAXes. Volume 2 describes the CDC CYBER 860A.

Administrative Information

The work described in this report was performed in the Scientific and Engineering Support Branch (3511) of the Computer and Information Services Department, David Taylor Research Center, under the sponsorship of the DTRC Computer Center (351).

***** Introduction *****

The DTRC Integrated Supercomputer Network consists of a CRAY X-MP/216 with five front-end computers: a DEC VAXcluster (two VAX 8550 processors), a secure DEC VAX 6410, a DEC VAX 8250, and a CDC CYBER 180/860. The Cray and VAXcluster can store and retrieve files on the Mass Storage System (MSS), which is part of the CDC CYBER 860.

The following operating systems are in use:

CRAY X-MP	COS	version 1.17.1
	UNICOS	(future)
DEC VAX	VMS	version 5.3-1
CDC CYBER 860	NOS	version 2.7.1
	NOS/VE	version 1.5.1

The front-end computers support both batch processing of jobs submitted at central site, through remote batch terminals or from interactive terminals; and demand processing, which supports a variety of interactive terminals. In addition, batch jobs can be sent to the Cray for processing with the output returned for examination or printing.

This reference manual is divided into two volumes: one covering the CRAY X-MP, the Mass Storage System, and the DEC VAXes; the other covers the CDC CYBER 860. They are designed to provide the new user with enough information to use the Network to run simple batch jobs and to create and run programs and batch jobs interactively. Most of the frequently used control statements are described in detail in the Appendices. Magnetic tapes are discussed briefly. No attempt is made to describe all features of the operating systems or even all parameters of the control statements presented. More information can be found in the publications listed in Appendix E.

Before using the system, job order number(s) to be charged must be registered with Code 3502. Outside users must transfer funds to DTRC before receiving a job order number. Each individual user should have 4-character User Initials assigned (also by Code 3502).

*** Hardware Configuration ***

** CRAY X-MP/216 **

```
DTNET name:       sn417         (UNICOS only, when available)
TCP/IP name:      sn417         (UNICOS only, when available)
Ethernet address: 192.91.138.5  (UNICOS only, when available)
Cray station ID:  C1

    2 X-MP central processing units (over 200 MFLOPS each)
   16M 64-bit words of central memory
    4 model DD-49 disk storage units (4.8 Gbytes)
    2 model DS-41 disk storage units (9.6 Gbytes)
```

** CDC CYBER 180 model 860 **

```
DTNET names:      cdc860, nos
TCP/IP names:     cdc860, nos
Ethernet address: 130.46.1.16
Cray station ID:  N1
                  N_  (UNICOS only, when available)
Network ID:       MFN

    1 CYBER 860A central processing unit (6.3 mips)
   2M 60-bit word memory
   25 peripheral processors
    3 model 895   disk drives
    4 model 679-5 nine-track tape drives (1600/6250 cpi)
    2 model 679-3 nine-track tape drives ( 800/1600 cpi)
    2 model 677-3 seven-track tape drives
    1 model 405   card reader
    1 model 415   card punch
    2 model 585   line printers (1200 lpm, upper/lower case)
    1 model 7990  Mass Storage System (210 Gbytes)
      3 model M861 storage modules
```

** DEC VAXcluster **

VAXcluster nodes: DT3, DT4
DTNET names: dt3, dt4
TCP/IP names: dt3, dt4
Ethernet addresses: 130.46.1.12, .10
Cray station IDs: V3 V4
V_ (UNICOS only, when available)

2 VAX 8550 processors (6 mips each; DT3, DT4) -- each with
48 Mbyte 32-bit words of central memory
2 model SA482 disk storage array (5.0 Gbytes)
6 model RA81 disk drives (7.2 Gbytes)
1 model TA79 nine-track tape drives (1600/6250 cpi)
3 model TU79 nine-track tape drives (1600/6250 cpi)
2 model LP27 impact printers (800 lpm, upper/lower case)

** DEC VAX **

VAX node: DOE *
DTNET name: doe
TCP/IP name: doe
Ethernet addresses: 130.46.1.13

1 VAX 8250 processors (1.2 mips)
16 Mbyte 32-bit words of central memory
4 model RA81 disk drives (1.6 Gbytes)
2 model TU81 nine-track tape drives (1600/6250 cpi)

** DEC Secure VAXcluster **

VAXcluster nodes: DBL07
Cray station IDs: (future)

1 VAX 6410 processors (7 mips)
64 Mbyte 32-bit words of central memory
2 model SA482 disk storage array (5.0 Gbytes)
6 model RA81 disk drives (2.4 Gbytes)
2 model TA78 nine-track tape drives (1600/6250 cpi)
1 model LP27 impact printers (800 lpm, upper/lower case)

---

* DOE is reserved for a special project and is not available for

general use.

** DTNET Dial-in **

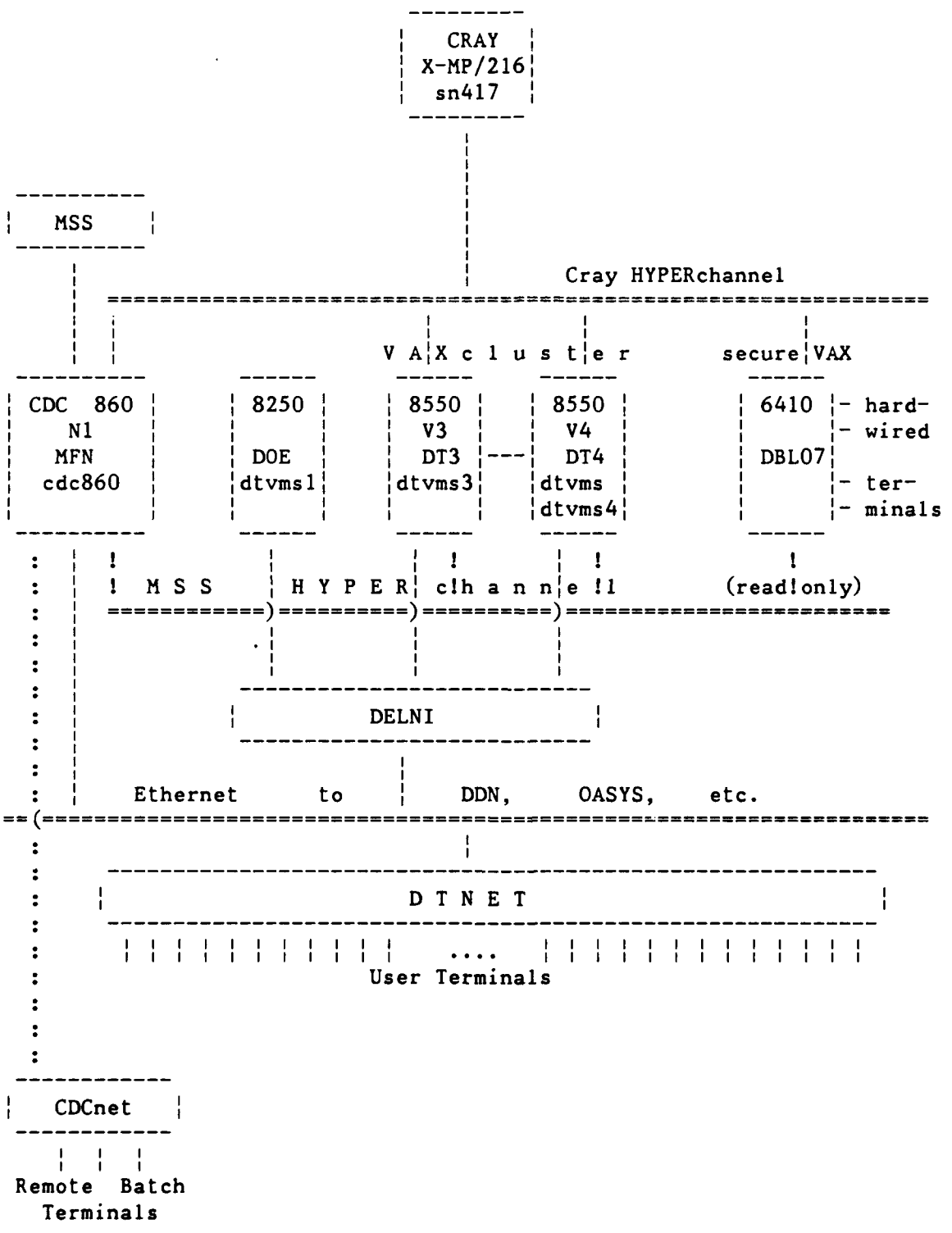
Access to Computer Center computers is via DTNET:

Modem Speed	Carderock	Annapolis	
1200 baud	(301) 227-5200 (32)	(301) 267-2010 (8) x4741 (8)	(within Annapolis site only)
2400 baud	(301) 227-5250 (32)		
9600 baud *	(301) 227-3700 (16)		

---

* While 9600 baud modems support lower speeds, access at a lower speed is not guaranteed.

*** The Integrated Supercomputer Network ***



***** User Interface With the Computer Center *****

*** General Information ***

The ADP Control Centers are located at Central Site at Carderock and Annapolis. You may submit tapes and pick up output from an ADP Control Center.

Computer and Information Systems Department Newsletter is our quarterly publication. The date of the latest on-line news update is printed at the start of each batch job (log) or interactive session. The NEWS command or procedure is used to view the current news file.

*** Registering ***

To register to use Computer Center computers, call our Business Office, Code 3502, at (301) 227-1361/1910. Be prepared to supply

- your name
- your DTRC code or non-DTRC company name and address and telephone
- the job order number(s) to be charged for computer work
- the computers on which you which to be registered
  - CRAY X-MP
  - DEC VAXcluster
  - DEC secure VAX
  - CDC CYBER 860 (NOS or NOS/VE)

Registration for the DEC VAXcluster or CRAY X-MP includes registration for the Mass Storage System (CDC CYBER 860 (NOS)).

You will be given

- User Initials (if you are a new user)
- the initial passwords (which MUST be changed during your first session) for each computer system for which you registered

** Multiple Accounts **

The following is a discussion of multiple accounts: how to log in, how to charge batch jobs, how to change permanent file accounting.

* Cray COS *

Interactive and batch

The account number is supplied by the AC= parameter of the ACCOUNT statement at the start of each batch or interactive session:

```
ACCOUNT,AC=....
```

Permanent files

Files are normally charged to the interactive or batch session's account number. The "ALTACN,AC=ac." statement is used to change the number for future file saves. It remains in effect until another ALTACN statement is encountered, or until end-of-session.

The account number for an existing file can be changed to current session's account number by

```
ACCESS,DN=PROCLIB,OWN=PUBLIC.
LIBRARY,DN=PROCLIB:*.
NEWCHRG,OLD=oldchrgno,ID=id.
```

where ID=id changes only those files with matching ID
ID changes only those files with a null ID
no ID changes all files.

Alternatively, this can be done from a VAXcluster node which connects to the Cray. CNEWCHRG generates and submits a Cray job to make the changes.

```
CNEWCHRG  upw  old_ac  [ new_ac ]  [ id ]
          [ wait ]  [ type ]
```

where upw is your user password
ID=id changes only those files with matching ID
ID changes only those files with a null ID
no ID changes all files
wait is WAIT to wait the the Cray job to complete
type is TYPE to display the generated Cray job

* VAX *

VAX users with more than one account are assigned a username/ password for each account. These usernames differ in the fifth character position, e.g., ABCD, ABCDA, ABCDB. The default login directory for each user is device:[username] where all files owned by the same individual are stored on the same device. For example,

```
U01:[ABCD]
U01:[ABCDA]
U01:[ABCDB]
```

The "usernames" belonging to a particular user are members of a VMS "group". By default on the VAXcluster, members of a group have Read and Execute access to all files owned by their fellow group members. User ABCDA wishing to access a file owned by ABCD simply references [ABCD]FILE.EXT .

These access rights can be changed by the SET PROTECTION and SET FILE /ACL commands. In addition, all members of these special "groups" have GRPPRV privilege which, when invoked, gives a member of the group full control, including file creation and deletion, over all files owned by all members of the group. GRPPRV is invoked by

```
$ SET PROCess /PRIVileges=GRPPRV
```

(this would likely be in your LOGIN.COM)

Then to "copy" a file from one account to another, for example from ABCD to ABCDA, user ABCDA would

```
$ COPY  [ABCD]FILE.EXT  []
```

or user ABCD would

```
$ COPY  FILE.EXT  [ABCDA]
```

To simply "move" a file from one account to another, ABCDA would

```
$ RENAME  [ABCD]FILE.EXT  []
$ SET  FILE  /OWNer_uic=ABCDA  -or-
             /OWNer_uic=parent
```

The command MYACcount will indicate the account number of the current session or job, while MYACcount /ALL will provide a list of all user/account pairs in the group.

* CDC NOS *

Interactive — You are normally prompted for the account number for the session when you log in. (See Appendix I: CHVAL,CN.)

Batch — A batch job is charged to the number appearing on the actual (CHARGE,accountno.) or implied (/CHARGE) statement at the start of the job.

Permanent files — Files are normally charged to the interactive or batch session's account number. The CHARGE statement is used to change the number for future file saves. It remains in effect until another CHARGE statement is encountered, or until end-of-session.

The account number for an existing file can be changed to current session's account number by

```
CHANGE,pfn/CP.
```

To change several files, use

```
BEGIN,NEWCHRG,,fn.
```

where fn may have wildcards. To change all files, use

```
BEGIN,NEWCHRG.
```

* Mass Storage System *

The MSS is part of the CDC CYBER 860. The account numbers on files may be changed from the DEC VAXcluster, the CRAY X-MP, or on the 860.

```
From the DEC VAXcluster:    $ HFT  ACCESS  /Password=password
                            $ MSSNewchrg  old_ac  new_ac
                                    ^-- all MSS files with old_ac are
                                        changed

From the CRAY X-MP (COS):   MSACCES,MPW=mss_pw.        <-- may need AC=ac
                            MSCHANG,MDN=mssfile,CP=newacctno.

On the CDC 860 (NOS) :      CHANGE,mfn/CP.

From the CDC 860 (NOS/VE):  MSACCES  mss_pw
                            MSCHANG  mfn  CP=1
```

*** Passwords, Passwords, Everywhere ***

Each computer system has its own password to gain access to it (while CDC NOS has two passwords, the CDC CYBER 860 at DTRC has only one). You MUST change these during your first session on each or you will be denied future access. For security, you are strongly urged to change your access passwords as soon as you can log into each computer. Passwords for all our computers expire in 90 days. For the VAX and CYBER, you must change your password during the session in which you are told it has expired. The new password must differ from the old one. On the VAX, it must differ from all others used during the previous 12 months.

To change your access passwords, use

. Cray COS (password is 4-15 characters, with at least one of the following characters: 0-9, $, %, @)

. on the Cray

```
ACCOUNT,US=username,AC=joborderno,UPW=current_pw,NUPW=new_pw.
```

. from the VAXcluster

```
CSUBMIT /NUPW              <-- use this form if you use CSUBMIT
current_pw                     to submit jobs to the Cray
new_pw
new_pw

   -or-

CNEWPW  current_pw  new_pw  new_pw  ac  wait
                            ^-- use this form if you do not use
                                CSUBMIT
```

See also page 3-1-2.

. DEC VAXcluster (password is 6-12 characters)
DEC secure VAX

```
SET PASSWORD       <-- you will be prompted for your current
                       and new passwords
```

. CDC CYBER 860 / MSS (NOS) (password is 4-7 characters, at least one rumber)

. from the VAXcluster

```
HFT PASSWORD        <-- you will be prompted for your current
                        and new passwords
```

. from the Cray (COS)

```
.SACCES,MPW=mpw.
MSPASSW,OLD=oldpw,NEW=newpw.
```

. on the 860 (NOS)

```
PASSWOR,oldpw,newpw.
```

. from the 860 (NOS/VE)

```
MSACCES  mpw
MSPASSW  oldpw  newpw
```

. CDC CYBER 860 / MSS (NOS/VE) (password is up to 31 alphanumeric characters and underscores, starting with a letter)

Since NOS/VE is reached via NOS, your NOS login password gives you access to NOS/VE. However, to run NOS/VE batch jobs, you must have defined your batch password. To change it,

```
SET_PASSWORD        <-- you will be prompted for your current
                        and new passwords
```

*** Trouble Forms ***

A Trouble Form is used:

1) for refund requests
2) when problems are encountered
3) for suggestions, gripes and complaints.

The Trouble Form should include a succinct description of the problem and include as much documentation (dayfile or log, listings, dumps) as possible. It should be submitted to Code 3511 for processing.

Trouble Forms may be entered directly into the computer from any of the front-ends (VAXcluster, CYBER 860) using the GRIPE command. If supporting documentation (such as listings or dumps) is needed, please send it to Code 3511 (User Services).

*** Refunds ***

Requests for refunds on lost time must be accompanied by output of the run and a Trouble Form, and must be reported within five working days. Decisions on refunds will be made by Code 35.

*** ADP Control Center ***

The ADP Control Center has the following capabilities:

- assign, sell, clean, test and degauss magnetic tapes
- process Calcomp plots, and Xerox and microfiche output
- sell frequently-used terminal paper and ribbons

The following EAM facilities are available off-line at Central Site:

- a small card interpreter
- card punch
- card verifier
- shredder

See Appendix F for Computer Center telephone numbers.

***** Software Available *****

The following table lists the major software products and the computers where they are available. Type "HELP @CCF Software" on the VAXcluster for the latest version of this table.

	DT3/DT4 8550	DBL07 6410	CRAY X-MP	CDC NOS	CDC NOS/VE
ABAQUS	x	-	x	-	-
ACSL	x	-	-	-	-
ALGOL	-	-	-	x	-
APL	x	-	-	x	-
APT	-	-	-	x	-
Basic	x	x	-	x	x
C (CC)	x	-	x	-	-
Calcomp	x	-	x	x	(1)
CDD	x	x	-	-	-
Cobol	x	x	-	x	x
Datatrieve	x	x	-	-	-
DBMS	x	-	-	-	-
DECalc	x	x	-	-	-
DISSPLA	x	-	x	x	-
DYNA3D	-	-	x	-	-
EISPACK	x	-	x	-	(1)
FMS	x	x	-	-	-
Fortran	x	x	x	x	x
FTP	x	-	-	-	-
GPSS	x	-	-	x	-
Hasp	-	-	-	x	-
HOTSPOT	-	-	-	x	-
IMSL	x	-	x	x	x
INGRES	(2)	-	-	-	-
Kermit	x	x	-	x	-
LINPACK	x	-	x	x	(1)
Macsyma	(2)	-	-	-	-
MODE4A/4C (200-UT)	-	-	-	x	-

(1) - coming
(2) - DT4 only

	DT3/DT4 8550	DBL07 6410	CRAY X-MP	CDC NOS	CDC NOS/VE
Nastran	-	-	x	-	-
Pascal	x	x	x	x	x
Patran	x	-	-	-	-
PCA	x	-	-	-	-
Pert Time	-	-	-	x	-
PL/I	x	x	-	-	-
PLOT10	x	-	-	-	-
Proj Mgt (PM)	x	-	-	-	-
RIM	x	-	-	-	-
Simscript	-	-	-	x	-
SPICE	-	-	x	-	-
SPY	-	-	x	-	-
TAURUS	x	-	-	-	-
TELNET	x	(1)	-	-	-
WIN/TCP	x	(1)	-	-	-
XMODEM	-	-	-	x	-

(1) coming

***** Prolog and Epilog Command Files *****

A Prolog or Epilog Command File is a file containing commands which are executed automatically each time an event occurs. Prologs are executed at login, at the start of a batch job, at the invocation of an editor, etc. Each DTRC system has one or more such files. Epilogs are executed at logout, at the termination of an editor or utility. NOS/VE supports epilog files.

*** VAX/VMS Command Files ***

A system-level login file is executed to define global symbols for all users. User file LOGIN.COM, if present, will be executed for each user login or batch job. This procedure file may set up symbols and logical names, establish process name, test whether batch or interactive, or other desired JCL. Type HELP LOGIN.COM_HINTS for suggestions to include in your LOGIN.COM file.

If file EDTINI.EDT exists, it will be executed each time EDT is entered and may be used to define special keys, macros, or other desired Editor commands.

If file EVE$INIT.EVE exists, it will be executed each time EVE is entered and may be used to define special keys, macros, or other desired Editor commands.

*** NOS Command Files ***

A LOGINPR procedure file may be created containing JCL desired for each login or batch job. For instance, after testing for interactive, TRMDEF could be used to set special desired characteristics for your terminal. Execution of this command file is not automatic, but is triggered by a one-time execution of the UPROC command. If your prolog is long, you may wish to include RECOVER processing.

When the FSE editor is entered, the STARTUP procedure from FSEPROC is executed. The system version of this procedure is currently empty. If you wish to define editor directives which are always executed, make a copy of FSEPROC in your files with desired modifications. NOS will then execute your FSEPROC file instead of the system file.

LOGINPR and FSEPROC must be indirect files.

*** NOS/VE Command Files ***

A PROLOG command file may be created containing SCL desired for each login or batch job. For instance, after testing for interactive, CHANGE_TERMINAL_ATTRIBUTES could be used to set special desired characteristics for your terminal.

An EPILOG command file may be created to be executed at each logout or batch job termination.

When EDIT_FILE is entered, the commands in file SCU_EDITOR_PROLOG are executed. For instance, if you know the keypad or have a layout of it, you may wish to put "SET_SCREEN_OPTION MENU_ROWS=0" into this file to use the bottom line(s) of the screen for editing instead of for displaying the keys.

*** Cray Command Files ***

Before the Cray is used from NOS for the first time, and each time the NOS password is changed, CDEFINE should be used to create a CRAYDEF file. This file frees the user from including CYBER user and password information in each Cray JCL file.

If ICF (Cray Interactive Facility) will be used from NOS, a default PLAY file named ICFPROF may be created which will be executed at each ICF activation. It should contain commands such as /PERIOD to eliminate the need to end each Cray command with a period.

More information about VAX/Cray procedures such as CXCOMMANDS.COM will be included later.

***** ANSI Standard Multi-file Tapes *****

ANSI standard multi-file labelled tapes have each data file delimited by HDR1 and EOF1 labels. In the HDR1 label is the set ID field.

*** VAX ***

The set identifier field is set to the VSN when utilities such as COPY are used to write a multi-file reel.

*** NOS ***

The user defines the multi-file set identifier at the first write of the LABEL with the SI parameter. For ease of recall and compatibility with VAX, the VSN is recommended for the SI. All future reads/writes must use the previously-defined set identifier. If a VAX multi-file reel is read on NOS, the SI field must be set to VAX VSN. If FCOPY is used to create a multi-file tape to be read on a VAX, each FCOPY must be followed by WRITEF to properly create the EOF labels.

*** NOS/VE ***

The multi-file set identifier is created by using the FILE_SET_IDENITIFIER parameter on the initial CHANGE_TAPE_LABEL_ATTRIBUTES command. The label for each successive file is entered on additional CHANGE_TAPE_LABEL_ATTRIBUTE commands. File specifications, i.e., minimum/maximum record and block sizes, are defined with the SET_FILE_ATTRIBUTES command.

***** The CRAY X-MP (UNICOS) *****

The CRAY X-MP/216 at DTRC is a powerful, general purpose computer having two central processing units (CPUs) which share files and are linked together. These CPUs share 16 million 64-bit words of memory. Each CPU achieves its extremely high processing rate (over 200 MFLOPS (million floating point operations per second)) using its scalar and vector capabilities.

*** UNICOS Version 5.1 ***

One operating system for the CRAY X-MP at DTRC is the Unix Cray Operating System (UNICOS), version 5.1, which supports both batch and interactive processing. UNICOS is expected to be available at DTRC within the next year.

***** The CRAY X-MP (COS) *****

The CRAY X-MP/216 at DTRC is a powerful, general purpose computer having two central processing units (CPUs) which share files and are linked together. These CPUs share 16 million 64-bit words of memory. Each CPU achieves its extremely high processing rate (over 200 MFLOPS (million floating point operations per second)) using its scalar and vector capabilities.

*** COS Version 1.17.1 ***

The operating system for the CRAY X-MP at DTRC is the Cray Operating System (COS), version 1.17.1, which supports both batch and interactive processing.

*** Accessing the CRAY X-MP ***

Batch jobs are normally submitted from one of the front-ends using: CSUBMIT or CRAY SUBMIT on the VAXcluster, or CSUBMIT on the CDC CYBER 860. They may also be submitted from a running batch or interactive job using the Cray SUBMIT command.

Interactive access is also from one of the front-ends using: CINT (station code version 4.02) on the VAXcluster, or ICF (Interactive Cray Facility) on the CDC CYBER 860 (NOS).

Both modes of access are described later in this chapter.

*** Cray Datasets ***

On the Cray, information is organized by COS into datasets, which may be on disk, memory-resident, or interactive. A dataset contains one or more files and may be temporary (available only to the job that created it) or permanent.

Each dataset has a disposition code to tell COS what to do with it when it is released. The 2-character alphanumeric disposition codes include SC (scratch - default), PR (print), IN (input), and ST (stage to the front end).

Jobs access local datasets, which may be temporary or permanent. Permanent datasets are made local by the ACCESS statement. Front end files are made local by the FETCH statement.

*** Changing your Cray password ***

Your Cray access password may be changed from a batch job or interactively on the Cray, or from a procedure on the VAXcluster which creates and submits a Cray batch job for you.

Via DCL command CSUBMIT:

```
$ CSUBMIT  /NUPW
```

You will be prompted for your old and new passwords and a Cray job will be submitted on your behalf to change your password. The database on the VAXcluster will be updated with your new password.

If you submit jobs using CSUBMIT, use CSUBMIT to change your password. If you use CRAY SUBMIT or CNEWPW to make the change, the database will not be updated until you use CSUBMIT/NUPW.

Batch:

```
$ CRAY SUBMIT mynewpw.job
```

where your file MYNEWPW.JOB contains:

```
JOB,JN=ssss.
ACCOUNT,AC=ac,US=us,UPW=current_pw,NUPW=new_pw.
```

Interactive:

```
$ CINT                    \
Cray Jobname: jobname     > or CINT /JN=jobname /US=username
Cray Username: username /
!ACCOUNT,AC=ac,US=us,UPW=current_pw,NUPW=new_pw.
!^Z                           <-- ctrl-Z
Cint> QUIT
$                             <-- you are back in DCL
```

Via DCL command CNEWPW:

```
$ CNEWPW  current_pw  new_pw  new_pw  [ ac ]  [ wait ]
```

where new_pw is entered twice for verification

ac	is your Cray account number (may be omitted if it is the same as your current VMS login)	
wait	is WAIT	- wait for the job to complete and display the .CPR file
	anything else	- to let the job run on its own (you will have file NUCRPW.CPR when it completes)

This procedure creates and deletes temporary file NUP$W.JOB.

*** Batch Jobs ***

Cray batch jobs are very similar to CDC batch jobs, but with different terminology. A batch job consists of one or more files. The first file is the JCL control statement file. It is followed by source or data files as needed by the JCL file. A typical job consisting of one source and one data file (*) looks like this:

```
JOB,JN=jobname,....
ACCOUNT,AC=job_order_number,US=username,UPW=password.

   <JCL statements>

/EOF                              <-- end-of-file

   <source file>

/EOF                              <-- end-of-file

   <data file>

<eod>                             <-- end-of-data
```

A Cray batch job has at least four datasets:

$CS - the control statement file
(part of $IN, but not accessible to the user)

$IN - the job input dataset. Accessible by its local name, $IN, or as Fortran unit 5.

$OUT - the job output dataset. Accessible by its local name, $OUT, or as Fortran unit 6.

$LOG - a history of the job. Not accessible to the user. $LOG is appended to $OUT when the batch job terminates.

(*) - When executing several programs or one program several times, the /EOF is required only when a program reads until end-of-file. If a program reads a specific number of data records, or has its own pseudo-end-of-file, the /EOF must NOT be present.

** Batch Job Classes **

Batch jobs fall into five service classes: NORMAL, DEFER, BUDGET, PZERO, and SECURE. The US= parameter of the JOB statement specifies the job class (there is no default job class). SECURE jobs may be submitted only from the secure VAX (see below). Type HELP RATES (on the VAX), BEGIN,RATES (on CDC NOS), or RATES (on CDC NOS/VE) for the current rates.

Each class, except SECURE and interactive, is broken into four subclasses determined by the memory requested. The first letter of each subclass is:

S (small)	<= 2 Mwords
M (medium)	<= 8 Mwords
L (large)	<= 12 Mwords
X (extra large)	> 12 Mwords

The subclasses for NORMAL are SNORM, MNORM, LNORM, XNORM; for DEFER: xDEFER; for BUDGET: xBUDGE; and for PZERO: xPZERO. The subclass names appear in the CRAY STATUS display.

The following chart shows for each job class: the maximum number of such jobs to be allowed to execute at the same time. They are listed in order of relative priority, highest priority first.

	maximum # jobs				
job class	IA	S	M	L	X
Interactive	14				
NORMAL		6	4	2	1
DEFER		6	4	2	1
BUDGET		6	4	2	1
PZERO		5	3	1	1
SECURE					

** SECURE Batch Job Class **

Classified processing may be done on the CRAY X-MP by making prior arrangement with Operations. Access to the Cray is available only from a terminal in the secure computer room connected to the secure VAX (node name: DBL07). Batch jobs submitted to the Cray from this terminal must have "US=SECURE" in the job statement; jobs with "US= any_other_class", or with US= omitted, will be rejected. Secure jobs may be submitted at any time but will be executed only during classified time. Secure jobs may access the Mass Storage System in read-only mode.

** From the VAXcluster **

To use the Cray from the VAXcluster, log in to a node which can access the Cray, prepare your Cray batch job using any editor, and submit the job file(s) to the Cray using the CSUBMIT command:

```
$ CSUBMIT filename          -or-     $ CRAY SUBMIT filename
```

or

```
$ CSUBMIT file1,file2,...   -or-     $ CRAY SUBMIT file1,file2,...
```

where filename is a VAXcluster file containing the Cray job
(default file extension: .JOB)

filei is a VAXcluster file containing part of the Cray job
- file1 - the job control statements
- file2 - the next file in the job (perhaps a Fortran source program)
- file3 - the next file in the job (perhaps the data for running the program)

The output will be returned to your file jobname.CPR, where jobname is taken from the job statement of the Cray job (JN parameter).

CSUBMIT remembers your Cray password. It ignores an ACCOUNT statement, if present, and creates one from CSUBMIT qualifiers and your VAXcluster login username and account. CSUBMIT can also change your login password. CRAY SUBMIT requires that there be an ACCOUNT statement in the jobfile.

Files sent to the Cray must not have embedded tabs. See Appendix D: DETAB.

* Killing Batch Jobs *

Cray jobs are identified by their Job Sequence Numbers (jsq). To find the jsq, use

```
$ CRAY  STATUS
   -or-
$ CRAY
CRAY> STATUS
```

To kill a batch job, use

```
$ CRAY  DROP  jsq     <-- terminate executing job with EXIT
                          processing

   -or-

$ CRAY  KILL  jsq     <-- delete a job from the input queue  -or-
                          terminate executing job without EXIT
                           processing  -or-
                          delete the output dataset from the output
                           queue
```

* VAXcluster-to-Cray Examples *

1) `$ CSUBMIT JOB1` -or- `$ CRAY SUBMIT JOB1`

where JOB1.JOB contains:

```
JOB,JN=MYJOB.                                          (1)
ACCOUNT,US=username,UPW=password,AC=account.           (1,4)
CFT.                                                   (1)
SEGLDR,GO.                                             (1)
/EOF
       PROGRAM ADD                                     (2)
       DO 10 I=1,5                                     (2)
          READ (5, *) N1, N2, N3                       (2)
          N = N1 + N2 + N3                             (2)
          WRITE (6, *) N1, N2, N3, N                   (2)
    10 CONTINUE                                        (2)
       END                                             (2)
/EOF
1  2  3                                                (3)
4  5  6                                                (3)
7  8  9                                                (3)
10 11 12                                               (3)
13 14 15                                               (3)
/EOF
```

will submit the job to the Cray with the output returned in file MYJOB.CPR. The ACCOUNT statement (4) is omitted (or ignored) when using CSUBMIT.

2) $ CSUBMIT RUN2.JOB,RUN2.FOR,RUN2.DAT -or-
$ CRAY SUBMIT RUN2.JOB,RUN2.FOR,RUN2.DAT

where RUN2.JOB contains the job control statements ((1) above)
RUN2.FOR contains the Fortran source program ((2) above)
RUN2.DAT contains the data ((3) above)

will submit the combined files to the Cray with the output returned in file MYJOB.CPR. Note that the /EOF records are not required in this format.

3) $ CSUBMIT RUN3 -or- $ CRAY SUBMIT RUN3

where RUN3.JOB contains:

```
JOB,JN=MYJOB.
ACCOUNT,US=username,UPW=password,AC=account.          (4)
FETCH,DN=PROG3,TEXT='PROG3.FOR'.
FETCH,DN=DATA3,TEXT='PROG3.DAT'.
CFT,I=PROG3.
SEGLDR,GO.
```

PROG3.FOR on the VAXcluster contains the program (2) above, with "OPEN (5, FILE='DATA3')" before the "DO 10 ..."

PROG3.DAT contains the data (3) above.

** From the CDC CYBER 860 **

To use the Cray from the CYBER 860, log in, prepare your Cray batch job using any editor, and submit the job file to the Cray using the CSUBMIT command (assumes you have set up the CRAYDEF file for your current CYBER 860 user name and password via a CDEFINE command):

```
/CSUBMIT,lfn.          <-- print at Central Site
/CSUBMIT,lfn,RB=un.    <-- put into output queue for user un
/CSUBMIT,lfn,TO.       <-- put into your wait queue
```

In the last two formats, use QGET to get the file from the queue. See Appendix D for additional parameters. To send the output elsewhere, use the Cray DISPOSE command (see Appendix C).

* Killing Batch Jobs *

Cray jobs are identified by their Job Sequence Numbers (jsq). To find the jsq, use

```
$ CSTATUS
```

To kill a batch job, use

```
$ CDROP,jsq.          <-- terminate executing job

   -or-

$ CKILL,jsq.          <-- delete a job from the input queue  -or-
                          terminate executing job keeping only the
                           dayfile -or-
                          delete an output dataset
```

* CYBER 860-to-Cray Examples *

1) /CSUBMIT,RUN1.

where local file RUN1 contains:

```
JOB,JN=myjob.
ACCOUNT,US=username,UPW=password,AC=account.
FETCH,DN=prog3,SDN=myprog,TEXT='GET,myprog.CTASK.'.
                                                    ^-- indirect file
FETCH,DN=mydata,TEXT='ATTACH,mydata.CTASK.'.        <-- direct file
CFT,I=prog3.
SEGLDR,GO.
```

-or-

```
JOB,JN=myjob.
ACCOUNT,US=username,UPW=password,AC=account.
FETCH,DN=prog3,SDN=myprog,TEXT='GET,myprog.CTASK.'.
                                                    ^-- indirect file

MSACCES,US=user,MPW=mspass.
MSFETCH,DN=mydata.                                  <-- direct file
CFT,I=prog3.
SEGLDR,GO.
```

MYPROG and MYDATA on the CDC CYBER 860 contain the program and data (see page 3-1-7, example 3).

** From a Running Cray Job **

A batch job to be submitted from a running Cray job may reside either on the Cray or on one of the front-ends. From within the Cray job, ACCESS or FETCH the file to make it a local file, then SUBMIT it to the COS input queue. (See Appendix C for additional parameters for these Cray commands.)

* Examples *

1) The job is in a permanent dataset on the Cray:

```
JOB,....
ACCOUNT,....
...
ACCESS,DN=myjob,PDN=mypermjob.
SUBMIT,DN=myjob.
...
```

2) The job is in a file on the VAXcluster:

```
JOB,....
ACCOUNT,....
...
FETCH,DN=myjob,TEXT='myjob.job'.     <-- submitted from VAXcluster
   -or-
FETCH,DN=myjob,MF=V3,TEXT='DT3"user pw"::UOn:[user]myjob.job'.
                                      ^-- submitted from CYBER 860
                                          or VAXcluster
SUBMIT,DN=myjob.
...
```

3) The job is in a file on the Mass Store (CDC CYBER 860):

```
JOB,....
ACCOUNT,....
...
MSACCES,US=user,MPW=mspass.
MSFETCH,DN=myjob.
SUBMIT,DN=myjob.
...
```

*** Interactive Jobs ***

CRAY X-MP interactive access is via the Cray Station code on one of the front-ends.

** From the VAXcluster **

The CRAY X-MP is accessed via the VMS Cray Station, which may be entered by the CRAY or CINT command.

The CRAY command puts you into Cray context (indicated by the CRAY> prompt). Among other capabilities, you can examine and manipulate your jobs in the Cray queues.

The CINT command initiates an interactive session on the Cray. If not included in the CINT statement qualifiers, you will then be requested to supply:

```
Cray Jobname:      <-- enter 1-7 alphanumeric characters as the
                       jobname for this session (must be upper case
                       to be able to fetch from the Mass Storage
                       System; should be different for each session)
Cray Username:     <-- enter your User Initials
```

The exclamation prompt (!) indicates that you have reached the Cray. Your first command must be your ACCOUNT statement. Any other commands will be ignored until a valid ACCOUNT statement is read.

```
!ACCOUNT,AC=1222233344,UPW=pw,US=userinit.
```

When you receive another ! prompt, your logon was successful. You may now use any of the commands in Appendix C. Every command MUST end with a terminator (.); if you forget, use the up-arrow to bring the command back and add the terminator.

To execute some Cray Station commands, use ^Z to interrupt CINT. At the Cint> prompt, enter the Station command. When it completes, you will be returned to your interactive session. Note that only a subset of the Cray Station commands may be executed in CINT.

To terminate the Cray interactive session, enter ^Z. At the Cint> prompt, type QUIT to return to the VMS prompt and close the interactive session.

To leave the Cray Station, enter EXIT (or ^Z). This will bring you out of Cray context and back to the VMS prompt.

* VMS Cray Station Commands *

See Appendix D for the syntax of these commands. (CINT) indicates that the command may be executed interactively (via CINT) as well as from the Cray Station (CRAY).

$	Create a temporary VMS subprocess, allowing you to enter DCL commands. To return to Cray context, type LOGOUT.
$	(CINT only) Execute a single DCL command.
+	Display the next page of information in Cray context.
-	Display the previous page of information in Cray context.
@	(CINT) Execute an indirect station command file (containing station commands) in Cray context. (Synonym for PLAY.)
^C	(CINT only) CTRL-C -- Same as ABORT.
^O	(CINT only) CTRL-O -- Toggles interactive output on and off until the next Cray prompt.
^Z	(CINT) CTRL-Z exit the current processing mode. In response to the Cray context prompt (CRAY>), it returns you to DCL; during a Cray interactive session, it returns you to command mode (Cint> prompt). While you are being prompted for command parameters, CTRL-Z cancels the command. You can also terminate the execution of an indirect station command file with CTRL-Z. In response to the Cint> prompt, you are returned to your interactive session.
ABORT	(CINT only) Interrupt the current interactive Cray job step and return to the "!" prompt after first displaying any COS output queued for the terminal.
ATTACH	(CINT only) Redirect Cray interactive terminal output to an alternate device (graphics).
ATTENTION	(CINT only) Interrupt the current interactive Cray job step and enters reprieve processing. If no reprieve processing, ATTENTION is the same as ABORT.
BYE	(CINT only) Terminate an interactive session. Depending on the command qualifiers, the COS interactive job may also be terminated.
CLEAR	Terminate any display command and clear the display portion of the screen.
COLLECT	(CINT only) Store COS interactive output in a VMS file.
COMMENT	Insert comments into an indirect station command file stream.

DATASET	Report the existence of a COS permanent dataset.
DELAY	Suspend execution of an indirect station command file for a specified period of time.
DISCARD	(CINT only) Discard all output from a Cray interactive session until the next COS prompt is issued.
DROP	Terminate a Cray job and returns the associated output dataset. COS job execution enters reprieve processing after the next COS EXIT control statement.
EOF	(CINT only) Send an end-of-file record to a connected COS interactive job. This command is normally required to terminate COS file input from the terminal.
EXIT	(CINT only) Return you from Cray context or Cint command mode to DCL level.
HELP	(CINT) Display information from the station help files or an index of all commands.
ISTATUS	(CINT only) Return the status of your Cray interactive job, including the CPU time used and the last Cray logfile message.
JOB	Display the status of a specific COS job.
JSTAT	Display the status of a specific job and its related tasks.
KILL	Terminate a Cray job immediately.
LOGFILE	Provide access to the station logfile messages.
LOOP	Restart execution of an indirect station command file at the beginning of the file. End looping with ^Z.
MESSAGE	Send a message to the Cray job and station logfiles.
PAUSE	Suspend the execution of an indirect station command file. Control is passed to the terminal, where you can terminate the command file by entering a command or resume it by entering a null line (<RET>).
PLAY	(CINT only) Execute an indirect station command file. (Same as @.)
QUIT	(CINT only) Terminate a Cray interactive session and the corresponding Cray interactive job. (Equivalent to BYE/ABORT.)

RECORD	Start or stop the recording of terminal input to the specified file while in Cray context for later use with the PLAY or @ commands. Exiting Cray context automatically issues a RECORD/OFF.
RELEASE	Release a dataset in the output HOLDING queue due to VMS quota problems.
REMOVE	Delete entries in the dataset staging queue.
RERUN	Immediately end the processing of a COS job and put job back into the input queue, unless the job has terminates or cannot be rerun.
SET	Define terminal working environment for the current session.
SHOW	Display information about the status of the station staging queue.
SNAP	Copy the current contents of the display region into the specified VMS file. If the command is issued from a terminal in line-by-line mode, the last display requested is recorded in the file.
STATCLASS	Display the current Cray job class structure.
STATUS	Display the Cray system status.
STATUS	(CINT only) Same as ISTATUS.
STORAGE	Initiate a COS disk status display providing the following information: device class or status; device name as it is known to COS; percentage of free space and permanent space on each device; number of recovered and unrecovered errors on each device; location of last error.
SUBMIT	Stage the specified VMS file to Cray to be put on the job input queue. The file must contain COS JCL (see CRAY HELP). The first record must be the JOB control statement. By default, the output from the COS job (known as a logfile) is sent to the directory from which the job was submitted.
SUPPRESS	Suppress the echoing of the next typed input line.
SWITCH	Set or clear COS job sense switches.

* Examples *

1) $ cint
   Cray Jobname: ABCD001 <-- any jobname (must be upper case to be able to fetch from the Mass Storage System)
   Cray Username: ABCD <-- user ABCD
   !ACCOUNT,AC=1222233344,UPW=mypw. <-- US=abcd not needed since upper case was used in entry above

   !<your Cray commands>
   !^Z <-- ctrl-Z to leave Cray
   Cint> <Station command> <-- returns to Cray when done
   !^Z <-- ctrl-Z to leave Cray
   Cint> quit <-- terminate Cray session

2) $ cint
   Cray Jobname: efgh002
   Cray Username: efgh
   !ACCOUNT,AC=1222233344,UPW=mypw,US=efgh. <-- US=efgh needed since lower case was used in entry above

   <same as example 1>

3) $ cint /jn=struct /us=efgh <-- any jobname; user EFGH (since this is a VMS DCL command, it is converted to upper case)
   !ACCOUNT,AC=1222233344,UPW=mypw. <-- US=efgh not needed since the VMS control statement is converted to upper case

   <same as example 1>

** From the CDC CYBER 860 **

The CRAY X-MP is accessed via the NOS Interactive Cray Facility (ICF), which may be entered by the APPSW,ICF command from IAF. You enter ICF, log onto the Cray, do your thing (Cray or ICF commands), leave the Cray and ICF. You will then be at the NOS prompt.

Alternatively, you can specify ICF as the application when you log into NOS.

ICF commands have a prefix (normally a slash "/") and can be intermixed with Cray commands. To terminate the Cray session (and ICF), enter /BYE or /LOGOFF.

* ICF Prologue File *

A user prologue may be defined to be executed each time you start an ICF session. This is an 8/12-bit ASCII indirect access file named ICFPROF, with access granted to user SYSTEMX (PERMIT,ICFPROF,SYSTEMX.) We suggest you include "/PERIOD ON" so you don't have to type a period at the end of each Cray command.

* NOS ICF User Commands *

/ABORT	Send abort interrupt to the interactive Cray job (also user-break-2 key (normally %2).
/ATTENTION	Send attention interrupt to the interactive Cray job (also user-break-1 key (normally %1).
/BYE	Terminate this Cray interactive session. (Same as /LOGOFF)
/CONNECT	Create a logical connection between this terminal and some other (slave) terminal.
/DISCARD	Discard output being sent from the Cray to this terminal.
/ENDCONNECT	Terminate a CONNECT.
/ENDPLAY	Terminate reading of a PLAY file.
/EOF	Send an end-of-file to the Cray.
/HELP	Display help information.
/ICFSTATUS	Display general information about the current status of ICF.
/LOGOFF	Terminate this Cray interactive session. (Same as /BYE)
/LOGON	Initiate or reconnect to an existing Cray job.

/PERIOD	Set/reset automatic generation of a terminator on COS commands.
/PLAY	Read data and commands from a NOS file in the user's catalog.
/PREFIX	Change the ICF command prefix letter.
/QUIT	Immediately terminate this Cray interactive session.
/RESUME	Resume the transmission of data to and from the Cray (negate the effect of SUSPEND).
/SUSPEND	Suspend transmission of data to and from the Cray.
/STATUS	Display Cray status.
/*	An ICF comment line.

* Examples *

```
1) /appsw,icf                          <-- / is the NOS prompt
   <a greeting>
   /logon                              <-- / is required;
                                           log onto DTRC Cray
   <a greeting>
   !account,ac=1222233344,upw=mypw.    <-- US=abcd not needed
   !<your Cray or ICF commands>
   !/bye                               <-- to leave Cray and ICF


2) FAMILY: ,abcd,pw,icf                <-- log into ICF directly
   <a greeting>
   /logon                              <-- / is required;
                                           log onto DTRC Cray
   <a greeting>
   !account,ac=1222233344,upw=mypw.    <-- US=abcd not needed
   !<your Cray or ICF commands>
   !/bye                               <-- to leave Cray and ICF
   T1210   - APPLICATION: iaf          <-- switch to another
                                           application such as IAF
```

***** Cray JCL Commands *****

The Cray Job Control Language (JCL) statements are grouped by function in this section. See Appendix C for a description of the syntax for each command. (DTRC) indicates a command or program added at DTRC. Some of the logic structure commands use JCL expressions, which are described later in this section.

*** Job Definition and Control ***

*	Entire line is a comment.
ACCOUNT	Validate a user's Job Order Number, user name and password.
ALTACN	Validate an alternate account number for permanent datasets.
CALL	Read control statements from another file.
CHARGES	Report on job resources.
ECHO	Control logfile messages.
EXIT	On job abort, processing continues with the statement following the EXIT; if no abort, terminate job processing.
IOAREA	Control access to a job's I/O area (containing the DSP and I/O buffers).
JOB	First statement of a job -- gives job parameters.
JOBCOST	(DTRC) Write a summary of job cost and system usage to $LOG.
LIBRARY	Specify search order for procedures during processing.
MEMORY	Request new field length.
MODE	Set/clear mode flags.
NORERUN	Control a job's rerunability.
OPTION	Specify user-defined options.
RERUN	Control a job's rerunability.
RETURN	Return from an alternate control statement file.
ROLLJOB	Protect a job by writing it to disk.
SET	Change value of a JCL symbolic variable.
SWITCH	Turn pseudo sense switches on or off.

*** Dataset Definition and Control ***

ACCESS Make a permanent dataset local.

ASSIGN Create a dataset and assign dataset characteristics.

HOLD Dataset release occurs with implicit HOLD.

NOHOLD Cancel effect of HOLD.

RELEASE Relinquish access to a dataset from a job.

*** Permanent Dataset Management ***

ACCESS Make a permanent dataset local.

ADJUST Redefine size of a permanent dataset.

DELETE Remove a permanent dataset.

MODIFY Change a permanent dataset's characteristic information.

MSCHANG (DTRC) Change the attributes of a Mass Storage System file.

NEWCHRG (DTRC) Change permanent file account number.

PERMIT Grant/deny access to a permanent dataset.

SAVE Make a dataset permanent.

SCRUBDS Write over a dataset before release.

*** Permanent Dataset Staging ***

See Chapter 3 for staging to and from the Mass Storage System.

ACQUIRE Get a front-end dataset and make it permanent.

DISPOSE Stage dataset to the front-end; release a local dataset; change disposition characteristics.

FETCH Get a front-end dataset and make it local.

MSACCES (DTRC) Supply your Username and password to the Mass Storage System (MSS).

MSFETCH (DTRC) Fetch a file from the MSS.

MSPURGE (DTRC) Purge a file from the MSS.

MSSTORE (DTRC) Store a file on the MSS.

SUBMIT Send local dataset to COS input queue.

*** Permanent Dataset Utilities ***

AUDIT Report on permanent datasets.

*** Local Dataset Utilities ***

BLOCK Convert an unblocked dataset to a blocked dataset.

COPYD Copy blocked datasets.

COPYF Copy blocked files.

COPYNF Copy files from one blocked dataset to another.

COPYR Copy blocked records.

COPYU Copy unblocked datasets.

DS List local datasets.

NOTE Write text to a dataset.

QUERY Determine the current status and position of a local file.

REWIND Position a dataset at its beginning.

SKIPD Skip blocked datasets (position at EOD (after last EOF)).

SKIPF Skip blocked files from current position.

SKIPR Skip blocked records from the current position.

SKIPU Skip sectors on unblocked datasets.

UBBLOCK Convert a blocked dataset to an unblocked dataset.

WRITEDS Initialize a blocked dataset by writing a single file containing a specific number of records of a specific length.

*** Dumps and Other Aids ***

COMPARE Compare two datasets.

DEBUG Interpret a dump.

DUMPJOB Capture job information in dataset $DUMP for display by DUMP.

DUMP Display job information previously captured by DUMPJOB.

FLODUMP Dump flowtrace table.

FTREF Generate Fortran cross-reference.

ITEMIZE Report statistics about a library dataset.

PRINT Write value of JCL expression to the logfile.

SPY Generate a histogram of time usage within a program to locate inefficient code.

*** Logic Structure ***

ELSE IF-loop control.

ELSEIF IF-loop control.

ENDIF IF-loop termination.

ENDLOOP LOOP termination.

EXITIF IF-loop control.

EXITLOOP LOOP control.

IF Begin a conditional block of code.

LOOP Start of an iterative control statement block.

*** Procedures ***

See Section 3-3 for additional information on the creation of procedures.

CALL Transfer control to a procedure.

"call by name"
Execute a complex procedure in a library.

ENDPROC End of a procedure.

PROC Begin an in-line procedure definition block. This is followed by the procedure prototype statement which names the procedure and gives the formal parameter specifications.

RETURN Return control from a procedure to its CALLer.

*** Programming Languages ***

CFT Compile a Fortran source program.

CFT77 Alternate Fortran compiler (slower compile, faster execute).

PASCAL Compile a Pascal source program

*** Program Libraries ***

See Section 3-4 for a discussion of program libraries (PL).

AUDPL Audit an UPDATE PL.

UPDATE Source and data maintenance.

*** Object Libraries ***

See Section 3-5 for a discussion of object libraries.

BUILD Generate and maintain library datasets.

SEGLDR Segment loader (see Section 3-6).

*** Miscellaneous ***

"call by name"
Execute a program by its local file name.

SID Debug programs interactively or in batch.

SORT Sort/merge.

*** JCL Expressions ***

An expression is a string of operands and operators. It is evaluated from left to right, taking into account parentheses and operator hierarchy. Expressions allow the incrementing of counters, error code checking, and string comparison.

There are four types of operands:

- integer constants (+ddd... or -ddd... - decimal
  nnn...B - octal
  range: 0 to ~10**19)
- literal constants ('ccc...'L - left-justified, zero-filled
  'ccc...'R - right-justified, zero-filled
  'ccc...'H - left-justified, blank-filled
  range of c: 040 - 176 octal
  default: H)
- symbolic variables (see below)
- subexpressions (its value becomes an operand)

Expressions may be used in IF, ELSEIF, EXITIF, and EXITLOOP.

** Symbolic Variables **

There are 38 symbolic variables: 6 system constants, 7 variables set by COS, and 25 which can be set by the user.

* System Constants *

Symbol	Range	Description
FALSE	0	False
SID	literal	Mainframe ID (C1)
SYSID	literal	COS level ('COS n.nn')
TRUE	-1	True

SN and XM are also available.

* COS-set Variables *

Symbol	Range	Description
ABTCODE	0-nnn	COS job abort code (ABnnn)
DATE	literal	mm/dd/yy
FL	0-77777777	current octal field length
FLM	0-77777777	JOB statement maximum octal FL
PDMST	64-bits	status of most recent Permanent Dataset Manager request
TIME	literal	hh:mm:ss
TIMELEFT	64-bit integer	job time remaining (milliseconds)

* User-set Variables *

Symbol	Range	Description
G0-G7	64-bits	8 global pseudo-registers (can be used to pass data between procedures)
J0-J7	64-bits	8 job (local) pseudo-registers (each procedure level has its own J registers)
JSR	64-bits	Job Status Register containing the previous job step completion code
NOTEXT	64-bits	text field not echoed (default: ON)
PDMFC	64-bits	most recent user-issued PDM request
SSW1-SSW6	64-bits	pseudo sense switches

** Operators **

Operators may be

. arithmetic (+, -, *, /); Underflow and overflow are not detected; division by 0 produces zero

. relational (.EQ., .NE., .LT., .GT., .LE., .GE.); returns -1 (TRUE) or 0 (FALSE)

. logical (.OR., .AND., .XOR., .NOT.); returns a 64-bit value

Operations are performed left to right, taking into account parentheses, with the hierarchy of operators: (*, /), (+, -), relational, .NOT., .AND., .OR., .XOR..

** Strings **

A string is a group of ASCII characters (040-176 octal) to be taken literally. There are two types of strings:

. literal - delimited by apostrophes -- '...'

. parenthetical - delimited by parentheses -- (...)

Literal strings do not include the delimiters. An apostrophe within a literal string is represented by two apostrophes: '...''...'. A null string is indicated by two apostrophes: ''. A literal string is continued by placing an apostrophe and a continuation character at the end of the first line and an apostrophe at the start of the string on the next line:

```
...'This Is A '^
   'Long String.'     becomes     This Is A Long String.
```

Parenthetical strings do not include the delimiters. Spaces are removed; nested parentheses are not treated as separators; literal strings may appear in a parenthetical string. A parenthetical string is continued by placing a continuation character at the end of the first line and continuing the string on the next line:

```
...(This Is A ^
    Long String.)      becomes      ThisIsALongString.
```

***** Procedures *****

A procedure is a group of control statements separate from the job control statement dataset ($CS). Calling a procedure provides a simplified way to process that group of control statements. A procedure may be called by a job repeatedly or by another procedure.

There are two kinds of procedures in COS:

- simple - a sequence of control statements
- complex - a prototype statement (giving the name of the procedure and any parameters), the control statements, and optional data.

*** Simple Procedures ***

A simple procedure has no name or parameters and resides in a non-library dataset. It is invoked by a CALL without the CNS parameter. Control is returned to the caller by a RETURN statement, the end of the first file in the dataset, or an EXIT (when not skipping because of an error condition). A simple procedure has no parameter substitution.

Any COS JCL statement, except PROC and ENDPROC, may be used in a simple procedure. One use might be to access all the datasets needed in several jobs without having to specify them in the individual jobs.

*** Complex Procedures ***

Complex procedures are named and may have parameters described in a prototype statement. Complex procedures are executed by

- "call by name", which may include parameters for substitution in the procedure. The procedure is in $PROC or a local dataset named in a LIBRARY statement.
- CALL,DN=procfyl,CNS, followed by a line containing the procedure name and parameters for substitution. The procedure is the first file in a separate dataset; PROC and ENDPROC are not used.

Complex procedures may appear, delimited by PROC and ENDPROC, in the job control statement dataset ($CS). When PROC is encountered, the procedure is written to $PROC. Subsequent calls to the procedure may then be made using the procedure name (and any substitute parameters).

A complex procedure has the general form:

```
PROC.                          <-- not for CALL
prototype statement
control statements
...
&DA1A,dn1.
data for first dataset
...
&DATA,dnn.
data for last dataset
ENDPROC.                       <-- not for CALL
```

** Prototype Statement **

The prototype statement defines the name of the procedure and its formal parameters with their default value(s). It has the form:

name,p1,p2,...,pn.

name - the name of the procedure (1-8 alphanumeric characters)

pi - a formal parameter specification

- posi - positional
- keyi=dval:kval - keyword
  - keyi - formal keyword name
  - dval - optional default value when keyi is omitted from the calling statement
  - kval - optional default value when keyi is specified in the calling statement without a value
- keyi= - no defaults; the caller must supply a non-null value
- keyi=: - no defaults; allows keyi and keyi=

** Temporary Datasets **

One or more temporary datasets may be included in a complex procedure following the control statement. Each starts with

&DATA,dn.

where dn is the required dataset name.

** Parameter Substitution **

Formal parameters are used, preceded by an ampersand (&), within the body of the procedure. On execution, each is replaced by the value supplied or implied in the calling statement. &param is delimited by any character except A-Z, a-z, 0-9, @, $, or %. If the next character is one of these, the underline (_) is used as the delimiter and is removed at execution time.

If too few positional parameters are specified by the caller, null strings are used for the remaining parameters; if too many, the job aborts. Keyword parameters may appear in any order, however, all positional parameters must precede all keywords.

** Apostrophes and Parentheses **

Apostrophes in the calling statement denote literals and are not removed during substitutions; the outer set of parentheses are removed. If you are not sure how a parameter is used in the procedure, enclose it in parentheses.

The following shows parenthetical substitution:

caller	after substitution
value	value
(value1=value2)	value1=value2
value1'.'value2	value1'.'value2
value1(.)value2	value1.value2

*** DTRC "System" Procedures ***

The following DTRC-written procedures have been added to COS as of the date of this page. See Appendix C for more information. For the current list, type "HELP @CRAY CONTENTS" on the VAX.

MSACCES Supply your Username and password to the Mass Storage System

MSAUDIT Sorted audit of Mass Storage System files.

MSCHANG Change the attributes of a Mass Storage System file.

MSFETCH Fetch a file from the Mass Storage System to the CRAY X-MP

MSPASSW Change your Mass Storage System access password.

MSPURGE Purge a Mass Storage System file from the CRAY X-MP

MSSTORE Store a CRAY X-MP file on the Mass Storage System

*** DTRC Procedure Library ***

One procedure library has been added to COS at DTRC:

PROCLIB,OWN=PUBLIC.

To use:
```
ACCESS,PROCLIB,OWN=PUBLIC.
LIBRARY,PROCLIB:*.
procname,....
```

The following routines are the procedures in PROCLIB as of the date of this page. See Appendix C for more information. For the current list, type "HELP @CRAY CONTENTS" on the VAX.

JOBCOST Write job cost summary to $LOG

NEWCHRG Change the account number of permanent files

*** Examples ***

** Simple Procedures **

1) The first file of dataset GETLIBS contains:

```
ACCESS,DN=MSPROC,OWN=PUBLIC.     <-- the MSS procedures
ACCESS,DN=DTLIB,OWN=PUBLIC.      <-- the DTLIB subroutine library
ACCESS,DN=SUBS.                  <-- your subroutine library
```

This is executed by:

```
CALL,DN=getlibs.
```

** Complex Procedures **

2) As in example 1, but your subroutine library is to be identified by the caller:

```
GETLIBS,SUBS.                    <-- prototype statement
ACCESS,DN=MSPROC,OWN=PUBLIC.     <-- the MSS procedures
ACCESS,DN=DTLIB,OWN=PUBLIC.      <-- the DTLIB subroutine library
ACCESS,DN=SUBS,PDN=&SUBS.        <-- your subroutine library
```

When called by:

```
CALL,DN=getlibs,CNS.
getlibs,othersubs.
```

the third ACCESS expands to ACCESS,DN=SUBS,PDN=othersubs. Note that the name of the procedure is unimportant, since it is the only procedure in the file. "getlibs,othersubs." could be replaced by "*,othersubs".

When called by:

```
CALL,DN=getlibs,CNS.
getlibs,(hislib,OWN=him).
```

the third ACCESS expands to ACCESS,DN=SUBS,PDN=hislib,OWN=him.

When called by:

```
CALL,DN=getlibs,CNS.
getlibs,'hislib,OWN=him'.
```

the third ACCESS expands to ACCESS,DN=SUBS,PDN='hislib,OWN=him'. While this is legal (it says the permanent filename is "hislib,OWN=him"), it is probably an error and, if so, will abort the procedure.

3) Create a procedure library from procedures in the job stream.

```
...
ECHO,OFF.
RELEASE,DN=$PROC.           <-- return existing $PROC
*
PROC.                       <-- write first procedure to $PROC
prototype
procedure body
RETURN...procname
EXIT.
RETURN,ABORT...procname
ENDPROC.                    <-- end of first procedure
*
PROC.                       <-- write next procedure to $PROC
prototype
procedure body
RETURN...procname
EXIT.
RETURN,ABORT...procname
ENDPROC.                    <-- end of procedure
*
...                         <-- more procedures
*
ACCESS,DN=proclib,NA,UQ.    <-- get original (existing) library
SAVE,DN=$PROC,PDN=proclib.  <-- save new library
DELETE,DN=proclib,NA.       <-- delete original library
RELEASE,DN=$PROC.           <-- return new library
ACCESS,DN=proclib.          <-- get new library with its own name
LIBRARY,DN=*:proclib.       <-- add it to the end of the library
                                list
-or-
LIBRARY,DN=proclib:*        <-- add it to the beginning of the
                                library list
ECHO,ON.
...
< use one of the procedures >
...
```

4) Create a procedure library from procedures in a separate file.

```
...
FETCH,DN=myprocs,TEXT='myprocs.pro'.        <-- defaults to AC=ST
CALL,DN=myprocs.
SAVE,DN=$PROC,PDN=proclib,PAM=R.            <-- others may use it
...
```

where VMS file MYPROCS.PRO contains:

```
*           first procedure
PROC.
prototype
procedure body
ENDPROC.
*           next procedure
PROC.
prototype
procedure body
ENDPROC.
*           next procedure
...                          <-- more procedures
*
```

***** Program Libraries *****

Source programs and data may be in separate datasets or may be stored and maintained in program libraries. UPDATE creates and maintains these libraries while AUDPL (see Appendix C) audits them.

*** UPDATE ***

UPDATE is a program for creating and modifying a program library (PL). In addition, UPDATE will extract individual modules for input to a compiler or other program.

By default, 72 columns of information are retained. Fifteen additional characters are retained for each line: an 8-character identifier, a period (.), and a 6-digit sequence number, i.e., id.seq.

UPDATE supports two kinds of text modules or decks:

- a regular deck (beginning with a DECK directive)
- a common deck (beginning with a COMDECK directive) which may be included in decks with a CALL directive

Each type includes all lines following the deck directive until the next deck or modification directive.

History information is retained allowing the deletion, modification, or restoration or previous modifications.

See Appendix C for a description of the UPDATE control statement parameters.

*** UPDATE Directives ***

An UPDATE directive, which must be in upper case, has the following format:

```
m directive_name  [ parameters ]
```

where m is the master character (default: asterisk (*)). There are five categories of directives.

** DECK and COMDECK **

*DECK deck (*DK)
First line of a new deck. <deck> is up to 8 characters, any ASCII character from 41 to 176 octal, except comma, period, blank, colon, equals.

*COMDECK cmdk (*CDK)
First line of a new common deck.

** Compile Directives **

*CALL cmdk (*CA)
Include the contents of a common deck.

*CWEOF
Write an EOF on the compile dataset if anything was written since the last EOF.

*NOSEQ
Do not write sequence numbers.

*SEQ
Write sequence numbers.

*WEOF
Write an EOF on the compile dataset.

*WIDTH dw
Change the data width (default: 72).

*IF, *ELSEIF, *ELSE, and *ENDIF are also available.

** Modification Directives **

*BEFORE id.seq (*B)
Insert before a line.

*COPY p,id1.seq1,id2.seq2 (*CY)
Copy a range of lines from deck or comdeck <p>.

*DELETE id1.seq1 (*D) <-- one line
*DELETE id1.seq1,id2.seq2 <-- a range of lines
*DELETE id1.seq1,.seq2 <-- same (short form)
Delete a line or a range of lines.

*IDENT ident (*ID)
*IDENT ident,K=k1:k2:...,U=u1:u2:...
Identify a set of modifications. You can require that other modification sets be known (K=) or unknown (U=).

*INSERT id.seq (*I)
Insert after a line.

*RESTORE id1.seq1 (*R) <-- one line
*RESTORE id1.seq1,id2.seq2 <-- a range of lines
*RESTORE id1.seq1,.seq2 <-- same (short form)
Restore a line or a range of lines.

** Run Options **

*/comment
A comment line.

*COMPILE p1,p2,...,pj.pk,...,pn (*C)
Write one or more decks, including a range (pj.pk), to the compile and/or source datasets. Use UPDATE,K to force the output order.

*COPY p,id1.seq1,id2.seq2,dn (*CY)
*COPY p,id1.seq1,id2.seq2,dn,SEQ
Copy a range of lines from deck or comdeck <p> to dataset <dn>. SEQ will include sequence numbers.

*LIST
Resume listing input lines. UPDATE,L=0 overrides *LIST.

*MASTER m
Define a new master character for subsequent directives. (default: *)

*NOLIST
Stop listing input lines. *NOLIST overrides UPDATE,IN.

*READ dn (*RD)
Read input from another dataset.

*REWIND dn
Rewind a dataset.

*SKIPF dn
*SKIPF dn,n
Skip file(s) in a local dataset.

*DECLARE and *DEFINE are also available.

** Input Edit Directives **

*EDIT p1,p2,...,pn (*ED)
Remove deleted and yanked lines from specific decks. These lines cannot be retrieved. This is useful for cleaning up a PL.

*MOVEDK dk1:dk2
*MOVEDK dk1:.
Position deck of common deck <dk1> immediately after deck or common deck <dk2> or at the beginning of the PL <.>.

*PURGE id1,id2,...,idj.idk,...,idn..
Remove the effect of a modification set (idi), a range of datasets (idj.idk), or a set and all following (idn..).

*PURGEDK dk
Permanently remove a deck or common deck.

*UNYANK id1,id2,...,idj.idk,...,idn..
Reactivate a deck, comdeck, or modification set previously yanked.

*YANK id1,id2,...,idj.idk,...,idn..
Temporarily delete a deck, comdeck, or modification set previously yanked.

*SKIP and *ENDSKIP are also available.

*** Examples ***

1) Create a PL:

```
JOB,JN=makepl1.
ACCOUNT,....                    <-- omit if using VAXcluster CSUBMIT
UPDATE,P=0,C=0.                 <-- no $PL or $CPL
SAVE,DN=$NPL,PDN=mypl.
/EOF
*DK DECK1
   <lines for deck DECK1>
*DK DECK2
   <lines for deck DECK2>
*DK DECK3
   <lines for deck DECK3>
```

2) Extract, compile and execute deck DECK2 from PL MYPL:

```
JOB,JN=getpl2.
ACCOUNT,....                    <-- omit if using VAXcluster CSUBMIT
ACCESS,DN=$PL,PDN=mypl.
UPDATE.
CFT77,I=$CPL.
SEGLDR,CMD='MAP,PART',GO.
/EOF
*C DECK2
```

3) Create a PL using a common deck, compile and execute:

```
JOB,JN=makepl3.
ACCOUNT,....                    <-- omit if using VAXcluster CSUBMIT
UPDATE,P=0.                     <-- no $PL (required to create)
SAVE,DN=$NPL,PDN=mypl.
CFT,I=$CPL.
SEGLDR,CMD='MAP,PART',GO.
/EOF
*CDK COM3
      common / mycom / a, b, c
      real a, b, c
*DK PROG3
      program prog3
*CALL COM3
      call sub
      print *, 'a,b,c=', a, b, c
      end
*DECK SUB
      subroutine sub
*CA COM3
      a = 1.
      b = 2.
      c = 3.
      return
      end
```

4) Update old source library to new, compile all decks and execute:

```
JOB,JN=job4.
ACCOUNT,....          <-- omit if using VAXcluster CSUBMIT
ACCESS,DN=$PL,PDN=mylib.
UPDATE,F,N.
SAVE,DN=$NPL,PDN=mylib.
CFT,I=$CPL.
SEGLDR,GO.
/EOF
*IDENT DS0620         <-- correction must be unique (initials,date)
*INSERT ALONE.57      <-- correct deck ALONE by insert after line 57
   <FORTRAN statements>
*DELETE FOUR.12,13    <-- correct deck FOUR replacing lines 12-13
   <new lines to replace deletions - optional>
/EOF
   <data lines, if any>
/EOF
```

5) Select routines from source subroutine library on MSS and compile with own program:

```
JOB,JN=job5.
ACCOUNT,....          <-- omit if using VAXcluster CSUBMIT
ACCESS,DN=MSPROC,OWN=PUBLIC.
LIBRARY,DN=MSPROC:*.
MSACCES,UN=un,MPW=mymsspw.
CFT77,ON=MSX.         <-- compile own programs with listing
MSFETCH,DN=LIBR,MDN=DTLIBPC,UN=NSYS.
UPDATE,P=LIBR,Q,L=0.
CFT77,I=$CPL.
SEGLDR,GO.            <-- load and execute
/EOF
    <own FORTRAN decks>
/EOF
*C rtn1,rtn6.rtn8     <-- select decks RTN1, 6, 7, 8 from library
/EOF
    <data records, if any>
/EOF
```

***** Object Libraries *****

BUILD is a utility for creating and maintaining libraries of absolute and relocatable object modules. These libraries can then be used by the loader to locate the program to execute or the subprograms to be loaded with your program.

The BUILD control statement is described in Appendix C.

*** BUILD Directives ***

A directive consists of a keyword and, perhaps, a comma-separated list of dataset or module names. The keyword is separated from its list by a blank. Directives cannot be continue. Multiple directives, separated by a semicolon or period, may appear in one line.

FROM dn1,dn2,...,dnn
: Single dataset for COPY, OMIT, LIST, or a list of datasets (copy dn1 thru dnn-1 to $NBL, dnn is the same as if specified alone. If no COPY, OMIT, dnn is also copied. dni can be a library or sequential dataset (like $BLD).

OMIT fn1,fn2,...,fnn
: List of modules to be excluded. Each fni may be a single name or a group name, i.e., with wildcards - (any 0 or more characters) or * (any single character).

COPY fn1,fn2,...,fnn
: List of modules to be copied. Each fni may be a single or group name, or a rename (ELM=OAK copies ELM and renames it OAK), or an inclusive range such as (first,last) or (first,) or (,last) or (,).

LIST
: Immediately list characteristics of modules in input dataset.

*** DTRC Object Libraries ***

Two object libraries have been added to COS at DTRC:

DTLIB,OWN=PUBLIC - Subprograms written or maintained by the Computer Center
To use: ACCESS,DN=DTLIB,OWN=PUBLIC.
SEGLDR directive: LIB=DTLIB

UTILITY,OWN=PUBLIC - Programs written or maintained by the Computer Center
To use: ACCESS,DN=UTILITY,OWN=PUBLIC.
LIBRARY,UTILITY:*.
program_name,....

*** Examples ***

1) Create a library of subprograms:

```
JOB,JN=JOB1.
ACCOUNT,....
CFT.
BUILD,I=0,OBL=0.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
   <Fortran source subprograms>
/EOF
```

2) Create a library of all subprograms from an UPDATE library:

```
JOB,JN=JOB2.
ACCOUNT,....
ACCESS,DN=$PL,PDN=MYPL.
UPDATE,F.
CFT,I=$CPL.
BUILD,I=0,OBL=0.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
```

3) Add a subprogram to an existing library and have the output list in alphabetical order.

```
JOB,JN=JOB3.
ACCOUNT,....
ACCESS,DN=$OBL,PDN=MYSUBLIB.
CFT.
BUILD,I=0,SORT.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
   <Fortran source subprograms>
/EOF
```

4) Delete subprogram BADSUB from an existing library and list the contents of both old and new libraries.

```
JOB,JN=JOB4.
ACCOUNT,....
ACCESS,DN=$OBL,PDN=MYSUBLIB.
BUILD,B=0.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
OMIT BADSUB
LIST
```

5) List the contents of an existing library.

```
JOB,JN=JOB5.
ACCOUNT,....
ACCESS,DN=SUBLIB,PDN=MYSUBLIB.
BUILD,OBL=0,NBL=0,B=0.
/EOF
FROM SUBLIB; LIST.
```

***** Loader *****

The loader is responsible for loading all programs, resolving any external references, and optionally initiating execution. Loading can produce either a single absolute module, or a (segmented) absolute program in which different parts of a program reside in memory only when needed.

*** SEGLDR ***

The primary loader is SEGLDR. It is controlled by directives which may appear as the next file in the input stream, in a separate file, or in the loader control statement.

** Control Statement **

See Appendix C for a fuller description of the SEGLDR control statement.

```
SEGLDR,I=dirfile,L=listfile,DN=binfil,LIB=library,ABS=absolute,
       CMD='directives',GO.
```

"SEGLDR." implies SEGLDR,I=$IN,L=$OUT,DN=$BLD,ABS=$ABD.

** Message Levels **

SEGLDR issues messages at the following levels:

ERROR - immediately terminates SEGLDR with no executable output

WARNING - no executable output but processing continues

CAUTION - executable output but a possible error was found

NOTE - SEGLDR has been misused or used ineffectively; executable output is still valid

COMMENT - does not affect execution

** Directives **

Most SEGLDR directives have the format: keyword=value. Comments (anything following an asterisk (*)) may appear anywhere in the directives, including at the end of a directive line. Multiple comments on a line are separated by a semicolon (;). Elements of a list are comma-separated. Directives may be continued by splitting the line after a parameter (the comma is the last non-blank character in the line).

Naming files: ABS, BIN, DEFLIB, LIB, NODEFLIB.

Listing control: COMMENT, ECHO, MAP, TITLE, TRIAL.

Naming modules and common blocks: COMMONS, DUPORDER, DYNAMIC, FORCE, MODULES.

Error message control: DUPENTRY, DUPLOAD, MLEVEL, REDEF, USX.

Entry point and execution control: EQUIV, SET, XFER.

Global heap memory management: HEAP, LOWHEAP, STACK.

Memory allocation and presetting: ALIGN, ORG, PRESET.

Symbolic debugging: DRD, SYMBOLS.

Miscellaneous COS-dependent directives: ABORT, ABSNAME, BCINC, GRANT, NOECHO, NORED, PADINC, SECURE.

Miscellaneous global directives: CASE, CPUCHECK.

Additional information, including directives not discussed here, may be found in SR-0066 Segment Loader Reference Manual.

* comment A comment.

Examples:

```
TITLE=GLOBAL DIRECTIVES
*----------------------
* Global directives
*----------------------
BIN=ABC
TITLE=TREE DIRECTIVES
*--------------------
* Tree directives
*--------------------
TREE
  ROOT(A,B)
ENDTREE
TITLE=SEGMENTS
*-------------
SEGMENT=ROOT
* ROOT directives
```

ABORT=ON ¦ OFF

Control SEGLDR error termination.

Values: ON - abort if errors
OFF - terminate normally even if errors

Default: ABORT=ON

ABS=dn

The dataset to contain the absolute module.

Default: $ABD

Examples: ABS=myprog

ALIGN=IGNORE ¦ MODULES ¦ NORMAL

Control the starting locations of modules and commmon blocks.

Values: IGNORE - start each module's local or common block at the word following the previous one (ignore align bit)

MODULES - start each module's local block and common block (if the align bit is set) at an instruction buffer boundary (32 words)

NORMAL - start each module's local or common block with the align bit set at an instruction buffer boundary (32 words)

Default: ALIGN=NORMAL

BIN=dn1,dn2,...

Datasets containing the relocatable modules to be loaded.

Default: BIN=$BLD

Examples: BIN=myfile,yourfile,
theirfyl
BIN=oldfile

CASE=UPPER ¦ MIXED

Control character conversion in directives.

Values: UPPER - convert to upper case
MIXED - do not convert

Default: CASE=UPPER

```
COMMONS=blk1:siz1,blk2:siz2,...
            Specify the order to load common blocks.

            Values:    blki - name of a common block

                       sizi - n - decimal size
                              0 - first occurrence of this block sets
                                  the size
                             (default: 0)

            Examples:  COMMONS=myblk:100000,data1
                                  ^-- MYBLK is 100,000 words (no
                                      matter how it is defined); DATA1
                                      has its first encountered length


DEFLIB=deflib1,deflib2,...,deflibn
            Add libraries to SEGLDR's list of default libraries.

            Remarks:   If a specified library is already in the
                       default library list, it is moved to the end of
                       the list.

                       Libraries in DEFLIB are searched after the
                       default system libraries; those in LIB are
                       searched before.

            Examples:  DEFLIB=mylib
                                  ^-- add MYLIB to the list
                       = = = = =
                       NODEFLIB; DEFLIB=mylib
                                  ^-- the default library list
                                      consists of just one library


DRD         Load for debugging.  Symbol tables are written to $DEBUG
            (or SYMBOLS=dn).

            Default:   Normal load


DUPENTRY=ERROR ¦ WARNING ¦ CAUTION ¦ NOTE ¦ COMMENT ¦ IGNORE
            Specify the message level for a duplicate entry point.

            Default:   DUPENTRY=CAUTION


DYNAMIC=comblk
DYNAMIC=//
            Name a common block to be located after the largest segment
            or the heap (if required).  You control its size.  It is
            always available to the program and cannot be preloaded
            with data.

            Values:    a COMMON block name or // (blank common)
```

Default: no dynamic common blocks

Examples: DYNAMIC=ARRAYS
^-- common block /ARRAYS/ is dynamic

ECHO=ON ¦ OFF

Resume or suppress listing of input directives.

Default: ECHO=OFF

EQUIV=epname(syn1,syn2,...)

Substitute a call to one entry point for a call to another.

Values: epname - the entry point to be used in the substitution

syni - an entry point to be replaced by epname

Examples:

```
  ...
CALL A
  ...
CALL B
  ...

EQUIV=C(A,B)
          ^-- replaces the calls to A and B
              by calls to C
```

FORCE=ON ¦ OFF

Control the forced loading of modules whose entry points are never called.

Default: FORCE=OFF

HEAP=init+inc

(Tasking) Allocate memory for dynamic management.

Values: init - initial decimal number of words

inc - size, in decimal words, of increment when the heap overflows
0 - the heap size is fixed
(ignored if DYNAMIC directive is specified)

Examples: HEAP=10000+2000

```
LIB=lib1,lib2,...
            Libraries to be searched for routines not included in BIN=
            files or default libraries.

            Remarks:   Libraries in DEFLIB are searched after the
                       default system libraries; those in LIB are
                       searched before.

            Examples:  ACCESS,DTLIB,OWN=NSYS.      <-- DTRC subroutine
                                                       library
                       ACCESS,sublib.              <-- your subroutine
                                                       library
                       SEGLDR,CMD='LIB=sublib,DTLIB',...


MAP=NONE ¦ STAT ¦ ALPHA ¦ ADDRESS ¦ PART ¦ EPXRF ¦ CBXRF ¦ FULL
            Control the map listing.

            Values:    NONE    - no map
                       STAT    - list load statistics: date/time,
                                 longest branch length, last segment,
                                 transfer entry point, stack and heap
                                 information
                       ALPHA   - STAT + block map for each segment
                                 (modules in alphabetical order)
                       ADDRESS - ALPHA but modules in address order
                       PART    - ALPHA + ADDRESS
                       EPXRF   - STAT + entry point cross reference
                       CBXRF   - STAT + common block cross reference
                       FULL    - PART + EPXRF + CBXRF

            Default:   MAP=NONE

            Examples:  MAP=STAT
                       MAP=EPXRF,CBXRF


MLEVEL=ERROR ¦ WARNING ¦ CAUTION ¦ NOTE ¦ COMMENT
            Print messages down to and including the level specified
            (has no effect if L=0).

            Default:   MLEVEL=CAUTION

            Examples:  MLEVEL=NOTE
                                 ^-- print error, warning, caution,
                                     and note messages
```

```
MODULES=mod1:ds1,mod2:ds2,...
            The modules to be included and, optionally, the dataset
            containing a specific module.

            Values:    modi - name of module to be loaded

                       dsi  - optional dataset containing the module

            Examples:  MODULES=sub1:sublib,sub2,sub3:yourlib
                       MODULES=sub4,sub5
                                  ^-- get SUB1 from SUBLIB; SUB3 from
                                      YOURLIB; SUB2, SUB4, SUB5 from
                                      the first dataset containing them


NODEFLIB    Do not search the default libraries.  Search only BIN and
            LIB datasets.

            NOTE: Segmented loads must specify the file containing
                  routine $SEGRES.

            Examples:  NODEFLIB; LIB=sublib,DTLIB,$SCILIB


ORDER=MODULES,COMMONS | COMMONS,MODULES | XMP.EMA
            Load modules before or after commons.

            Values:    XMP.EMA - most efficient allocation on X-MP
                                 having more than 4 million words

            Defaults:  ORDER=MODULES,COMMONS (<=4 million words)
                       ORDER=XMP.EMA         (> 4 million words)


PRESET=ONES | ZEROS | INDEF | -INDEF | value
            Preset uninitialized data areas.

            Values:    ONES   - set to -1
                       ZEROS  - set to 0
                       INDEF  - set to octal 0605054000000000000000
                       -INDEF - set to octal 1605054000000000000000
                       value  - 16-bit value placed in each parcel
                                (0 < value < 177777 octal)

            Default:   PRESET=ZEROS
```

SET=epname:value

Set the value of an entry point.

Values: epname - the entry point name

value - the value it is to have (overrides the value found in the relocatables)

Examples: SET=$RBUFLN:256
SET=$WBUFLN:256
^-- change the read or write buffer length to 256 characters (to change the read/write buffer area, use COMMONS=$RFDCOM:265 or COMMONS=$WFDCOM:265 (must be 9 more than the buffer length)

STACK=init+inc

(Tasking) Allocate part of heap memory to a stack for reentrant programs.

Values: init - initial size, in decimal words, of a stack
<128 - default used

inc - size, in decimal words, of increments when the stack overflows
0 - stack overflow is not allowed

Default: Static variables unless Tasking or ALLOC=STACK.

Examples: STACK=5000+2000

SYMBOLS=ON ¦ OFF ¦ dn

Specify program symbol table handling.

Values: ON - write symbol table to $DEBUG

OFF - ignore symbol table

dn - write symbol table to dn (dn may not be ON or OFF)

Default: SYMBOLS=ON

TITLE=title

TITLE — Define the second line of each page header. A page eject is forced.

Value: title - a string of 0-74 characters
(ends with end-of-line or semicolon)
omitted - clear the second header line

Examples: TITLE=This is a user title, really!

TRIAL — Do not generate an executable module. Lets you get the load map, determine optimal memory usage for data, or get the total memory required.

Examples: TRIAL

USX=WARNING ¦ CAUTION ¦ IGNORE

Specify how to treat unsatisfied externals.

Values: WARNING - issue a warning message;
do NOT write executable output
CAUTION - issue a caution message;
write executable output
IGNORE - issue no message;
write executable output

Default: USX=CAUTION

XER=entry — Specify the entry point at which the program is to start execution.

Values: entry - the starting entry point name

Remarks: Use this to specify the name of the main program to be executed if it is in a library.

Default: The first primary entry point encountered -- if none, "main" is used.

*** Segmentation ***

To make a large program fit into memory, it may be structured in segments, so that only a portion of the program resides in memory. By using the tree structure directives of SEGLDR, different arrangements of a program can be tried, without changing the program, until the best is achieved.

** Segmentation Directives **

Tree definition: TREE, tree_definition, ENDTREE.

Segment description: SEGMENT, BIN, COMMENT, COMMONS, DUP, ECHO, MODULES, SAVE, TITLE, ENDSEG.

Global: COPY, SAVE, SLT.

BIN=dn1,dn2,...

Datasets containing the relocatable modules to be loaded. Only the first file of each dataset is processed.

Default: BIN=$BLD

Examples:
```
SEGMENT=birch
  BIN=myfile,yourfile,
      theirfyl
  BIN=oldfile
ENDSEG
          ^-- all modules in datasets MYFILE,
              YOURFILE, THEIRFYL, and OLDFILE
              are loaded into segment BIRCH
```

COMMONS=blk1:siz1,blk2:siz2,...

Specify the order to load common blocks.

Values: blki - name of a common block

sizi - n - decimal size
0 - first occurrence of this block sets the size
(default: 0)

Examples:
```
COMMONS=myblk:100000,data1
          ^-- MYBLK is allocated 100,000 words
              (no matter how it is defined);
              DATA1 has its first encountered
              length
```

COPY Force the program to execute from a scratch file. This may speed program execution, especially of programs with segments which are loaded many times, because a faster form of I/O is used. SAVE=ON also forces the use of a scratch file.

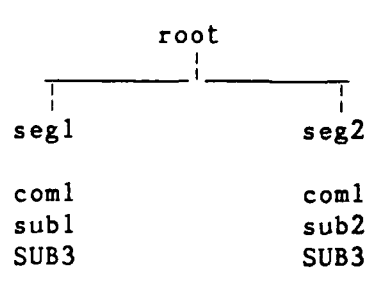
Default: a scratch file is not used

DUP=mod(seg1,seg2,...)
Specify that a module is to be loaded into several segments. DUP must appear before the definitions of the segments into which the module is to be placed.

An alternate way is to list the module in the MODULES or COMMONS directive of each segment.

Examples:

```
DUP=sub3(seg1,seg2)
SEGMENT=seg1
  MODULES=sub1
  COMMONS=com1
ENDSEG
SEGMENT=seg2
  MODULES=sub2
  COMMONS=com1
ENDSEG
```



ENDSEG End the definition of a segment of a tree structure.

Examples: see SEGMENT

ENDTREE End the definition of a tree structure.

Examples: see TREE

MODULES=mod1,mod2,...
(segment) List the modules to be put into the segment.

Values: modi - module name and optional dataset from which it is to be loaded (mod:ds)

Examples:

```
MODULES=m:binm,n,o
              ^-- load module M from dataset BINM
                  and modules N and O from the
                  first dataset which contains
                  them
```

SAVE=ON ¦ OFF

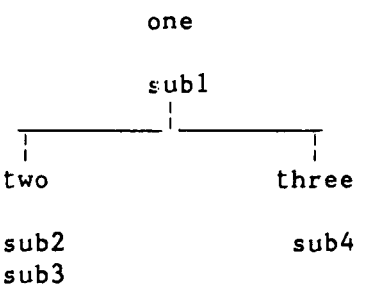
(Global) Specify whether all segments are to be saved (written to disk) before being overlaid. SAVE in a segment overrides the global SAVE.

Values: OFF - do not save each segment
ON - save each segment

Default: SAVE=OFF

Examples:

```
SAVE=ON
TREE
  one(two,three)
ENDTREE
SEGMENT=one
  MODULES=sub1
SEGMENT=two
  MODULES=sub2,sub3
SEGMENT=three
  SAVE=OFF
  MODULES=sub4
ENDSEG
```



SEGMENT=segname

Begin the description of the contents of one segment of a tree.

Examples:

```
SEGMENT=oak
  MODULES=k,l,m
  COMMONS=//,oakcom
ENDSEG
```

TREE

End the global directives and start the definition of a tree structure.

Examples:

```
TREE
  tree structure
ENDTREE
```

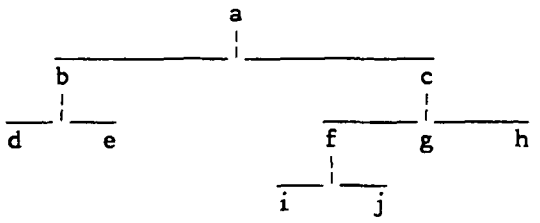
tree segment structure

Define the tree structure, that is, the segments in each branch of the tree. The order of these definitions is unimportant.

Syntax: segname(seg1,seg2,...)

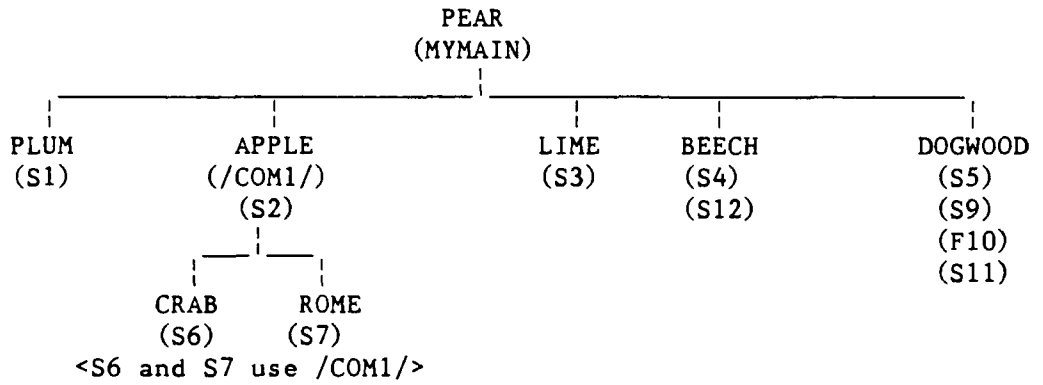
Examples:

```
TREE
  a(b,c)
  b(d,e)
  c(f,g,h)
  f(i,j)
ENDTREE
```



** Sample Tree Diagram **

A block data subprogram defines common /COM1/ which is to be loaded with program S2. /COM1/ is also referred to by S6 and S7.




```
TREE
  pear(plum,apple,lime,beech,dogwood)
  apple(crab,rome)
ENDTREE
SEGMENT=pear
  MODULES=mymain
SEGMENT=plum
  MODULES=s1
SEGMENT=apple
  MODULES=s2
  COMMONS=com1
SEGMENT=line
  MODULES=s3
SEGMENT=beech
  MODULES=s4,s12
SEGMENT=dogwood
  MODULES=s5,s9,f10,s11
SEGMENT=crab
  MODULES=s6
SEGMENT=rome
  MODULES=s7
ENDSEG
```

** Segmentation Cautions **

1. To develop a segmented job, several runs may be required, so relocatable object code should be SAVEd. Common blocks and some system routines may need to be included in lower segments to operate properly.

2. The load map should be checked carefully for any duplicate common block entries. The same common block may appear in more than one segment, each being considered a different common block. References are to the common block in the segment, if none, then to the one on the same branch. If a given common block is to appear only once in a program (the normal case), then it should be placed in the segment nearest to the root segment which can be referenced by all segments which use it.

*** Compile, Load and Save an Absolute Program ***

** Simple Load **

```
JOB,JN=jobname,....
ACCOUNT,....
CFT.
SEGLDR,CMD='ABS=myprog'.
SAVE,DN=myprog,PAM=R.          <-- read only
/EOF
      PROGRAM MYPROG (...
         ...
/EOF
```

** Segmented LOAD **

```
JOB,JN=jobname,....
ACCOUNT,....
CFT.
SAVE,DN=$BLD,PDN=myprogob.        <-- save relocatable modules for
                                      possible re-segmentation
SEGLDR.
SAVE,DN=myprog,PAM=R.             <-- read only
/EOF
   (CFT source program)
/EOF
ABS=myprog
TREE
  ...
ENDTREE
SEGMENT=...
  ...
ENDSEG
SEGMENT=...
  ...
ENDSEG
  ...
/EOF
```

***** The Mass Storage System *****

The Mass Storage System (MSS) is a large capacity on-line mass storage device. It is a cost effective extension to the Cray, CDC and VAXcluster disk systems and conventional magnetic tape storage. Specifically, the MSS, which is part of the CDC CYBER 860 (NOS), offers:

- More than 20 times the on-line storage of the VAXcluster system; more than 40 times the on-line storage of the CRAY X-MP.
- On-line access to files which previously had to be stored on magnetic tape because of size restrictions and/or infrequent use.
- Reduced storage charges for these on-line files.

*** MSS Security ***

To provide adequate security for MSS users, you must submit your MSS (CYBER 860) password in any non-CDC (NOS) job or interactive session which will manipulate MSS files. To protect your MSS files, you must change this password at least every 90 days using the PASSWOR command on the CDC CYBER 860 (NOS), the HFT PASSWORD command on the VAXcluster, the MSPASSW command on the CRAY X-MP or the CDC 860 (NOS/VE).

*** MSS File Purge ***

MSS files may be purged by the Computer Center if the job order number is invalid or has been cancelled.

To recover purged files, call User Services, Code 3511, (301) 227-1907. A fee will be charged for this service. After the files have been restored, you must change to your valid job order number:

on 860 (NOS):	CHANGE,mfn/CP or BEGIN,NEWCHRG
on 860 (NOS/VE):	MSCHANG mfn CP=1
on Cray (COS):	see page 4-1-4 (MSCHANG)
on VAXcluster:	see page 4-1-8 (MSSNEWCHRG)

*** MSS Backup for Critical Files ***

In addition to normal file backup, critical direct files may be backed up and stored off-station. These files are available in the event of a catastrophe (such as fire) at the Carderock Computer Center.

For a file to be designated as "critical", it must have the attribute Backup Requirement (BR) set to critical (CR). This is done by specifying "BR=CR" if the file is critical, or "BR=Y" if it is not, when the file is made permanent. The default is BR=Y meaning on-station backup. For example (on NOS):

```
DEFINE,lfn=mfn/BR=CR.    <-- store a critical file
CHANGE,mfn/BR=CR.        <-- make a file critical
CHANGE,mfn/BR=Y.         <-- make a file non-critical
```

Files designated for this off-station backup service will be charged a higher rate.

*** Using the MSS from the Cray ***

A description of the syntax of these commands may be found in Appendix C.

ACQUIRE Transfer a file from the MSS as a local dataset and make it permanent on the Cray.

Examples:
```
ACQUIRE,DN=SOURCE,SDN=MYFILE,PDN=MYFILE,MF=N1,^
        TEXT='USER,user,pw.ATTACH,MYFILE.CTASK.'.
              ^-- transfer your direct MSS file
                  MYFILE as local dataset SOURCE
                  and make it a permanent dataset
                  named MYFILE

ACQUIRE,DN=DATA46,PDN=DATA46,MF=N1,^
        TEXT='USER,user,pw.'^
        'ATTACH,DATA46/UN=ABCD,PW=filepw.CTASK.'.
              ^-- transfer user ABCD's MSS file
                  DATA46 (assuming you have
                  permission to read the file) as
                  local dataset DATA and make it
                  a permanent dataset named DATA46
```

DISPOSE Transfer a Cray local dataset to the MSS.

Examples:
```
DISPOSE,DN=FT13,MF=N1,SDN=MYOUT13,DC=ST,^
        TEXT='USER,user,pw.'^
             'PURGE,MYOUT13/NA.'^
             'DEFINE,MYOUT13.'^
             'CTASK.'.
               ^-- local dataset FT13 is
                   transferred to the MSS where it
                   will be known as MYOUT13
```

FETCH Transfer a file from the MSS as a local dataset. It is released at the end of the job.

Examples:
```
FETCH,DN=SOURCE,SDN=MYFILE,MF=N1,^
      TEXT='USER,user,pw.ATTACH,MYFILE.CTASK.'.
              ^-- transfer your MSS file MYFILE as
                  local dataset SOURCE

FETCH,DN=ABDATA,MF=N1,TEXT='USER,user,pw.'^
      'ATTACH,ABDATA/UN=ABCD,PW=filepw.CTASK.'.
              ^-- transfer user ABCD's MSS file
                  ABDATA as local dataset ABDATA

FETCH,DN=SOURCE,SDN=MYFILE,MF=N1,^
      TEXT='USER,user,pw.GET,MYINDF.CTASK.'.
              ^-- transfer your CYBER 860 indirect
                  file MYFILE as local dataset
                  SOURCE
```

The following procedures provide access to the Mass Storage System. They have been made part of COS at DTRC.

MSACCES Supply your Username and password to the MSS. MSACCES is required before you can use the MSx commands.

```
Example:   MSACCES,US=myid,MPW=mymsspw.
```

MSAUDIT Sorted audit of Mass Storage files.

```
Examples:  MSAUDIT.          <-- short audit of your MSS files

           MSAUDIT,LO=X,SHOWPW=1.
                        ^-- full audit showing each file's
                            password, if any

           MSAUDIT,L=audout,LO=X,UN=otheruser.
                        ^-- full audit of another user's
                            files you are allowed to see
                            with output in local dataset
                            AUDOUT
```

MSCHANG Change Mass Storage System file attributes.

```
Examples: MSCHANG,MDN=myfile,CT=PUBLIC.
                        ^-- make your MSS file MYFILE
                            public

          MSCHANG,MDN=oldname,NMDN=newname.

          MSCHANG,MDN=myfile,CP=1.
                        ^-- change the account number of
                            file MYFILE to your current
                            MSS charge number
```

MSFETCH Fetch a direct file from the MSS.

```
Examples:  MSFETCH,DN=infyl,MDN=mydata.
                        ^-- your file in transparent mode

           MSFETCH,DN=prog,MDN=othrpgm,UN=ABCD,PW=pgmpw.
                        ^-- another user's file
```

MSPASSW Change Mass Storage System access password.

```
Example:   MSPASSW,OLD=oldpw,NEW=newpw.
```

MSPURGE Purge an MSS file.

Example: MSPURGE,DN=myfyle.

MSSTORE Store a file on the MSS as a direct file.

Examples: MSSTORE,DN=out1,MDN=outfyl1,NA=1.
^-- overwrite if file already exists

MSSTORE,DN=fyl2,MDN=file2,DF=CB.
^-- file is stored in CDC Display Code

*** using the MSS from the VAXcluster ***

A description of the syntax of these commands may be found by typing "HELP <command>" on the VAXcluster.

HFT HYPERchannel (direct) File Transfer.

Examples:

```
HFT ACCESS /U=ABCD /A=1222233344 /P=MSS_password
                  ^-- gain access to the MSS

HFT CHANGE "MYFILE/AC=newac,CT=PU"
                  ^-- change account number of MSS
                      file MYFILE and make it public

HFT DEFAULT
                  ^-- display your current ACCESS
                      values

HFT DELETE MYFILE
                  ^-- delete MSS file MYFILE

HFT DIRECTORY
                  ^-- audit your MSS file names

HFT DIRECTORY "LO=F"
                  ^-- full audit of your MSS files

HFT FETCH MYPROG MYPROG.FOR
                  ^-- fetch your MSS file MYPROG and
                      make it permanent file
                      MYPROG.FOR

HFT PASSWORD
old password
new password
new password repeated
                  ^-- change your MSS password

HFT PERMIT "MYFILE/UN=xxxx,M=R"
                  ^-- give read access to user xxxx

HFT STORE MYPROG.FOR "MYPROG/CT=S"
HFT STORE MYPROG.FOR "MYPROG/CT=S" /DELETE
                  ^-- store your file MYPROG.FOR on the
                      MSS as MYPROG (/DELETE will
                      delete your VAXcluster permanent
                      file)
```

MSSAUDIT Audit your MSS files in a variety of formats.

```
        Examples:  MSSAUDIT  S     <-- get a sorted short audit of
                                       your MSS files at the terminal

                   MSSAUDIT  F  MSSAUDIT.LIS
                                  ^-- put a sorted full audit of your
                                      MSS files into file MSSAUDIT.LIS

                   MSSAUDIT  0  UN=xxxx      (0 = zero)
                                  ^-- display a sorted list of the MSS
                                      files owned by user xxxx
                                      (assuming you have permission to
                                      see them)
```

MSSBACKUP Store several files in a single file on the MSS, retaining each file's characteristics. Fetch individual files from the MSS file previously stored by MSSBACKUP.

```
        Examples:  MSSBACKUP  STORE  *.*  VMS0322
                                  ^-- store all your files in a BACKUP
                                      file on the MSS
                                      (0322 is the date)

                   MSSBACKUP  LIST  VMS0322  KEEP
                                  ^-- list the contents of the above
                                      BACKUP file on MSS at your
                                      terminal, keeping the .MSSBCK
                                      file for later FETCHes today

                   MSSBACKUP  FETCH  VMS0322  RD*
                                  ^-- fetch the files beginning with
                                      RD (do not replace any existing
                                      versions)

                   MSSB  DELETE  VMS0322
                                  ^-- Delete the BACKUP file from MSS
```

MSSDELETE Delete several MSS files.

```
        Examples:  MSSDELETE MYFILE
                                  ^-- same as HFT DELETE "MYFILE"

                   MSSD F1,F2,F3,F4,F5
                                  ^-- delete 5 MSS files
```

MSSNEWCHRG

Change the account number on your MSS files.

Examples: MSSNEWCHRG 1222233344 1234567890
^-- change job order number for
all files currently stored with
account number 1-2222-333-44 to
1-2345-678-90

*** Using the MSS from the CDC CYBER 860 ***

The MSS is just a peripheral on the CDC CYBER 860 and is under the control of NOS. All NOS files on the CYBER 860, whether they reside on disk or the MSS, are accessed by the standard NOS permanent file commands.

NOS/VE does not have direct access to the MSS. The following commands provide access to the Mass Storage System. A description of their syntax may be found in Appendix H.

CHANGE_LINK_ATTRIBUTES (chala)
Change individual link attributes for communication between dual-state partners.

```
Examples:  chala pw=mymsspw
                          ^-- required to access the MSS
                              (see also MSACCES)
```

DISPLAY_LINK_ATTRIBUTES (disla)
Display individual link attribute values.

```
Examples:  disla
           CHARGE  :
           FAMILY  : nlfam
           PROJECT :
           USER    : AMDS
```

GET_FILE (getf)
Copy a NOS file to NOS/VE.

```
Examples:  getf  my_file  myfile
                          ^-- Get MSS file MYFILE and store
                              as NOS/VE file MY_FILE
```

REPLACE_FILE (repf)
Copy a NOS/VE file to NOS direct file, replacing any existing file.

```
Examples:  repf  my_file  myfile
                          ^-- copies NOS/VE file MY_FILE to
                              MSS as MYFILE, replacing any
                              existing MSS/NOS file with the
                              same name
```

MSACCES Access the Mass Storage System.

```
        Examples:    MSACCES  mymsspw
```

MSAUDIT Obtain a sorted audit of your MSS files.

```
        Examples: MSAUDIT          <-- short audit of your MSS files

                  MSAUDIT,LO=F,SPW=Y
                                ^ -- full audit showing each file's
                                     password, if any

                  MSAUDIT  audout  s  UN=other
                                ^-- short audit of another user's
                                    files you are allowed to see
                                    with output in file AUDOUT in

                  MSAUDIT  F='V******'
                                ^-- all files starting with "V"
                                    your current catalog
```

MSCATLIST The NOS CATLIST command.

MSCHANG Change the attributes of a Mass Storage System file.

```
        Examples: MSCHANG  myfile  CT=PU
                                ^-- make MYFILE a public file

                  MSCHANG,myfile,CP=1
                                ^-- change the account number

                  MSCHANG  myfile  NFN=newfile  M=E
                                ^-- change the name of the file and
                                    make it execute-only
```

MSFETCH Fetch a file from the Mass Storage System.

```
        Examples: MSFETCH,mssfyl1,in1
                                ^-- MSSFYL1 is retrieved and stored
                                    as file IN1 in your current
                                    catalog
                  MSFETCH  mssfyl2  in2  D64
                                ^-- MSSFYL2 is retrieved, converted
                                    from 64-character NOS Display
                                    Code and stored as file IN2 in
                                    your current catalog
```

MSPASSW Change your Mass Storage System access password.

```
Examples:  MSPASSW,OLD=mymsspw,NEW=numsspw
             -or-
           MSPASSW  mymsspw  numsspw
             -or-
           MSPASSW  N=numsspw  O=mymsspw
                          ^-- the above are the same
```

MSPURGE Purge a file on the Mass Storatge System.

```
Examples:  MSPURGE  F=mymss1
                          ^-- purge MSS file MYMSS1

           MSPURGE  (f1,f2,f3,f4,f5)
                          ^-- purge MSS files F1, F2, F3, F4,
                              and F5
```

MSSTORE Store a file on the Mass Storage System.

```
Examples:  MSSTORE,in1,mssfyl1
                          ^-- IN1 is stored as private, direct
                              file MSSFYL1
           MSSTORE  in2  mssfyl2  D64  PW=fylepw
                          ^-- IN2 is stored as private file
                              MSSFYL2 (even if MSSFYL2 already
                              exists) in CDC Display Code --
                              FYLEPW is the password required
                              for another user to access the
                              file -- if MSSFYL2 does not
                              exist, this will be a direct file

           MSSTORE  in3  mssfyl3  A6   I  PU
                          ^-- IN3 is stored as public, indirect
                              file MSSFYL3 in 64-character
                              Display Code
```

***** DEC VAXcluster -- VMS *****

The Digital Equipment Corporation (DEC) VAXcluster has two 8550 central processing units (CPUs) or nodes, each with 48 megabytes of memory, which share files and are linked together. Access is via DTNET. A separate VAX 6410 for secure processing is located at Carderock and is accessed in the secure computer room.

*** VMS Version 5.3 ***

The operating system for the DEC VAXcluster and the VAX 6410 at DTRC is called VMS, version 5.3-1.

Permanent files (user programs and data files retained for frequent use) reside on disk drives and the Mass Storage System. User files, if not specifically requested on a tape, will be assigned to available disk areas.

*** Accessing the VAXcluster ***

To access the VAXcluster, set your terminal to 8-bit, no parity, then:

- dial (301) 227-5200 <-- this will connect you with DTNET at 1200 baud (see page 1-1-4 for higher speeds)
- after the phone call completes, or if you are hardwired into DTNET, press the RETURN key until it displays the DTNET> prompt
- enter "connect dt4" (or "c dt4") to connect to DT4 (similarly for DT3)
- in response to the Username: prompt, enter your User Initials
- in response to the Password: prompt, enter your login password (the default VAX prompt is $)

*** Login Password ***

Your initial login password is your username, usually your user initials. This is entered in response to

Password:

the first time you log in. This password MUST be changed during your first session.

To change your login password, type

SET PASSWORD

You will be prompted for the current password, the new password, and the new password again (to insure there were no transmission problems).

Your password should be changed frequently, and must be changed at least every 90 days.

*** Logout Procedures ***

To terminate your session, get rid of any unwanted permanent files (remember that new versions of a file may be made frequently during the session with up to five retained and costing you money). You may also want to get rid of any journal files made by EDT (.JOU) or EVE (.TJL).

When this is done, or immediately, if the Central Site operator requests it, type LOGOUT. A time and usage summary of the session and a cost estimate will be displayed.

You will be returned to your DTNET session. To leave, type "L". This will disconnect the phone, if you have dialed in.

Note

If you do not type anything for about 13 minutes, you will be logged off VMS automatically. You are given a 5-minute warning.

*** System News ***

At login, a system bulletin may be displayed. For more details, type NEWS. To see earlier news items, type OLDNews. To see ancient news items, type VERYoldnews.

*** Login Procedure File ***

A Login Procedure File is a file in your home directory with the name LOGIN.COM. It contains commands to be executed each time you log in before you are given the $ prompt. Commands and qualifiers should be spelled in full to allow for possible future changes in the operating system.

Any command may be in LOGIN.COM. You may want to see who is logged in ($ SHOW USERS /FULL), or look at your home directory files ($ DIRECTORY) or all your files ($ DIRECTORY [...]), or define one or more of your HELP libraries ($ ASSIGN UOn:[myid]mylib HLP$LIBRARY_5). You should also define your home directory with a logical name (such as your first name, but NOT your username) using ($ DEFINE myname UOn:[xxxx]). Then, you need only type myname: to refer to your home directory, which you may need to do frequently. For suggestions of other commands, symbols and logical names you might include, type "HELP LOGIN.COM_Hints".

*** Files ***

1. Because VMS at DTRC automatically deletes the low version number when more than 5 versions of a file are created, you should not use different versions of a file for different purposes. Instead use the file type field.

2. To reduce your file space and, therefore, your costs, you may wish to do a "PURGE [xxxx...]" every now and then to remove all low versions (or "PURGE [xxxx...] /KEEP=2" to keep the highest two versions.

3. When editing with EDT or EVE, a journal file is created of all your editing commands for use in re-editing your file if your editing session is aborted (^Y or a line disconnect). (If your editing session ends normally (EXIT or QUIT), the journal file is deleted.) You should check periodically for any journal files and delete them if they are no longer needed. Use the command "DIRectory /DATE [...]*.JOU,*.TJL" to see them.

*** Batch Jobs ***

A batch job is a procedure which is submitted by the SUBMIT command. By default, the job will be executed on either DT3 or DT4. If your job must run on a specific node, use the /QUEUE=DTn_BATCH qualifier (n is the desired node number). See page 1-3-1 ff for a table of the nodes on which specific software is available.

** Killing Batch Jobs **

When a job is SUBMITted, a message is displayed giving the "entry number". When the job goes into execution, it has a "process ID". To find out these numbers, use

```
$ SHOW QUEUE *BATCH      <-- all VAXcluster batch queues
$ SHOW SYSTEM            <-- process ID and entry number on current
                             node (if the job is in execution)
```

To delete a job which has not gone into execution:

```
$ DELETE  SYS$BATCH  /ENTRY=entry
```

To delete an executing job:

```
$ DELETE  node_BATCH  /ENTRY=entry     <-- any node
   -or-
$ STOP    /ID=pid                      <-- current node -- pid is
                                           last 4 digits of process
                                           ID (leading zeros may be
                                           omitted)
```

*** Accessing Other Networks ***

DTRC also has access to the following networks:

DDN - the Defense Data Network (with connection to INTERNET)
(host tables allow transfer to some other networks)

OASYS - the DTRC Office Automation System

The following can be reached from our DECnet using SET HOST:

NAVSEA node names: SEAHUB, SEAA, SEAB, SEAC, SEAD, SEAE

** Checking Host Accessibility **

Host accessibility may be verified on the VAX using the FINDHOST command. FINDHOST will search a downloaded version of the name server host tables. You may enter the address, the host name, or any portion of either the host name or address. A listing will be given of all entries that meet the specified search. The search string will be highlighted in the resulting list.

$FINDHost <string>

-or-

SFH <string>

If the requested string is not matched, you will get a message that there were no matches. Call User Services for more information.

** Transferring VMS Files To and From OASYS **

While logged into DTn:

```
ftp dtrc.dt.navy.mil    <-- File Transfer Protocol to OASYS
   -or-                     (dtrc) via Ethernet
ftp dtrc
login                   <-- to log into OASYS
<user name>             <-- your OASYS user name
<password>              <-- your OASYS password

get                     <-- get a file from OASYS
<OASYS filename>
<VMS filename>

put                     <-- send a file to OASYS
<VMS filename>
<OASYS filename>

bye                     <-- leave ftp
```

** Transferring VMS Files To and From CDC CYBER 860 **

While logged into DTn:

```
ftp cdc860              <-- connect to CDC CYBER 860 / MSS
<CR>                    <-- your name
<password>              <-- your MSS password
<account number>        <-- if requested

get                     <-- get a file from MSS
<MSS filename>
<VMS filename>

put                     <-- send a file to MSS
<VMS filename>              e.g., to make a public indirect
<MSS filename>              file:
                               put myfile.dat 'myfile/ia,ct=pu'

bye                     <-- leave ftp
```

See also page 5-1-8.

** Mail to Users at Other Sites **

Mail may be sent to users at other sites which are accessible via DDN. This is one way to transfer large (or small) text files. Use FTP, Kermit, or some other protocol for binary files.

While logged into VMS:

```
$ mail
MAIL> send
To: wins%"<user@hostname>"    <-- where some typical hostnames
...                               are: dtrc.dt.navy.mil,
                                  dtoal.dt.navy.mil,
                                  icst-is.arpa, gwuvax.gwu.edu)
```

For example, to send a message to "sommer" on dtrc (OASYS B system) from node DT4:

```
$ mail
MAIL> send
To: wins%"sommer@dtrc"        <-- the brackets are optional
...
```

Mail is sent via the VMS mail utility and the Simple Mail Transfer Protocol (SMTP). The "To:" address has one of the following forms:

Destination	Address Syntax	Utility
same VAX	user	local VMS mail
same network	node::user	DECnet
another VAX	wins%"<user@host>"	SMTP
remote host	wins%"<user@host>"	SMTP
remote host routed through other hosts on your network	wins%"<@host,@host:user@host>"	SMTP
remote host on another network routed through a gateway	wins%"<@host,@gateway:user@host>"	SMTP

Note that local VMS and DECnet mail is sent immediately; SMTP mail is sent every 20 minutes.

** Mail From Users at Other Sites **

The following are the Ethernet addresses for CCF computers as of the date of this page. Type "HELP @CCF Network_addr" on the VAX for an up-to-date list.

	computer		address	
	oasys		130.46.1.53	
	dtoa1		130.46.1.2	
	dtrc		130.46.1.3	
	dtoa3		130.46.1.4	
	dtix		130.46.1.5	
	nems		130.46.1.6	
	dt70		130.46.1.7	
	dt18		130.46.1.8	
	dtvms3		130.46.1.12	(DT3)
	dtvms	dtvms4	130.46.1.10	(DT4)
*	cdc860	nos	130.46.1.16	
*, **	sn417		192.91.138.5	(Cray UNICOS)

To access these via DDN add ".dt.navy.mil", e.g., dtvms.dt.navy.mil. Thus, the address for mail to be sent to user ABCD on the VAXcluster via DDN is "abcd@dtvms.dt.navy.mil".

---

* - No mail. This is listed to show the network address.

** - Available only when UNICOS is up.

***** Help Libraries *****

A help library (file type .HLB) contains help modules, that is, modules that provide information about a program, subprogram, procedure, or some general help information such as hints on how to do something. It is created and accessed using the following DCL commands:

LIBRARY	Create, maintain, list, and extract modules from a help library.
HELP	Display the desired helps.

*** The System Help Library ***

The system help library is read using the DCL command HELP. It provides help about the HELP program and lists many topics (VMS features, DCL commands, Hints, and other general information).

*** DTRC Help Libraries ***

Four help libraries have been added to VMS at DTRC:

- CCF - General information about the Computer Center
- CRAY - Routines added to Cray at DTRC
- DTLIB - Subprograms in library DTLIB (Cray, CDC NOS, VMS)
- UTILITIES - Utility programs and procedures

When executing the HELP command, the additional help libraries are accessed by entering '@name', where 'name' is one of the help libraries listed above (e.g., @DTLIB) in response to 'Topic?'. For a table of contents of any of the above libraries, type

```
HELP @name Contents
```

*** User Help Module ***

A help module (default file type .HLP) is a file containing all the help information for one or more programs, procedures, etc. Column 1 of each line identifies the different sections of the help module. A digit indicates a keyword; a slash (/) indicates a qualifier; anything else is part of the help text. For example,

```
1 key-1                     <-- HELP topic
   ...
 help message text
   ...
2 key-2                     <-- HELP sub-topic
   ...
 help message text
   ...
n key-n
   ...
 help message text
   ...
1 key-1                     <-- next HELP topic
```

A "1" line gives the topic name (up to 15 characters, avoid using b'anks; replace blanks with an underscore (_)). A "2" line is a sub-topic of the "1"-level topic; a "3" line is a sub-topic of the most recent "2"-level sub-topic; etc. Qualifiers (/ in column 1) will be listed separately by HELP and will all be displayed if the (sub)topic they qualify is selected.

A help module might look something like:

```
1 topic
 <description of topic>
2 Qualifiers
 <optional description of qualifiers>
/topic_qualifier_1
 <description of topic_qualifier_1>
/topic_qualifier_2
 <description of topic_qualifier_2>
/topic_qualifier_3
 <description of topic_qualifier_3>
2 sub-topic_1
 <description of sub-topic>
3 sub-topic_of_sub-topic_1
 <description of sub-sub-topic>
3 Qualifiers_of_sub-topic_1
 <optional description of qualifiers>
/sub-topic_1_qualifier_1
 <description of qualifier_1 of sub_topic 1>
/sub-topic_1_qualifier_2
 <description of qualifier_2 of sub_topic 1>
...
```

*** Hints For Designing Help Displays ***

While help messages can continue without interruption, you may wish to format the messages to fit the screen display. A topic ("1" in column 1) will have 17 lines in the first display; a sub-topic ("2" in column 1) will have 15 lines; a sub-sub-topic ("3" in column 1) will have 13 lines; etc. For all levels, the second and following displays have 20 lines. Level 1 lines should not exceed 78 columns; level 2 lines should not exceed 76 columns; level 3 lines, 74 columns; etc. Longer lines may "wrap around".

Every help library should have a module called "HELP" to describe the help library.

You may wish to have a table of contents module (suggested name "Contents") to list the routine names and give a short description of what each routine does.

If possible, the first help screen for a program, subprogram or procedure should contain all that is needed to use it. Definitions of parameters and qualifiers should be put into sub-topics.

*** Selecting (Sub)topic Names ***

While you may choose anything you want for topic and sub-topic names, we recommend the following conventions:

- use upper case for routine names, parameters, and qualifiers (e.g., AUXPRINT, /CC, /HEADER, JGDATE, FLR below)
- use lower case (first letter upper case) for general information (e.g., Parameters, Qualifiers, Examples, Admin_info below)
- replace blanks with underscores (_) so that the name will be listed as a single element by HELP (e.g., Admin_info below)

*** Create a Help Library ***

The LIBRARY command is used to create a help library.

```
LIBRARY /HELP /CREATE  help_library_name

        -or-

LIBRARY /HELP /CREATE=(option,...)  help_library_name
```

where help_library_name is the name of the library to be created. It will have the default filename help_library_name.HLB.

The following options may be specified:

BLOCKS:n The number of 512-word blocks to be allocated. (default: 100)

HISTORY:n The maximum number of library update history records to be maintained. (default: 20)

KEYSIZE:n The maximum length of module names. (default: 15)

MODULES:n The maximum number of modules the library can hold. (default: 256)

*** Modify a Help Library ***

The LIBRARY command is used to insert, and delete help library modules. Wildcards are allowed in module names.

```
LIBRARY /HELP /INSERT   help_library_name  help_module_name

LIBRARY /HELP /REPLACE  help_library_name  help_module_name

LIBRARY /HELP /DELETE=(module[,...])  help_library_name
```

'LIBRARY /HELP help_library_name help_module_name' is the same as if '/REPLACE' were specified. If '/LOG' is specified, a messages will be displayed for each operation done. (E.g., LIBR /HELP /LOG ...)

*** Compress a Help Library ***

After several inserts, deletes or replaces, there may be a lot of "dead space" in the library. To remove this, that is, to compress the library, use:

```
LIBRARY /HELP /COMPRESS  help_library_name

        -or-

LIBRARY /HELP /COMPRESS=(option,...)  help_library_name
```

/LOG will list the modules as they are copied into the compressed library.

The options available are the same as for /CREATE.

*** List the Contents of a Help Library ***

The LIBRARY command also lists the contents of a help library. The /LIST qualifier, which may be specified alone or with any of the above operations, will provide information about the library including a list of the modules in the library. If /FULL is also specified, the list of modules will include the date and time it was inserted into the library. If /HISTORY is specified, it will show who did what to the library and when. The number of history records retained is defined when the library was created or compressed.

For a list of the library without other operations, use

```
LIBRARY /HELP /LIST                    -or-
LIBRARY /HELP /LIST /FULL              -or-
LIBRARY /HELP /LIST /FULL /HISTORY
```

The list will be displayed on SYS$OUTPUT. To put the listing into a file, use /LIST=filespec.

To list information about specific modules, use /MODULE=(list) where <list> is a comma-separated list of module names with wildcards allowed. The default is /MODULE=*.

To list information about modules inserted after a certain time, use /SINCE (for those inserted today) or /SINCE=date_and_time (for those inserted after a specific date and/or time (e.g., /SINCE=09:00 for those after 9 AM today).

*** Extract a Help Module ***

To extract a help module to make some modifications to it, use

```
LIBRARY /HELP /EXTRACT=(module[,...])
              /OUTPUT=file-spec
              help_library_name
```

If /OUTPUT is specified, the modules are put into file <file-spec>. If /OUTPUT is omitted, they are put into file help_library_name.HLP.

Wildcards are allowed in module names.

*** Accessing your Help Library ***

To access you help library, use

```
HELP /LIBRARY=filespec  [ topic  [ sub-topic ]  ]
```

where <filespec> must be complete (e.g., U09:[abcd]mylib), not just the filename.

*** Adding Your Help Library to the System Helps ***

The DCL HELP command supports many user libraries in addition to the system library. User libraries are added by assigning help library names to HLP$LIBRARY_n, where n is omitted or a digit. HLP$LIBRARY through HLP$LIBRARY_4 are already defined at LOGIN. You may add your own help libraries starting with HLP$LIBRARY_5. For example, you may wish to put

```
$ DEFINE  /NOLOG  HLP$LIBRARY_5  UOn:[myid]mylib1
$ DEFINE  /NOLOG  HLP$LIBRARY_6  UOn:[myid]mylib2
```

into your LOGIN.COM file so that your help library will always be part of the system HELP command for you. The first missing number (in this case "7") will end the list. These will be listed at the end of the last screen of the topic display. To access library "5" above, use "HELP $mylib1", or "@mylib1" at the Topic? prompt.

*** Using HELP ***

The HELP command access the system help library ("HELP"), your library set ("HELP @libname"), or any other help library ("HELP /LIBRary= filespec").

On initial entry into a help library, the help module is displayed, if present, a list of topics, and, perhaps, the library set. At the "Topic?" prompt, enter the name of the topic for which you want help. Only as many characters as are needed to uniquely identify the topic are required. If the name is not unique, all matching topics are displayed.

After the topic has been displayed (may be more than one screen), a list of additional information (sub-topics) may also be shown. At the prompt, enter the sub-topic name.

When you have finished with a level, press RETURN to go up one level. Pressing RETURN at the "Topic?" prompt exits the HELP command. At any prompt (even in the middle of typing an entry, ^Z (CTRL-Z) will terminate HELP.

Enter a question mark (?) at any time to display the most recent (sub)topic again. The actual help displayed depends on how you got to the current level. The RETURN key should not be pressed with the "?", since the "?" is recognized immediately. (If a help library is entered from a program other than the HELP command, the RETURN is required after the "?".)

If you have forgotten the names of the additional (sub)topics, just enter something you know is not a (sub)topic name (in most cases, "ZZ" is sufficient). This will display an error message and show the valid (sub)topic names.

The up-arrow key may be used to bring back your most-recent entry, which may be edited and resubmitted.

*** Sample Help Modules ***

The following are sample help modules for a program, a subprogram, a procedure, general information; and a HELP help module.

** A Program **

The following is a portion of the help module for the AUXPRINT program.

```
1 AUXPRINT                                                  <-- topic
 List a file on an auxiliary printer (one attached to an
 interactive terminal).

   Format:                                        !  Defaults

      AUXPRINT  file-spec  [ /[NO]CC      ]      !  /NOCC
                           [ /[NO]HEADER  ]      !  /NOHEADER
                           [ /LENGTH=1    ]      !  /LENGTH=66
                           [ /SKIP=s      ]      !  /SKIP=0;
                                                 !  /SKIP ==> /SKIP=10
                           [ /WIDTH=w     ]      !  /WIDTH=80;
                                                 !  /WIDTH ==>
                                                          /WIDTH=132


2 Parameter                                                 <-- sub-topic
 file-spec

 Specifies the name of the file to be printed.

 If omitted, you will be prompted for it.

 Defaults:  extender - .DAT; filename - FOR002

2 Qualifiers                                                <-- sub-topic
 The qualifiers may follow the command name or the file-spec.  If a
 qualifier is specified more than once, only the final value is
 retained.

/CC

 /CC
 /NOCC

   Specifies whether the file has carriage control in column 1 of
   each line.

 Default: /NOCC (that is, the file does not have carriage control
          in  column 1)
```

/HEADER

/HEADER
/NOHEADER

Determines whether the listing will have a heading giving the date and file-spec.

Default: /NOHEADER

2 Admin_info <-- sub-topic

Language: VAX/VMS Fortran 77

Authors: Dan Allen - DTRC Code 189.2
David V. Sommer - DTRC Code 3511

Date written: 10/81 (da)

Dates revised
03/14/85 - dvs - add qualifiers /CC /HEADER /LENGTH /SKIP
10/22/85 - dvs - shorten /CC output by 1 line
systems - change default to /NOHEADER
03/07/86 - dvs - add /WIDTH qualifier
- fix /CC processing when first top-of-page is not first record

** A Subprogram **

This illustrates a subprogram help module. We suggest that such a help have the following sub-topics:

- Parameters (if the routine has them)
- Examples (at least one example to show how to use the routine)
- Admin_info (to show the source language, author, a brief history, and anything else that might be appropriate)

```
1 JGDATE                                                    <-- topic
 Convert any Gregorian date to a relative Julian number or vice versa.

 Usage:   INTEGER jg, jd, gyear, gmonth, gday
             ...
          CALL JGDATE (jg, jd, gyear, gmonth, gday)

 The relative Julian number corresponding to a Gregorian date is the
 number of days since 11/24/-4713 (extrapolating the Gregorian calendar).

 This subroutine is useful in determining the elapsed number of days
 between any two calendar dates.  It can also be used to find the
 calendar date so many days from any given date.
2 Parameters                                                <-- sub-topic
 CALL JGDATE (jg, jd, gyear, gmonth, gday)

        jg     - in  - int - direction of conversion
                             1 - Gregorian to Relative Julian
                             2 - Relative Julian to Gregorian
  jg=1: jd     - out - int - will contain relative Julian number
        gyear  - in  - int - Gregorian year (e.g., 1985)
        gmonth - in  - int - Gregorian month (1-12)
        gday   - in  - int - Gregorian day (1-31)

  jg=2: jd     - in  - int - relative Julian number
        gyear  - out - int - will contain Gregorian year (e.g., 1985)
        gmonth - out - int - will contain Gregorian month (1-12)
        gday   - out - int - will contain Gregorian day (1-31)

2 Examples                                                  <-- sub-topic

        INTEGER jd, gy, gm, gd
           ...
        CALL JDDATE (1, jd, 1985, 2, 25)
        jd = jd + 1000
        CALL JGDATE (2, jd, gy, gm ,gd)

 This example will find the date 1000 days from 02/25/85.
```

2 Admin_info <-- sub-topic

Language: Fortran 77

Author: David V. Sommer - DTRC Code 3511

Date written: 1968 or earlier

Dates revised
03/01/79 - implement on Burroughs 7700
02/01/85 - implement on DEC VAXcluster

** A Command Procedure **

The procedure FLR has the following definition for all users:

```
$ FLR :== @VSYS:FLR
```

Without this definition, the "Format" would have

```
@VSYS:FLR [ filename]
```

1 FLR <-- topic
Compile Fortran, Link and Run.

Format:

```
FLR [ filename ]
```

If filename is omitted, you will be prompted for it.

For execution, FOR005, FOR006 and SYS$INPUT are assigned to the terminal. Thus, all Fortran READ, PRINT, READ (5,..., WRITE (6,..., TYPE, and ACCEPT statements will read from or write to the terminal.

Ignore the system message "previous value of SYS$INPUT has been superseded".

** General Information **

The following is a portion of the help module for a discussion of the DTRC accounting for users with more than one account. This module has no sub-topics.

1 Many_accounts
VAXcluster users with more than one account are assigned a username/ password for each account. These usernames differ in the fifth character position, e.g., CAWE, CAWEA, CAWEB. The default login directory for each user is device:[username] where all files owned by the same individual are stored on the same device. For example,

```
U01:[CAWE]
U01:[CAWEA]
U01:[CAWEB]
```

ACCESSING FILES OWNED BY YOUR ALTER EGO

The "usernames" belonging to a particular user are members of a VMS "group". By default on the VAXcluster, members of a group have Read and Execute access to all files owned by their fellow group members. User CAWEA wishing to access a file owned by CAWE simply references [CAWE]file.ext .

Of course, these access rights can be changed by the SET PROTECTION and SET FILE /ACL commands. In addition, all members of these special "groups" have GRPPRV privilege which, when invoked, gives a member of the group full control, including file creation and deletion, over all files owned by all members of the group. GRPPRV is invoked by

```
$ SET PROCess /PRIVileges=GRPPRV
```

(this would likely be in your LOGIN.COM)

Then to "copy" a file from one account to another, for example CAWE to CAWEA, user CAWEA would

```
$ COPY  [CAWE]file.ext  []
```

or user CAWE would

```
$ COPY  file.ext  [CAWEA]
```

To simply "move" a file from one account to another, CAWEA would

```
$ RENAME  [CAWE]file.ext  []
$ SET  FILE  /OWNer_uic=CAWEA
```

Finally, the command MYACcount will indicate the account number of the current session or job, while MYACcount /ALL will provide a list of all user/account pairs in the group.

** "HELP" module **

It is recommended, though not necessary, that your help library have a help module named HELP. Such a module will be displayed when you enter the library, and, therefore, should give a brief description of the library and, if appropriate, pointers to related libraries.

The following is the help module HELP for library @CCF:

```
1 HELP
 The CCF help modules provide information of general interest to users
 of the DTRC Central Computing Facility.

 Other help libraries available include:

      @CRAY      - DTRC additions to Cray
      @DTLIB     - subprograms in library DTLIB (formerly NSRDC)
      @UTILITIES - utility programs and procedures

 Last modified: 31-JUL-1990 13:05:35
```

***** Procedures *****

A procedure is a group of control statements in a file (default file type .COM). Calling a procedure provides a simplified way to process that group of control statements. A procedure may call another procedure.

Eight parameters, P1 through P8, are available for you (or another procedure) to pass data or other information to a procedure.

Both string and integer variables may be used in a procedure. Several lexical functions are available to interrogate the system, to manipulate variables, etc. Files may be read or written. And, of course, DCL statements may be executed.

*** DTRC Procedures ***

Type HELP @UTILITIES CONTENTS for a list of procedures (and programs) which have been added to the DTRC VAX/VMS system.

***** Object Libraries *****

An object library (file type .OLB) contains compiled subprograms for use in linking with a program.

The Librarian utility LIBRARY is used to create, maintain, list, and extract modules from an object library.

*** DTRC Object Library ***

One object library has been added to VMS at DTRC:

VSYS:DTLIB - Subprograms written or maintained by the Computer Center

To use: LINK yourobj,DTIB/LIB

*** User Object Module ***

An object module (file type .OBJ) is a file containing one or more compiled subprogram(s). They are produced by compiler such as FORTRAN, COBOL, PASCAL, etc.

*** Create an Object Library ***

The LIBRARY command is used to create an object library.

```
LIBRARY /CREATE  object_library_name

        -or-

LIBRARY /CREATE=(option,...)  object_library_name
```

where object_library_name is the name of the library to be created. It will have the default filename object_library_name.OLB.

The following options may be specified:

BLOCKS:n The number of 512-word blocks to be allocated. (default: 100)

GLOBALS:n The maximum number of global symbols the library can contain. (default: 128)

HISTORY:n The maximum number of library update history records to be maintained. (default: 20)

KEYSIZE:n The maximum length of module names.
(default: 15)

MODULES:n The maximum number of modules the library can hold.
(default: 256)

*** Modify an Object Library ***

The LIBRARY command is used to insert, and delete object library modules. Wildcards are allowed in module names.

LIBRARY /INSERT object_library_name object_module_file

LIBRARY /REPLACE object_library_name object_module_file

LIBRARY /DELETE=(module[,...]) object_library_name

'LIBRARY object_library_name object_module_file' is the same as if '/REPLACE' were specified. If '/LOG' is specified, a message will be displayed for each operation. (E.g., LIBR /LOG ...)

If object_module_file contains several object modules, each will be a separate entity in the object library.

If the qualifier /NOGLOBALS is specified, the global symbols for the modules being inserted will not be put into the global symbol table.

*** Compress an Object Library ***

After several inserts, deletes or replaces, there may be a lot of "dead space" in the library. To remove this, that is, to compress the library, use:

LIBRARY /COMPRESS object_library_name

-or-

LIBRARY /COMPRESS=(option,...) object_library_name

/LOG will list the modules as they are copied into the compressed library.

In addition to the options available for /CREATE:

KEEP Copy the history records, etc., to the compressed library.
(default: do not copy)

*** List the Contents of an Object Library ***

The LIBRARY command also lists the contents of an object library. The /LIST qualifier, which may be specified alone or with any of the above operations, will provide information about the library including a list of the modules in the library. If /FULL is also specified, the list of modules will include the date and timeit was inserted into the library. If /HISTORY is specified, it will show who did what to the library and when. The number of history records retained is defined when the library was created or compressed.

For a list of the library without other operations, use

```
LIBRARY /LIST                -or-
LIBRARY /LIST /FULL          -or-
LIBRARY /LIST /FULL /HISTORY
```

The list will be displayed on SYS$OUTPUT. To put the listing into a file, use /LIST=file-spec.

If the qualifier /NAMES is specified, the names of all global symbols will also be listed.

*** Extract an Object Module ***

To extract an object module to make some modifications to it, use

```
LIBRARY /EXTRACT=(module[,...]  /OUTPUT=file-spec
        object_library_name
```

If /OUTPUT is specified, the modules are put into file <file-spec>. If /OUTPUT is omitted, they are put into file object_module_name.OBJ.

*** Linking with an Object Library ***

If your program uses subprograms in an object library, they can be linked using

```
LINK  your_obj, your_lib/LIBrary
```

where your_obj is the object module for your program
your_lib is your object library
/LIBrary tells the linker that your_lib is an object library

If you are linking more than one object file or using more than one object library, you might use one of the following forms:

```
LINK obj1, obj2, lib1/LIB
LINK obj1, obj2, lib1/LIB, lib2/LIB
LINK obj1, obj2, lib1/LIB, obj3
LINK obj1, obj2, lib1/LIB, obj3, lib3/LIB
```

etc.

***** Text Libraries *****

A text library (file type .TLB) contains text modules, that is, modules containing source programs, documents, notes, data, etc.

The Librarian utility LIBRARY is used to create, maintain, list, and extract modules from a text library.

*** DTRC Text Libraries ***

The following text libraries have been added in VSYS: at DTRC.

DTLIB - Source code for subprograms in library VSYS:DTLIB.OLB

DTLIBCRAY - Source code for subprograms in library DTLIB on the Cray

INCLUDE - Some common block and code segments to INCLUDE in a program or subprogram

UTILITIES - Source code for programs which have been added to VSYS:

*** User Text Module ***

A text module (default file type .TXT) is a file containing a source program, a document, some miscellaneous information, etc.

*** Create a Text Library ***

The LIBRARY command is used to create a text library.

```
LIBRARY /TEXT /CREATE  text_library_name

        -or-

LIBRARY /TEXT /CREATE=(option,...)  text_library_name
```

where text_library_name is the name of the library to be created. It will have the default filename text_library_name.TLB.

The following options may be specified:

BLOCKS:n The number of 512-word blocks to be allocated. (default: 100)

HISTORY:n The maximum number of library update history records to be maintained. (default: 20)

KEYSIZE:n The maximum length of module names. (default: 15)

MODULES:n The maximum number of modules the library can hold. (default: 256)

*** Modify a Text Library ***

The LIBRARY command is used to insert, and delete text library modules.

```
LIBRARY /TEXT text_library_name  text_module_file  /INSERT

LIBRARY /TEXT text_library_name  text_module_file  /INSERT
                                                   /MODULE=module_name

LIBRARY /TEXT text_library_name  text_module_file  /REPLACE

LIBRARY /TEXT text_library_name  text_module_file  /REPLACE
                                                   /MODULE=module_name

LIBRARY /TEXT text_library_file  /DELETE=(module[,...])
```

"LIBRARY /TEXT text_library_name text_module_file" is the same as if "/REPLACE" were specified. If "/MODULE=..." is omitted, the module name will be the filename without the file type. If "/LOG" is specified, a message will be displayed for each operation. (E.g., LIBR /TEXT /LOG ...)

Wildcards are allowed in the module names when deleting.

*** Compress a Text Library ***

After several inserts, deletes or replaces, there may be a lot of "dead space" in the library. To remove this, that is, to compress the library, use:

```
LIBRARY /TEXT /COMPRESS  text_library_name

        -or-

LIBRARY /TEXT /COMPRESS=(option,...)  text_library_name
```

/LOG will list the modules as they are copied into the compressed library.

The options available are the same as for /CREATE.

*** List the Contents of a Text Library ***

The LIBRARY command also lists the contents of a text library. The /LIST qualifier, which may be specified alone or with any of the above operations, will provide information about the library including a list of the modules in the library. If /FULL is also specified, the list of modules will include the date and time it was inserted into the library. If /HISTORY is specified, it will show who did what to the library and when. The number of history records retained is defined when the library was created or compressed.

For a list of the library without other operations, use

```
LIBRARY /TEXT /LIST                  -or-
LIBRARY /TEXT /LIST /FULL            -or-
LIBRARY /TEXT /LIST /FULL /HISTORY
```

The list will be displayed on SYS$OUTPUT. To put the listing into a file, use /LIST=file-spec.

*** Extract a Text Module ***

To extract a text module to make some modifications to it, use

```
LIBRARY /TEXT /EXTRACT=(module[,...]) /OUTPUT=file-spec
        text_library_name
```

If /OUTPUT is specified, the modules are put into file <file-spec>. If /OUTPUT is omitted, they are put into file text_library_name.TXT.

Wildcards are allowed in the module names.

***** Editors *****

VAX/VMS has two widely-user text editors: EDT and EVE; and a Text Processing Utility (TPU) which can be used to create your own editor. EVE is a editor written in TPU. This chapter gives an overview of EDT and EVE.

*** The EDT Text Editor ***

EDT is used to create or modify a file. There are three modes for using EDT: line, keypad (which uses the full screen), and non-keypad. Line mode is very similar to NETED on the CDC CYBER 176 or 750.

** Invoking EDT **

EDT is executed by:

```
$ EDIT  /EDT  file
   or
$ EDIT  file          <-- /EDT is the default editor
```

where file may be a file specification or a logical name.

If the file is an existing file, the first line of the file will be displayed on the screen, followed by an * (the * is the prompt when in line mode). If the file does not exist, [EOB] will be displayed on the first line, followed by the * prompt. You are now ready to edit the file. A journal file of every command you enter is saved temporarily in filename.JOU. If EDT is terminated abnormally (including your session being disconnected), you can recover almost all of your editing by "EDIT /RECOVER file".

To change to screen mode, type "change" or "c" at the * prompt. To return to line mode, enter end-of-file (^Z).

** On-line HELP **

Help is available in both line mode and keypad (change) mode. In line mode, at the * prompt, type "HELP" or "HELP command". Keypad mode uses the PF2 commmand to invoke the help utility. EDT will paint a picture of the keypad and prompt you to push the key for which you need help.

** Terminating EDT **

There are two ways to leave EDT: "EXIT", which saves the file; and "QUIT" which does not save it. If, for some reason, you wish to save the journal file, "EXIT /SAVE" will save both the file and the journal file.

*** The EVE Editor ***

The Extensible VAX Editor, EVE, is a full-screen interactive text editor designed for use with VT100- and VT200-compatible terminals. Some features include multiple files and buffers, two windows, and some word processing commands. Advanced editing commands are entered through the use of a command line.

EVE has its own keypad. The EDT keypad may be used by typing "SET KEYPAD EDT" on the command line. In developing EVE, DEC has attempted to simplify the EDT keypad by reducing the number of keystrokes for each keypad command to one.

** Invoking EVE **

To begin an EVE session, enter

```
$ EVE
   -or-
$ EVE  file
```

A wildcard character, the asterisk, can be substituted for all or some of the characters in a long file name. If one file name matches the specification, that file is edited; otherwise, an error message is issued and no file is used. For example,

```
$ EVE getty.txt
$ EVE this_is_a_long_file_name.and_a_long_file_type
$ EVE this_*.and_*
```

** The Screen **

The screen is divided into four parts. The first part, the window, contains the file's text. If the file is empty, you will only see the [End of file] notice. The second part, the status line, is highlighted, contains the current buffer name, mode, and direction. The third, the command line, displays advanced EVE commands. The fourth part, the message window, displays both informative and error messages.

** On-line Help **

EVE has both keypad help as well as an extensive "word processing" format help menu.

** Terminating EVE **

There are two commands that allow you to leave the EVE environment. To terminate EVE and save the file, type end-of-file (^Z). This will create a new file or another version of an existing file. To leave EVE without saving your changes, press the DO key and then type QUIT. If your editing session ends abnormally, the "EVE /RECOVER file" command can be used to recover your session using journal file file.TJL.

*** Why Use EVE Instead of EDT? ***

EDT users should consider switching to EVE for the following reasons:

. EVE's use of windows allows editing multiple files simultaneously on the same screen. This is useful for making common changes to programs and subprograms or for moving lines from one file to another.

. EVE has more ways of extending the basic editor and saving those extensions for future sessions than EDT.

. EVE's string searching capability is much more flexible than EDT. It includes VMS and UNIX wildcard searching.

. EVE offers "spawn" and "attach" and "DCL" commands to allow the user to work outside of the current process and return to the same active EVE session.

. EVE supports the EDT keypad.

***** Magnetic Tape *****

Magnetic tapes should be used for sequential data for such purposes as:

- Transfer of information to and from other computers and off-line peripherals
- Files which are used infrequently
- Back-up copies of disk files
- Long-term storage of data

Tapes should not be used for scratch files or random information. For safety, two copies on different tapes should be maintained, or for data which is updated, a grandfather-father-son system is advised. It is not wise to mount a tape containing good data, read through it, and write new data at the end. Instead, copy the existing data to a second tape and add the new data to the second tape, retaining the first tape as a back-up.

Processing a file on tape will take considerably more I/O time than on disk and more elapsed time.

Information concerning the physical and logical characteristics of the tape is specified in control statements.

Nine-track tapes are supported on the DEC VAX and CDC CYBER 860 computers; 7-track tapes are supported on the CDC CYBER 860 (NOS only). There are no tape drives on the Cray, so tapes must be accessed via one of the front ends.

*** Tape Labels ***

Tapes may be labelled or unlabelled. Labels should always be used except when writing data for, or reading data from a computer which cannot handle ANSI standard labels.

In general, a labelled tape has volume and end-of-volume labels, and may also have user labels. Each file on the tape may have its own header and trailer labels.

*** Tape Formats ***

Generally, records on tape are fixed or variable length, blocked or unblocked, ASCII or EBCDIC (9-track), BCD (7-track), coded, or binary. Where possible, tapes written by or for another computer should be 9-track, 6250 or 1600 cpi, fixed length, blocked, ASCII.

*** Tape Care and Cleaning ***

Tapes should be stored in closed containers in racks which give them vertical support. Tapes may not be spliced. They should be read and rewound at least every six months. Logs should be kept on contents, format, and creation dates of tapes.

If a tape has many parity errors, cleaning it may help. Even a brand new tape may need cleaning. This off-line process does not destroy the information on the tape. If a tape receives heavy usage, cleaning it after ten or more uses may reduce the incidence of parity errors. A tape can also be certified, which determines whether there are any areas on the tape which do not record properly. Certification DESTROYS current information on the tape (except VSN). To change the VSN, contact the Tape Librarian and request blank labelling or degaussing.

If, after a tape has been cleaned, it still has many parity errors, call User Services to have the tape drive cleaned. If the tape continues to have parity errors, it should be exchanged for a new tape. The information on the old tape is not recovered automatically in this case.

To have a tape cleaned or certified, submit an off-line work request to the Tape Librarian. Users who are not at the Carderock site should call (301) 227-1967.

When possible, slot tapes should be in the Computer Room environment for at least two hours before reading or writing. This allows temperature and humidity to stabilize and should minimize tape problems.

Please notify Code 3511 (User Services), (301) 227-1907, of any unusual tape problems.

*** Tape Assignment ***

Two classes of tape storage are provided in the Computer Center, 'Library' and 'Slot'. Tapes which are used frequently should be permanently stored in the NA cabinet, which is accessible from the CYBER 860 or VAXcluster. These tapes are assigned a permanent external label indicating location by cabinet, shelf and position, such as 'NA2499', and are referred to as 'Library' tapes. The volume serial number (VSN) of a Library tape is the same as the external label and should usually be a labelled tape.

Tapes which are seldom used on the CDC CYBER or VAX computers, which are being transferred between systems, or which are normally retained by the owner are assigned a temporary slot number for up to 24 hours at the computer on which they are to be used. At the end of the day's processing (or earlier at the user's request), these are returned to the ADP Control Center for pickup by the user and will require a new slot number assignment for the next use.

The VSN for a slot tape is 'SLOTxx=id'
where xx is the assigned slot number
id is the user's external sticker on the tape reel (six (6) one-inch-high characters, please, for easy reading by the operator)

Tapes belonging to remote users may be sent to the Tape Librarian. Special slots may be assigned for several weeks' continuous usage (on the CYBER 860, these are C1-9, Y1-9, B1-9, R1-9; on VAXcluster these are V1-9, A1-9, X1-9, S1-9).

All tapes to be used in a job must be supplied by the user as Library tapes and/or Slot tapes. No scratch tapes are available.

Tapes stocked by the Computer Center are of 2400-foot nominal length (10.5 in. diameter). Smaller tapes may be used. For remote slot assignment, assignment of library tapes, or to arrange for the purchase of tapes, contact the Tape Librarian, (301) 227-1967. CYBER procedure BEGIN,TPGET may be used to acquire NA tapes.
Slot tapes may be signed in at the ADP Control Center.

*** Using Tapes on the DEC VAX ***

The DEC VAXcluster has four 9-track tape drives (6250/1600 cpi).

The following VMS control statements are used to access or analyze magnetic tapes:

ALLOCATE	Assign a tape drive to a logical name.
DEALLOCATE	Return a previously allocated device and disassociate the job's logical name from the tape drive.
DISMOUNT	Release a tape volume that was previously mounted.
INITIALIZE	Initialize a magnetic tape.
MOUNT	Mount a magnetic tape and, if labelled, check the label.

The following prodecures have been developed to handle the tape mounting and dismounting for you:

COPYD2T	Copy disk files to a VAX tape using COPY.
COPYT2D	Copy a VAX tape (written by COPY) to disk.
FILEMANAGER	An interactive procedure using the VMS BACKUP utility to create, add to, restore from, or list the contents of a backup tape.
RFTAPE	Read Foreign TAPE (copy tape-to-disk). Reads one or more files from a fixed, blocked or unblocked, ASCII or EBCDIC tape and saves them on disk.
WFTAPE	Write Foreign TAPE (copy disk-to-tape). Writes one or more disk files to a fixed, blocked or unblocked (ASCII or EBCDIC) tape.

** Examples **

1. Initialize a VAX/VMS tape:

```
$! TAPINIT.COM : initialize VAX/VMS tape, default is 1600
$!
$    if p3 .nes. "1600" .and. p3 .nes. "6250" then p3 = "1600"
$!
$    allocate mu: tape                ! get any available tape drive
$!
$    mount tape: /foreign /density='p3' -
                 /comment="mount slot''p1' vsn=''p2' ringin"
$    dismount tape /nounload
$    initialize tape 'p2'
$    deallocate tape
$    exit
$!
$! p1 - 1- or 2-digit slot number or NONE
$! p2 - 6-character VSN
$! p3 - density (6250 or 1600) defaults to 1600
$!
$! created 06/23/88 by CASG
$! last modified 06/24/88 @ 1146 by CASG (add "?" for help)
$!
$! End of TAPINIT.COM
```

The above is a portion of the actual procedure to show just the defaulting of density and how to initialize a tape. To see the full procedure, which includes validation of each parameter, and allows "?" for help for the procedure and each parameter, type "TYPE VSYS:TAPINIT.COM".

*** Using Tapes on the CYBER 860 ***

The CDC CYBER 860 has six 9-track tape drives (four for 6250/1600 cpi and two for 1600/800 cpi), and two 7-track tape drives (800/556 cpi). All drives are available to NOS; two 9-track (6250/1600 cpi) drives are available to NOS/VE.

** NOS **

The following NOS control statements are used to access or analyze magnetic tapes:

LABEL Mount a magnetic tape and, if labelled, check the label.

LISTLB List the labels of an ANSI-labelled tape.

RESOURC Specify that more than one tape drive is required.

TDUMP Octal and alphanumeric dump of all or part of a file.

VSN Associate a local file name with one or more volume serial numbers.

* Examples *

The following examples illustrate tape usage in batch jobs. Tapes may also be used interactively (without the job, USER and CHARGE statements).

1. Unlabelled NOS/BE tape to disk:

```
xxxx.            job statement.
USER,xxxx,upw.
CHARGE,1234567890.
DEFINE,disk/CT=PU.
LABEL,tape,F=SI,LB=KU,VSN=NA9999,D=1600,PO=R,R.
COPYBF,tape,disk,5.
UNLOAD,tape.
```

2. Copy old stranger (foreign) tape to new - 6250 multifile:

```
xxxx.
USER,xxxx,upw.
CHARGE,1234567890.
RESOURC,GE=1.                          <-- one additional tape drive
LABEL,t4,VSN=NA9998,D=GE,PO=W,W,F=S,L=softwstr.
VSN,t5=SLOTxx=CA9995.
LABEL,t5,PO=R,R,F=S,D=GE,L=softwstr.
COPY,t5,t4,EL=10,M=coded,PO=E.
UNLOAD,t5.
```

** NOS/VE **

The following NOS/VE control statements are used to access or analyze magnetic tapes:

CHANGE_TAPE_LABEL_ATTRIBUTES
: Change the current magnetic tape label attributes.

DETACH_FILE
: Detach one or more files from a job.

DISPLAY_BACKUP_LABEL_TAPE
: Display the current job default label type for a permanent file backup file on tape.

DISPLAY_TAPE_LABEL_ATTRIBUTES
: Display the current magnetic tape label attributes.

REQUEST_MAGNETIC_TAPE
: Associate a file with a magnetic tape.

SKIP_TAPE_MARK
: Position a tape backward or forward.

* Examples *

1. Read an unlabelled tape on VE:

```
/set_working_catalog       $user
/change_block_label_type   file_label=u
/request_magnetic_tape     file=$local.tape  ..
../                        external_vsn=mytape  ..
../                        type=mt9$1600
/copy_file  $local.tape    myfile1
/detach     $local.tape
```

2. Create a multi-file labelled tape:

```
/reqmt  file=$local.tape1  ..
../     external_vsn=TAPE02  ..
../     recorded_vsn=TAPE02  ..
../     ring=false  ..
../     density=mt9$6250
/chatla  f=$local.tape1  ..
../      rf=true
../      file_identifier=file1  ..
../      file_set_identifier=many1
/set_file_attributes  f=$local.tape1  ..
../                   block_type=user_specified_record  ..
../                   record_type=ansi_fixed  ..
../                   maximum_record_length=80
/copf    file1           $local.tape1
/chatla  f=$local.tape1  fi=file2
/copf    file2           $local.tape1
/chatla  f=$local.tape1  fi=file3
/copf    file3           $local.tape1
/distla  f=$local.tape1  do=current_file   " display label written
/detach  $local.tape1
```

***** Other Software *****

This chapter discusses various programming languages and other software packages available on the CCF computers.

ABAQUS A family of modeling capabilities based on the finite element method, designed to provide solutions to a wide range of mostly non-linear structural problems, and programmed around a common data management structure.

Execution: Cray COS: from the VAX: @VSYS:ABACRAY

DEC VAX/VMS: @VSYS:ABA

Post-processing of Cray or VAX runs is done on the VAX: @VSYS:ABAPLOT

Remarks: Processing is normally done on the Cray unless more memory is required than is available.

For Cray processing with .FIL output files, the .INP file must include "*FILE FORMAT,ASCII".

If a plot file is generated on the Cray, each *PLOT statement must include "OUTPUT=ASCII".

References: Machine-readable:

VMS: HELP ABAQUS

Contact: Pete Matula, (301) 227-1936
Mike Brown, (301) 227-1706

C A modern, block-structured programming language designed for portability, system programming, and general-purpose applications. It is derived from Algol-60.

Execution: Cray COS:

```
CPP,'inputfile'.
                    ^-- C Pre-Processor
CC.                 <-- C compiler
SEGLDR,CMD='LIB=$CLIB;STACK'.
```

DEC VAX/VMS:

```
$ CC
```

References: "C - A Reference Manual", Hardison and Steele

Hardware manufacturers' reference manuals

Machine-readable:

VMS: HELP CC

CMS (Code Management System) A source code library maintenance system which can be used for any ASCII file. CMS tracks the history of the file (changes, reason for change, who made the change and when). It can merge modifications; and stores the current and historic versions of the file.

Execution: DEC VAX/VMS:
```
$ CMS
CMS>command
  -or-
$ CMS command
```

References: Machine-readable:

VMS:
```
HELP CMS
  -or-
$ CMS
CMS>help          <-- internal help
```

DataTrieve (DTR)

VAX DataTrieve is a data management system which runs on VMS. It is a tool for defining, storing, updating, and displaying data. The data may reside either in a relational database created through DTR or an existing RMS file. It provides interactive and program-callable access to data, a report writing facility, a graphics capablility, screen formatting support using FMS (Forms Management System), and distributed access on a network connected by DECnet.

Execution: DEC VAX/VMS: $ DTR32

Remarks: Data formats, procedures, and other data structures are stored in the Common Data Dictionary (CDD).

Users wishing to use DTR must have a valid CDD path established for them by User Services.

References: Machine-readable:

```
VMS: HELP DATATRIEVE
        -or-
     $ dtr32
     DTR>help          <-- internal help
```

Contact: User Services

DISSPLA (Display Integrated Software System and Plotting Language)
A library of Fortran subroutines which facilitate plotting. It does not rely upon features particular to any type of graphic device.

Execution: Cray COS: (version 10.0)

```
ACCESS,DN=DISSPLA,OWN=PUBLIC.
SEGLDR,CMD='LIB=DISSPLA'
```

To dispose the meta file DISPLOT for post-processing on the VAX:

```
DISPOSE,DN=DISPLOT,DF=BB,
        TEXT='DISPLOT.DAT'.
```

DEC VAX/VMS: (version 10.5)

```
$ FORTRAN yourfile
$ DISLINK yourfile
 Other libraries (Y or N) <as you
                           need>
```

To post-process files created by "CALL COMPRS":

```
$ RUN VSYS:DISPOP
```

Remarks: Cray post-processing must be done on the VAX.

References: DISSPLA User's Manual

Machine-readable:

VMS: HELP DISSPLA

Contact: User Services

DTLIB A library of subprograms written or supported by the CCF. The contents of DTLIB (formerly call NSRDC) is different on each machine, but generally includes routines in the areas of:

- . character manipulation
- . sorting
- . date/time manipulation
- . debugging aids
- . extraction of job information
- . some of the Fortran 8x intrinsics

Usage: Cray COS: ACCESS,DN=DTLIB,OWN=PUBLIC.

DEC VAX/VMS: $ LINK <obj>, DTLIB/LIBrary

CDC 860 NOS: ATTACH,DTLIB/UN=NSYS.

References: Machine-readable:

Cray: on VAX, "HELP @DTLIB"

VAX: HELP @DTLIB

Contact: User Services

DYNA3D DYNA3D is an explicit three-dimensional finite element code for analyzing the large deformation dynamic response of inelastic solids and structures. A contact-impact algorithm permits gaps and sliding along material interfaces with friction. Using a specialization of this algorithm, such interfaces can be rigidly tied to admit variable zoning without the need of transition regions. Spatial discretization is achieved by the use of 8-node solid elements, 2-node beam elements, 4-node shell elements, 8-node solid shell elements, and rigid bodies. The equations-of-motion are integrated in time by the central difference method. The 1989 version of DYNA3D contains thirty material models and ten equations of state to cover a wide range of material behavior.

Execution: Cray COS:Use VMS

DEC VAX/VMS: @VSYS:DYNA3D

Remarks: This DYNA3D procedure creates a Cray batch job from user responses to pertinent questions. There is an option to have the Cray job submitted by the procedure. In the Cray job, the binary plot files are restructured by program CVBIN so that they may be read by the TAURUS graphics post-processor on the VAXcluster.

References:

Cray:

Machine-readable:

VMS: HELP DYNA3D

Contact: User Services

GPSS General Purpose Simulation System (GPSS) is a generalized simulation package.

Execution: DEC VAX/VMS: $ GPSS qualifiers parameters

CDC 860 NOS: ATTACH,GPSS/UN=APPLLIB.
GPSS,parameters.
^-- use FX for fixed format

Remarks: The VMS and CDC versions are different.

References: The IBM document.

General Purpose Simulation System Reference Manual, Simulation Software Ltd. (VAX/VMS version)

Machine-readable:

VMS: HELP GPSS

IMSL (proprietary) The International Mathematical and Statistical Libraries package (edition 10) contains 948 subroutines in the following areas:

- 426 general applied mathematics routines
- 351 statistics routines
- 172 special functions

IMSL 10 was a major revision.

Major enhancements were made in many areas of numerical math. Most statistical analysis subprograms can print results, handle missing values, and implement advances in algorithms. There is no ERROR parameter in the argument list and no need for you to dimension work arrays. Workspace is allocated out of a common area. Informative messages are printed when errors occur. Matrices no longer require packing into one-dimensional arrays. Some user-supplied external subprograms must now be functions.

CHARACTER variables are used in the routines and in the many intermediary routines not explicitly called by the application.

Usage:

Cray COS:
```
ACCESS,DN=IMSL,OWN=PUBLIC.
SEGLDR,...,CMD='LIB=IMSL',....
```

DEC VAX/VMS: add "IMSL/LIBrary to the LINK statement

CDC 860 NOS: may be used only by FTN5 programs and is in two permanent files:

```
IMSLM  - the Math routines
IMSLSS - the Special function
         and Statistics routines
```

If both the mathematics and statistics packages are needed, you must use the following search order:

```
ATTACH,IMSLM,IMSLSS/UN=NSYS.
LIBRARY,IMSLSS,IMSL.
  -or-
LDSET,LIB=IMSLSS/IMSLM.
```

References: The IMSL documentation is in three sections:

MATH/Library V1.0	- general applied mathematics
STAT/Library V1.0	- statistics
SFUN/Library V2.0	- special functions

Also,

Update Guide	- describes the differences with the previous version

Machine-readable:

DEC VAX/VMS: HELP IMSL

Contact: User Services

INGRES A relational database management system marketed by Ingres Corporation. Transactions against the database are done through SQL (an ANSI standard query language) or through forms-based utilities accessed by name or through INGMENU, a user-friendly, forms-based interface to the INGRES utilities.

Execution: DEC VAX/VMS:

```
$ SETINGRES
                ^-- once to define
                    INGRES symbols
$ INGMENU  <data_base>

$ name      <-- a specific utility
```

Remarks: You must be an authorized INGRES user before you may access any of the INGRES utilities, including INGMENU. Call User Services to register.

References: Machine-readable:

VMS: HELP INGRES

Contact: User Services

KERMIT File transfer system to/from microcomputers.

Execution: DEC VAX/VMS: KERMIT

CDC 860 NOS: GET,KERMIT/UN=NSYS.
KERMIT.

Remarks: To use Kermit on the VAX or CDC CYBER, you must have Kermit on your PC (it might be a subset of PROCOMM).

VAX files to be transferred should have carriage return carriage control. Files with Fortran carriage control or with Print control will not transfer properly.

References: Machine-readable:

VMS: $ kermit
Kermit-32> help <-- internal help

NOS: BEGIN,HELP,,KERMIT,outfyl.
^-- a 7-page document

Contact: User Services

LINPACK A package of 40 subroutines obtained from Argonne Laboratories. Lab. These subroutines analyze and solve classes of systems of simultaneous linear algebraic equations. Routines are included for:

- general, banded, symmetric indefinite, symmetric positive definite, triangular, tridiagonal square, and Hermetian matrices
- orthogonal-triangular and single value decompositions of rectangular matrices
- least square problems
- basic linear algebra problems

There are four versions:

precision	prefix	VAXcluster	Cray	NOS
single	S		x	x
double	D	x		
complex	C		x	
complex*16	Z	x		

Usage: Cray COS: part of SCILIB

DEC VAX/VMS: LINK <obj>, VSYS:LINPACK/LIBrary

CDC 860 NOS:
```
GET,LINPACK/UN=NSYS.
LDSET,LIB=LINPACK.
   -or-
LIBRARY,LINPACK.
```

References: "LINPACK Users' Guide", J. J. Dongara, J. R. Bunch, C. D. Moler, G. W. Stewart, SIAM, 1979.

Machine-readable documentation may be listed using:

DEC VAX/VMS:
```
"HELP  LINPACK"
"HELP  LINPACK  x<routine>"
where x<routine> is "x"
followed by the single
precision name
```

Contact: User Services

MMS (Module Management System) used to automate the assembly of software. MMS reads a system file and determines what has changed since the last "system build" and reassembles.

Execution: DEC VAX/VMS:

Remarks: Eliminates recompiling if the program has not changed since the system was last built.

References: Machine-readable:

VMS: HELP MMS

NASTRAN A general-purpose finite element structural analysis program capable of performing a wide range of analysis on models of complex structures, including static stress analysis, natural frequency analysis, buckling analylsis, frequency response analysis, and transient response analysis.

Execution: Cray COS:

```
ACCESS,DN=NASTRAN,ID=RPK,
                      OWN=PUBLIC.
CALL,DN=NASTRAN,CNS.
NASTRAN,I=mydata.
       ^-- simple execution
           (MYDATA must be
            ACCESSed prior to
            this)
```

References: DTNSRDC/CMLD-81-05: NASTRAN Theory and Application Course Supplement

Machine-readable:

VMS: HELP NASTRAN <-- for Cray version

Contact: Tony Quezon, (301) 227-1645

PASCAL A modern programming language designed for general-purpose applications. It is derived from Algol-60.

Execution: Cray COS: PASCAL

DEC VAX/VMS: $ PASCAL

CDC 860 NOS: PASCAL.

References: "Pascal - User Manual and Report", Jensen and Wirth

Hardware manufacturers' reference manuals

Machine-readable:

VMS: HELP PASCAL

PCA (Performance and Coverage Analyzer) Pinpoints performance problems; analyzes programs written in several languages; reports on performance characteristics; can plot a program's use of resources using histograms or tables.

Execution: DEC VAX/VMS: $ PCA

References: Machine-readable:

VMS: HELP PCA

See also: Cray COS: SPY

SPICE A general-purpose circuit simulation program for nonlinear dc, nonlinear transient, and linear ac analyses. Circuits may contain resistors, capacitors, inductors, mutual inductors, independent voltage and current sources, four types of dependent sources, transmission lines, the four most common semiconductor devices: diodes, BJT's, JFET's, and MOSFET's, and a Josephson Junctions model.

Execution: Cray COS:

```
ACCESS,PDN=SPICE,OWN=PUBLIC.
SPICE.
/EOF
   <SPICE data>
```

References: SPICE 2G.2.5 (Program Reference), E. Cohen, University of California (420 pages)

SPICE Version 2G User's Guide, 8 Nov 1982 (73 pages)

Machine-readable:

VMS: . HELP SPICE
. VSYS:SPICE.DOC (the User's Guide)

Contact: User Services

***** Appendix A *****

*** ASCII Character Set ***

char	ASCII (hex)	EBCDIC (hex)	Display (octal)	char	ASCII (hex)	EBCDIC (hex)	Display (octal)
NUL	00	00		(((	28	4D	51
SOH	01	01		)))	29	5D	52
STX	02	02		***	2A	5C	47
ETX	03	03		+++	2B	4E	45
EOT	04	37		,,,	2C	6B	56
ENQ	05	2D		---	2D	60	46
ACK	06	2E		...	2E	4B	57
BEL	07	2F		///	2F	61	50
BS	08	16		000	30	F0	33
HT	09	05		111	31	F1	34
LF	0A	25		222	32	F2	35
VT	0B	0B		333	33	F3	36
FF	0C	0C		444	34	F4	37
CR	0D	0D		555	35	F5	40
SO	0E	0E		666	36	F6	41
SI	0F	0F		777	37	F7	42
DLE	10	10		888	38	F8	43
DC1	11	11		999	39	F9	44
DC2	12	12		:::	3A	7A	63
DC3	13	13		;;;	3B	5E	77
DC4	14	3C		<<<	3C	4C	72
NAK	15	3D		===	3D	7E	54
SYN	16	32		>>>	3E	6E	73
ETB	17	26		???	3F	6F	71
CAN	18	18		@@@	40	7C	74
EM	19	19		AAA	41	C1	01
SUB	1A	3F		BBB	42	C2	02
ESC	1B	27		CCC	43	C3	03
FS	1C	1C		DDD	44	C4	04
GS	1D	1D		EEE	45	C5	05
RS	1E	1E		FFF	46	C6	06
US	1F	1F		GGG	47	C7	07
space	20	40	55	HHH	48	C8	10
!!!	21	4F	66	III	49	C9	11
"""	22	7F	64	JJJ	4A	D1	12
###	23	7B	60	KKK	4B	D2	13
$$$	24	5B	53	LLL	4C	D3	14
%%%	25	6C		MMM	4D	D4	15
&&&	26	50	67	NNN	4E	D5	16
'''	27	7D	70	OOO	4F	D6	17

char	ASCII (hex)	EBCDIC (hex)	Display (octal)
PPP	50	D7	20
QQQ	51	D8	21
RRR	52	D9	22
SSS	53	E2	23
TTT	54	E3	24
UUU	55	E4	25
VVV	56	E5	26
WWW	57	E6	27
XXX	58	E7	30
YYY	59	E8	31
ZZZ	5A	E9	32
[[[	5B	4A	
\\\	5C	E0	75
]]]	5D	5A	
^^^	5E	5F	76
___	5F	6D	65
grave	60	79	
aaa	61	81	
bbb	62	82	
ccc	63	83	
ddd	64	84	
eee	65	85	
fff	66	86	
ggg	67	87	

char	ASCII (hex)	EBCDIC (hex)	Display (octal)
hhh	68	88	
iii	69	89	
jjj	6A	91	
kkk	6B	92	
lll	6C	93	
mmm	6D	94	
nnn	6E	95	
ooo	6F	96	
ppp	70	97	
qqq	71	98	
rrr	72	99	
sss	73	A2	
ttt	74	A3	
uuu	75	A4	
vvv	76	A5	
www	77	A6	
xxx	78	A7	
yyy	79	A8	
zzz	7A	A9	
{{{	7B	C0	61
|||	7C	6A	
}}}	7D	D0	62
~~	7E	A1	
DEL	7F	07	

*** CDC NOS Character Set ***

Display Code	char-acter	punch 026	punch 029 if diff	7-track ext BCD	9-track ASCII (note 6)	9-track EBCDIC (note 6)	note/name
00	:::	2-8			25	6C	colon (1,2)
01	AAA	12-1		61	41	C1	
02	BBB	12-2		62	42	C2	
03	CCC	12-3		63	43	C3	
04	DDD	12-4		64	44	C4	
05	EEE	12-5		65	45	C5	
06	FFF	12-6		66	46	C6	
07	GGG	12-7		67	47	C7	
10	HHH	12-8		70	48	C8	
11	III	12-9		71	49	C9	
12	JJJ	11-1		41	4A	D1	
13	KKK	11-2		42	4B	D2	
14	LLL	11-3		43	4C	D3	
15	MMM	11-4		44	4D	D4	
16	NNN	11-5		45	4E	D5	
17	OOO	11-6		46	4F	D6	
20	PPP	11-7		47	50	D7	
21	QQQ	11-8		50	51	D8	
22	RRR	11-9		51	52	D9	
23	SSS	0-2		22	53	E2	
24	TTT	0-3		23	54	E3	
25	UUU	0-4		24	55	E4	
26	VVV	0-5		25	56	E5	
27	WWW	0-6		26	57	E6	
30	XXX	0-7		27	58	E7	
31	YYY	0-8		30	59	E8	
32	ZZZ	0-9		31	5A	E9	
33	000	0		12	30	F0	(sometimes 00)
34	111	1		01	31	F1	
35	222	2		02	32	F2	
36	333	3		03	33	F3	
37	444	4		04	34	F4	
40	555	5		05	35	F5	
41	666	6		06	36	F6	
42	777	7		07	37	F7	
43	888	8		10	38	F8	
44	999	9		11	39	F9	
45	+++	12	12-6-8	60	2B	4E	plus
46	---	11		40	2D	60	minus
47	***	11-4-8		54	2A	5C	asterisk
50	///	0-1		21	2F	61	slash
51	(((	0-4-8	12-5-8	34	28	4D	left paren
52	)))	12-4-8	11-5-8	74	29	5D	right paren
53	$$$	11-3-8		53	24	5B	dollar
54	===	3-8	6-8	13	3D	7E	equal
55				20	20	40	blank
56	,,,	0-3-8		33	2C	6B	comma
57	...	12-3-8		73	2E	4B	period

Display Code	char-acter	punch 026	punch 029 if diff	7-track ext BCD	9-track ASCII (note 6)	9-track EBCDIC (note 6)	note/name
60	###	0-6-8	3-8	36	23	7B	pound
61	[[[	7-8	12-2-8	17	5B	4A	left bracket
62	]]]	0-2-8	11-2-8	32	5D	5A	right bracket
63	%%%	2-8			25	6C	percent (1,2)
64	"""	4-8	7-8	14	22	7F	quote
65	___	0-5-8		35	5F	6D	underline
66	!!!	11-2-8	12-7-8	52	21	4F	exclam (3)
66	!!!	11-0		52	21	4F	exclam (3)
67	&&&	0-7-8	12	37	26	50	ampersand
70	'''	11-5-8	5-8	55	27	7D	apostrophe
71	???	11-6-8	0-7-8	56	3F	6F	question
72	<<<	12-2-8	12-4-8	72	3C	4C	less than (3)
72	<<<	12-0		72	3C	4C	less than (3)
73	>>>	11-7-8	0-6-8	57	3E	6E	greater than
74	@@@	5-8	4-8	15	40	7C	at
75	\\\	12-5-8	0-2-8	75	5C	E0	reverse slant
76	^^^	12-6-8	11-7-8	76	5E	5F	caret
77	;;;	12-7-8	11-6-8	77	3B	5E	semicolon (4)
55		6-8	0-4-8		20	40	blank (5)

Notes:

(1) In the 63-character set (NOS/BE), Display Code 00 has no character, and 63 is the colon (:). In the 64-character set (NOS), 00 is the colon (:), and 63 is the percent (%).

(2) On 7-track tape, this becomes zero (display 33).

(3) Alternate punches.

(4) Avoid a whole word of semicolons, which is a negative zero and is treated as an end-of-record.

(5) On some terminals, this is transmitted as a binary zero. For these terminals, avoid putting this punch in columns 9-10, 19-20, ..., 79-80, as each will be interpreted as a zero-byte terminator.

(6) When ASCII and EBCDIC tapes are read and converted to Display Code, lower case letters are folded into upper case. A number of other codes are also folded.

***** Appendix B *****

*** Cray UNICOS Commands ***

This appendix is reserved for a description of Cray UNICOS commands. It will be expanded when UNICOS is available at DTRC.

***** Appendix C *****

*** Cray COS JCL Commands ***

Cray COS JCL commands have the following general syntax:

```
verb sep1 param1 sep2 param2 ... sepn paramn term comments
```

verb is the name of the routine to be executed. It consists of an alphabetic character (A-Z, a-z, $, %, @) followed by 0-6 alphanumeric characters for system, local dataset name and system dataset name verbs; or 1-8 alphanumeric characters for library-defined verbs.

sepi are separators and include:

```
 ,     - VERB,parameter.
 (     - VERB(parameter).

 .     - VERB,parameter.      <-- use period if comma
 )     - VERB(parameter)      <-- use right paren if left paren

 ,     - VERB(parameter,parameter)

 =     - VERB(keyword=value)

 :     - VERB(keyword=value1:value2)

 ^     - VERB(...parameters...^      <-- statement continued
         parameters)                 <-- on another line

'...' - VERB(keyword='string')

(...) - VERB(keyword=(value:value))
```

parami are parameters, which may be positional or keyword.
Positional parameters have one of the following formats:

```
value
value1:value2:...:valuen
```

Keyword parameters have one of the following formats:

```
keyword
keyword=value
keyword=value1:value2:...:valuen
```

term is the statement terminator. It is either a period

```
VERB.
VERB,parameters.
```

or a right parenthesis

```
VERB(parameters)
```

comments follow the terminator.

*** Strings ***

The following string representations are used in this appendix:

aa...a 1 or more alphabetic characters

axx...x 1 or more alphanumeric characters, the first alphabetic

xxx...x 1 or more alphanumeric characters

nnn...n 1 or more decimal (unless otherwise stated) digits

*** Some Common Parameters ***

The following parameters are used in many JCL commands. If they have a different meaning or a special condition, it will be mentioned in the individual description.

AM=mode Alternate User Access Mode (see PAM=)

DC=dc Disposition code
- IN - input queue of destination station
- MT - magnetic tape at job origin mainframe
- PR - print at job origin mainframe
- SC - scratch the dataset
- ST - stage to mainframe (make permanent at job origin mainframe)

DF=df Dataset format (blocking; front-end conversion)
- BB - binary blocked (no reblocking, no conversion; for graphics output)
- BD - binary deblocked (same as TR)
- CB - character blocked (front-end converts to ASCII (VAX) or Display Code or ASCII (NOS))
- CD - character deblocked (front-end converts to ASCII (VAX) or Display Code (NOS))
- TR - transparent (no deblocking; no conversion; for object modules, etc.)

(default: CB)

DN=dn Local dataset name (axxxxxx, 7 maximum)

ED=ed Edition number (1-4095)

ERR Suppress error termination messages

EXO=exo Execute option
- ON - execute-only (cannot be read or PSDUMPed)
- OFF - not execute-only

I=idn
IDN=idn Input dataset name (normal default: $IN)

ID-uid Additional permanent dataset ID
(axxxxxxx, 8 maximum)

L=ldn Name of dataset to contain the listing
(default: $OUT)

M=mn Maintenance control word (axxxxxxx, 8 maximum)

MF=mf Front-end computer
N1 - CDC CYBER 180/860A (NOS)
V3 - DEC VAXcluster node DT3 (VMS)
(default: front-end of job origin)

MSG Suppress normal termination messages

NA No abort. If omitted, an error causes the job step to abort.

O=odn
ODN=odn Output dataset name (normal default: $OUT)

OWN=owner Owner of the permanent dataset
(not needed for your own files)

PAM=mode Public Access Mode
E - execute only (same effect as EXO=ON)
M - maintenance only
N - no public access
R - read only
W - write only
Example: PAM=R:W gives read and write permission
(default: N)

PDN=pdn Permanent dataset name (xxxxxxxxxxxxxxx, 15 maximum; enclosed in quotes "..." if other than A-Z,0-9)

R=rd Read control word (axxxxxxx, 8 maximum)

TEXT='text' Text (up to 240 character) to be passed to the front-end, enclosed in apostrophes ('...')

TID=tid Destination terminal
(default: terminal of job origin)

UQ Unique access (required to delete or modify a dataset)
(default: multiple access)

W=wt Write control word (axxxxxxx, 8 maximum)

*** Permanent Dataset Utility Shorthand Notation ***

In the permanent dataset utility commands, wildcards may be used in the PDN, PDS, ID, US, and OWN parameters. An asterisk "*" represents any single character; a minus sign "-" represents zero or more characters. They are illustrated with PDN=.

PDN=ABC-	all permanent dataset names starting with ABC
PDN=A***	all 4-character permanent dataset names starting with A
PDN=-A*-	all permanent dataset names containing the letter A followed by one or more other characters
PDN=-	all permanent dataset names
PDN=***-	all permanent dataset names having 3 or more characters

*** A Word About Continuations ***

If a COS JCL statement is too long to fit on one line, it may be continued by breaking the statement after a parameter, ending the line with a caret (^), and continuing the statement on the next line(s). For example,

```
FETCH,DN=prog3,SDN=myprog,^
      TEXT='GET,myprog.CTASK.'.
```

If a text field (quoted string) is too long, it may be split anywhere by adding an apostrophe (') to close the partial string and a caret to end the first line, and starting the next line with an apostrophe immediately followed by the rest of the string. For example,

```
DISPOSE,DN=FT14,SDN=myout14,DC=ST,MF=N1,TEXT='USER,user,pw.'^
        'PURGE,myout14/NA.DEFINE,myout14.CTASK.'.
```

-or-

```
DISPOSE,DN=FT14,SDN=myout14,DC=ST,MF=N1,^
        TEXT='USER,user,pw.'^
             'PURGE,myout14/NA.'^
             'DEFINE,myout14.'^
             'CTASK.'.
```

*** Summary of Cray JCL Commands ***

The following are Cray JCL statements, except as indicated by:

(DTRC - x) A command, procedure or program added at DTRC. Unless otherwise noted, these are accessed by:

```
ACCESS,DN=x,OWN=PUBLIC.
LIBRARY,DN=x:*.
name,....
```

x is one of: PROCLIB, UTILITY.

*

Entire line is a comment.

Syntax: * <comments>

Similar commands: NOS: COMMENT; *
VMS: !

Examples:
```
* This is a comment ---
```

ACCESS

Make a permanent dataset local.

Syntax:
```
ACCESS,DN=dn,PDN=pdn,ID=uid,ED=ed,R=rd,W=wt,M=mn,
       UQ,NA,ERR,MSG,OWN=owner.
```

Parameters:

PDN=pdn - If omitted, dn is used.

R=rd - required to read the dataset if R= on SAVE

W=wt - required for ADJUST if W= on SAVE

M=mn - required to DELETE the dataset if M= on SAVE

Similar commands: NOS: ATTACH; GET
VMS: no local file concept

Examples:
```
ACCESS,DN=mylocal,PDN=mypermfile.
ACCESS,DN=mylcl,PDN=yourpermfile,OWN=yourid.
= = = = =
ACCESS,DN=myfile,UQ.
DELETE,DN=myfile.
```

ACCOUNT

Validate the user. Follows the JOB statement or, is the first interactive statement.

Syntax:
```
ACCOUNT,AC=ac,US=us,UPW=upw,NUPW=nupw.
```

Parameters: AC=ac - Account number (required)
(10 digits or "S" + 9 digits)

US=us - Username (your 4-character User Initials)

UPW=upw - User password (required)

NUPW=nupw - New user password

Remarks: This must be the first statement of an interactive session. When entered via CDC NOS ICF, US= may be omitted because it is supplied automatically. When entered via the DEC VMS Cray Station, US= may be omitted if you entered it in upper case in response to the CRAY USERNAME: prompt.

See also: JOB; page 1-2-2; Appendix D: CNEWPW

Similar commands: NOS: CHARGE
VMS: no user-specified charging

Examples:
```
ACCOUNT,AC=1234567890,US=xxxx,UPW=mypass.
ACCOUNT,AC=1234567890,US=xxxx,
        UPW=mypass,NUPW=nupass.
```

ACQUIRE Get a front-end dataset and make it local and permanent.

Syntax:
```
ACQUIRE,DN=dn,PDN=pdn,AC=ac,ID=uid,ED=ed,RT=rt,
        R=rd,W=wt,M=mn,UQ,MF=mf,TEXT='text',DF=df,
        OWN=ov,PAM=mode,ERR,MSG.
```

Parameters: AC=ac - acquisition code
IN - input dataset
IT - intertask communication
ST - dataset staged from front end (MF=)
(default: ST)

ED=ed - (defaults: 1 (permanent dataset does not exist)
highest (permanent dataset exists))

RT=rt - retention period (1-4095 days)
(default: 45)

Remarks: If the dataset is permanent, ACQUIRE is the same as ACCESS. If not, then it is the same as FETCH, SAVE,ACCESS.

See also: FETCH, MSFETCH

Similar commands: NOS: ATTACH; GET
VMS: HFT FETCH

Examples: ACQUIRE,DN=myfile,PDN=myfile,TEXT='myfile.FOR'.

ADJUST Redefine size of a permanent dataset.

Syntax: ADJUST,DN=dn,NA,ERR,MSG.

Permissions required: write; UQ on ACCESS

Remarks: ADJUST attempts to close the file. Subsequent references in the same job must reopen it and begin at BOD.

Similar commands: NOS: APPEND
VMS: lengthened automatically; cannot be shortened

Examples: ADJUST,DN=myfile,NA.

ALTACN Validate an alternate account number for permanent files.

Syntax: ALTACN,AC=ac.

Parameters: ac - the alternate account number

Remarks: ALTACN validates the supplied Job Order Number.

To use the validated number, specify the ACN parameter on the SAVE or MODIFY command.

See also: MODIFY, SAVE

Similar commands: NOS: CHANGE

Examples:
```
ALTACN,AC=1222233344.        <-- define the number
...
SAVE,DN=newfyl,ACN.          <-- use the number
ACCESS,DN=oldfyl,PDN=myoldfyl,UQ,....
MODIFY,DN=oldfyl,ACN.        <-- change the number
```

ASSIGN Create a local dataset and assign dataset characteristics.

Syntax: ASSIGN,DN=dn,LM=lm,A=alias,BS=bs,U.

Parameters: LM= - maximum number of 512-word blocks in the dataset
(maximum: 296000; default: 40000)

A= - alternate unit name

```
                BS=  - octal number of 512-word blocks for the
                       I/O buffer
                       (default: 10 octal)

                U    - unblocked dataset
                       (default: blocked)

        Remarks:    See COS Reference Manual for additional
                    parameters.

                    At system initiation,
                       ASSIGN,DN=$IN,A=FT05.
                       ASSIGN,DN=$OUT,A=FT06.
                    are performed automatically.  You may reassign
                    them at any time.

                    A Fortran OPEN will not recognize an ASSIGNed
                    dataset.


        Similar commands:  NOS, VMS: ASSIGN

        Examples:   ASSIGN,DN=myinput,A=FT11.
                                  ^-- Fortran program reading from
                                      unit 11 will read file MYINPUT
                                      instead


AUDIT   Report on permanent datasets.

        Syntax:     AUDIT,L=ldn,PDN=pdn,ID=uid,OWN=own,ACN=acn,
                          LO=opt:...:opt,SZ=dsz,ACC=opt:opt,
                          X=mm/dd/yy:'hh:mm:ss',
                          TCR=mm/dd/yy:'hh:mm:ss',
                          TLA=mm/dd/yy:'hh:mm:ss',
                          TLM=mm/dd/yy:'hh:mm:ss'.


        Parameters: L=    - list dataset name
                            (default: $OUT)

                    PDN=  - name of permanent dataset(s) to be listed

                    ID=   - list datasets with this ID
                    ID    - list datasets with null ID

                    OWN=  - list datasets with this ownership value

                    ACN=  - list datasets with this account number
```

LO= - list options:
- S - short list (PDN, ID, ED; 2 per line) (may not be mixed with other options)
- A - access tracking (owner name, count, time of last and first accesses)
- B - backup info (backup volume name,etc.)
- L - long list (PDN, ID, ED, size (words), retention time, access count, track access flag, public access mode (PAM), creation, last access, last dump time, device name, preferred residency (PR), current residency (CR). (default in batch if no LO)
- N - notes list
- P - permit list (permitted owner name, access mode, access count, time of last access, time of permit creation)
- R - retired dataset list (same as L, but only retired datasets)
- T - text list
- X - extended long list (L plus number of blocks and words allocated)

SZ= - list datasets >= this size (in words)

ACC= - access option parameters
- AM - those datasets belonging to OWN that you are allowed to see
- PAM - those datasets belonging to OWN having any form of public access (R:W:M:E)

X= - list datasets expired as of this date
X - list datasets expired as of now

TCR= - list datasets created since this date
TCR - not allowed
TCR=mm/dd/yy is sufficient

TLA= - list datasets not accessed since this date
TLA - not allowed
TLA=mm/dd/yy is sufficient

TLM= - list datasets modified since this date
TLM - not allowed
TLM=mm/dd/yy is sufficient

Similar commands: NOS: CATLIST
VMS: DIRECTORY; MSSAUDIT

```
        Examples:   AUDIT,LO=S          <-- short audit
                    AUDIT,LO=P          <-- audit showing who can and
                                            has accessed the datasets
                    AUDIT,LO=L:P:N      <-- long audit, permitted
                                            users and notes
                    AUDIT,LO=L          <-- long audit
                    AUDIT,OWN=PUBLIC.   <-- list public files
```

AUDPL Audit an UPDATE program library (PL).

```
        Syntax:     AUDPL,P=pdn,I=idn,L=ldn,M=mdn,*=m,/=c,DW=dw,
                      LW=lw,JU=ju,DK=list,PM=list,LO=string,
                      CM,NA,NR.

        Parameters: P  I  L  *  /  NR  - see UPDATE

                    M=  - Modifications dataset name (will contain
                          reconstructed modification sets)
                          (default: $MODS)
                    M=0 - No modifications output

                    DW= - Data width (number of characters written
                          per line to M dataset)
                          (default: up to DW value on UPDATE stmt)

                    LW= - Listing width (number of characters written
                          per line to L dataset
                          (Values: divided into pages:  80,  132;
                                   continuous listing: C80, C132)
                          (default: 132, divided into pages)

                    JU= - Justification
                           N - identifier name left-justified;
                               sequence number right-justified;
                               no period between
                           L - entire sequence field left-justified
                               with period between
                          (default: identified name right-justified;
                                    sequence number preceded by a
                                    period and left-justfied)

                    DK=dk1:dk2:...:dkn                              (1)
                    DK='dk1,dk2,...,dkj.dkk,...,dkn'                (2)
                        - Decks for A, C, D, H, I options and PM
                          parameter
                           (For (1): up to 100 decks;
                            for (2): separate single decks with
                                     commas, and ranges of decks with
                                     periods)
                          (Maximum string length: 96 characters)
                          (default: options apply to all decks)
                    DK  - By itself is invalid
```

```
                PM=id1:id2:...:idn                                  (1)
                PM='id1,id2,...,idj.idk,...,idn'                    (2)
                    - Pulled modification sets (reconstructs
                      modification sets for the listed
                      identifiers for the decks listed in DK)
                       (Syntax: same as for DK=)
                PM  - By itself is invalid

                LO=string
                    - Listing options for ldn
                       Text listing (for DK= decks, if specified)
                        A - active lines
                        C - conditional text directives
                            (subset of option D)
                        D - compile dataset generation directives
                            (subset of option A)
                        H - modification histories
                        I - inactive lines
                       Summary options (for the entire PL)
                        K - deck line counts
                        L - identifier list
                        M - modification set cross-reference
                        N - identifier list in ASCII order
                        O - overlapping modification set list
                        P - short summary of the PL
                        S - status of modification set
                        X - common deck cross-reference

                CM  - Copy modifications (reconstructed
                      modification sets) to ldn and mdn

                NR  - Do not rewind modifications or binary
                      identifier list datasets at start or end
                      of AUDPL

        Similar commands:  NOS: UPDATE
                           VMS: CMS; LIBRARIAN; INCLUDE (in Fortran)

        Examples:   AUDPL,P=mypl,LO=P.
                    = = = = =
                    AUDPL,P=mypl,PM=mod2a:mod3c:example,
                          LO=AIKLMNOPSX.
                    COPYF,I=$MODS.


BLOCK   Convert an unblocked dataset to a blocked dataset.

        Syntax:     BLOCK,DN=ldn,BLKSIZE=size.          (1)

                    BLOCK,I=idn,O=odn,BLKSIZE=size.     (2)

        Parameters: DN=     - the dataset to be replaced (using an
                              intermediate dataset $UNBLK)
                              (ldn is rewound before and after)
```

BLKSIZE= - record length in 64-bit words (non-foreign datasets only) ((2) - not permitted if previously assigned as foreign; record length and type are taken from the input ASSIGN)

I= - the unblocked input dataset (idn is not rewound before the copy)

O= - the blocked output dataset (if previously opened (ASSIGN), odn is not rewound before; otherwise, odn is created)

Remarks: For foreign datasets, the record length and type are taken from the ASSIGN.

BLOCK is intended primarily for postprocessing datasets created by or for certain stations.

Examples:
```
BLOCK,DN=myfile.
              ^-- Replace MYFILE with blocked copy
                  of itself
= = = = =
BLOCK,I=myunblk,O=myblk.
              ^-- Copy unblocked file MYUNBLK as
                  blocked file MYBLK
```

BUILD Generate and maintain library datasets.

Syntax:
```
BUILD,I=idn,L=ldn,OBL=odn,B=bdn,NBL=ndn,
      SORT,NODIR,REPLACE.
```

Parameters:

I=idn - Directive dataset name (default: $IN)
I - Same as I=$IN
I=0 - No directives

L=ldn - List dataset name (default: $OUT)
L - Same as L=$OUT

OBL=odn - Old object library dataset name (default: $OBL)
OBL - Same as OBL=$OBL
OBL=0 - No old binary library

B=bdn - Dataset with new object modules (default: $BLD)
B - Same as B=$BLD
B=0 - No modules to be added

```
NBL=ndn - Output new object library dataset name
          (default: $NBL)
NBL     - Same as NBL=$NBL
NBL=0   - No output written

SORT    - modules are to be output in alphabetical
          order
          (default: written in the order they
                    were first read)

NODIR   - Do not append the directory to the
          output dataset - use to retrieve
          relocatables
          (default: append the directory)

REPLACE - Modules in the new library are replaced
          and in the same order as in the old
          library
          (default: new modules follow the
                    unreplaced modules in the new
                    library)
```

Directives: see page 3-5-1.

See also: Section 3-5

Similar commands: NOS: LIBEDIT
VMS: LIBRARIAN

Examples:

```
BUILD,OBL=0,I=0.
SAVE,DN=$NBL,PDN=mylib.
                ^-- create a new library from $BLD
= = = = =
ACCESS,DN=$OBL,PDN=mylib.
BUILD,I=0.
SAVE,DN=$NBL,PDN=mylib.
                ^-- add modules from $BLD to
                    existing library
= = = = =
ACCESS,DN=mylib1.
ACCESS,DN=mylib2.
ACCESS,DN=mylib3.
BUILD,I,OLB=0,B=0.
SAVE,DN=$NBL,PDN=mylib4.
- Directive: FROM mylib1,mylib2,mylib3
                ^-- merge several libraries - if
                    duplicate module names, last
                    found is retained (or use rename
                    form, if desired)
= = = = =
ACCESS,DN=$OBL,pdn=mylib.
BUILD,B=0.
SAVE,DN=$NBL,PDN=mylib.
- Directive: OMIT badpgm
                ^-- remove a module from a library
= = = = =
```

```
ACCESS,DN=xyz,PDN=mylib.
BUILD,I,OBL=xyz,B=0,NBL=$BLD,NODIR.
- Directive: COPY myprog
             ^-- extract module for loading
```

CALL Read control statements from the first file of another dataset or transfer control to a procedure.

Syntax:
```
CALL,DN=dn.          <-- read from another file
CALL,DN=dn,CNS.      <-- call a procedure
```

Parameters:

DN=dn - the dataset containing the statements or procedure (rewound before use)

CNS - Crack Next Statement - the first statement in "dn" is the procedure header; the statement following the CALL is treated as the invocation of the procedure

See also: Section 3-3

Similar commands:
NOS: BEGIN
VMS: @name

Examples: Without CNS:

If the first file of dataset XYZ contains:

```
ACCESS,DN=INFYL,PDN=MYFILE.
ACCESS,DN=FILE1,PDN=MYDATA.
```

Then CALL,DN=XYZ. will access both datasets. This might be useful if you have several jobs using the same files, or if you have the same processing to be done by many jobs.

With CNS:

If the first file of dataset XYZ contains:

```
G,FILE,DATA.
ACCESS,DN=INFYL,PDN=&FILE.
ACCESS,DN=FILE1,PDN=&DATA.
```

Then CALL,DN=XYZ,CNS.
```
     *,MYFILE,MYDATA
```
will access the datasets MYFILE and MYDATA. Note that PROC and ENDPROC statements and the procedure name (G) are not used.

"call by name"
Execute a program by its local file name.

Syntax: dn.
dn,parameters.

Parameters: depends upon the local file being executed

Similar commands: NOS: LGO or an lfn
VMS: $ name :== $ dir:name
$ name

Examples: ACCESS,DN=myobj.
myobj.

CFT Compile a Fortran source program.

Syntax CFT,I=idn,L=ldn,B=bdn,C=cdn,E=m,EDN=edn,
OPT=option,MAXBLOCK=mb,INT=il,ALLOC=alloc,
ON=string,OFF=string,TRUNC=nn,AIDS=aids,
CPU=cpu:hdw,UNROLL=r,LOOPMARK[=lmmsgs],
DEBUG,SAVEALL,ANSI.

Parameters:

I= - Input dataset name
(default: $IN)

L= - Listable output
(default: $OUT)

L=0 - List only fatal errors

B= - Binary load module dataset name
(default: $BLD)

B=0 - No binary load modules

C= - pseudo-CAL output dataset name
(default: no dataset)

E= - Highest level of messages to be suppressed
1 - comment
2 - note
3 - caution
4 - warning
5 - error
(default: 3)

EDN= - Alternate error listing dataset
(default: no dataset)

ON= - Options to be enabled
(default: C E L P Q R S T U V)

OFF= - Options to be disabled
(default: A B D F G H I J N O W X Z)
A - abort if errors
B - list sequence number of code generation block
C - list common block names and lengths
D - list DO-loop table
E - recognize compiler directives
F - FLOWTRACE
G - list generated code (use only if requested by User Services)
H - list only first statement of each program unit
I - generate label symbol table
J - one-trip DO-loops
L - recognize listing control statements
M - ignored
N - put null symbols in symbol table
O - identify out-of-bound array references
P - allows double precision
Q - abort on 100 fatal errors
R - round multiply results
S - list source code
T - list symbol table
U - enable recognition of INTEGER*2 declarations
V - vectorize inner DO-loops
W - do not use
X - include cross-reference
Y - ignored
Z - put DEBUG symbol table on $BLD

TRUNC= - number of bits to be truncated
(default: 0; maximum: 47)

AIDS= - number of vectorization inhibition messages
LOOPNONE - no messages
LOOPPART - maximum of 3 per inner loop; 100 per compilation
LOOPALL - all messages
(default: LOOPPART)

OPT= - options (no more than one from each of the following groups: OPT=opt:opt:...):

. constant increment integer optimization:
  NOZEROINC - no incrementation by zero value variables
  ZEROINC - incrementation by zero value variables
  (default: NOZEROINC)

. optimization for 1-line DO-loop replacement with $SCILIB call:
  SAFEDOREP - no replacement if DO-loop has potential dependencies or equivalenced variables
  FULLDOREP - alway replace
  NODOREP - never replace
  (default: SAFEDOREP)

. move invariant code outside of DO-loop:
  INVMOV - enable
  NOINVMOV - disable
  (default: INVMOV)

. instructions moving over a branch instruction:
  UNSAFEIF - enable
  SAFEIF - disable
  (default: SAFEIF)

. bottom loading of scalar loops:
  BL - enable
  NOBL - disable
  (default: BL)

. B and T register allocation:
  BTREG - allocate maximum of 24 scalars to T regs
  NOBTREG - aliocate to memory
  (default: NOBTREG)

. compilation of loops with specific ambiguous dependencies in vector and scalar versions:
  CVL - enable
  NOCVL - disable
  (default: enabled)

. update scalar temporaries in DO-loops:
  KEEPTEMP - enable
  KILLTEMP - disable
  (default: enable)

```
MAXBLOCK=   - number of words in a block of code to
              optimize or vectorize
MAXBLOCK=1  - disable
              (default: 2310)

INT=        - integer lengths
               64 - full 64-bit integers
               24 - short 24-bit integers
              (default: 64)

ALLOC=      - static memory allocation
               STATIC - all memory
               STACK  - read-only constants and
                        DATA, SAVE and common
                        block entities
               HEAP   - deferred implementation
              (default: STATIC)

CPU=         - mainframe type and hardware charac-
               teristics for running generated code
               cpu type:
                CRAY-XMP - 1, 2 or 4 processors
                CRAY-X1  - single-processor
                CRAY-X2  - dual-processor
                CRAY-X4  - quad-processor
               (default: compiling machine)

              hardware characteristics:
                [NO]EMA  - extended memory
                [NO]CI   - compressed index
                [NO]GS   - gather/scatter
                [NO]CIGS - compressed index gather/
                           scatter
                [NO]VPOP - vector popcount
                           functional unit
                [NO]AVL  - two vector logical
                           functional units
                [NO]BDM  - bidirectional memory

UNROLL=     - iteration count for unrolling inner
              DO-loops
              (range: 0 <= r <= 9)
              (default: 3)
UNROLL=0    - turn off unrolling

LOOPMARK=   - draw DO-loop brackets in source
              listing
               MSGS   - reasons for not vectorizing
               NOMSGS - no messages
              (default: NOMSGS)
LOOPMARK    - same as LOOPMARK=NOMSGS
```

DEBUG - put sequence number labels in Debug Symbol Table
(forces ON=IW and MAXBLOCK=1)
(default: debugging turned off)

SAVEALL - allocate user variables to static storage; compiler-generated variables to B or T registers

ANSI - flag non-ANSI usage

Remarks: CFT compiles faster than CFT77, but executes more slowly.

Production programs should be compiled using CFT77 and the resulting $BLD file saved.

See also: CFT77

Similar commands: NOS: FTN5
VMS: FORTRAN

Examples:
```
CFT.
CFT,I=$CPL.      <-- from UPDATE
CFT,LOOPMARK=MSGS.
CFT,B=myobj.
```

CFT77 Compile a Fortran 77 source program.

Syntax
```
CFT77,I=idn,L=ldn,B=bdn,C=cdn,E=m,OPT=option,
      INTEGER=il,ALLOC=alloc,ON=string,
      OFF=string,TRUNC=nn,CPU=cpu:hdw,DEBUG,
      LIST,STANDARD.
```

Parameters: I L B C ALLOC TRUNC CPU DEBUG - same as CFT

E= - same as CFT, except E=5 not allowed

OPT= - at most one from each of the following groups (OPT=opt:opt):

. optimization:
- FULL - attempt full optimization
- OFF - no optimization (fast compile)
- NOVECT - scalar optimization only

(default: FULL)

. constant increment integer optimization:
- NOZEROINC - no incrementation by zero-value variables
- ZEROINC - incrementation by zero-value variables

(default: NOZEROINC)

INTEGER= - integer length
64 - full 64-bit integers
46 - short 46-bit integers
(default: 46)

ON= - M - enable the loopmark option
(same as CFT,LOOPMARK=MSGS)
(default: P Q R)

OFF= - (default: A F G H J M O S X Z)

LIST - full compilation listing (sets ON=CGSX)
DO NOT USE -- specify ON=CMSX instead

STANDARD - flag non-standard Fortran 77 usage

Remarks: CFT77 compiles much more slowly than CFT, but may execute faster. OPT=OFF does not vectorize and will, therefore, run slower.

Production programs should be compiled using CFT77 and the resulting $BLD file saved.

See also: CFT

Similar commands: NOS: FTN5
VMS: FORTRAN

Examples:
```
CFT77.
CFT77,I=$CPL.      <-- from UPDATE
CFT77,B=myobj,ON=M.
```

CHARGES Report on job resources.

Syntax: CHARGES,L=ldn,MSG=msgopt,SR=options.

Parameters: MSG - controls the display of messages in the system log
ON - output to $LOG and $SYSLOG
OFF - output not displayed in log

SR - control display of system resources
CPU - CPU, I/O wait, and CPU wait times since start of job
DS - permanent dataset statistics (synonym: DISK)
FSU - FSS (buffer memory in IOS) usage
GRU - generic resource usage
JNU - job name and user number
JSQ - job sequence number
MM - job size (memory) statistics (synonym: MEMORY)
MULTI - % of time spent in each CPU
NBF - number of blocks received from/ queued to a front end (synonym: FE)

RDM - job and permanent data usage and limits
TASK - CPU, I/O wait, and CPU wait times broken down by task; and totals for job
WT - time spent waiting in input queue (synonym: QWAIT)
(default: all statistics)

Remarks: CHARGES is invoked automatically at job end.

Similar commands: NOS: ENQUIRE
VMS: CHARGES; ^T

Examples: CHARGES,SR=DS:MM:TASK

COMPARE Compare two datasets.

Syntax: COMPARE,A=adn,B=bdn,L=ldn,DF=df,ME=maxe,CP=cpn,
CS=csn,{CW=cw|CW=cw1:cw2},ABORT=ac.

Parameters: A= - input dataset names - error if adn=bdn
B=

L= - name of dataset for list of differences
(default: $OUT;
may not be same as adn or bdn)

DF= - input dataset format
B - binary - datasets compared logically with difference listed in octal
T - text - differences printed as text
(default: T)

ME= - maximum number of differences to be printed
(default: 100)

CP= - amount of context printed, that is, the number of records on either side of a difference to be printed
(applies only to DF=T)
(default: 0)

CS= - amount of context to be scanned, that is, the number of records on either side of a discrepancy to be scanned
(applies only to DF=T)
(default: 0)

```
                CW=     - compare width - either compare columns 1
                          through cw or columns cw1 through cw2
                          (default: CW=1:133)

                ABORT=  - abort the job step after ac or more
                          differences have been found
                ABORT   - same as ABORT=1
                          (default: 1)

        Similar commands:  NOS: VERIFY; VFYLIB
                           VMS: DIFFERENCES

        Examples:     ACCESS,DN=one,PDN=myfile1.
                      ACCESS,DN=two,PDN=myfile2.
                      COMPARE,A=one,B=two,CS=5.

COPYD   Copy blocked datasets.

        Syntax:       COPYD,I=idn,O=odn,S=m.

        Parameters:   S=m    - shift count (number of ASCII blanks to be
                               inserted at the start of each line)
                               (maximum: 132)
                      S      - same as S=1
                               (default: 0)

        See also:     COPYF; COPYNF; COPYR; COPYU

        Similar commands:  NOS: COPY; COPYSBF
                           VMS: COPY

        Examples:     COPYD,I=myprog,S=25.
                                   ^-- copy shifted file to $OUT
                                       (source program centered on wide
                                       paper)

COPYF   Copy blocked files.

        Syntax:       COPYF,I=idn,O=odn,NF=nf,S=m.

        Parameters:   I  O  S - same as COPYD

                      NF=nf   - decimal number of files to copy
                      NF      - copy through EOD
                                (default: 1)

        Remarks:      After tne copy, both datasets are positioned
                      after the EOF for the last file copied.  If
                      BFI=OFF is specified on the ASSIGN, compressed
                      blanks are expanded.

        See also:     COPYD; COPYNF; COPYR; COPYU
```

Similar commands: NOS: COPY; COPYBF; COPYCF; COPYSBF
VMS: COPY

Examples: COPYF,I=FT02. <-- print Fortran unit 2 on $OUT.

COPYNF Copy files from one blocked dataset to another.

Syntax: COPYNF,I=idn,O=odn,NF=n.

Parameters: I O - same as COPYD

NF=n - deciaml number of files to copy.
NF - copy through EOD
(default: 1)

Remarks: After the copy, the input dataset is positioned after the EOF for the last file copied; the output dataset is after the EOF of the last record copied.

See also: COPYD; COPYF; COPYR; COPYU

Similar commands: NOS: COPYBF; COPYCF

Examples: COPYNF,I=mydata,O=files,NF=3.
^-- copy 3 files from dataset MYDATA to dataset FILES

COPYR Copy blocked records.

Syntax: COPYR,I=idn,O=odn,NR=nr,S=m.

Parameters: I O S - same as COPYD

NR=nr - decimal number of records to copy
NR - copy through EOF
(default: 1)

Remarks: After the copy, both datasets are positioned at the end of the last record copied. If BFI=OFF is specified on the ASSIGN, compressed blanks are expanded.

See also: COPYD; COPYF; COPYNF; COPYU

Examples: COPYR,I=myfile,O=recs,NR=342.

COPYU Copy unblocked datasets.

Syntax: COPYU,I=idn,O=odn,NS=ns.

Parameters: I O - same as COPYD

NS=ns - number of sectors to copy
NS - copy through EOD
(default: 1)

See also: COPYD; COPYF; COPYNF; COPYR

Examples: COPYU,I=unfy11,O=unfy12,NS.

&DATA Defines the beginning of data within a procedure.

Syntax: &DATA,dn.

Parameters: dn - the name of the dataset to contain the data which follows this statement

Remarks: All lines following an &DATA up to the next &DATA or ENDPROC are written to the specified dataset.

Similar commands: NOS: .DATA
VMS: OPEN,WRITE,CLOSE

Examples:
```
PROC,MYPROC.
   ...
ENDPROC.
&DATA,IN1.
1.73, 2.6, 4
4.62, 9.7, 6
0,0,0
&DATA,IN2.
06Test01
12Ship 472-396X
```

DDA Dynamic Dump Analyzer (selectively examine the contents of a program memory dump).

Syntax: DDA,I=idn,S=sdn,L=odn,DUMP=ddn,LOG=ldn,ECHO=edn.

Parameters: I= - the directives to be executed
(default: $IN)

S= - symbolic dataset name
(default: $DEBUG)

L= - output listing
(default: $OUT)

DUMP= - the dataset with the dump to be analyzed
(default: $DUMP)

LOG= - the dataset to receive a copy of all input to and output from the debugger
(default: $DBLOG)

ECHO= - the dataset to receive a copy of all input to the debugger
(default: $DBECHO)

Remarks: Like DEBUG, DDA interprets the contents of a program memory dump created during abort exit processing. Unlike DEBUG, you can give directives to dynamically select the information to display.

Directives: See SR-0311, COS Symbolic Debugging Package Reference Manual (formerly SR-0112).

See also: DEBUG

Similar commands: NOS: FTN5,DB=PMD
VMS: FORTRAN/DEBUG

Examples: See DUMPJOB

DEBUG Interpret a dump.

Syntax:
```
DEBUG,S=sdn,L=ldn,DUMP=ddn,CALLS=n,TASKS,
      SYMS=sym[:sym],NOTSYMS=nsym[:nsym],
      MAXDIM=dim,BLOCKS=blk[:blk],
      NOTBLKS=nblk[:nblk],RPTBLKS,PAGES=np.
```

Parameters:

S= - Debug symbolic tables
(default: $DEBUG)

L= - Listable output
(default: $OUT)

DUMP= - Dump dataset name
(default: $DUMP)

CALLS= - Number of routine levels to display
(default: 50)

TASKS - Trace back through all existing tasks
(default: only through tasks running when dump taken)

SYMS= - List of symbols to be displayed
(Maximum: 20 symbols)
(default: all symbols)
NOTSYMS= - List of symbols to be skipped
(Maximum: 20 symbols)
(default: all symbols displayed)

MAXDIM= - Maximum number of each dimension to be displayed
(default: 20:5:2:1:1:1:1)

BLOCKS= - List of common blocks to include
(Maximum: 20 symbols)
BLOCKS - Include all common blocks
NOTBLKS= - List of common blocks to exclude
(overrides BLOCKS)
(Maximum: 20 symbols)
NOTBLKS - Exclude all but subprogram block

RPTBLKS - Repeat blocks (display with each subprogram
(default: display once)

PAGES= - Page limit
(default: 70)

Similar commands: NOS: FTN5,DB=PMD
VMS: FORTRAN/DEBUG

Examples: See DUMPJOB.

DELETE Remove a permanent dataset.

Syntax: DELETE,DN=dn,NA,ERR,MSG,PARTIAL.

DELETE,PDN=pdn,ID=uid,OWN=owner,ED=ed,M=mn,
NA,ERR,MSG.

Parameters: PARTIAL - delete the contents of the file, but not the information about the file

ED=ed - edition number (1-4095)
unsigned - specific edition
+n - delete n highest editions
-n - keep n highest editions
ALL - all editions
(default: highest edition)

Remarks: The first form is used if the permanent file has already been ACCESSed.

The second form does not ACCESS the file.

See also: Appendic C: CDELETE

Similar commands: VMS: CREATE a new version, PURGE/KEEP=1;
DELETE; PURGE

Examples:
```
ACCESS,myfile,UQ.
DELETE,DN=myfile,PARTIAL.
= = = = =
DELETE,PDN=myfile,ALL.
= = = = =
DELETE,PDN=A**.
            ^-- delete all datasets with
                3-character names starting with
                "A"
```

DISPOSE Stage a dataset to the front-end; release a local dataset; change disposition characteristics.

Syntax:
```
DISPOSE,DN=dn,SDN=sdn,DC=dc,MF=mf,SF=sf,ID=uid,
        TID=tid,R=rd,W=wt,M=mn,TEXT='text',DF=df,
        WAIT|NOWAIT,DEFER,NRLS.
```

Parameters:

DN=dn - required

SDN=sdn - staged dataset name (1-15 characters)
(default: dn; required for CYBER 860)

DC=dc - to 860: DC=ST is required
to VAX: DC=PR with TEXT='any' makes a file with Fortran carriage control; DC=ST (with TEXT='any') makes a file with carriage return carriage control

SF=sf - special forms (1-8 alphanumeric characters)
(default: no special forms)

DF=df - TR or CB or BB
(default: CB)

WAIT
NOWAIT - wait or don't wait until dataset has been staged to the front-end
(default: NOWAIT)

DEFER - disposition occurs at end-of-job or when the dataset is RELEASEd

NRLS - after disposition, the dataset remains local (use WAIT)

See also: MSSTORE

Similar commands: NOS: ROUTE
VMS: FICHE (DTRC); PRINT; XEROX (DTRC)

Examples:
```
DISPOSE,DN=out1,DC=PR.
                ^-- to VAX (assumed job origin)
= = = = =
DISPOSE,DN=out2,SDN=mymss,MF=N1,DC=ST,^
        TEXT='USER,user,pw.'^
             'PURGE,mymss/NA.'^
             'DEFINE,mymss.'^
             'CTASK.',WAIT.
             ^-- send to MSS
= = = = =
DISPOSE,DN=out3,MF=V3,^
        TEXT='myvax.dat',WAIT.
             ^-- send to VAXcluster
= = = = =
DISPOSE,DN=DISPLOT,DC=ST,DF=BB,TEXT='plot.dat',^
        WAIT.
             ^-- DISSPLA output file to VAX for
                 post processing
```

DS List local datasets.

Syntax: DS.

Remarks: The information displayed includes alis, size, position (e.g., EOF), last operation, and open status.

Similar commands: NOS: ENQUIRE,F

Examples: DS.

DSDUMP Dump a dataset in octal or hexadecimal.

Syntax:
```
DSDUMP,I=idn,O=odn,DF=df,IW=n,NW=n,IR=n,NR=n,
       IF=n,NF=n,IS=n,NS=n,Z,DB=db,DSZ=sz.
```

Parameters:

I= - (synonym: DN=idn)

O= - dataset to receive the dump
(default: $OUT)

DF= - dataset format
B - blocked
U - unblocked
(default: B)

IW= - decimal/octal number of the initial word for each record/sector
(defaults: 0 (Z specified);
1 (Z omitted))

```
NW=  - decimal/octal number of words to dump
       (default: 1)
NW   - through end of record/sector

IR=  - decimal/octal number of the initial record
       for each input file - only if DF=B
       (defaults: 0 (Z specified);
                  1 (Z omitted))
NR=  - decimal/octal number of records per file
       to dump - only if DF=B
       (default: 1)
NR   - all records in each file

IF=  - decimal/octal number of the initial file in
       idn - only if DF=B
       (defaults: 0 (Z specified);
                  1 (Z omitted))
NF=  - decimal/octal number of files to dump -
       only if DF=B
       (default: 1)
NF=0 - all files in the dataset

IS=  - decimal/octal number of the initial
       sector - only if DF=U
       (defaults: 0 (Z specified);
                  1 (Z omitted))
NS=  - decimal/octal number of sectors to dump -
       only if DF=U
       (default: 1)

Z    - the zero-base for the initial-value
       parameters (IW, IR, IF, IS)
        Z    - each Ix is relative to 0;
               output refers to word, record,
               file, and sector numbers start
               at 0
                 DSDUMP,...,IW=4096.  is same as
                 DSDUMP,...,Z,IW=4095.
        no Z - each Ix is relative to 1
       (does not affect Nx parameters)

DB=  - numeric base for displaying the data words
        OCTAL or O - octal
        HEX   or H - hexadecimal

DSZ= - size of data items to dump
        WORD   or W - words   (64 bits)
        PARCEL or P - parcels (16 bits)
       (default: WORD)
```

Similar commands: NOS: TDUMP

```
Examples:    DSDUMP,I=myfile,NW=25,NR=5,DB=H.
                        ^-- hexadecimal dump of first 25
                            words of first 5 records of
                            MYFILE
```

DUMP Display job information previously captured by DUMPJOB.

Syntax: DUMP,I=idn,O=odn,FWA=fwa,LWA=lwa,JTA,NXP,V,DSP,
FORMAT=f,CENTER.

Parameters:

I= - dataset containing the memory image
(default: $DUMP)

FWA= - first word address to dump
(default: word 0 of Job Communication
Block (JCB))

LWA= - last word address to dump
(default: 200 of JCB)

LWA - the limit address

LWA=0 - no memory

JTA - dump Job Table Area
(default: no JTA dump)

NXP - dump No Exchange Package, B, T, cluster,
and semaphore registers
(default: these are dumped;
NXP overrides V if both
specified)

V - dump vector registers
(default: do not dump vector registers)

DSP - dump Logical File Tables (LFTs) and
Dataset Parameter Tables (DSPs)
(default: do not dump LFTs and DSPs)

FORMAT= - format for dumping FWA through LWA
D - data - decimal integer and ASCII
G - data - floating-point or
exponential and ASCII
I - instr - CAL mnemonics and ASCII
M - data - each 16-bit parcel
displayed as 1 hex and 4
octal digits
C - data - octal integer and ASCII
P - data - 16-bit parcel
X - data - hex integer and ASCII

CENTER - dump 100 (octal) words on each side of
P-register address in P format

Examples: See DUMPJOB.

DUMPJOB Capture job information in dataset $DUMP for display by DUMP or DEBUG or DDA.

Syntax: DUMPJOB.

Examples:

```
...
EXIT.
DUMPJOB.
DUMP,....  -or-  DEBUG,BLOCKS,....  -or-  DDA,....
```

ECHO Control logfile messages.

Syntax: ECHO,ON=class1:...:classm,OFF=class1:...:classn

Parameters: ON= - list of classes whose messages are to be written to the log file ("ON" is the same as "ON=ALL")
OFF= - list of classes whose messages are NOT to be written to the log file ("OFF" is the same as "OFF=ALL")
classi - ABORT - job failure
EXPINF - dataset statistics messages
JCL - messages in user's JCL
PDMERR - PDM errors
PDMINF - PDM dataset information
ALL - all classes

Remarks: The ECHO state after returning from a procedure call is the same as before the call, regardless of any changes made in the procedure.
Within a procedure, the ECHO state is that of the caller, unless changed within the procedure.

Similar commands: VMS: /LOG on some commands

Examples: ECHO,OFF.

ELSE See IF.

ELSEIF See IF.

ENDIF See IF.

ENDLOOP See LOOP.

ENDPROC See PROC.

EXIT On job abort, processing continues with the statement following the EXIT; if no abort, terminate job processing.

Syntax: EXIT.

Similar commands: NOS: EXIT
VMS: ON condition

Examples:
```
...
EXIT.
DUMPJOB.
DUMP.
...
```

EXITIF See IF.

EXITLOOP See LOOP.

FETCH Get a front-end dataset and make it local.

Syntax:
```
FETCH,DN=dn,SDN=sdn,AC=ac,TEXT='text',MF=mf,
      DF=df.
```

Parameters:

DN= - local dataset name

SDN= - staged dataset name (front-end dataset name)
(default: dn)

AC= - acquisition code (where the dataset is to be acquired)
IN - input (job) dataset - use SUBMIT to run the job
IT - intertask communication
MT - magnetic tape at the front end
ST - staged dataset from the front end
(default: ST)

MF= - mainframe computer identifier
N1 - MSS
V3 - DT3
(default: front end of job origin)

DF= - dataset format (BB, BD, CB, CD, TR)
(default: CB)

Remarks: FETCH defaults to DF=CB, MSFETCH defaults to DF=TR.

See also: MSFETCH

Similar commands: VMS: HFT FETCH (get an MSS file, DTRC)

Examples:
```
FETCH,DN=SOURCE,TEXT='PROG.FOR'.
= = = = =
FETCH,DN=FT11,DF=TR,^
      TEXT='[ABCD.SUBD1]CRAYBIN.DAT'.
             ^-- binary data file from a VAX
                 subdirectory of user ABCD
= = = = =
FETCH,DN=SORC,SDN=mssname,MF=N1,^
      TEXT='USER,name,pw.^
           'GET,mssname.CTASK.'.
             ^-- get an indirect MSS (860) file
```

FLODUMP Dump flowtrace table of a program abort.

Syntax: FLODUMP,L=ldn.

Parameters: L= - dataset to contain the report
(default: $OUT)

Examples:
```
...
EXIT.
DUMPJOB.
FLODUMP.
```

FTREF Generate Fortran cross-reference.

Syntax: FTREF,I=idn,L=ldn,CB=op,TREE=op,ROOT=root,
END=end,LEVL=n,DIR=dir,NORDER,MULTI.

Parameters:

I= - input dataset containing the cross-reference table listing and Fortran source program (ON=XS)

CB= - global common block cross references
PART - routines using a common block
FULL - use of common block variables
NONE - no output information
(default: PART)

TREE= - static calling tree
PART - entry names, external calls, calling routines, common block names
FULL - PART plus static calling tree
NONE - no output information
(default: PART)

ROOT= - if TREE=FULL, this defines the name of the routine to be used as the root of the tree
(default: the routine not called by any other routine;
if more than one, the first alphabetically)

END= - if TREE=FULL, this defines the name of the routine to be used as the end of any branch of a tree
(default: complete trees are generated)

LEVEL= - if TREE=FULL, this is the maximum length of any branch
(default: the entire program)

DIR= - dataset containing processing directives
(default: no directives)

NORDER - list subprograms in input order
(default: list in alphabetical order)

MULTI - summarize multitasking subroutine usage

Directives: The following may be in the DIR= dataset:

ROOT - list of modules to be used as roots of separate trees
ROOT,md1,md2,...,mdn.

SUBSET - list of modules to be processed
SUBSET,md1,md2,...,mdn.
(default: all modules)

CHKBLK - list of common blocks to be checked for locked variables
CHKBLK,blk1,blk2,...,blkn.

CHKMOD - list of external calls to be checked for calling from a locked area
CHKMOD,mod1,mod2,...,modn.

Similar commands: NOS: FTN5,LO=
VMS: FORTRAN /CROSS_REFERENCE

HOLD Specify that dataset release occurs with implicit HOLD.

Syntax: HOLD,GRN=grn.

Parameters: GRN=grn - generic resource name

Remarks: This prevents return of resources to the system and is useful when dataset assignment is done by applications over which the user has no control.

See also: NOHOLD

IF Begin a conditional block of code.

Syntax:
```
IF(expression)
  <do if true>
ELSEIF(expression)
  <do if true>
ELSE.
  <do if all other tests fail>
ENDIF.

EXITIF.                  <-- exit unconditionally
EXITIF(expression)       <-- exit if exp is true
```

Parameters: exp - a valid JCL expression

Remarks: Literal strings, '...', in an IF/ELSEIF expression are limited to 8 characters (one machine word).

Similar commands: NOS: IF; IFE
VMS: IF

Examples:

```
ACCESS,DN=MYPROG,NA.
IF(PDMST.NE.1)
  UPDATE(Q=MYPROG)
  CFT(I=$CPL,ON=A)
  NOTE(DN=SLIN,TEXT='ABS=MYPROG')
                    ^-- create input directive
                        file for SEGLDR
  SEGLDR(I=SLIN)
  SAVE(DN=MYPROG,NA)
  EXITIF.
  EXIT.
*.
*.     Error while generating MYPROG
*.
  EXIT.
ENDIF.
MYPROG.
```

==========

Same as above, but in a procedure, with SEGLDR directives in a data file in the procedure:

```
PROC.
DOMYPROG.
   ...      <-- omit NOTE command
ENDPROC.
&DATA,SLIN
   ...
ABS=MYPROG
```

IOAREA Control access to a job's I/O area (containing the DSP and I/O buffers).

Syntax: IOAREA, { LOCK | UNLOCK }

Parameters: LOCK - the limit address is set to the base of the DSPs, denying direct access to the user's DSP and I/O buffers. When locked, system I/O routines can gain access.

UNLOCK - the limit address is set to JCFL, allowing access to these areas.

Examples:

```
IOAREA,LOCK.
```

ITEMIZE Report statistics about a library dataset.

Syntax: ITEMIZE,DN=dn,L=ldn,NREW,MF=n,T,BL,E,B,X.

Parameters: DN= - (default: $OBL)

NREW - no rewind
(default: rewind before and after)

NF= - number of files to be listed
(default: 1)
NF - all files

T - truncate lines after 80 characters
(if specified, E, B, X may not be used)

BL - burstable listing (each heading is at top of a page
(default: page eject only when current page is nearly full)

E - list all entry points (binary library datasets only)

B - E plus code and common block information
(B overrides E)

X - B plus external information
(X overrides B)

Restrictions: . an UPDATE PL is recognized only if it is the only item in a dataset
. standard COS blocked datasets only

Similar commands: NOS: ITEMIZE
VMS: LIBRARIAN

Examples: ITEMIZE,DN=myreloc
ITEMIZE,DC=mylib,X.

JOB First statement of a job - gives job parameters.

Syntax: JOB,JN=jn,MFL=fl,T=tl,OLM=olm,US=jcn.

Parameters: JN=jn - job name (1-7 alphanumeric characters)

MFL=fl - maximum field length (decimal) for the job - fl is rounded up to the nearest multiple of 512 words, or the amount needed to load CSP (Control Statement Processor)
(default: 768000)
MFL - the system maximum (3,532,800)

T=t1 - job time limit (decimal seconds)
(default: 30; max: 200000)
T - the system maximum (~194 days!)
NOTE: your job will not run because
this exceeds the DTRC maximum!

OLM=olm - maximum size of $OUT; olm is the number of 512-word blocks (each block holds about 45 lines)
(default: 8192; maximum: 65536)

US=jcn - job class (1-7 alphanumeric characters)
jcn is one of:
NORMAL, DEFER, BUDGET, PZERO, SECURE
Job is dropped to a lower class if it doesn't fit the requested job class.
(default: NORMAL, if it fits)
(see page 3-1-4 for the job class limits and SECURE restrictions)

Remarks: The JOB statement may be continued.

See also: ACCOUNT

Examples:
```
JOB,JN=jobname1.
ACCOUNT,....
<rest of job>
```

JOBCOST (DTRC - UTILITY) Write a summary of the job cost and system usage to $LOG.

Syntax: JOBCOST

Remarks: A subroutine version is available in DTLIB.

Examples:
```
ACCESS,DN=UTILITY,OWN=PUBLIC.
LIBRARY,DN=UTILITY:*.
JOBCOST.     <-- the cost to this point in job
< execute your program >
JOBCOST.     <-- the cost of running your program
```

LIBRARY Specify the library dataset search order for control statement verbs.

Syntax: LIBRARY,DN=dn1:dn2:...:dn64,V.

Parameters: DN= - up to 64 library names to be searched - an asterisk means add the listed names to the current searchlist
V - list the current library searchlist in the logfile

Similar commands: NOS: LIBRARY; LDSET,LIB= (not subs)

Examples:
```
LIBRARY,DN=THISLIB:YOURLIB.
                          ^-- the searchlist contains
                              2 libraries
LIBRARY,DN=THATLIB:*,V.
                          ^-- the searchlist now has
                              3 libraries and are
                              listed in the logfile
LIBRARY,,V.               <-- list the current
                              searchlist in the logfile
```

LOOP

Start of an iterative control statement block.

Syntax:
```
LOOP.
...
EXITLOOP.
EXITLOOP(expression)
...
ENDLOOP.
```

Parameters: exp - a valid JCL expression

Similar commands: NOS: WHILE

Examples: Merge two datasets for 60 records:
```
SET,J1=0.
SET,J2=60.
LOOP.
  EXITLOOP(J2.EQ.0)
  IF(J1.EQ.0)
    COPYR,I=DSIN1,O=OUTDS.
    SET,J1=1.
  ELSE.
    COPYR,I=DSIN2,O=OUTDS.
    SET,J1=0.
  ENDIF.
  SET,J2=J2-1.
ENDLOOP.
REWIND,DN=DSIN1:DSIN2:OUTDS.
```

MEMORY

Request new field length.

Syntax:
```
MEMORY.
MEMORY,FL=fl.
MEMORY,FL=fl,{ USER ¦ AUTO }.
```

Parameters:
- FL=fl - the decimal number of words of field length; "FL" allocates the job maximum
- USER - field length is retained until the next request
- AUTO - field length is reduced automatically at the end of each job step

Similar commands: NOS: MFL

Examples:
```
MEMORY,FL,USER.          <-- get and hold the maximum
                             field length
MEMORY,AUTO.             <-- resume automatic mode
                             (FL reduces after next job
                             step)
MEMORY,FL=32978.         <-- get and hold 32978 words
                             (user mode)
MEMORY,FL=32978,AUTO.
                         ^-- get 32978 words for next
                             job step only
```

MODE Set/clear mode flags.

Syntax:
```
MODE,FI=option,BT=option,EMA=option,AVL=option,
     ORI=option.
```

Parameters:
```
option - ENABLE or DISABLE
FI     - floating-point error interrupts
         (default: ENABLE)
BT     - bidirectional memory transfers
         (default: ENABLE)
EMA    - extended memory addressing
         (default: DISABLE)
AVL    - second vector logical function unit
         (default: DISABLE)
ORI    - operand range error interrupt
         (default: ENABLE)
```

Similar commands: NOS: MODE
VMS: ON condition

MODIFY Change a permanent dataset's characteristics.

Syntax:
```
MODIFY,DN=dn,PDN=pdn,ID=uid,ED=ed,RT=rt,R=rd,
       W=wt,M=mn,NA,ERR,MSG,EXO=exo,PAM=mode,ACN.
```

Parameters:
```
RT=rt - new retention period
RT=   - reset to default

ACN   - use the alternate account number
```

Remarks: If the file has control words (M=, R=, W=), they must all be specified in the ACCESS.

See also: ALTACN; NEWCHRG; SAVE; Appendix D: CNEWCHRG

Similar commands: NOS: CHANGE
VMS: SET PROTECTION

Examples:
```
ACCESS,DN=mylocal,PDN=myperm,UQ,....
MODIFY,DN=mylocal,PAM=R.
```

MSACCES (DTRC) Supply username and password to the Mass Storage System.

Syntax: MSACCES,US=us,MPW=mpw,AC=ac.

Parameters: us - user initials/username
(default: the executing VAX user initials)

mpw - MSS password

ac - account/charge number
(default: the executing VAX account number)

Remarks: MSACCES is required before using the MSx commands.

Similar commands: VMS: HFT ACCESS (DTRC)

Examples:
```
MSACCES,MPW=mymsspw.
MSAUDIT,.... -or- MSCHANG,.... -or- MSFETCH,....
             -or- MSPASSW,.... -or- MSPURGE,....
             -or- MSSTORE.....
= = = = =
MSACCES,US=other,MPW=otherpw,AC=otherac.
             ^-- access the MSS as another user
```

MSAUDIT (DTRC) Sorted audit of Mass Storage files.

Syntax: MSAUDIT,MPW=mpw,L=ldn,LO=lo,SHOWPW=showpw,UN=un.

Parameters: mpw - your MSS password

lo - list options
F - full audit (4 lines per file + cost per month and per day)
S - short audit (length, filename, CT, M (permissions), number of uses, indirect/direct)
I - intermediate audit (short plus number of uses, date created, date last accessed, number of streams (direct files), password (if requested), charge number (your files), cost per day)
(default: LO=F)

showpw - enter anything to include each file's password (your files only) in the output list (LO=S or I)
(default: passwords are not included)

un - Username (User Initials) of the owner of the MSS files to be audited
(default: your own files)

Remarks: MSACCES is required before using the MSx commands.

MSAUDIT provides a sorted listing of your files on the Mass Storage System (4 lines per file) and two shorter forms (1 line per file).

See also: AUDIT

Similar commands: NOS: BEGIN,AUDIT; CATLIST
VMS: DIRECTORY/FULL; MSSAUDIT

Examples:
```
MSAUDIT,mymsspw.
              ^-- 4 lines per file listing of
                  your MSS files on $OUT
====================
MSAUDIT,mymsspw,L=audout,LO=I,SHOWPW=x.
              ^-- 1 line per file listing
                  (including each file's password)
                  written to local file AUDOUT
====================
MSAUDIT,mymsspw,L=hisout,LO=S,UN=other.
              ^-- short listing of MSS files of
                  user OTHER in file HISOUT
```

MSCHANG Change Mass Storage System file attributes.

Syntax:
```
MSCHANG,MDN=mdn,NMDN=nmdn,PW=pw,CT=ct,M=m,BR=br,
        PR=pr,NA=na,AC=ac,CP=cp.
```

Parameters:

mdn - MSS filename whose attributes are to be changed

nmdn - new MSS filename

pw - new password
0 - clear the password

ct - file permit Category Type

ct	meaning
P or PR or PRIVATE	private
S or SPRIV	semiprivate
PU or PUBLIC	public

m - alternate user permission mode for semiprivate and public files

m	meaning
E (EXECUTE)	you can execute; others can read or execute concurrently
R (READ)	all can read or execute concurrently

RU	(READUP)	all can read or execute; one (other) user can rewrite the file
RA	(READAP)	all can read or execute; one (other) user can lengthen the file
RM	(READMD)	all can read or execute; one (other) user can lengthen or rewrite the file
U	(UPDATE)	all can read or execute; you can rewrite the file
A	(APPEND)	all can read or execute; you can lengthen the file
M	(MODIFY)	all can read or execute; you can lengthen or rewrite the file
W	(WRITE)	you can read, execute, lengthen, rewrite, or shorten the file; others have no concurrent access

br - backup requirements

br	meaning
CR	off-station backup
Y	on-station backup

pr - preferred residence

pr	meaning
M	alternate storage - MSS
N	no preference

na - one of:
0 - abort on errors
non-0 - do not abort on errors
(default: NA=0)

ac - may alternate users obtain information about the file? (Y or N)

cp - account number is to be replaced by the one currently in effect
non-0 - change the account number

MDN is required; the defaults for the others is to leave them unchanged.

Remarks: MSACCES is required before using the MSx commands.

Similar commands: NOS: CHANGE
VMS: HFT CHANGE

Examples: MSACCES,UN=myid,MPW=mymsspw.

```
MSCHANG,MDN=myfile,NMDN=newname.
              ^-- change MSS file MYFILE to NEWNAME

MSCHANG,MDN=myfile,NMDN=newname,NA=1.
              ^-- change MSS file MYFILE to
                  NEWNAME (don't abort if MSS file
                  NEWNAME already exists)

MSCHANG,MDN=myfile,CT=PU.
              ^-- make MSS file MYFILE public

MSCHANG,MDN=myfile,PW=mypw.
              ^-- put a password on MSS file MYFILE

MSCHANG,MDN=myfile,BR=CR.
              ^-- make MSS file MYFILE a critical
                  file with off-station backup

MSCHANG,MDN=myfile,BR=Y.
              ^-- make MSS file MYFILE a non-
                  critical file with on-station
                  backup

MSCHANG,MDN=myfile,CP=1.
              ^-- change the account number to the
                  one in effect on the MSS
```

MSFETCH (DTRC) Fetch a file from the Mass Storage System.

Syntax: MSFETCH,DN=dn,MDN=mdn,DF=df,UN=un,PW=pw.

Parameters:

dn - the local dataset name

mdn - the MSS dataset (file) name
(default: MDN=dn)

df - data format
TR - transparent (no conversion)
CB - character blocked (convert from CDC display code)
(default: DF=TR)

un - Username (User Initials) of the owner of the MSS file
(omit for your own files)

pw - optional MSS file password

Remarks: MSACCES is required before using the MSx commands.

MSFETCH defaults to DF=TR, FETCH defaults to DF=CB.

See also: ACQUIRE, FETCH

Similar commands: NOS: ATTACH
VMS: HFT FETCH (DTRC)

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSFETCH,DN=in1,MDN=mymsfyl.
MSFETCH,DN=in2,MDN=hisfyl,UN=him,DF=CB,PW=fylepw.
```

IN1 is your file MYMSFYL transferred without conversion.

IN2 is file HISFYL belonging to user HIM converted from CDC Display Code (FYLEPW is the password HIM requires for access to the file).

MSPASSW Change Mass Storage System access password.

Syntax: MSPASSW,OLD=oldpw,NEW=newpw.

Parameters: oldpw - your current MSS access password

newpw - your new MSS access password

Remarks: MSACCES is required before using the MSx commands.

Similar commands: NOS: PASSWOR .
VMS: HFT PASSWORD

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSPASSW,OLD=mymsspw,NEW=newmsspw.
```

MSPURGE (DTRC) Purge a file from the Mass Storage System.

Syntax: MSPURGE,MDN=mdn.

Parameters: mdn - the MSS dataset (file) name
(default: MDN=dn)

Remarks: MSACCES is required before using the MSx commands.

Similar commands: NOS: PURGE
VMS: HFT DELETE; MSSDELETE (both DTRC)

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSPURGE,MDN=mssfyll.
```

MSSTORE (DTRC) Store a file on the Mass Storage System.

Syntax: MSSTORE,DN=dn,MDN=mdn,DF=df,CT=ct,NA=na,PW=pw,
BR=br,M=m,PR=pr,AC=ac.

Parameters: dn - the local dataset name

mdn - the MSS dataset (file) name
(default: MDN=dn)

df - data format
TR - transparent (no conversion)
CB - character blocked (convert from CDC display code)
(default: DF=TR)

ct - Category type
P - private
PU - public
S - semi-private
(default: CT=P)

na - No Abort
0 - abort if file already exists on the MSS
1 - replace the old MSS file, if one exists
(default: NA=0)

pw - optional MSS file password

br - backup requirements

br	meaning
CR	off-station backup
Y	on-station backup

(default: BR=Y)

m - alternate user permission mode for semiprivate and public files

m	meaning
E (EXECUTE)	you can execute; others can read or execute concurrently
R (READ)	all can read or execute concurrently
RU (READUP)	all can read or execute; one (other) user can rewrite the file
RA (READAP)	all can read or execute; one (other) user can lengthen the file

RM	(READMD)	all can read or execute; one (other) user can lengthen or rewrite the file
U	(UPDATE)	all can read or execute; you can rewrite the file
A	(APPEND)	all can read or execute; you can lengthen the file
M	(MODIFY)	all can read or execute; you can lengthen or rewrite the file
W	(WRITE)	you can read, execute, lengthen, rewrite, or shorten the file; others have no concurrent access

br - backup requirements

br	meaning
CR	off-station backup
Y	on-station backup

pr - preferred residence

pr	meaning
M	alternate storage - MSS
N	no preference

(default: PR=N)

ac - may alternate users obtain information about the file? (Y or N)

Remarks: MSACCES is required before using the MSx commands.

See also: DISPOSE

Similar commands: NOS: DEFINE
VMS: HFT STORE (DTRC)

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSSTORE,DN=in1,MDN=mssfyl1.
MSSTORE,DN=in2,MDN=mssfyl2,BR=CR.
MSSTORE,DN=in3,MDN=mssfyl3,DF=CB,NA=1,PW=fylepw.
```

IN1 is stored as private file MSSFYL1.

IN2 is stored as private file MSSFYL2 with off-station backup.

IN3 is stored as private file MSSFYL3 (even is MSSFYL3 already exists) in CDC Display Code. FYLEPW is the password required for another user to access the file.

NEWCHRG (DTRC - PROCLIB) Change permanent file account number.

Syntax: NEWCHRG,OLD=oldchrgno,ID=id.

Parameters: OLD= - the account number to be changed

ID=id - change all files having this ID
ID - change all files having a null ID
(default: change all IDs)

Remarks: NEWCHRG changes from the specified account number to the "current" number of the Cray job (from the ACCOUNT or most recent ALTACN statement).

See also: ALTACN; MODIFY; Appendix D: CNEWCHRG

Similar commands: NOS: BEGIN,NEWCHRG

Examples:
```
JOB,JN=....
ACCOUNT,AC=....
ACCESS,PROCLIB,OWN=PUBLIC.
LIBRARY,PROCLIB:*.

NEWCHRG,OLD=1222233344.
            ^-- change all files from account
                1-2222-333-44 to the current one
= = = = =
...
NEWCHRG,OLD=1222233344,ID=myid,
            ^-- change all files WITH ID=MYID
                from account 1-2222-333-44 to
                the current one
= = = = =
...
ALTACN,AC=5666677788.
NEWCHRG,OLD=12222433344.
            ^-- change all files from account
                1-2222-333-44 to 5-6666-777-88
```

NOHOLD Cancel the effect of HOLD.

Syntax: NOHOLD,GRN=grn.

Parameters: GRN=grn - generic resource name

See also: HOLD

NORERUN Control a job's rerunability.

Syntax: NORERUN,option.

Parameters: option - ENABLE - declare a job nonrerunable if any of the nonrerunable functions are done

DISABLE - stop monitoring nonrerunable functions (if a job has already been declared nonrerunable, that status is not changed)

(default: ENABLE)

See also: RERUN

Similar commands: NOS: NORERUN

Examples: NORERUN,DISABLE.

NOTE Write text to a dataset.

Syntax: NOTE,DN=dn,TEXT='text'.

Parameters: DN= - the dataset to be written (at its current position)

DN - write to $OUT

TEXT= - up to 153 character to be written

Similar commands: NOS: NOTE
VMS: OPEN,WRITE,CLOSE

Examples:
```
NOTE,DN=UIN,TEXT='*COMPILE myprog,mysub'.
REWIND,UIN.
UPDATE,I=UIN,....
```

OPTION Specify user-defined options.

Syntax:
```
OPTION,LPP=n,PN={ p | ANY },STAT=stat,BS=bsz,
       ST=dev,DEF=pdev,XSZ=mxsz:mnsz,RDM,SEQ,
       UNB.BLK,NOF,OVF,SPD=sect,BFI=bfi,
       LM=mxsz,SZ=dsz.
```

Parameters: LPP=n - number of lines per page for job listings (0-255 decimal)

LPP=0 - do not change the current setting (default: 66)

PN=p - select a processor (p is 1 or 2)

PN=ANY - any available processor (if invalid, job aborts with an error message)

(default: ANY)

BS - buffer size (# of octal 512-word blocks in circular I/O buffer)
(default: system defined; BS and UNB are mutually exclusive)

ST - storage device type
SCR - scratch
PERM - permanent

DEF - preferred device types

XSZ - maximum and minimum transfer sizes in octal sectors
(default: system defined; normally half the buffer size)

RDM - ramdom dataset
(default: sequential; RDM and SEQ are mutually exclusive)

SEQ - sequential dataset
(default: sequential; RDM and SEQ are mutually exclusive)

UNB - unblocked dataset
(default: blocked; UNB and BS are mutually exclusive)

BLK - blocked dataset
(default: blocked; BLK and UNB are mutually exclusive)

NOF - do not overflow to another device
(default: system defined; NOF and OVF are mutually exclusive)

OVF - overflow allowed
(default: system defined; NOF and OVF are mutually exclusive)

LN - maximum number of decimal 512-word blocks for a dataset - job aborts if exceeded

SZ - number of decimal 512-word blocks to reserve for dataset when it is created
(default: system defined)

BFI - blank field initiation (octal ASCII code signaling the beginning of a sequence of blanks)
OFF - no blank compression
(default: octal 33 (ESC))

SPD - dataset is striped

```
                STAT=   - the level of I/O statistics gathered
                          for local datasets to appear in the
                          user logfile
                          (user level   - accounting information
                           system level - device information)
                           ON   - installation defined
                           OFF  - no statistics
                           FULL - user and system info
                          (default: OFF)
                STAT    - same as STAT=ON

        Similar commands:  VMS: SUBMIT /QUEUE=
```

PASCAL Compile a Pascal source program.

```
        Syntax:       PASCAL,I=idn,L=ldn,B=bdn,O=list,
                            CPU=cpu:char.

        Parameters:  B=   - generated binary load modules
                          (default: $BLD)

                     O=   - Compiler options, separated by colons
                          (default: A-:BP-:BREG=8:BT-:C-:D+:H2:^
                                    H+24:L+:O+:P-:R+:RV-:S4:S+4:^
                                    ST-:T+:TREG=8:U-:V+:X-:Z+)

                     CPU= - Cray to execute the program
                           cpu  - CRAY-XMP
                                  CRAY-X1  - single-processor
                                  CRAY-X2  - dual-processor
                                  (default: the compiling machine)

                           char - [NO]EMA     - extended memory
                                                (24-bit A-register
                                                immediate loads;
                                                common blocks > 4
                                                million words)
                                  [NO]CIGS    - compressed index
                                                scatter/gather
                                  [NO]VPOP    - vector population
                                                and parity
                                  [NO]READVL  - vector length read
                                                instructions
                                  MEMSIZE=nK  - (n * 1024) words
                                  MEMSIZE=nM  - (n * 1048576) words
                                  [NO]BDM     - bidirectional memory

        Similar commands:  NOS, VMS: PASCAL

        Examples:    PASCAL,I=mypasc.
```

PERMIT Grant/deny access to a permanent dataset.

Syntax: PERMIT,PDN=pdn,ID=uid,AM=am,RP,USER=ov,ADN=adn,
NA,ERR,MSG.

Parameters: PDN=pdn - required

RP - remove the permissions

USER=ov - the name (User Initials) of the user to be granted/denied permission

ADN=adn - local dataset with the permit list

Similar commands: NOS: CHANGE; PERMIT
VMS: SET PROTECTION; Access Control List

Examples:
```
PERMIT,PDN=myfile,USER=abcd,AM=R.
                    ^-- make file readonly for user ABCD
= = = = =
PERMIT,PDN=myfile,USER=abcd.AM=N.
                    ^-- remove all permissions for user
                        ABCD
```

PRINT Write the value of a JCL expression to the logfile.

Syntax: PRINT(expression)

Parameters: exp - any valid JCL expression
(maximum length: 8 characters)

Logfile format: UT060 decimal octal ASCII

Similar commands: NOS: DISPLAY
VMS: WRITE SYS$OUTPUT

Examples:
```
SET(J1=J1+1)
PRINT,J1.
```

PROC Begin an in-line procedure definition block. This is followed by the procedure prototype statement which names the procedure and gives the formal parameter specifications.

Syntax:
```
PROC,L=ldn,LIB=plib.
name,p1,p2,...,pn
   ...
ENDPROC.
```

Parameters: L - listing dataset to receive the echo of the definition block
(default: $LOG)

LIB - procedure library dataset to receive the definition body
(default: $PROC)

name - the name of the procedure (1-8 alphanumeric characters; should not be the same as a system verb)

pi - a formal parameter specification in one of the following formats:

```
pos                 - positional
key=dvalue:kvalue - keyword
  key     - formal keyword parameter
  dvalue - optional default value if
           the parameter is omitted
  kvalue - optional value if the
           parameter is specified with
           no value
special cases:
  key=   - specify a null value
  key=: - no defaults, but caller may
          specify key= or just key
```

See also: Section 3-3

Similar commands: NOS: .PROC
VMS: always 8 parameters

Examples:
```
PROC.
...
ENDPROC.
```

QUERY Determine the current status and position of a local file.

Syntax: QUERY,DN=dn,STATUS=status,POS=pos.

Parameters: STATUS= - the JCL symbolic variable name to receive the status of the dataset - return values:

value	meaning
-1	dn is not local
0	dn is closed
1	dn is open for output
2	dn is open for input
3	dn is open for I/O

POS= - the JCL symbolic variable name to receive the position of the dataset - return values:

value	meaning
-1	position indeterminate (not local, unblocked, closed)
0	BOD (beginning-of-data)
1	EOD (end-of-data)
2	EOF (end-of-file)
3	EOR (end-of-record)
4	mid-record

Remarks: In addition, a logfile message is generated:

```
QU001 - DN: ldn STATUS:  status  POS:  pos
```

where status is UNKNOWN, CLOSED, OPEN-O, OPEN-I, OPEN-I/O
pos is N/A, BOD, EOD, EOF, EOR, MID

Similar commands: NOS: ENQUIRE
VMS: no local file concept

Examples:
```
QUERY,DN=myfile,STATUS=J0,POS=J1.
IF(J0.LT.0)
   COMMENT. file myfile is not local
   ...
ELSE.
   COMMENT. file myfile is local
   ...
ENDIF.
```

RELEASE Return a dataset.

Syntax: RELEASE,DN=dn1:dn2:...:dn8,HOLD.

Parameters: DN= - up to 8 dataset names
HOLD - hold generic resource (do not return the allocation to the system pool)

See also: HOLD, NOHOLD

Similar commands: NOS: RETURN

Examples: RELEASE,DN=temp:file1:out.

RERUN Control a job's rerunability.

Syntax: RERUN,option.

Parameters: option - ENABLE - mark job as rerunable regardless of any nonrerunable functions which may have been performed so far in the job
DISABLE - mark the job as nonrerunable
(default: ENABLE)

See also: NORERUN

Similar commands: NOS: NORERUN

Examples: RERUN,ENABLE.

RETURN Return control from a procedure to its CALLer.

Syntax: RETURN.
RETURN,ABORT.

Parameters: ABORT - cause COS to issue a job step abort

Similar commands: NOS: REVERT
VMS: EXIT

Examples: See PROC.

REWIND Position a dataset at its beginning.

Syntax: REWIND,DN=dn1:dn2:...:dn8.

Parameters: DN= - up to 8 datasets to be rewound

Similar commands: NOS: REWIND

Examples: REWIND,DN=temp:out:in1.

ROLLJOB Protect a job by writing it to disk.

Syntax: ROLLJOB.

Remarks: There is no guarantee that a job will remain recoverable.

Examples: ROLLJOB.

SAVE Make a local dataset permanent and define its characteristics.

Syntax:
```
SAVE,DN=dn,PDN=pdn,ID=uid,ED=ed,RT=rt,R=rd,W=wt,
     M=mn,UQ,NA,ERR,MSG,EXO=exo,PAM=mode,
     ADN=adn,ACN.
```

Parameters:
- RT=rt - retention period
- RT= - set to default
- ADN=adn - local dataset with the permit list
- ACN - use the alternate account number

See also: ALTACN, MODIFY

Similar commands: NOS: DEFINE; SAVE
VMS: CREATE

Examples:
```
SAVE,DN=out,PDN=ABCOUT.
= = = = =
SAVE,DN=prog,PDN=mastprog,M=maint,PAM=R.
             ^-- the file is world-readable and
                 YOU can't accidentally delete it
```

SCRUBDS Write over a dataset before release.

Syntax:
```
SCRUBDS,DN=lfn.
```

Parameters:
- lfn - the uniquely accessed file to be overwritten

Remarks: SCRUBDS writes zeros over an existing dataset.

Examples:
```
ACCESS,DN=myfyl,PDN=myfyle,UQ.
SCRUBDS,DN=myfyl.
```

SEGLDR Segment loader.

Syntax:
```
SEGLDR,I=idn,L=ldn,DN=bdn1:bdn2:...:bdn8,
       LIB=lib1:lib2:...:lib8,ABS=adn,
       CMD='directives',GO.
```

Parameters:
- I= - Dataset with SEGLDR directives (default: $IN)
- I - Same as I=$IN
- L= - Listable output (default: $OUT)
- L - Same as L=$OUT
- DN= - Up to 8 binary load dataset(s)
- DN - Same as DN=$BLD (default: $BLD)

LIB= - Up to 8 relocatable object libraries
to be searched

ABS= - Dataset to contain the absolute program
(default: $ABD)

CMD= - Global directives to be processed;
treated as first record read from I=idn;
separate commands with semicolons
(e.g., CMD='BIN=bdn;MAP=PART')

GO - Load and execute;
ignored for a segmented load

Remarks: By default, input load modules are read from $BLD.

Directives: See section 3-6.

Similar commands: NOS: SEGLOAD
VMS: virtual machine

Examples: CFT77,B=myobj.
SEGLDR,DN=myobj,LIB=mylib,CMD='MAP=PART',GO.

SET Change the value of a JCL variable.

Syntax: SET(symbol=expression)

Parameters: exp - a valid arithmetic, logical or literal
assignment expression - may be delimited by
parentheses

Remarks: The job-step aborts if the variable is unknown,
is changable only by COS, or is a constant.

Similar commands: NOS: SET
VMS: $ name = value

Examples: SET(J1=J1+1) <-- increment procedure-local
register J1 by 1

SET(G1=(SYSID.AND.177777B))
^-- put the low-order 2 characters
of the current system revision
level into global register G1

SET(G3=((ABTCODE.EQ.74).AND.(G2.EQ.0)))
^-- define global register G3

SID Debug programs interactively or in batch.

Syntax: SID=adn,I=idn,S=sdn,L=lsn,ECH=edn,CNT=n.

Parameters: adn - absolute dataset name (from LDR,AB=adn)

I= - Input directives
(default: $IN)

S= - Symbol dataset name
(default: $DEBUG)

L= - Listable output
(default: $OUT)

ECH= - Dataset for echoing input directives
(default: no echoing)
ECH - Same as ECH=ldn

CNT= - Breakpoint interrupt count
(default: 0 (no abort))

Similar commands: NOS: CID
VMS: DEBUG

SKIPD Skip blocked datasets (position at EOD (after last EOF)).

Syntax: SKIPD,DN=dn.

Parameters: DN - (default: $IN)

Same as: SKIPF,DN=dn,NF.

Similar commands: NOS: SKIPEI
VMS: OPEN with ACCESS=APPEND in program

Examples: SKIPD,DN=myfile.

SKIPF Skip blocked files from current position.

Syntax: SKIPF,DN=dn,NF=nf.

Parameters: DN=dn - (default: $IN)

NF=nf - decimal number of files to skip forward
NF=-nf - decimal number of files to skip backward
NF - position after the last EOF of the dataset
(default: NF=1)

Similar commands: NOS: SKIPF; SKIPFB; SKIPR

Examples: SKIPF,DN=myfile.

SKIPR Skip blocked records from the current position.

Syntax: SKIPR,DN=dn,NR=nr.

Parameters:
- DN=dn - (default: $IN)
- NR=nr - decimal number of records to skip forward
- NR=-nr - decimal number of records to skip backward
- NR - position after the last EOF of the current file (default: NR=1)

Examples: SKIPR,DN=myfile.

SKIPU Skip sectors on unblocked datasets.

Syntax: SKIPU,DN=dn,NS=ns.

Parameters:
- DN=dn - no default
- NS=ns - decimal number of sectors to skip forward
- NS=-ns - decimal number of sectors to skip backward
- NS - position after the last sector of the dataset (default: NS=1)

Examples: SKIPU,DN=myfile.

SORT Sort/merge.

Syntax:
```
SORT,S=sdn[:sdn...],M=mdn[:mdn...],O=odn,
     DIR=ddn,L=ldn,ECHO,RETAIN,NOVERF.
```

Parameters:
- S= - Input dataset of up to 8 unsorted files
- M= - Input dataset of up to 8 sorted files to be merged (S or M or both must be specified)
- O= - Output dataset (required)
- DIR= - Dataset with SORT directves (default: $IN)
- L= - Listable output (default: $OUT)
- L=0 - No listable output
- ECHO - Write directives to L=ldn (Not allowed if L=0)

RETAIN - Retain input order for equal keys

NOVERF - Do not verify the sort
(default: verify)

Similar commands: NOS: SORT5
VMS: SORT

SPY Generate a histogram on time usage within a program to locate inefficient code.

Syntax: SPY,PREP,BS=bcktsz,D=dbugdn,S=scrtch,
SUB=rtn1:rtn2:..:rtnn,TS=time.

SPY,POST,ADDRESS,L=listdn,NOLABEL,NOLIB,S=scrtch,
SUB=rtn1:rtn2:..:rtnn,MINHIT=n.

Parameters:

BS= - bucket size in words; each bucket begins on a word address that is a multiple of the bucket size
(default: 4)

D= - dataset containing the program's symbol table
(default: $DEBUG)

S= - dataset where SPY,PREP will write tables for SPY,POST to use

SUB= - list of up to 20 routines to be analyzed

TS= - time slice in microseconds
(default: 500)

ADDRESS - the report will be by address instead of by label

L= - the output report listing dataset
(default: $OUT)

NOLABEL - the bucket size will be an entire routine

NOLIB - exclude library calls to routines whose names begin with "$"

MINHIT= - minimum number of hits required to generate a report line for a bucket or label
(default: 1; 0 is NOT recommended)

Remarks: At SPY's request, COS reads the address of the current machine instruction. A group of addresses is called a bucket; accessing a bucket is called a hit. After execution, SPY generates a report of all buckets, including a bar graph showing where the time has been spent.

Use SEGLDR to create the absolute; LDR mixes code and data making it more difficult to analyze.

Similar commands: NOS: HOTSPOT
VMS: PCA

Examples:
```
CFT,ON=IZ.  -or-  CFT77,ON=Z.  -or-  CAL,SYM.
                  -or-  PASCAL,O=DM3.
SEGLDR,ABS=myabs.          <-- you must create an
                               absolute program
SPY,PREP.                  <-- prepare for SPY
myabs.                     <-- run your program
SPY,POST.                  <-- prepare the report
EXIT.
SPY,POST.
```

Since an absolute module is always created, you could use

```
SEGLDR.
SPY,PREP.
$ABD.
SPY,POST.
EXIT.
SPY,POST.
```

SUBMIT Send a local dataset to the COS input queue.

Syntax: SUBMIT,DN=dn,SID=sf,DID=df,DEFER,NLRS.

Parameters:

DN= - Dataset containing the job (required)

SID= - Source front-end identifier (2 alphameric characters)

DID= - Destination front-end identifier (2 alphameric characters)

DEFER - Defer the SUBMIT until the dataset is released (default: SUBMIT occurs immediately)

NLRS - Do not release the dataset after the SUBMIT; it remains local and read-only (default: dataset is released after the SUBMIT)

Similar commands: NOS: ROUTE,DC=IN; CSUBMIT
VMS: SUBMIT; CRAY SUBMIT

Examples: SUBMIT,DN=myjob1.

SWITCH Turn pseudo sense switches on/off.

Syntax: SWITCH,n=x.

Parameters: n - switch number (1-6)
x - switch position
ON - turned on (set to 1)
OFF - turned on (set to 0)

Similar commands: NOS: SWITCH; OFFSW; ONSW

Examples: SWITCH,2=ON.

UNBLOCK Convert a blocked dataset to an unblocked dataset.

Syntax: UNBLOCK,DN=ldn. (1)

UNBLOCK,I=idn,O=odn. (2)

Parameters: DN= - the dataset to be replaced (using an intermediate dataset $UNBLK)
(ldn is rewound before and after)

I= - the blocked input dataset
(default: $IN)
(idn is not rewound before the copy)

O= - the unblocked output dataset
(if previously marked to be unblocked (ASSIGN), odn is not rewound before; otherwise, odn is replaced)

Remarks: UNBLOCK is intended primarily for postprocessing datasets created by or for certain stations.

Examples:
```
UNBLOCK,DN=myfile.
            ^-- Replace MYFILE with unblocked
                copy of itself
= = = = =
UNBLOCK,I=myblk,O=myunblk.
            ^-- Copy blocked file MYBLK as
                unblocked file MYUNBLK
```

UPDATE Source and data maintenance.

Syntax:

```
UPDATE,P=pdn,I=idn1:idn2:...:idnn,C=cdn,N=ndn,
       L=ldn,E=edn,S=sdn,*=m,/=C,DW=dw,DC=dc,
       ML=n,&,opts.

where & is one of: F
                   Q[=d1:d2:...:dn]
                   Q='d1,d2,...,dj.dk,...,dn'
```

Parameters:

```
P=   - Program library dataset
       (default: $PL)
P    - Same as P=$PL
P=0  - Required for a creation run

I=   - Input datasets with directives and text
       (Maximum: 100 datasets)
       (default: $IN)
I    - Same as I=$IN
I=0  - No input dataset

C=   - Compile output dataset
       (default: $CPL)
C    - Same as C=$CPL
C=0  - No compile output

N=   - New program library dataset
       (default: creation run:     $NPL
                 modification run: no new PL)
N    - Same as C=$CPL
N=0  - No new PL

L=   - Listable output
       (default: $OUT)
L    - Same as L=$OUT
L=0  - No listable output

E=   - Error dataset name
       (default: $OUT)
E    - Same as E=$OUT
E=0  - Errors written to L=ldn
       (If edn and ldn are the same, ldn is
        used and E=0)

S=   - Source output dataset
       (default: $SR)
S    - Same as S=$SR
S=0  - No source output

*=m  - Master character for directives
       (defaults: creation run:     *
                  modification run: read from
                                    the PL)
```

```
/=c - comment character
      (default: /)

DW= - Data width (number of characters written
      per line to compile and source datasets
      (defaults: creation run:     72
                 modification run: dw when PL
                                   was created)
DW  - Same as DW=72 (creation) or use dw when PL
      was created (modification run)

DC= - Declared modifications option:
       ON  - mod declaration required
       OFF - mod declaration not required
      (default: OFF)

ML= - Message level (highest severity level to
      suppress):
       1 - comment
       2 - note
       3 - caution
       4 - warning
       5 - error
      (default: 3 - suppress COMMENT, NOTE, and
                    CAUTION messages)

F   - Full UPDATE mode
      (default (F and Q omitted): normal UPDATE
                                  mode)

Q=  - Quick UPDATE mode
      (Maximum: 100 deck names)
      (default (F and Q omitted): normal UPDATE
                                  mode)

opts - NA - no abort
       NR - no rewind of C and S files
       IF - write conditional text summary to ldn
       IN - write input to ldn
       ID - write identifier summary to ldn
       ED - write edited card summary to ldn
       CD - write compile dataset generation
            directives to ldn
       UM - write unprocessed modifications to
            ldn and/or edn
       SQ - put sequencing in source output in
            columns dw+1 on (no effect on compile
            output)
       NS - no sequencing in compile output
       K  - sequence decks according to Q

Similar commands:  NOS: UPDATE
                   VMS: CMS; LIBRARIAN
```

Examples:
```
UPDATE,I=mysorc,P=0,ID.
                    ^-- create $NPL, list identifiers
= = = = =
UPDATE.
CFT,I=$CPL.
...
/EOF
*COMPILE a,b,...
/EOF
```

WRITEDS Initialize a blocked dataset.

Syntax: WRITEDS,DN=dn,NR=nr,RL=rl.

Parameters:

DN=dn - required

NR=nr - required - decimal number of records to be written

RL=rl - optional - decimal record length (if non-zero, the first word of each record is the record number as a binary integer starting with 1) (default: 0 (a null record))

Remarks: Writes a single file containing a specific number of records of a specific length. This is useful only for random (direct-access) files, which must be pre-formatted.

Examples:
```
WRITEDS,DN=myfile,NR=1000,RL=125.
```

***** Appendix D *****

*** DEC VMS DCL Commands ***

DEC VMS DCL (Digital Command Language) commands have the following general syntax:

```
verb       param1  param2  ...           ! comments
@filename  param1  param2  ...  param8    ! comments
RUN        filename                      ! comments
```

verb is the name of the routine to be executed. It consists of an alphabetic character (A-Z, a-z, $, _) followed by 0-30 alphanumeric characters for the name of the command. A procedure (.COM) is executed using an at sign ("@") followed by the name of the procedure file. A user program is executed by the RUN statement.

parami are parameters, which may be positional or keyword.

comments follow an exclamation mark ("!") that is not part of a quoted parameter.

Because VMS has an extensive on-line help facility, the individual DCL commands are not described here. For a list of the help topics, type "HELP". For specific helps, type "HELP topic". The Computer Center maintains the following help libraries which are always available:

HLP$LIBRARY	@CCF	general information about the Computer Center
HLP$LIBRARY_1	@DTLIB	subprograms in library DTLIB (Cray COS, CDC NOS, and DEC VAX/VMS)
HLP$LIBRARY_2	@UTILITIES	commands, programs, procedures, and packages added at DTRC
HLP$LIBRARY_3	@CRAY	DTRC additions to Cray
HLP$LIBRARY_4		Reserved for future use

*** Selected DEC VAX/VMS Commands ***

The following are a few of the DEC VAX/VMS DCL commands:

ALLOCATE Assign a tape drive to a logical name.

```
        Syntax:      ALLOCATE  device  logical_name

        Parameters:  device    - the logical name of a specific or
                                 generic tape drive

                     log_name  - the name by which the tape is to be
                                 known to the job (1-255 characters)

        Examples:    $ ALLOCATE  MU:  tape
                                  ^-- next available tape drive
                                      starting with MU will be
                                      assigned to logical name TAPE
```

DEALLOCATE Return a previously allocated device and disassociate the job's logical name from the tape drive.

```
        Syntax:      DEALLOCATE  logical_name
                     DEALLOCATE  device_name

                     DEALLOCATE  /ALL

        Parameters:  log_name  - the name by which the tape is known
                                 to the job
                     dev_name  - the name of the device
                                 (use if the device was not deallocated
                                 and the logical name is no longer
                                 defined)

        Qualifiers:  /ALL - deallocate all allocated devices

        Examples:    $ DEALLOCATE  tape
                                   ^-- deallocate the tape drive
                                       associated with logical name
                                       TAPE
                     = = = = =
                     $ DEALLOCATE  $2$mua0
                                   ^-- deallocate tape drive mua0
```

DISMOUNT Release a tape volume that was previously mounted.

Syntax: DISMOUNT device_name

Parameters: device_name - the physical or logical name of the device to be dismounted

Qualifiers: /NOUNLOAD - Do not unload the tape (keeps the device and volume in a ready state (default: /UNLOAD)

Examples: $ DISMOUNT /NOUNLOAD tape
^-- release file TAPE but keep the tape mounted for a future MOUNT

INITIALIZE Initialize a magnetic tape.

Syntax: INITIALIZE device vsn

Parameters: device - the name given the tape in the ALLOCATE

vsn - a 6-character volume serial number (all DTRC Network tapes are NAnnnn, where nnnn is a 4-digit number)

Remarks: HELP INITIALIZE for additional qualifiers

Examples: See page 6-1-6

MOUNT Mount a magnetic tape and, if labelled, check the label.

Syntax: $ MOUNT device,... [vsn,...] [logical_name]
/BLOCKSIZE=mbl /COMMENT="string"
/DENSITY=den /FOREIGN
/[NO]LABEL /RECORDSIZE=mrl
/[NO]UNLOAD /[NO]WRITE

Parameters: device - physical or logical name of the tape drive (for more than one tape, separate with commas or plus signs)

vsn - the volume serial number of the tape(s) as recorded in the tape's label record (0-6 characters) (not with /FOREIGN)

log_name - the logical name to be used (not needed if is a logical name is used for DEVICE)

Qualifiers:

/BLOCKSIZE= - the default block size in bytes (range: 18-65,534; default: 2048)

/COMMENT = - specify additional information to the operator

/DENSITY= - the tape density (1600 or 6250) (default: the density of the first record of the volume)

/FOREIGN - an unlabelled tape

/LABEL - the tape has VAX/VMS ANSI labels
/NOLABEL - the same as /FOREIGN (default: /LABEL)

/RECORDSIZE= - the number of characters in each record - normally used with /FOREIGN and /BLOCKSIZE (mrl <= mbl)

/UNLOAD - unload the tape when DISMOUNTed
/NOUNLOAD - do not unload the tape (default: /UNLOAD)

/WRITE - the tape can be written
/NOWRITE - the tape is read only (default: /WRITE)

Examples:

```
$ MOUNT  tape:  /FOREIGN  /DENSITY=1600  -
         /RECORDSIZE=140  /BLOCKSIZE=5040  -
         /comment="Please mount slot98 ", -
                  "vsn=ABCD01 ring"
             ^-- mount a slot tape for writing
                 blocked records
= = = = =
$ MOUNT mytape  NA9999 /DENSITY=1600
        /comment="Pls mount with NO ring"
             ^-- mount a read-only tape
= = = = =
```

See page 6-1-6 for an example of initializing a tape.

SET MAGTAPE Define default characteristics for subsequent use of a magnetic tape device; position a magnetic tape.

Syntax:

```
SET MAGTAPE  device  /DENSITY  /END_OF_FILE
                     /LOG  /LOGSOFT  /REWIND
                     /SKIP=option
```

Parameters: device - the logical name of a specific or generic tape drive

Qualifiers: /DENSITY - the default density (1600 or 6250) for writes to a foreign or unlabelled tape

/END_OF_FILE - write a tape mark at the current position on the tape

/LOG - display information about what was done

/LOGSOFT - log soft errors on the error log file

/REWIND - rewind the tape

/SKIP= - position the tape

option	meaning
BLOCK:n	skip <n> blocks
END_OF_TAPE	position at the end-of-tape mark
FILES:n	skip <n> files
RECORD:n	skip <n> records

/UNLOAD - rewind and unload the tape

Similar commands: NOS: BKSP, REWIND, SKIPEI, SKIPF, SKIPFB, UNLOAD, WRITEF

Examples:
```
$ MOUNT  tape:  /FOREIGN
$ SET MAGTAPE  tape:  /DENSITY=6250
                ^-- mount a foreign tape and set the
                    write density to 6250 cpi
= = = = =
$ SET MAGTAPE  /SKIP=FILES:4
                ^-- skip forward 4 files
```

*** Selected DEC VAX/VMS Additions ***

The following are DTRC additions to DEC VAX/VMS:

APRINT (DTRC) Print one or more files on the printer in Annapolis.

Syntax: APRINT file(s) copies delete PRINT_quals

Parameters:
- file - the file(s) to be printed
- copies - number of copies (default: 1)
- delete - DELETE to delete the file(s) after printing (default: keep the files)
- PRINT_quals - P4-P8 may be used for additional qualifiers for the PRINT statement

Remarks: All PRINT qualifiers which we support are available.

The files are places into terminal queue SYS$ANAP.

See also: CAPRINT

Examples:
```
APRINT  myfile.out
APRINT  myfile.out  4
```

AUX (DTRC) Turn an auxiliary printer on or off; for supported printers, send control characters to control character size and page eject.

Syntax: AUX option

Parameters: option - one of:

```
On/off:
 ON      - turn printer on
 OFF     - turn printer off
Page eject:
 TOP     - page eject (leave AUX ON)
 TOPOFF  - page eject (leave AUX OFF)
ALPS:
 ACC     - condensed (17 cpi)
 APC     - Pica (10 cpi)
Brother 2024L:
 BCC     - condensed characters (18 cpi)
 BCCOFF  - condensed characters off
 BEC     - Elite (12 cpi)
 BPC     - Pica (10 cpi)
 BWC     - wide characters (5 cpi)
 BWCOFF  - wide characters off
Okidata MicroLine 82 or 84:
 OCC     - condensed characters (15 cpi)
 OLC     - large (8.3 cpi)
 OPC     - Pica (10 cpi)
 OWC     - wide characters (5 cpi)
 VC132   - same as OCC
 VC80    - same as OPC
```

Remarks: Other printers which use the same control codes may use the corresponding options.

See also: AUXPRINT

Similar commands: NOS: BEGIN,AUX; BEGIN,AUXPRNT

Examples:

```
$ AUX ON
$ TYPE myfile.dat
$ AUX OFF
= = = = =
$ AUX ON
$ AUX BCC      <-- condensed on Brother 2024L
$ TYPE myprog.for
$ AUX BCCOFF
$ AUX OFF
```

AUXPRINT (DTRC) Print one of more files on an axiliary printer (one attached to an interactive terminal)

Syntax: AUXPRINT files /ALLTYPES /CC /COPIES= /CS= /DOUBLE_SPACE /EJECT_AT_END /FF /HEADER /LOG /NEWPAGE /PS= /PW= /SHIFT= /SKIP=

Parameters: files - the name of the file or comma-separated list of files to be printed -- wildcards are allowed (defaults: filename: FOR001; type: .DAT)

Qualifiers:

/ALLTYPES - controls the processing of certain file types (default: /NOALLTYPES)

/CC - carriage control is in column 1 (default: /NOCC)

/COPIES= - number of copies (default: 1)

/CS= - character set (see AUX)
ALPS:
ACC, APC
Brother 2024L:
BCC, BDC, BEC, BPC, BWC
Okidata MicroLine 82 or 84:
OCC, OLC, OPC, OWC
(default: however the printer is set)

/DOUBLE - double spacing (default: /NODOUBLE)

/EJECT - eject to a new page at the end of the last file printed (ignored for /CC) (default: /NOEJECT_AT_END)

/FF - page eject for <FF> in column 1 (forces /NOCC; /NOFF ignores <FF>) (default: /FF)

/HEADER - print a header with the filename before printing the file (default: /NOHEADER)

/LOG - display information about the printing (default: /LOG)

/NEWPAGE - start each file on a new page (default: /NONEWPAGE)

/PS= - the page size (number of lines possible per page) (default: /PS=66)

/PW= - the page width (maximum number of columns per line) -- less than 133 (defaults: /PW=80; /PW or /PW=0 implies /PW=132)

```
                /SHIFT=   - number of columns to shift each line
                            (for /CC, columns 2 on are shifted)
                            (default: /SHIFT=0;
                                      /SHIFT implies /SHIFT=1)
                /SKIP=    - number of lines to skip before
                            printing the file
                            (default: /SKIP=0;
                                      /SKIP implies /SKIP=10)

Remarks:        Other printers which use the same control codes
                as the ALPS, Brother 2024L or Okidata MicroLine
                82 or 84 may use the /CS character sets.

See also:       AUX

Similar commands:  NOS: BEGIN,AUX; BEGIN,AUXPRNT

Examples:       AUXPRINT myprog.for
                = = = = =
                AUXPRINT memo.txt /CS=BEC /CC
                             ^-- print Elite characters on
                                 Brother 2024L printer, each line
                                 has carriage control in column 1
                = = = = =
                AUXPRINT a*.dat /CS=OCC /N /E
                             ^-- print all .DAT files starting
                                 with A using condensed characters
                                 on an Okidata MicroLine 82
                                 printer starting each file on a
                                 new page and ejecting a page
                                 after the last file
                = = = = =
                AUXPRINT myprog.lis /PW
                             ^-- print a wide compilation listing
                                 (assumes wide paper is in the
                                 printer)
```

CAPRINT (DTRC) Convert the record attribute of a file having Fortran carriage control characters in column 1 of each line to "Fortran carriage control" and print on the remote printer in Annapolis.

Syntax: CAPRINT file copies keep PRINT_quals

Parameters:

- file - the file to be printed
- copies - number of copies (default: 1)
- keep - any character will keep the converted file after it has been printed (default: delete the file)
- PRINT_quals - P4-P8 may be used for additional qualifiers for the PRINT statement

Remarks: This is useful for printing CDC output files or any VAX file having column 1 carriage control but a different record attribute.

The files are places into terminal queue SYS$ANAP.

See also: APRINT

Examples:

```
CAPRINT  abcd.out
             ^-- convert and print file ABCD.OUT
CAPRINT  abcd.out  5
             ^-- print 5 copies of ABCD.OUT
CAPRINT  abcd.out  "" keep
             ^-- print 1 copy and keep the
                 converted file (the next version
                 of ABCD.OUT)
```

CNEWCHRG (DTRC) Change the account number on Cray permanent files from the VAXcluster.

Syntax: CNEWCHRG upw old_ac [new_ac] [id]
[wait] [type]

Parameters: upw - Your user password for the generated ACCOUNT statement (the AC= value is taken from your current VAX/VMS session) (default: none - upw is required)

old_ac - the old account number (default: none - old_ac is required)

new_ac - the new account number (if not your current VAX/VMS account number)

id - optional Cray ID qualifier
ID=id - a specific ID
ID - the null ID
(default: all IDs)

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file NUCRAC.CPR)

type - TYPE - type the generated Cray job at your terminal
other - do not type it

Remarks: CNEWCHRG creates and submits a Cray job to make change.

CNEWCHRG works from any node of the VAXcluster. NEWCHRG is a Cray statement.

Any existing file NUCRAC.CPR is deleted before the Cray job is submitted.

This procedure creates and deletes all versions of file NUA$C.JOB.

Similar commands: COS: ALTACN/MODIFY; NEWCHRG
NOS: CHANGE

Examples:

```
CNEWCHRG  myupw  1222233344
                 ^-- change all files from
                     1-2222-333-44 to the current
                     (ACCOUNT) account number
                     without waiting for it to
                     complete
Some time later:

DIRectory  NUCRAC.CPR
                 ^-- see if the job has completed
SET TERMinal /Width=132
TYpe NUCRAC.CPR
                 ^-- look at it
SET TERMinal /Width=80
DELete NUCRAC.CPR;*
                 ^-- delete the file
= = = = =
CNEWCHRG  myupw  1222233344  5666677788  ""  WAIT
                 ^-- change all files from
                     1-2222-333-44 to an alternate
                     account number and wait for it
                     to finish  (note: the "" is the
                     ID parameter - a null string to
                     change all files)
= = = = =
CNEWCHRG  myupw  1222233344  ""  myid  ""  TYPE
                 ^-- change ID=MYID files from
                     1-2222-333-44 to the current
                     (login) account number without
                     waiting for it to complete --
                     type the generated job before
                     submitting it

This will display:

JOB,JN=NUCRAC.
ACCOUNT,US=myid,AC=myvmsaccount,UPW=myupw.
ACCESS,DN=PROCLIB,OWN=PUBLIC.
LIBRARY,DN=PROCLIB:*.
NEWCHRG,OLD=1222233344,ID=myid.

Look at it and delete it sometime later (see
previous example).
```

CNEWPW (DTRC) Change your Cray password.

Syntax: CNEWPW old_pw new_pw new_pw [ac] [wait]

Parameters: old_pw - your current Cray password

new_pw - your new Cray password

new_pw - your new Cray password again for verification

ac - your Cray account number (if not the same as your current VMS login account number)

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file NUCRPW.CPR)

Remarks: CNEWPW creates and submits a Cray job to make change.

CNEWPW works from any node of the VAXcluster. NUPW= is a parameter in the Cray ACCOUNT statement.

Any existing file NUCRPW.CPR is deleted before the Cray job is submitted.

This procedure creates and deletes all versions of file NUP$W.JOB.

Similar commands: COS: ACCOUNT
VMS: SET PASSWORD

Examples:
```
CNEWPW  myold  mynew  mynew
              ^-- change your password without
                  waiting for it to be done
Some time later:
DIRectory  NUCRPW.CPR
              ^-- see if the job has completed
SET TERMinal /Width=132
TYpe NUCRPW.CPR          <-- look at it
SET TERMinal /Width=80
DELete NUCRPW.CPR;*      <-- delete the file
= = = = =
CNEWPW  myold  mynew  mynew  1222233344 WAIT
              ^-- change your password for Job
                  Order Number 1-2222-333-44 and
                  wait for it to complete
```

CSUBMIT (DTRC) Submit a job to the Cray.

Syntax: CSUBMIT file(s) /AC=accountno /US=username
/UPW=password /NUPW
/EOF=string /AFTER=time
/LOG

Parameters: file - one of:
. a single file containing a complete Cray job
. a comma- and/or plus-separated list of files which make up the Cray job
(default filetype: .JOB)

Qualifiers: /AC - if you have multiple account numbers, use /AC to specify an account number other than your current VAXcluster login account

/AC is required if you use /US.

(default: your VAXcluster login account number)

/AFTER - specifies when the job is to be sent to the Cray

(default: the job is queued for immediate submission to the Cray)

/EOF - specifies the embedded COS end-of-file separator contained in the submitted job (if non-alphanumeric characters (including lower case letters) are used, they must be enclosed in quotes)

For example, /EOF="E O F" means that lines containing just the 5-character string "E" space "O" space "F" are to be interpretted as end-of-file. /EOF=DAVE means that lines containing just the string "DAVE" are end-of-files.

(default: /EOF="/EOF")

/LOG - if you have CRAY SET TERM INFORM turned on and you do not want to see the message that your job has been queued, use /NOLOG

(default: /LOG)

/NUPW - indicates that your Cray password is to be changed

You will be prompted for your current Cray password. If it does not match the database password, you are prompted for the password in the database. If they match, you are prompted for your new password, which will be put into the database.

Note: To do nothing more than change your password, use

CSUBMIT /NUPW

If you are changing only the password in the database, no Cray job will be generated. If you are changing your password on the Cray, a dummy job will be created and run with the output in file SETNUPW.CPR

Note: /NUPW cannot be used in a batch job

/UPW - the first time, your password will be entered into the database -- subsequently, use /UPW only if you are using a different /US

(default: /UPW=password in database)

/US - specify a different username for the Cray job (of course, you must be authorized to use the other username and must also supply /AC and /UPW)

Note: /US cannot be used in a batch job

(default: /US=the first 4 letters of your VAXcluster login username)

Remarks: This differs from CRAY SUBMIT in that jobs submitted using CSUBMIT do not need an ACCOUNT statement, CSUBMIT constructs it for you.

The first time you use CSUBMIT, your password (/UPW) is added to a database. Every CSUBMIT then uses this database password to generate an ACCOUNT statement for you. Thus, your Cray job files no longer have your password, meaning that every time you change your password, you don't have to change all your Cray job files.

Similarly, for your account number, a single Cray job may now be run under a different account, or even a different username, without changing the job file.

N.B. If there is an ACCOUNT statement in your job, it will be ignored and a new ACCOUNT statement will be generated.

Note that you must be logged into a VAXcluster node which connects to the Cray.

You can still use CRAY SUBMIT and RCSUBMIT to submit Cray jobs. However, these do not use (and cannot modify) the database, and, therefore, require ACCOUNT statements.

See also: CRAY SUBMIT; CNEWPW

Similar commands: NOS: CSUBMIT
NOS/VE: SUBMIT_CRAY

Examples:

```
$ CSUBMIT  myjob  /UPW=mycraypw
             ^-- submit for the first time the
                 Cray job in file MYJOB.JOB using
                 CSUBMIT

$ CSUBMIT  myjob
             ^-- submit the same job again

$ CSUBMIT  otherjob
             ^-- submit another job

$ CSUBMIT  myjob  /AC=5666677788
             ^-- submit the job and charge it to
                 another of my accounts

$ CSUBMIT  myjob  /US=other  /AC=9888877766
                   /UPW=otherpw
             ^-- Submit the job as another user

$ CSUBMIT  /NUPW
             ^-- change your Cray password
                 (assuming you are user ABCD)
Enter ABCD's current CRAY password.
 Password: <pw>          <-- your password entries
                             are not echoed

Enter ABCD's New CRAY password.
 Password: <pw>
 Verification: <pw>
%CX-S-SUB_OK, Job: SETNUPW queued for submission
$
```

```
$ CSUBMIT  /NUPW
             ^-- Change your Cray password
                 (assuming you are user ABCD)
                 when your actual Cray password
                 is not the same as the one in
                 the database -- perhaps you had
                 changed it using CNEWPW or CRAY
                 SUBMITted a job to change it
Enter ABCD's current Cray password.
 Password: <pw>            <-- your password entries
                               are not echoed

ABCD's current Cray password does not match the
 CSUBMIT password.
Please enter ABCD's CSUBMIT password.
 Password: <pw>

Enter ABCD's new Cray password.
 Password: <pw>
 Verification: <pw>        <-- since your current
$                              and new Cray pass-
                               words are the same,
                               the database is
                               updated, but no Cray
                               job is created

$ CSUBMIT  myjcl,myprog.for,mydata1.dat+
           mydata2.dat,mydata3.dat
             ^-- Create and submit a job
                 comprised of the following
                 VAX/VMS files:

                   MYJCL.JOB    - Cray job control
                                  statements
                   MYPROG.FOR   - Cray Fortran
                                  program
                   MYDATA1.DAT  - first part of
                                  data file
                   MYDATA2.DAT  - second part of
                                  data file
                   MYDATA3.DAT  - separate data
                                  file

$ CSUBMIT  myjob  /EOF="The end"
             ^-- (upper case T, the rest is
                 lower case) submit a job with
                 the end-of-file lines as
                 "The end"

$ CSUBMIT  myjob  /AFTER=18:00       (a)
$ CSUBMIT  myjob  /AFTER=TOMORROW    (b)
$ CSUBMIT  myjob  /AFTER=+00:05      (c)
             ^-- Submit the job a) after 6 PM,
                                b) tomorrow,
                                c) in 5 minutes
```

DETAB (DTRC) Remove tabs from a file or convert tab-format Fortran source lines to fixed-format.

Syntax: DETAB in_file_spec out_file_spec
/FORTRAN /LOG /INCREMENT=inc
/TABS=tab_list

Parameters: in_file_spec - the input file containing tabs

out_file_spec - the output file with any tabs removed
(default: next version of in_file_spec)

Qualifiers: /FORTRAN - tab-format lines are converted to fixed-format (the first tab is set at column 7 (or 6 for continuation lines) and remaining tabs are converted to three blanks)
Since tabs are collapsed to three blanks, it is unlikely that a DETABbed line will exceed 72 characters. If any lines do, you will be told how many and the length of the longest line.

/NOFORTRAN - no reformatting is done

/INCREMENT= - tabs are set every <inc> columns

If both /TABS and /INCREMENT are specified, tabs are set at the column(s) specified by /TABS= and every <inc> columns after that.

/LOG - list summary information and any warning messages
(Default: /NOLOG)

/TABS=n - set one tab at column n

/TABS=(n1,n2,...,nn)
- set tabs at these columns

If /INCREMENT=inc is not specified, then the tabs following the last defined tab stop, are each converted to a single blank.

If /INCREMENT=inc is specified, then the tabs following the last defined tab stop will be every inc columns after the last defined tab stop.

(Defaults: /TABS=0 /INCREMENT=8 /NOFORTRAN)

Note: /FORTRAN overrides /TABS and /INCREMENT.

Remarks: This is useful for:

- Preparing files to go to the Cray, Xerox 8700 or Microfiche, which don't recognize the tab character
- Removing tabs in Fortran programs (for sending to another computer (such as the Cray and CYBER 860) which don't recognize the tab-format).
- Changing the tab values while removing them (e.g., changing from every 8 columns, which is the VAX/VMS standard, to every 5 columns).

Examples: DETAB myprog.for /F

PRINTRM1 (DTRC) Print a file on the remote mini at Annapolis (RM1).

Remarks: Since RM1 is no longer available, use APRINT or CAPRINT to print in Annapolis.

QPRINT (DTRC) Print a file on a CDC CYBER 860 central site.

Syntax: QPRINT vaxfile node /ASCII
/DELETE
/JOB=<job_extension>
/NAME=<job_name>
/TID=<terminal_id>

Parameters: vaxfile - file specification of the VAXcluster file to be printed on CDC

node - the remote node on which the file is to be printed. One of:
MFN - the CDC CYBER 860

Qualifiers: /ASCII - controls whether <vaxfile> is to be printed in upper and lower case (/ASCII) or just upper case (/NOASCII)
(default: /NOASCII)

/DELETE - controls whether <vaxfile> is deleted after it has been sent
(default: /NODELETE)

/JOB - the three alphanumeric characters to follow your user initials for the CDC jobname - if fewer than 3 characters, leading zeros are added
(/JOB and /NAME are mutually exclusive)
(default: /JOB=000)

/NAME - the 1- to 7- alphanumeric character CDC job name - if fewer than 7 characters, it is padded on the right with zeros
(/JOB and /NAME are mutually exclusive)
(default: /NAME=xxxxext
where xxxx are the executing user initials
and ext is the job extension (/JOB))

/TID - Specifies where the file is to be printed -- no remote printers are currently supported
(default: print at Central Site)

How it works: The CDC name of the output file is created from the /NAME or /JOB qualifier.

The output in your VAXfile is placed in the SYS$QFT queue for transfer the HYPERchannel to the Mass Storage System (MSS) flagged for the node you requested.

Every 5 minutes or so, the queue transfer program on MFN checks for jobs coming to it and places them into their requested queues.

Remarks: CDC jobs may not have tabs or certain special characters. If /ASCII is not used, lower case will be folded into upper case. You may use RUN VSYS:CMP2FOR to remove tabs and change <FF> in column 1 to '1' before using QPRINT; the DETAB command may be used to remove tabs. Special characters not recognized by CDC will be converted to blanks by CDC.

The file must have Fortran carriage control.

Since RM1 is no longer available, use APRINT or CAPRINT to print in Annapolis.

Similar commands: COS: DISPOSE
NOS: ROUTE

Examples:
```
@VSYS:CMP2FOR myprog.lis
              ^-- prepare compilation listing for
                  printing
QPRINT myprog.lis MFN /NAME=xxxxABC /DELETE
              ^-- xxxx is the user initials;
                  MYPROG.LIS will be deleted
                  after is has been sent
= = = = =
QPRINT /ASCII myprog.out MFN /JOB=1
              ^-- print at with jobname xxxx001
                  in upper and lower case
```

QSUBMIT (DTRC) Submit a job to a CDC CYBER 860 NOS input queue printing on the 860 Central Site Printer.

Syntax: QSUBMIT vaxfile node

Parameters: vaxfile - file specification of the VAXcluster file containing a CDC batch job (embedded end-of-records are indicated by a separate line containing only EOR in columns 1-3)

node - the remote node on which the job is to run -- one of:
MFN - the CDC CYBER 860

Remarks: CDC jobs may not have tabs or certain special characters; lower case will be folded into upper case. Special characters not recognized by CDC will be converted to blanks by CDC.

How it works: The CDC job in your VAXfile is placed in the SYS$QFT queue for transfer the HYPERchannel to the Mass Storage System (MSS) flagged for the node requested.

Every 5 minutes or so, the queue transfer program on MFN checks for jobs to it and places them into its input queue. The output is on a CDC central site printer.

As on CDC, if you want the job's output to be sent somewhere, then

```
ROUTE,OUTPUT,DC=PR,TID=<tid>,DEF.
```

should be placed in your CDC job to cause deferred routing of the entire file to another terminal ID.

See also: QPRINT

Similar commands: COS, NOS, VMS: SUBMIT
NOS/VE: JOB; SUBMIT

Examples: QSUBMIT myfile.cdcjob MFN
^-- submits the CDC job in MYFILE.CDCJOB to the CDC CYBER 860 (MFN) NOS input queue with jobname from the job's JOB statement

RCAUDIT (DTRC) Create and submit a job to audit Cray files.

Syntax: RCAUDIT cpw lo pdn id own acn sz wait

Parameters: cpw - your Cray password

lo - list option ([S], A, B, L, N, P, R, T, X)
0 - use the default

pdn - the file to be audited
0 - use the default
(note: RCAUDIT cannot specifically audit file "0")
(default: all files)

id - the ID for the file
0 - null ID

own - other owner's files
0 - use the default
(default: your files)

acn - restrict audit to this account number
0 - use the default
(default: all account numbers)

sz - restrict audit to files larger than this many words
0 - use the default
(default: all files)

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file RCAUD.CPR)

Note: If P1 and P2 are both specified in the execute line, defaults are used for all other unspecified parameters.

Remarks: Any existing file RCAUD.CPR is deleted before the Cray job is submitted.

This procedure creates and deletes all versions of file RCAUD.JOB.

See also: Appendix C: AUDIT

Similar commands: NOS: BEGIN,AUDIT
VMS: DIRECTORY

```
Examples:    RCAUDIT  mycraypw
                          ^-- short audit of all my files
                              (don't wait)
             = = = = =
             RCAUDIT  mycraypw  0  0  0  0  0  0  WAIT
                          ^-- same (wait for completion)
             = = = = =
             RCAUDIT  mycraypw  x
                          ^-- "X" audit of all my files
             = = = = =
             RCAUDIT  mycraypw  x  "A-"
                          ^-- "X" audit of all files starting
                              with "B" (the "" are needed
                              because the "-" Cray wildcard
                              is the VMS end-of-line
                              continuation character)
             = = = = =
             RCAUDIT  mycraypw  0  0  0  0  1222233344  100000
                          ^-- Short audit of all my files
                              larger than 100000 words under
                              Job Order Number 1-2222-333-44
             = = = = =
             RCAUDIT  mycraypw  x  0  0  abcd
                          ^-- "X" audit of all ABCD's files
                              (that I have permission to see)
```

RCDELETE (DTRC) Delete a Cray permanent file.

```
Syntax:      RCDELETE  pw  pdn  id  ed  m  [ wait ]

Parameters:  pw   - your Cray password

             pdn  - the file to be deleted

             id   - the ID for the file

             ed   - the edition
                      n  - a specific edition
                     +n  - delete n highest editions
                     -n  - keep   n highest editions
                     ALL - delete all editions
                    (default:  delete the highest edition)

             m    - mainenance control word
             wait - WAIT  - wait for the job to complete,
                            display, delete the .CPR file
                            (synonyms: YES, TRUE)
                    other - do not wait (Cray job creates file
                            RCDEL.CPR)

Remarks:     Any existing file RCDEL.CPR is deleted before
             THE Cray job is submitted.
```

This procedure creates and deletes all versions of file RCDEL.JOB.

See also: Appendix C: DELETE

Similar commands: COS: DELETE,PDN=
NOS, VMS: PURGE

Examples:
```
RCDELETE  mycraypw  abcde
             ^-- delete the highest edition of
                 file ABCDE (don't wait)
= = = = =
RCDELETE  mycraypw  abcde  0  0  0  WAIT
             ^-- delete the highest edition of
                 file ABCDE (wait for completion)
= = = = =
RCDELETE  mycraypw  abcde  zyx  +3  ijk
             ^-- delete the high 3 editions of
                 file ABCDE with ID=ZYX and
                 maintenance control word IJK
= = = = =
RCDELETE  mycraypw  abcde  zyx  -2  ijk
             ^-- keep the high 2 editions of
                 file ABCDE with ID=ZYX and
                 maintenance control word IJK
= = = = =
RCDELETE  mycraypw  abcde  0 ALL
```

RCGET (DTRC) Create and submit a job to get a Cray permanent dataset and save it as a VAX/VMS permanent file.

Syntax: RCGET cpw VAXfile pdn id df ed r wait

Parameters:

cpw - your Cray password

VAXfile - the VAX filespec for the file
0 - use the default
.ext - "<pdn>.ext"
(default: "<pdn>.")

pdn - the Cray file to be fetched
0 - use the default
(default: first 15 characters of the VAXfilename)
(note: VAXfile and pdn may not both be "0")

id - the ID of the file
0 - null ID
(default: all files)

df - data format (BB, CB, TR)
0 - use the default
(default: CB)

```
                ed      - edition number
                            0 - use the default
                          (default: the highest edition)

                r       - read control word
                            0 - use the default
                          (default: no read control word)

                wait    - WAIT  - wait for the job to complete,
                                  display, delete the .CPR file
                                  (synonyms: YES, TRUE)
                          other - do not wait (Cray job creates
                                  file RCGET.CPR)
                          (default: nowait)

Remarks:        Any existing file RCGET.CPR is deleted before
                THE Cray job is submitted.

                This procedure creates and deletes all versions
                of file R$C$G$E$T.JOB.

See also:

Similar commands:  COS: DISPOSE

Examples:       RCGET  mycraypw  zyx.FOR  abcde
                             ^-- get Cray file ABCDE as VAX/VMS
                                 file ZYX.FOR (don't wait)
                = = = = =
                RCGET  mycraypw  zyx.FOR  abcde  0 0 0 0 WAIT
                             ^-- same (wait for completion)
                = = = = =
                RCGET  mycraypw  ""  abcde
                             ^-- get Cray file ABCDE as ABCDE.
                = = = = =
                RCGET  mycraypw  .FOR  abcde
                             ^-- Get Cray file ABCDE as ABCDE.FOR
                = = = = =
                RCGET  mycraypw zyx.out abcde qrs 0 3 0 myreadcw
                             ^-- get Cray file ABCDE,ID=QRS,ED=3
                                 with read controlword as ZYX.OUT
                = = = = =
                RCGET  mycraypw plot.out plotout 0 BB 0 myreadcw
                             ^-- Get Cray file PLOTOUT with
                                 DISSPLA output
```

RCSAVE (DTRC) Create and submit a job to save a VAX/VMS file as a Cray permanent dataset.

Syntax: RCSAVE cpw VAXfile pdn id df pam m wait

Parameters:

cpw - your Cray password

VAXfile - the VAX filespec for the file
0 - use the default
.ext - "<pdn>.ext"
(default: "<pdn>.")

pdn - the Cray file to be fetched
0 - use the default
(default: first 15 characters of the VAXfilename)
(note: VAXfile and pdn may not both be "0")

id - the ID for the file
0 - null ID
(default: all files)

df - data format (BB, CB, TR)
0 - use the default
(default: CB)

pam - public access mode
E - execute only
M - maintenance only
N - no public access
R - read only
W - write only
0 - use the default
(e.g., R:W gives read and write permission)
(default: N)

m - maintenance control word
0 - no maintenance control word

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file RCSAV.CPR)

Note: If P1 and P2 are both specified in the execute line, defaults are used for all other unspecified parameters.

Remarks: An LO=X audit is done for file <pdn>.

Any existing file RCSAV.CPR is deleted before The Cray job is submitted.

This procedure creates and deletes all versions of file RCSAV.JOB.

See also:

Similar commands: COS:
VMS:

Examples:

```
RCSAVE  mycraypw  abcde.fgh  zyx 0 0 r
                ^-- make my VAX/VMS file ABCDE.FGH
                    a permanent dataset on the Cray
                    with the name ZYX and having
                    world read access (don't wait)
= = = = =
RCSAVE  mycraypw  abcde.fgh  zyx 0 0 r 0 WAIT
                ^-- same (wait for completion)
= = = = =
RCSAVE  mycraypw  abcde.fgh  "" "" "" r
                ^-- make my VAX/VMS file ABCDE.FGH a
                    permanent dataset on the Cray
                    with the name ABCDE and having
                    world read access (the "" are
                    place holders)
= = = = =
RCSAVE  mycraypw  abcde.fgh  zyx  qrs  0 0 ijk
                ^-- make my VAX/VMS file ABCDE.FGH a
                    permanent dataset on the Cray
                    with the name ZYX, ID=QRS and
                    maintenance control word IJK
                    (no permissions)
= = = = =
RCSAVE  mycraypw  plot.out  plotout  0 0 BB
                ^-- after RCGETting a binary blocked
                    file (perhaps DISSPLA output ),
                    send it back to the Cray
```

RCSUBMIT (DTRC) Submit a job to the Cray from any CCF VAXcluster node.

Syntax: RCSUBMIT job_file [password]

Parameters: job_name - the name of the file containing your Cray job

password - your VAXcluster login password -- for security, you may wish to omit this and be prompted for it (this is not used if you are on a node which is connected to the Cray)

Remarks: RCSUBMIT works from any node of the VAXcluster. CRAY SUBMIT works only on a node which connects directly with the Cray.

RCSUBMIT and CRAY SUBMIT require an ACCOUNT statement in the job file. CSUBMIT does not, and ignores it if it is present. If you normally use CSUBMIT to submit your jobs, you should not use RCSUBMIT (or CRAY SUBMIT).

See also: CRAY SUBMIT; CSUBMIT

Similar commands: COS, VMS: SUBMIT
NOS: ROUTE

Examples: RCSUBMIT . crayjob myclustrpw
^-- from a node not connected to the Cray

where file CRAYJOB.JOB contains:

```
JOB,JN=test.
ACCOUNT,AC=jobordrno,US=abcd,UPW=mypw.
DISPOSE,DN=$OUT,TEXT='node::',DEFER.
          ^-- at end-of-job, $OUT will be put
              into file node::TEST.CPR
FETCH,DN=test,TEXT='node::test.for'
          ^-- fetch program from node NODE
CFT,I=test,L=0.
FETCH,DN=FT05,TEXT='node::test.dat'.
          ^-- fetch data from node NODE
SEGLDR,GO.
DISPOSE,DN=FT04,TEXT='node::test.out'.
          ^-- send another output file of the
              program to node NODE
= = = = =
CRAY SUBMIT crayjob
          ^-- from a node connected to the
              Cray (you can use RCSUBMIT, but
              this is faster)
```

*** Cray Station Commands ***

The VAX/VMS Cray Station provides the VMS user with access to the CRAY X-MP. The Cray Station is accessed via two commands: CRAY (all Station commands except interactive) and CINT (interactive access and a subset of the Station commands). The CRAY prompt is CRAY>; the CINT prompt is Cint>.

The following discussion of the Cray station commands is derived from the on-line helps for the CRAY amd CINT commands. Type "CRAY HELP" or "CINT /HELP" at the DCL level, or "HELP" at the CRAY> oı Cint> prompt for more detailed information.

CRAY Enter the Cray context utility or executes a single station command when that command is supplied as a parameter.

Syntax: $ CRAY [station_command] /BREAKTHROUGH /REFRESH

Parameters:
- station_command - a single Cray station command to be executed
- omitted - you remain in Cray context until you enter EXIT

Qualifiers:
- /BREAKTHROUGH - a display refresh occurs during command input (valid for refresh mode only) (default: /NOBREAKTHROUGH)
- /REFRESH - enable display refreshing in a split screen Cray context (requires DEC_CRT option enabled)
- /NOREFRESH - standard teletype environment (defaults: /REFRESH (VT100-type terminals) /NOREFRESH (non-VT100 terminals))

See also: CINT

Similar commands: NOS: ICF

Examples: $ CRAY

CINT From the DCL level, enter Cray interactive including a subset of the Cray context commands.

Syntax: $ CINT /HELP /JN=jobname /MML=mml /UPPERCASE /PLAY=play_file /US=username

Qualifiers: /H - display help information without having to enter Cray interactive

/J - the interactive job name (first 7 characters used)

/M - maximum message length

/UP - controls whether input is converted to uppercase (default: /NOUPPERCASE)

/P - the play file to be run

/US - the username (1-15 characters)

Remarks:

See also: CRAY

Similar commands: NOS: ICF

Examples:
```
$ CINT
Cray Jobname: myjob
Cray Username: AMDS
!ACCOUNT,....
!
```

** Cray Context Commands **

The following commands may be executed at the CRAY> prompt. This identified with (CINT) may also be executed at the Cint> prompt.

$ Create a temporary VMS subprocess, allowing you to enter DCL commands.

Syntax: $ [dcl_command]

Parameters: dcl_command - any DCL command

Remarks: Since a subprocess is created, any logical names or process resources created in the subprocess will not be available from the main process.

To return to Cray context, type LOGOUT.

Similar commands: NOS ICF:

Examples: $ show users

\+ Display the next page of information in Cray context.

Syntax: +

Similar commands: NOS ICF:

Examples: CRAY> +

\- Display the previous page of information in Cray context.

Syntax: -

Similar commands: NOS ICF:

Examples: CRAY> -

@ Execute an indirect station command file in Cray context.

Syntax: @file_spec

Parameters: file_spec - a VMS file containing station commands

Remarks: "@" is a synonym for the PLAY command.

See also: PLAY

Similar commands: NOS ICF: /PLAY

Examples: CRAY> @station.COM

ABORT (CINT) Interrupt the current interactive Cray job step and return control to the COS Control Statement Processor (CSP). CSP will then issue the "!" prompt. Any COS output queued for the terminal will be displayed before the prompt is issued.

Syntax: ABORT

See also: DROP, KILL

Similar commands: NOS ICF: ABORT

Examples: CRAY> ABORT

ATTACH (CINT) Redirect COS interactive terminal output to an alternate device.

Syntax: ATTACH [alt_device] /CHAR=(char,pos)
/MRS=max_rec_size
/OFF
/ON

Parameters: alt_device - the alternate device
omitted - the current output device

Qualifiers: /CHAR - route entire record to attached device if character <char> is in position <pos> of the current Cray interactive output record

/MRS - route entire record (no carriage control) to attached device if the length of the current Cray interactive output record exceeds max_rec_size

/OFF - do not route Cray interactive records to to attached device (all other parameters or qualifiers ignored)

/ON - enable routing of Cray interactive records to an attached device

Default: /ON

Remarks: The device specified must not be in use and can be any device that accepts record I/O, such as a graphics terminal.

Similar commands: NOS ICF: /CONNECT

ATTENTION (CINT) Interrupt current interactive Cray job step and enter reprieve processing.

Syntax: ATTENTION

See also: ABORT

Remarks: If reprieve processing not specified, same as ABORT.

Similar commands: NOS ICF: /ATTENTION

Examples: CRAY> ATTENTION

BYE (CINT) Terminate an interactive session and, optionally, the COS interactive job.

Syntax: BYE /ABORT /SAVE

Qualifiers: /ABORT - terminate the associated COS interactive job

/SAVE - the associated COS interactive job remains active and output is saved; if the job reaches a COS threshold for output messages or requires input, the job is suspended; the terminal can be reconnected to the COS interactive job by the INTERACTIVE command

Remarks: BYE /ABORT is equivalent to QUIT.

See also: QUIT

Similar commands: NOS ICF: /BYE, /LOGOFF, /QUIT

Examples: CRAY> BYE

CLEAR Terminate any display command and clears the display portion of the screen.

Syntax: CLEAR

Remarks: CLEAR is only available when Cray context is in refresh mode.

Examples: CRAY> CLEAR

COLLECT (CINT) Store COS interactive output in a VMS file.

Syntax: COLLECT file_spec /ECHO /OFF /ON

Parameters: file_spec - the VMS file to receive the COS interactive output

Qualifiers: /ECHO - display the output generated at the terminal as well as the VMS file
/NOECHO - do not echo the generated output at the terminal; only into the VMS file (default: /ECHO)

/OFF - stop writing COS job output to a VMS file and close the VMS file (ignore other qualifiers

/ON - write COS job output to a VMS file (default: /ON)

Remarks: COLLECT can be used before the interactive job is initiated.

Examples: CRAY> COLLECT mycosfile.out

COMMENT Insert comments into an indirect station command file stream.

Syntax: COMMENT string

Parameters: string - any text

Remarks: The comment line can be 256 characters long, including "COMMENT".

See also: @, MESSAGE

Similar commands: NOS ICF: /*

Examples: COMMENT This is a comment

CONTROL_C (CINT) CTRL-C (^C) performs the same function of the attention command.

Syntax: ^C <-- ^ is the CTRL key

Remarks: Brings you back to the DCL prompt.

See also: ABORT; ATTENTION

Examples:
```
; ^C          <-- leave Cray session abnormally
$               <-- you are back at the DCL level
```

CONTROL_O (CINT) CTRL-O (^O) performs the same function as the discard command.

Syntax: ^O <-- ^ is the CTRL key

Remarks: ^O toggles output on and off until the next Cray prompt.

See also: DISCARD

Examples: ! ^O

CONTROL_Z (CINT) CTRL-Z (^Z) exits the current processing mode.

Syntax: ^Z <-- ^ is the CTRL key

Remarks: In response to the Cray context prompt (CRAY>), you are returned to DCL; in a Cray interactive session, you are returned to command mode. While you are being prompted for command parameters, CTRL-Z cancels the command.

CTRL-Z also terminates the execution of an indirect station command file.

See also: @

Examples:
```
! ^Z            <-- leave Cray session
CRAY> QUIT      <-- terminate Cray session
CRAY> ^Z        <-- terminate Cray context
$               <-- you are back at the DCL level
```

DATASET Test for the existence of a COS permanent dataset.

Syntax: DATASET pdn /ID=id /ED=ed /OV=owner

Parameters: pdn - name of PDS

Qualifiers: /ID= - id of the dataset (1-8 characters)
(default: null)

/ED= - edition number of the dataset (1-4095)
(default: current highest edition number)

/OV= - owner of the dataset

Examples: DATASET,myfile.

DELAY Suspend execution of an indirect station command file for a specified period of time.

Syntax: DELAY seconds

Parameters: seconds - suspension time in seconds

Examples: DELAY 20

DISCARD (CINT) Discard all output from a COS interactive session until the next COS prompt is issued.

Syntax: DISCARD

See also: ^O

Similar commands: NOS ICF: /DISCARD

Examples: DISCARD

DROP Terminate a COS job and return the associated output dataset. COS job execution enters reprieve processing after the next COS EXIT control statement.

Syntax: DROP jsq

Parameters: jsq - job sequence number

Remarks: Use STATUS to obtain the job sequence number (COS jsq).

KILL terminates the job immediately; DROP continues processing after an EXIT statement.

See also: ABORT, KILL

Examples:
```
$ CRAY
CRAY> STATUS
CRAY> DROP 9876
```

EOF (CINT) Sends an end-of-file record to a connected COS interactive job.

Syntax: EOF

Remarks: EOF is normally required to terminate COS file input from the terminal.

Similar commands: NOS ICF: /EOF

Examples: CRAY> EOF

EXIT (CINT) Leave Cray context command mode and return to DCL.

Syntax: EXIT
^Z

Remarks: EXIT will close the file specified in a RECORD command, if it is still open.

See also: RECORD

Similar commands: NOS ICF: /EXIT

Examples: CRAY> EXIT

HELP (CINT) Display help information on the Cray station commands.

Syntax: HELP [station_command]

Parameters: station_command - a specific command for which help is desired
omitted - a list of all available commands

Similar commands: NOS ICF: /HELP

Examples: $ CRAY HELP
= = = = =
CRAY> HELP
= = = = =
CRAY> HELP CINT

ISTATUS (CINT) Get the status of your COS interactive job (with CPU time used and the last COS logfile message).

Syntax: ISTATUS

See also: JSTAT, STATUS

Examples: ISTATUS

JOB Display the status of a specific COS job.

Syntax: JOB jobname /JSQ=jsq

Parameters: jobname - the COS job name

Qualifiers: /JSQ= - the job sequence number from which to start the search for the job

Similar commands: NOS ICF: /STATUS

Examples: JOB myjob4

JSTAT Display the status of a specific job and its related tasks.

Syntax: JSTAT jsq /[NO]CYCLE /[NO]TRANSLATE

Parameters: jsq - the job sequence number

Qualifiers:
- /CYCLE - cycle the display refresh through all the available information
- /NOCYCLE - display only the current page until you enter "+" or "-" (default: /NOCYCLE)
- /TRANSLATE - display the terminal ID field in the VMS UIC equivalent
- /NOTRANSLATE - display it in the station internal form (default: /TRANSLATE)

Remarks: Use STATUS to obtain the COS job sequence number (jsq).

See also: ISTATUS, STATUS

Similar commands: NOS ICF: /STATUS

Examples: JSTAT

KILL Delete a job from the input queue, or immediately terminate an executing job, or delete the job's output dataset from the output queue.

Syntax: KILL jsq

Parameters: jsq - the job sequence number

Remarks: Use STATUS to obtain the COS job sequence number (jsq).

KILL terminates the job immediately; DROP continues processing after an EXIT statement.

See also: ABORT, DROP

Similar commands: NOS ICF: /ABORT

Examples:
```
CRAY> STATUS
CRAY> KILL 9876
```

LOGFILE Provides access to the station logfile messages.

Syntax: LOGFILE [file_spec] /ACQUIRE /ALL
/BEFORE=time /DISPOSE
/ERROR /INTERACTIVE
/JOB /MASTER /NETWORK
/NODE=nodename /[NO]NOTIFY
/OPERATOR /OUTPUT=file_spec
/PRINT /RELEASE
/SINCE=time /SUCCESS
/STMSG /TRANSLATE

Parameters: file_spec - An alternate station logfile to be displayed

Qualifiers: /ACQU - display ACQUIRE and FETCH messages

/ALL - display all messages

/BEFO - display messages from before a specified time

/DISP - display DISPOSE messages

/ERRO - display error messages

/INTE - display interactive processing messages

/JOB - display job submission messages

/MAST - display COS master operator messages

/NETW - display DECnet messages (all nodes)

/NODE= - display DECnet messages (one node)

/NOTI - you will be notified an asychronous LOGFILE operation is performed (requires /RELEASE) (default: /NONOTIFY)

/OPER - display operator messages

/OUTP= - VMS file to receive station messages currently being displayed

/PRIN - print station messages currently being displayed

/RELE - close the existing logfile and create a new version

/SINC= - display messages since a specified time

/SUCC - display success, warning, and informational messages

/STMS - display COS station messages and associated replies

/TRAN - display terminal ID field (TID) as the VMS UIC equivalent

/NOTR - display TID in the station internal form (default: /TRANSLATE)

Examples: CRAY> LOGFILE jobname.LOG /SINCE=09:15

LOOP Restart execution of an indirect station command file at the beginning.

Syntax: LOOP

Remarks: CTRL-Z must be issued to terminate looping.

Examples: CRAY> LOOP

MESSAGE Send a message to the COS job logfile.

Syntax: MESSAGE string /JN=jobname
/JSQ=jsq

Parameters: string - the message text (for embedded blanks, enclose in quotes ("..."))

Qualifiers: /JN= - the name of the COS job to receive the message (requires /JSQ)

/JSQ= - the job sequence number of the COS job to receive the message

See also: COMMENT

Similar commands: NOS ICF: /*

Examples: MESSAGE This is a message

PAUSE Suspend execution of an indirect station command file.

Syntax: PAUSE

Remarks: Control passes to the terminal, where you can terminate the command file by entering a command or resume it by entering a null line (<RET>).

Examples: PAUSE

PLAY (CINT) Execute an indirect station command file in Cray context.

Syntax: PLAY file_spec

Parameters: file_spec - a VMS file containing station commands

Remarks: PLAY files cannot themselves contain other (embedded) PLAY commands.

"@" is a synonym for the PLAY command.

Similar commands: NOS ICF: /PLAY

Examples: CRAY> PLAY station.COM

QUIT (CINT) Terminate a Cray interactive session and the corresponding COS interactive job.

Syntax: QUIT

Remarks: QUIT is the equivalent of BYE /ABORT.

See also: BYE

Similar commands: NOS ICF: /BYE, /LOGOFF, /QUIT

Examples:
```
!^Z              <-- leave Cray session
CRAY> QUIT       <-- terminate the Cray session
CRAY> EXIT       <-- terminate the Cray station
```

RECORD Start or stop the recording of terminal input to a file while in Cray context for later use with the PLAY or @ commands.

Syntax: RECORD [file_spec] /ON /OFF

Parameters: file_spec - the file into which terminal input is to be recorded

Qualifiers: /ON - start command recording (file_spec required)

/OFF - end command recording (default: /ON)

Remarks: Exiting Cray context automatically issues a RECORD/OFF.

Examples:
```
RECORD station.com  /ON
   ...
RECORD /OFF
```

REMOVE Delete entries in the dataset staging queue.

Syntax: REMOVE queue_id /LOCKED /SPOOL /STAGE

Parameters: queue_id - an 8-character hexadecimal number from the SHOW QUEUES display (leading zeros can be omitted)

Qualifiers: /LOCKED - controls whether or not locked entries are removed (default: /NOLOCKED)

/SPOOL - remove an entry in the network spooled dispose queue

/STAGE - remove an entry in the Cray staging queue

RERUN Immediately end the processing of a COS job and put it back into the input queue.

Syntax: RERUN jsq

Parameters: jsq - the job sequence number

Remarks: The job input dataset is saved and all output datasets associated with the job are deleted. The job input dataset is then rescheduled so the job can be rerun. No action is taken if the job execution is complete or if COS determines the job cannot be rerun.

Use STATUS to obtain the COS job sequence number (jsq).

SAVE Stages a VMS file to COS disk storage.

Syntax: SAVE file_spec /DELETE /DF=d /ED=ed /ID=id /MN=mn /PDN=pdn /RD=rd /RT=rt /US=us /WT

Parameters: file_spec - the file to be staged

File_spec qualifiers:

/DELE - delete the file when is has been successfully staged to the Cray

/DF= - dataset format: CB, BB, or TR (default: CB)

/ED= - edition number (0-4095) (default: next higher number)

/ID= - identification (1-8 alphameric chars)

/MN= - maintenance control word

/PDN= - dataset name to be used
(converted to uppercase)
(default: the input file name)

/RD= - read permission control word

/RT= - the retention period, in days

/US= - the COS username

/WT= - the write permission control word

Examples: SAVE myfile.dat /PDN=mydata /US=ABCD

SET TERMINAL Define the terminal working environment.

SET TERMINAL FORTRAN
SET TERMINAL NOFORTRAN
Specify whether the terminal is to interpret output records from a COS interactive session as having FORTRAN carriage control.

Default: NOFORTRAN

SET TERMINAL INFORM
SET TERMINAL NOINFORM
Enable/disable the sending of station messages to the user logged on to VMS at a VAX terminal.

Default: NOINFORM

SET TERMINAL PAGE
SET TERMINAL PAGE=lines
SET TERMINAL NOPAGE
Specify the number of lines of output before a page break.

Default: NOPAGE

Default for lines: determined by the scroll setting

SET TERMINAL REFRESH
SET TERMINAL REFRESH=seconds <-- integer 0-60
SET TERMINAL NOREFRESH
REFRESH provides a split-screen Cray context environment and is supported only on terminals with the DEC_CRT attribute. NOREFRESH provides a line-by-line Cray context environment.

Defaults: REFRESH (VT100-type terminals)
NOREFRESH (non-VT100-type terminals)

SET TERMINAL SCROLL=lines
Changes the Cray context window size.

"lines" is the size of the command area (bottom window) and must be an integer from 3 to 13.

Default for lines: 4

SET TERMINAL WIDTH=80
SET TERMINAL WIDTH=132
Changes the width of the terminal within Cray context.

Default: 80

SHOW QUEUES Display entries in the dataset staging queue.

Syntax: SHOW QUEUES /ACQUIRE /ALL /CYCLE /JOB /NODE=node_id /OWNER /SAVE /STAGE /TRANSLATE

Qualifiers:
/ACQU - display all entries originating from COS (ACQUIRE or FETCH) (default: /ALL)

/ALL - display all entries (same as /ACQUIRE/JOB/SAVE) (default: /ALL)

/CYCL - cycle the display refresh through all the available information

/NOCYC - display only the current page until you enter "+" or "-" (default: /NOCYCLE)

/JOB - display entries originating from VMS (default: /ALL)

/NODE= - display entries from a specific DECnet node (valid only from an attached station)

/OWNER - display only your entries

/SAVE - display entries for SAVEd datasets (default: /ALL)

/STAGE - display all Cray staging entries

```
                    /TRAN   - display the terminal ID field in the VMS
                              UIC equivalent
                    /NOTRA  - display it in the station internal form
                              (default: /TRANSLATE)

          Remarks:  The following fields are displayed:
                      . Position in the staging queue (L is a locked
                        entry i.e., one that is being processed)
                      . Request type (JB=job, AC=acquire/fetch,
                        SV=save)
                      . Queue ID for use in the REQUEUE and RELEASE
                        commands
                      . VAX username of entry owner
                      . Dataset transfer name (job name or dataset
                        name)
                      . Dataset terminal ID (TID)

          Similar commands:  NOS ICF: /STATUS

          Examples:  SHOW QUEUES /OWNER
                                 ^-- display all your entries
```

SNAP Copy the current contents of the display region into a VMS file.

```
          Syntax:  SNAP  file_spec  /[NO]ESCAPE

          Parameters:  file_spec - VMS file to receive the snapshot

          Qualifiers:  /ESCAPE   - retain escape sequences
                       /NOESCAPE - remove escape sequences
                                   (default: /NOESCAPE)

          Remarks:  In line-by-line mode, the last display requested
                    is recorded.

          Examples:  SNAP snap.job123
```

STATCLASS Display the current COS job class structure.

```
          Syntax:  STATCLASS  /[NO]CYCLE

          Qualifiers:  /CYCLE     - cycle the display refresh through
                                    all the available information
                       /NOCYCLE   - display only the current page until
                                    you enter "+" or "-"
                                    (default: /NOCYCLE)

          Similar commands:  NOS ICF: /ICFSTATUS, /STATUS

          Examples:  STATCLASS
```

STATUS (CINT) Displays the COS system status.

Syntax: STATUS /ALL /CLASS=class_id /CYCLE /EXECUTING /HOLD /ID=mainframe_id /INPUT /NODE=node_id /OUTPUT /OWNER /RECEIVING /SENDING /TRANSLATE /VAX

Qualifiers:

/ALL - display all COS jobs

/CLAS= - display jobs and datasets of a specific job class (default: /ALL)

/CYCL - cycle the display refresh through 11 available information

/NOCY - display only the current page until you enter "+" or "-" (default: /NOCYCLE)

/EXEC - display the execution queue status (default: /EXECUTION)

/HOLD - display COS datasets in the hold queue

/ID= - display jobs and datasets originating from a specific mainframe

/INPU - display the input queue status

/NODE= - display the entries for a specific DECnet node

/OUTP - display the output queue status

/OWNE - display only your jobs and datasets

/RECE - display the Cray receiving queue status (default: /RECEIVING)

/SEND - display the Cray sending queue status (default: /SENDING)

/TRAN - display terminal ID field (TID) as the VMS UIC equivalent

/NOTR - display TID in the station internal form (default: /TRANSLATE)

/VAX - display only COS jobs related to this VAX/VMS station (or network of stations)

See also: ISTATUS, JSTAT

Similar commands: NOS ICF: /STATUS

Examples: STATUS

SUBMIT Stage a VMS file to the COS input queue.

Syntax: SUBMIT file_spec /AFTER=time /EOF=eof /PRINT

SUBMIT f1,f2,... /AFTER=time /EOF=eof /PRINT

Parameters: file_spec - single VMS file with a complete COS job

f1,f2,... - two or more files to be combined to create a complete COS job

Qualifiers: /AFTER= - specify when the job is to be sent to the Cray

/EOF= - specify what represents an end-of-file (e.g., /EOF="E O F") (default: /EOF="/EOF")

/PRINT - print the job's output file on COS job completion

/NOPRINT - put the COS job's output into your VMS file COS_jobname.CPR

(default: /NOPRINT)

Remarks: The file must contain a COS job. By default, the job's output (including the dayfile) is sent to the originating directory.

See also: CSUBMIT; RCSUBMIT

Similar commands: NOS: CSUBMIT

Examples:
```
CRAY> SUBMIT myjob1
   -or-
$ CRAY SUBMIT myjob1
= = = = =
CRAY> SUBMIT myjob2,myprog2.for,mydata2.dat
   -or-
$ CRAY SUBMIT myjob2,myprog2.for,mydata2.dat
```

SUPPRESS (CINT) Suppress the echoing of the next typed input line.

Syntax: SUPPRESS

Examples:
```
Cint> SUPPRESS
```

SWITCH Set or clear COS job sense switches.

Syntax: SWITCH jsq ssw /OFF
SWITCH jsq ssw /ON

Parameters: jsq - the COS job sequence number

ssw - the sense switch number (1-6)

Qualifiers: /OFF - turn switch <ssw> off

/ON - turn switch <ssw> on

Remarks: These switches can be used for program synchronization on the Cray.

Examples:
```
CRAY> STATUS                <-- to get the jsq
CRAY> SWITCH 9876 3 /ON     <-- turn on switch 3
```

***** Appendix E *****

*** References ***

The following manuals describe various features of the Cray, DEC and CDC systems.

** Cray **

SR-0009	Fortran (CFT) Reference Manual
SR-0011	COS Version 1 Reference Manual
SR-0013	UPDATE Reference Manual
SR-0018	CFT77 Reference Manual
SV-0020	DEC VAX/VMS Station Reference Manual
SR-0035	CDC NOS Station Reference Manual
SR-0039	COS Message Manual
SR-0060	Pascal Reference Manual
SR-0066	SEGLDR Reference Manual
SR-0113	Programmer's Library Reference Manual

** DEC **

AA-001AE-GZ	DCL Dictionary
AA-LA16A-TE	EDT Reference Manual
AA-LA62A-TE	EVE Reference Manual
AA-D034E-TE	VAX Fortran Language Reference Manual
AA-LA98A-TE	VAX/VMS User's Manual
-----	Introduction to VAX/VMS by Terry Shannon

** CDC NOS **

60460420	NOS Full Screen Editor
CMLD-88/15	CDC NOS Full Screen Editor (FSE) User's Guide
60459680	NOS 2 Reference Set Volume 3: System Commands

** CDC NOS/VE **

60464018	NOS/VE Commands and Functions Quick Reference
60464015	NOS/VE File Editor
60485913	Fortran Version 1 for NOS/VE
60464012	Introduction to NOS/VE
60464014	NOS/VE System Usage

** General **

CMLD-87-07	Fortran 77 Extensions - A Comparison
CISD-90/01	Computer Center Reference Manual, Volume 1: Cray, MSS, DEC (this manual)
CISD-90/02	Computer Center Reference Manual, Volume 2: CDC

***** Appendix F *****

*** CCF Computer Systems ***

Cray

C1

Computer:	CRAY X-MP/216
Front-ends:	DEC VAXcluster (station code version 4.01), CDC CYBER 180/860 (N1)
Links to:	Mass Storage System (N1)
Operating system:	COS level 1.17
Services:	batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours Tuesday and Thursday mornings for maintenance
Location:	Central site

DEC VAXcluster

DT3 (V3)

Computer:	VAX 8550
Links to:	CRAY X-MP (C1); CDC CYBER 180/860 with MSS (N1/MFN); DECnet to NAVSEA (SEAHUB, etc.)
Operating system:	VMS 5.3-1
Services:	batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.12 (dtvms3.dt.navy.mil)

DT4 (V4)

Computer:	VAX 8550
Links to:	CRAY X-MP (C1); CDC CYBER 180/860 with MSS (N1/MFN); DECnet to NAVSEA (SEAHUB, etc.)
Operating system:	VMS 5.3-1
Services:	batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.10 (dtvms.dt.navy.mil or dtvms4.dt.navy.mil)

Secure DEC VAX

SECURE

Computer:	VAX 6410
Links to:	CRAY X-MP (C1)
Operating system:	VMS 5.3-1
Services:	secure batch, secure interactive
Schedule:	24 hours a day, 7 days a week, except a few hours for maintenance
Location:	Central site

Control Data Corporation

MFN (N1)

Computer:	CDC CYBER 180/860A with Mass Storage System
Cray Station ID:	N1
Links via NOS to:	CRAY X-MP (C1)
Links via NOS from:	CRAY X-MP (C1), DEC VAXcluster
Operating systems:	dual state with . NOS version 2.7.1 level 716 . NOS/VE version 1.5.1 level 739
Services:	trillion-bit storage, local and remote batch, interactive
Schedule:	24 hours a day. 7 days a week, except a few hours for maintenance
Location:	Central site
Network address:	130.46.1.16 (cdc860.dt.navy.mil)

OASYS (Office Automation SYStem) composed of:

OASYS

Computer:	Sequent S27
Links to:	Mass Storage System
Operating system:	DYNIX v3.0.17.9 (BSD 4.2 + some 4.3 + some AT&T System V)
Services:	OASYS (Office Automation)
Schedule:	24 hours a day, 7 days a week, except a few hours Wednesday night for backups
Location:	Central site
Network address:	130.46.1.53 (oasys.dt.navy.mil)

DTOA1

Computer:	DEC VAX 11/780
Links to:	Mass Storage System
Operating system:	Ultrix-32
Services:	OASYS (Office Automation - primarily Carderock)
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.2 (dtoa1.dt.navy.mil)

DTRC

Computer:	DEC VAX 11/780
Links to:	Mass Storage System
Operating system:	Ultrix-32
Services:	OASYS (Office Automation - primarily Carderock)
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.3 (dtrc.dt.navy.mil)

DTOA3

Computer:	DEC VAX 11/780
Links to:	Mass Storage System
Operating system:	Ultrix-32
Services:	CASYS Office Automation - primarily Annapolis)
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.4 (dtoa3.dt.navy.mil)

*** Services and Support ***

Accounting for Computer Services: Code 3502		(301) 227-1910
Computer status (recorded message)		(301) 227-3043
Dispatch desk		(301) 227-1967
Manuals		(301) 227-1907
Microcomputer support	Carderock:	(301) 227-4901
	Annapolis:	(301) 267-4987
Tape Librarian		(301) 227-1967
Training		(301) 227-1907
User Services (Scientific and Engineering User Support Branch - Code 3511)	Carderock:	(301) 227-1907
	Annapolis:	(301) 267-3343

Stan Willner (Head)
Sharon Good
Mike Kass
Ed Kennedy
Brenda Peters
Dave Sommer (Annapolis)

Administrative Personnel

35	Computer & Information Services Department (G. Gray)	(301) 227-1270
3501	Assistant for Technical Development and Operations (L. Minor)	(301) 227-1428
3502	Computer Department Business Office	(301) 227-1361
3509	Administrative Office (D. Braxton)	(301) 227-3454
351	Scientific & Engineering Systems Div. (S. Willner)	(301) 227-1907
3511	S&E User Support Branch (S. Willner)	(301) 227-1907
3512	VAX/VMS Systems Branch (M. Brady)	(301) 227-3642
3513	Cray/CDC Systems Branch (J. Wessel)	(301) 227-1271
353	Office Automation Systems Division (R. Yearick)	(301) 227-1428
3531	Unix Systems and Programming Branch (R. Yearick)	(301) 227-1428
3533	OA/Microcomputer Support Branch (P. Hayden)	(301) 227-4901
		(301) 267-4987
355	Information Systems Division (E. Kearney)	(301) 227-1184
3551	Business Systems Branch (B. Crum)	(301) 227-1127
3552	Special Project Branch (D. Singla)	(301) 227-1184
357	Communications and Facilities Division (R. Weachter)	(301) 227-1270
3571	Computer Facilities Branch (R. Weachter)	(301) 227-3937
3572	Networks and Communications Branch (T. Smith)	(301) 227-1400

***** Appendix G *****

*** Internal Data Structure ***

1. The following table summarizes word lengths on various computers:

computer	op sys	bits/word	digits/word	characters/word
CRAY X-MP		64	22 octal	8
CDC CYBER 200		64	16 hex	8
CDC CYBER 180	NOS/VE			
CDC CYBER 180	NOS & NOS/BE	60	20 octal	10
CDC CYBER 170	NOS/BE			
DEC VAX		16	4 hex	2
(when used in Fortran)		32	8 hex	4
IBM		32	8 hex	4
Burroughs 7700		48	12 hex	6
Unisys 1100		36	12 octal	4 (ASCII) 6 (Fieldata)

This affects the conversion of programs in four areas:

a. The degree of precision of operations is different. Therefore, convergence factors may need to be increased or decreased in absolute value.

b. Constants and data may need to be changed.

c. Octal and hexadecimal constants used in masking operations are generally affected and require alteration according to their intended use.

d. Since different computers may store a different number of characters per word, DATA statements that store a string of Hollerith characters may position the characters in different relative positions in different words. All variable formats (whether read in as data or created by the programmer) should be checked. Better yet, Fortran programs which store Hollerith data in INTEGER or REAL variables should be changed to use the Fortran 77 CHARACTER variables and never need to worry about this problem again. (You may have to worry about the maximum length of a CHARACTER variable, but not how it is stored.)

2. Internal representation of character data is ASCII in the CRAY X-MP and DEC VAX, Display Code in the CDC CYBER, and ASCII, EBCDIC or internal BCD in some other systems.

CHARACTER string	machine	op sys	internal representation
' ' (1 blank)	CRAY X-MP		* oct 20 hex
	CDC 170		55
	CDC 180	NOS	55
	CDC 180	NOS/VE	20
	DEC VAX		20
'0' (1 zero)	CRAY X-MP		* oct 30 hex
	CDC 170		33
	CDC 180	NOS	30
	DEC VAX		30
'FILE48'	CRAY X-MP		* oct 46494C463438 hex
	CDC 170		061014053743
	CDC 180	NOS	061014053743
	CDC 180	NOS/VE	46494C453438
	DEC VAX		3834454C4946
			(8 4 E L I F)

* - the octal representation depends on the position in the word

Hollerith words	machine	op sys	internal machine representation
<blanks>	CRAY X-MP		0200401002004010020040 oct
			2020202020202020 hex
	CDC 170		5555555555555555555 oct
	CDC 180	NOS	5555555555555555555 oct
	CDC 180	NOS/VE	2020202020202020 hex
	DEC VAX		20202020 hex
<zeroes>	CRAY X-MP		0300601403006014030060 oct
			3030303030303030 hex
	CDC 170		33333333333333333333 oct
	CDC 180	NOS	33333333333333333333 oct
	CDC 180	NOS/VE	3030303030303030 hex
	DEC VAX		30303030 hex
FILE48	CRAY X-MP		0431112304246416020040 oct
			46494C4534382020 hex
	CDC 170		06101405374355555555 oct
	CDC 180	NOS	06101405374355555555 oct
	CDC 180	NOS/VE	46494C453438202C hex
	DEC VAX		454C4946 20203834 hex
			(E L I F 8 4) <-- 2 words

3. The character sequence for the CRAY X-MP, DEC VAXcluster and CDC 180 (NOS/VE) is ASCII. Note that numbers precede letters for alphabetic comparisons. The character sequences for CDC 180 (NOS) at DTRC is Display Code (64-character set). CDC NOS Fortran uses the Display Code sequence (letters before numbers); CDC NOS COBOL uses the ASCII6 sequence (numbers before letters). Cray, DEC VAX and CDC NOS/VE use the ASCII sequence.

4. CDC NOS uses some special bit configurations in floating point arithmetic to indicate indefinite and infinite operands. These errors could be caused by referencing program areas not initialized or areas overwritten due to inadequate storage reservation. The CPU will not do any further calculation if it encounters such a number and the job will abort with an error mode 2 or 4.

```
+ infinity    3777xxxxxxxxxxxxxxx  oct
- infinity    4000xxxxxxxxxxxxxxx
+ indefinite  1777xxxxxxxxxxxxxxx
- indefinite  6000xxxxxxxxxxxxxxx
              where 'x' is any octal digit, usually 0.
```

5. CDC NOS/VE uses several exponents in floating point arithmetic to indicate zero:

```
+ zero  0xxx, 1000 thru 2FFF  hex
- zero  8xxx, 9000 thru AFFF
```

6. CDC NOS/VE uses special exponents in floating point arithmetic to indicate indefinite and infinite operands:

```
+ infinity    D000 thru EFFF  hex
- infinity    5000 thru 6FFF
+ indefinite  7xxx
- indefinite  Fxxx
              where 'x' is any hexadecimal digit
```

7. The word format of integers and floating point numbers differs on the various computers.

	integer	floating point	
CRAY X-MP			
1, 1.0	0000000000000000001	0400014000000000000000	oct
	0000000000000001	4018000000000000	hex
-1, -1.0	1777777777777777777	1400014000000000000000	oct
	FFFFFFFFFFFFFFFF	C001800000000000	hex
2, 2.0	0000000000000000002	0400024000000000000000	oct
	0000000000000002	4002800000000000	hex
4, 4.0	0000000000000000004	0400044000000000000000	oct
	0000000000000004	4003800000000000	hex
DEC VAX			
1, 1.0	00000001	00004080	hex
-1, -1.0	FFFFFFFF	0000C080	
2, 2.0	00000002	00004100	
4, 4.0	00000004	00004180	
CDC CYBER (NOS)			
1, 1.0	0000000000 0000000001	1720400000 0000000000	oct
-1, -1.0	7777777777 7777777776	6057377777 7777777777	
2, 2.0	0000000000 0000000002	1721400000 0000000000	
4, 4.0	0000000000 0000000004	1722400000 0000000000	
CDC CYBER (NOS/VE)			
1, 1.0	0000000000000001	4001800000000000	hex
-1, -1.0	FFFFFFFFFFFFFFFF	C001800000000000	hex
2, 2.0	0000000000000002	4002800000000000	hex
4, 4.0	0000000000000004	4003800000000000	hex

Note the difference in the format of negative integers (and CYBER floating point) numbers:

CRAY X-MP, DEC VAX, CDC NOS/VE	CDC NOS
two's complement of absolute value	one's complement of absolute value

8. Logical variables are represented by:

	CRAY X-MP, CDC	DEC VAX
TRUE	-1	1 in bit 0
FALSE	0	0 in bit 0

9. By default, your program area in central memory is set as follows:

Cray COS	Cray UNICOS	DEC VMS	CDC NOS	CDC NOS/VE
zero *	zero	zero	zero	zero

---

* - when not auto-tasking (HEAP, STACK)

*** Internal Representation ***

** CRAY X-MP **

Words in the CRAY X-MP are 64 bits long. Bits are numbered 0-63 or 63-0.

```
Integer:  bit   0    - the sign bit (0 = positive; 1 = negative) (23)
          bits  1:23 - the absolute value of the integer        (22:0)
          range      - ~ -10**14 to ~10**14

Integer (CFT,INTEGER=64):
          bit   0    - the sign bit (0 = positive; 1 = negative) (63)
          bits  1:63 - the absolute value of the integer        (62:0)
          range      - ~ -10**19 to ~10**19

Real:     bit   0    - the sign of the number                   (63)
          bits  1:15 - the exponent (2000 bias)                 (62:48)
          bits 16:63 - the mantissa                             (47:0)
          range      - ~10**-2466 to ~10**2465
          precision  - ~ 14 decimal digits

Double:   First word:
          bit   0    - the sign of the number                   (63)
          bits  1:15 - the exponent (2000 bias)                 (62:48)
          bits 16:63 - the high order part of the mantissa      (47:0)

          Second word:
          bits  0:15 - unused                                   (63:48)
          bits 16:63 - the low order part of the mantissa       (47:0)
          range      - ~10**-8193 to ~10**8189
          precision  - ~ 29 decimal digits
```

** DEC VAX **

Bytes in the DEC VAX are 8 bits long with bits are numbered 7-0. A word (INTEGER*2 in Fortran) is 16 bits long (15-0). A longword (INTEGER or INTEGER*4) is 32 bits long (31-0).

```
Word (INTEGER*2):
          bit   15    - the sign bit (0 = positive; 1 = negative)
          bits  14:0  - the absolute value of the integer
          range       - -32,768 to 32,767

Longword (INTEGER*4):
          bit   31    - the sign bit (0 = positive; 1 = negative)
          bits  30:0  - the absolute value of the integer
          range       - -2,147,483,648 to 2,147,483,647

F_float (REAL*4):
          bit   15    - the sign of the number
          bits  14:7  - the exponent (excess 128)
          bits   6:0 and
                31:16 - the mantissa
          range       - ~.29*10**-8 to ~1.7*10**38
          precision   - ~ 7 decimal digits

D_float (REAL*8, DOUBLE PRECISION):
          bit   15    - the sign of the number
          bits  14:7  - the exponent (excess 128)
          bits   6:0  and
                63:48 and
                47:32 and
                31:16 - the mantissa
          range       - ~.29*10**-8 to ~1.7*10**38
          precision   - ~ 16 decimal digits

G_float (FORTRAN/G_floating):
          bit   15    - the sign of the number
          bits  14:4  - the exponent (excess 1024)
          bits   3:0 and
                63:16 - the mantissa
          range       - ~.56*10**-308 to ~.9*10**308
          precision   - ~ 15 decimal digits

H_float (REAL*16):
          bit   15    - the sign of the number
          bits  14:0  - the exponent (excess 16,384)
          bits 127:16 - the mantissa
          range       - ~.84*10**-4932 to ~.59*10**4932
          precision   - ~ 33 decimal digits
```

** CDC CYBER (NOS, NOS/BE) **

Words in the CDC CYBER 170 and CYBER 180 (when running NOS or NOS/BE) are 60 bits long. Bits are numbered 59-0.

Integer: bit 59 - the sign bit (0 = positive; 1 = negative)
bits 58:0 - the absolute value of the integer

Integer: bit 59 - the sign bit (0 = positive; 1 = negative)
bits 47:0 - the absolute value of the integer
(if used in multiplication or division)

Real: bit 59 - the sign of the number
bits 58:48 - the exponent (2000 bias)
bits 47:0 - the mantissa with the binary point after bit 0

Double: (Double precision is performed in the software, not in the hardware)
First word:
bit 59 - the sign of the number
bits 58:48 - the exponent (2000 bias)
bits 47:0 - the high order part of the mantissa with the binary point after bit 0

Second word:
bit 59 - the sign of the number
bits 58:48 - the exponent (2000 bias)
bits 47:0 - the low order part of the mantissa with the binary point after bit 0

** CDC CYBER (NOS/VE) **

Words in the CDC CYBER 180 (when running NOS/VE) are 64 bits long. Bits are numbered 0-63.

```
Integer:  bit  0      - the sign bit (0 = positive; 1 = negative)
          bits 1:63   - the absolute value of the integer
          precision   - ~ 19 decimal digits

Real:     bit  0      - the sign of the number
          bits 1:15   - the exponent (4000 bias)
                          1:3 - the following FP (or DP) numbers
                                  00x - FP zero
                                  0x0 - FP zero
                                  011 - standard FP number
                                  100 - standard FP number
                                  101 - FP infinity
                                  110 - FP infinity
                                  111 - FP indefinite
          bits 16:63  - the mantissa with the binary point before bit 16
          range       - 4.8*10**(-1234) to 5.2*10**(1232)
          precision   - ~ 14 decimal digits

Double:   First word:
          bit  0      - the sign of the number
          bits 1:15   - the exponent (4000 bias)
                          1:3 - same as for real
          bits 16:63  - the high order part of the mantissa with the
                        binary point before bit 16

          Second word:
          bit  64     - same at bit 0
          bits 65:79  - same as bits 1:15
          bits 80-127 - the low order part of the mantissa with the
                        binary point after bit 0

          range       - 4.8*10**(-1234) to 5.2*10**(1232)
          precision   - ~ 29 decimal digits
```

***** Glossary *****

Alphabetic (CDC - NOS)
The letters A-Z.

Alphabetic (CDC - NOS/VE)
The letters A-Z, a-z.

Alphabetic (Cray - COS)
$, %, @, and the letters A-Z, a-z.

Alphabetic (DEC)
$, _ (underscore), and the letters A-Z, a-z (upper and lower case are the same).

Alphanumeric
Alphabetic and the digits 0-9.

User initials (userid or username)
The 4-character ID assigned to each user by Code 3502. This is used to identify jobs, for charge authorization, to identify permanent and MSS files, magnetic tapes, etc.

***** Index *****

Note - NOS/BE system control statements are flagged with ".
Intercom commands are flagged with @.
UPDATE directives begin with *.
Compiler options are flagged with $.

Primary references are flagged with an asterisk after the page number, for example, 1-1*.

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David Taylor Research Center

Bethesda, Maryland 20084-5000

CISD-90/01 30 September 1990

Computer & Information Services Department

Departmental Report

COMPUTER CENTER REFERENCE MANUAL, VOLUME 1

David V. Sommer
Sharon E. Good

Approved for Public Release:
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CISD-90/01 COMPUTER CENTER REFERENCE MANUAL, VOLUME 1

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The Computer Center in the Computer and Information Services Department of the David Taylor Research Center has installed an Integrated Supercomputer Network. This manual provides an introduction to the Network. Some information has been distilled from many individual documents and augmented to reflect usage at DTRC. Control statement examples and descriptions of hardware and software are included, as is information on moving files among the CDC CYBER 860 (with the Mass Storage System), the DEC VAXcluster, the secure DEC VAX, and the CRAY X-MP, creating and executing batch jobs, and using the interactive systems. Volume 1 describes the Cray X/MP, the Mass Storage System and the DEC VAXes. Volume 2 describes the CDC CYBER 860.

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18 (continued)

Hardware
Interactive
Mass Storage System
Programming
Secure computing
Software Documentation
Supercomputer

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David Taylor Research Center
Bethesda, Maryland 20084-5000

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Computer Center Reference Manual
Volume 1: Cray, MSS, DEC

****

by
David V. Sommer
Sharon E. Good

Scientific and Engineering User Support Branch
Code 3511

	Carderock	Annapolis
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For recorded message on computer status (301) 227-3043

Questions and requests for more detailed information
should be directed to Code 3511, Bldg. 17, Rm. 226

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Departmental Report

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Abstract

The Computer Center in the Computer and Information Services Department of the David Taylor Research Center has installed an Integrated Supercomputer Network. This manual provides an introduction to the Network. Some information has been distilled from many individual documents and augmented to reflect usage at DTRC. Control statement examples and descriptions of hardware and software are included, as is information on moving files among the CDC CYBER 860A (with the Mass Storage System), the DEC VAXcluster, the secure DEC VAX, and the CRAY X-MP, creating and executing batch jobs, and using the interactive systems. Volume 1 describes the CRAY X-MP, the Mass Storage System, and the DEC VAXes. Volume 2 describes the CDC CYBER 860A.

Administrative Information

The work described in this report was performed in the Scientific and Engineering Support Branch (3511) of the Computer and Information Services Department, David Taylor Research Center, under the sponsorship of the DTRC Computer Center (351).

***** Introduction *****

The DTRC Integrated Supercomputer Network consists of a CRAY X-MP/216 with five front-end computers: a DEC VAXcluster (two VAX 8550 processors), a secure DEC VAX 6410, a DEC VAX 8250, and a CDC CYBER 180/860. The Cray and VAXcluster can store and retrieve files on the Mass Storage System (MSS), which is part of the CDC CYBER 860.

The following operating systems are in use:

CRAY X-MP	COS	version 1.17.1
	UNICOS	(future)
DEC VAX	VMS	version 5.3-1
CDC CYBER 860	NOS	version 2.7.1
	NOS/VE	version 1.5.1

The front-end computers support both batch processing of jobs submitted at central site, through remote batch terminals or from interactive terminals; and demand processing, which supports a variety of interactive terminals. In addition, batch jobs can be sent to the Cray for processing with the output returned for examination or printing.

This reference manual is divided into two volumes: one covering the CRAY X-MP, the Mass Storage System, and the DEC VAXes; the other covers the CDC CYBER 860. They are designed to provide the new user with enough information to use the Network to run simple batch jobs and to create and run programs and batch jobs interactively. Most of the frequently used control statements are described in detail in the Appendices. Magnetic tapes are discussed briefly. No attempt is made to describe all features of the operating systems or even all parameters of the control statements presented. More information can be found in the publications listed in Appendix E.

Before using the system, job order number(s) to be charged must be registered with Code 3502. Outside users must transfer funds to DTRC before receiving a job order number. Each individual user should have 4-character User Initials assigned (also by Code 3502).

*** Hardware Configuration ***

** CRAY X-MP/216 **

```
DTNET name:       sn417         (UNICOS only, when available)
TCP/IP name:      sn417         (UNICOS only, when available)
Ethernet address: 192.91.138.5 (UNICOS only, when available)
Cray station ID:  C1

     2 X-MP central processing units (over 200 MFLOPS each)
   16M 64-bit words of central memory
     4 model DD-49 disk storage units (4.8 Gbytes)
     2 model DS-41 disk storage units (9.6 Gbytes)
```

** CDC CYBER 180 model 860 **

```
DTNET names:      cdc860, nos
TCP/IP names:     cdc860, nos
Ethernet address: 130.46.1.16
Cray station ID:  N1
                  N_ (UNICOS only, when available)
Network ID:       MFN

     1 CYBER 860A central processing unit (6.3 mips)
    2M 60-bit word memory
    25 peripheral processors
     3 model 895   disk drives
     4 model 679-5 nine-track tape drives (1600/6250 cpi)
     2 model 679-3 nine-track tape drives ( 800/1600 cpi)
     2 model 677-3 seven-track tape drives
     1 model 405   card reader
     1 model 415   card punch
     2 model 585   line printers (1200 lpm, upper/lower case)
     1 model 7990  Mass Storage System (210 Gbytes)
       3 model M861 storage modules
```

** DEC VAXcluster **

VAXcluster nodes: DT3, DT4
DTNET names: dt3, dt4
TCP/IP names: dt3, dt4
Ethernet addresses: 130.46.1.12, .10
Cray station IDs: V3 V4
V_ (UNICOS only, when available)

2 VAX 8550 processors (6 mips each; DT3, DT4) -- each with
48 Mbyte 32-bit words of central memory
2 model SA482 disk storage array (5.0 Gbytes)
6 model RA81 disk drives (7.2 Gbytes)
1 model TA79 nine-track tape drives (1600/6250 cpi)
3 model TU79 nine-track tape drives (1600/6250 cpi)
2 model LP27 impact printers (800 lpm, upper/lower case)

** DEC VAX **

VAX node: DOE *
DTNET name: doe
TCP/IP name: doe
Ethernet addresses: 130.46.1.13

1 VAX 8250 processors (1.2 mips)
16 Mbyte 32-bit words of central memory
4 model RA81 disk drives (1.6 Gbytes)
2 model TU81 nine-track tape drives (1600/6250 cpi)

** DEC Secure VAXcluster **

VAXcluster nodes: DBL07
Cray station IDs: (future)

1 VAX 6410 processors (7 mips)
64 Mbyte 32-bit words of central memory
2 model SA482 disk storage array (5.0 Gbytes)
6 model RA81 disk drives (2.4 Gbytes)
2 model TA78 nine-track tape drives (1600/6250 cpi)
1 model LP27 impact printers (800 lpm, upper/lower case)

---

* DOE is reserved for a special project and is not available for

general use.

** DTNET Dial-in **

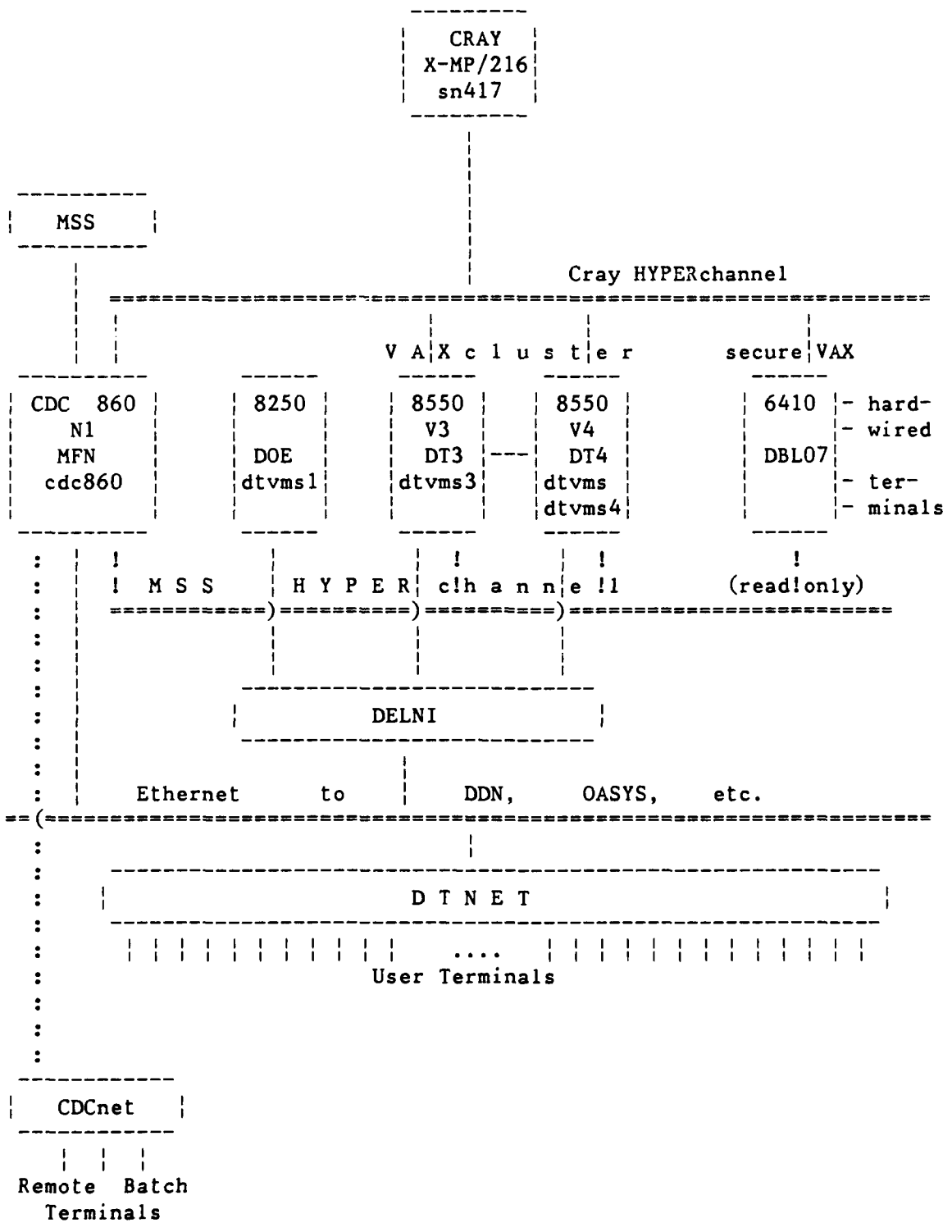
Access to Computer Center computers is via DTNET:

Modem Speed	Carderock	Annapolis	
1200 baud	(301) 227-5200 (32)	(301) 267-2010 (8) x4741 (8)	(within Annapolis site only)
2400 baud	(301) 227-5250 (32)		
9600 baud *	(301) 227-3700 (16)		

---

* While 9600 baud modems support lower speeds, access at a lower speed is not guaranteed.

*** The Integrated Supercomputer Network ***



***** User Interface With the Computer Center *****

*** General Information ***

The ADP Control Centers are located at Central Site at Carderock and Annapolis. You may submit tapes and pick up output from an ADP Control Center.

Computer and Information Systems Department Newsletter is our quarterly publication. The date of the latest on-line news update is printed at the start of each batch job (log) or interactive session. The NEWS command or procedure is used to view the current news file.

*** Registering ***

To register to use Computer Center computers, call our Business Office, Code 3502, at (301) 227-1361/1910. Be prepared to supply

- your name
- your DTRC code or non-DTRC company name and address and telephone
- the job order number(s) to be charged for computer work
- the computers on which you which to be registered
  - CRAY X-MP
  - DEC VAXcluster
  - DEC secure VAX
  - CDC CYBER 860 (NOS or NOS/VE)

Registration for the DEC VAXcluster or CRAY X-MP includes registration for the Mass Storage System (CDC CYBER 860 (NOS)).

You will be given

- User Initials (if you are a new user)
- the initial passwords (which MUST be changed during your first session) for each computer system for which you registered

** Multiple Accounts **

The following is a discussion of multiple accounts: how to log in, how to charge batch jobs, how to change permanent file accounting.

* Cray COS *

Interactive and batch

The account number is supplied by the AC= parameter of the ACCOUNT statement at the start of each batch or interactive session:

```
ACCOUNT,AC=....
```

Permanent files

Files are normally charged to the interactive or batch session's account number. The "ALTACN,AC=ac." statement is used to change the number for future file saves. It remains in effect until another ALTACN statement is encountered, or until end-of-session.

The account number for an existing file can be changed to current session's account number by

```
ACCESS,DN=PROCLIB,OWN=PUBLIC.
LIBRARY,DN=PROCLIB:*.
NEWCHRG,OLD=oldchrgno,ID=id.
```

where ID=id changes only those files with matching ID
ID changes only those files with a null ID
no ID changes all files.

Alternatively, this can be done from a VAXcluster node which connects to the Cray. CNEWCHRG generates and submits a Cray job to make the changes.

```
CNEWCHRG  upw  old_ac  [ new_ac ]  [ id ]
          [ wait ]  [ type ]
```

where upw is your user password
ID=id changes only those files with matching ID
ID changes only those files with a null ID
no ID changes all files
wait is WAIT to wait the the Cray job to complete
type is TYPE to display the generated Cray job

* VAX *

VAX users with more than one account are assigned a username/password for each account. These usernames differ in the fifth character position, e.g., ABCD, ABCDA, ABCDB. The default login directory for each user is device:[username] where all files owned by the same individual are stored on the same device. For example,

```
U01:[ABCD]
U01:[ABCDA]
U01:[ABCDB]
```

The "usernames" belonging to a particular user are members of a VMS "group". By default on the VAXcluster, members of a group have Read and Execute access to all files owned by their fellow group members. User ABCDA wishing to access a file owned by ABCD simply references [ABCD]FILE.EXT .

These access rights can be changed by the SET PROTECTION and SET FILE /ACL commands. In addition, all members of these special "groups" have GRPPRV privilege which, when invoked, gives a member of the group full control, including file creation and deletion, over all files owned by all members of the group. GRPPRV is invoked by

```
$ SET PROCess /PRIVileges=GRPPRV
```

(this would likely be in your LOGIN.COM)

Then to "copy" a file from one account to another, for example from ABCD to ABCDA, user ABCDA would

```
$ COPY  [ABCD]FILE.EXT  []
```

or user ABCD would

```
$ COPY  FILE.EXT  [ABCDA]
```

To simply "move" a file from one account to another, ABCDA would

```
$ RENAME  [ABCD]FILE.EXT  []
$ SET  FILE  /OWNer_uic=ABCDA  -or-
             /OWNer_uic=parent
```

The command MYACcount will indicate the account number of the current session or job, while MYACcount /ALL will provide a list of all user/account pairs in the group.

* CDC NOS *

Interactive — You are normally prompted for the account number for the session when you log in. (See Appendix I: CHVAL,CN.)

Batch — A batch job is charged to the number appearing on the actual (CHARGE,accountno.) or implied (/CHARGE) statement at the start of the job.

Permanent files — Files are normally charged to the interactive or batch session's account number. The CHARGE statement is used to change the number for future file saves. It remains in effect until another CHARGE statement is encountered, or until end-of-session.

The account number for an existing file can be changed to current session's account number by

```
CHANGE,pfn/CP.
```

To change several files, use

```
BEGIN,NEWCHRG,,fn.
```

where fn may have wildcards. To change all files, use

```
BEGIN,NEWCHRG.
```

* Mass Storage System *

The MSS is part of the CDC CYBER 860. The account numbers on files may be changed from the DEC VAXcluster, the CRAY X-MP, or on the 860.

From the DEC VAXcluster:
```
$ HFT  ACCESS  /Password=password
$ MSSNewchrg  old_ac  new_ac
        ^-- all MSS files with old_ac are
            changed
```

From the CRAY X-MP (COS):
```
MSACCES,MPW=mss_pw.        <-- may need AC=ac
MSCHANG,MDN=mssfile,CP=newacctno.
```

On the CDC 860 (NOS) :
```
CHANGE,mfn/CP.
```

From the CDC 860 (NOS/VE):
```
MSACCES  mss_pw
MSCHANG  mfn  CP=1
```

*** Passwords, Passwords, Everywhere ***

Each computer system has its own password to gain access to it (while CDC NOS has two passwords, the CDC CYBER 860 at DTRC has only one). You MUST change these during your first session on each or you will be denied future access. For security, you are strongly urged to change your access passwords as soon as you can log into each computer. Passwords for all our computers expire in 90 days. For the VAX and CYBER, you must change your password during the session in which you are told it has expired. The new password must differ from the old one. On the VAX, it must differ from all others used during the previous 12 months.

To change your access passwords, use

. Cray COS (password is 4-15 characters, with at least one of the following characters: 0-9, $, %, @)

. on the Cray

```
ACCOUNT,US=username,AC=joborderno,UPW=current_pw,NUPW=new_pw.
```

. from the VAXcluster

```
CSUBMIT /NUPW              <-- use this form if you use CSUBMIT
current_pw                     to submit jobs to the Cray
new_pw
new_pw

   -or-

CNEWPW  current_pw  new_pw  new_pw  ac  wait
                            ^-- use this form if you do not use
                                CSUBMIT
```

See also page 3-1-2.

. DEC VAXcluster (password is 6-12 characters)
DEC secure VAX

```
SET PASSWORD       <-- you will be prompted for your current
                       and new passwords
```

. CDC CYBER 860 / MSS (NOS) (password is 4-7 characters, at least one number)

. from the VAXcluster

```
HFT PASSWORD        <-- you will be prompted for your current
                        and new passwords
```

. from the Cray (COS)

```
MSACCES,MPW=mpw.
MSPASSW,OLD=oldpw,NEW=newpw.
```

. on the 860 (NOS)

```
PASSWOR,oldpw,newpw.
```

. from the 860 (NOS/VE)

```
MSACCES  mpw
MSPASSW  oldpw  newpw
```

. CDC CYBER 860 / MSS (NOS/VE) (password is up to 31 alphanumeric characters and underscores, starting with a letter)

Since NOS/VE is reached via NOS, your NOS login password gives you access to NOS/VE. However, to run NOS/VE batch jobs, you must have defined your batch password. To change it,

```
SET_PASSWORD        <-- you will be prompted for your current
                        and new passwords
```

*** Trouble Forms ***

A Trouble Form is used:

1) for refund requests
2) when problems are encountered
3) for suggestions, gripes and complaints.

The Trouble Form should include a succinct description of the problem and include as much documentation (dayfile or log, listings, dumps) as possible. It should be submitted to Code 3511 for processing.

Trouble Forms may be entered directly into the computer from any of the front-ends (VAXcluster, CYBER 860) using the GRIPE command. If supporting documentation (such as listings or dumps) is needed, please send it to Code 3511 (User Services).

*** Refunds ***

Requests for refunds on lost time must be accompanied by output of the run and a Trouble Form, and must be reported within five working days. Decisions on refunds will be made by Code 35.

*** ADP Control Center ***

The ADP Control Center has the following capabilities:

- assign, sell, clean, test and degauss magnetic tapes
- process Calcomp plots, and Xerox and microfiche output
- sell frequently-used terminal paper and ribbons

The following EAM facilities are available off-line at Central Site:

- a small card interpreter
- card punch
- card verifier
- shredder

See Appendix F for Computer Center telephone numbers.

***** Software Available *****

The following table lists the major software products and the computers where they are available. Type "HELP @CCF Software" on the VAXcluster for the latest version of this table.

	DT3/DT4 8550	DBL07 6410	CRAY X-MP	CDC NOS	CDC NOS/VE
ABAQUS	x	-	x	-	-
ACSL	x	-	-	-	-
ALGOL	-	-	-	x	-
APL	x	-	-	x	-
APT	-	-	-	x	-
Basic	x	x	-	x	x
C (CC)	x	-	x	-	-
Calcomp	x	-	x	x	(1)
CDD	x	x	-	-	-
Cobol	x	x	-	x	x
Datatrieve	x	x	-	-	-
DBMS	x	-	-	-	-
DECalc	x	x	-	-	-
DISSPLA	x	-	x	x	-
DYNA3D	-	-	x	-	-
EISPACK	x	-	x	-	(1)
FMS	x	x	-	-	-
Fortran	x	x	x	x	x
FTP	x	-	-	-	-
GPSS	x	-	-	x	-
Hasp	-	-	-	x	-
HOTSPOT	-	-	-	x	-
IMSL	x	-	x	x	x
INGRES	(2)	-	-	-	-
Kermit	x	x	-	x	-
LINPACK	x	-	x	x	(1)
Macsyma	(2)	-	-	-	-
MODE4A/4C (200-UT)	-	-	-	x	-

(1) - coming
(2) - DT4 only

	DT3/DT4 8550	DBL07 6410	CRAY X-MP	CDC NOS	CDC NOS/VE
Nastran	-	-	x	-	-
Pascal	x	x	x	x	x
Patran	x	-	-	-	-
PCA	x	-	-	-	-
Pert Time	-	-	-	x	-
PL/I	x	x	-	-	-
PLOT10	x	-	-	-	-
Proj Mgt (PM)	x	-	-	-	-
RIM	x	-	-	-	-
Simscript	-	-	-	x	-
SPICE	-	-	x	-	-
SPY	-	-	x	-	-
TAURUS	x	-	-	-	-
TELNET	x	(1)	-	-	-
WIN/TCP	x	(1)	-	-	-
XMODEM	-	-	-	x	-

(1) coming

***** Prolog and Epilog Command Files *****

A Prolog or Epilog Command File is a file containing commands which are executed automatically each time an event occurs. Prologs are executed at login, at the start of a batch job, at the invocation of an editor, etc. Each DTRC system has one or more such files. Epilogs are executed at logout, at the termination of an editor or utility. NOS/VE supports epilog files.

*** VAX/VMS Command Files ***

A system-level login file is executed to define global symbols for all users. User file LOGIN.COM, if present, will be executed for each user login or batch job. This procedure file may set up symbols and logical names, establish process name, test whether batch or interactive, or other desired JCL. Type HELP LOGIN.COM_HINTS for suggestions to include in your LOGIN.COM file.

If file EDTINI.EDT exists, it will be executed each time EDT is entered and may be used to define special keys, macros, or other desired Editor commands.

If file EVE$INIT.EVE exists, it will be executed each time EVE is entered and may be used to define special keys, macros, or other desired Editor commands.

*** NOS Command Files ***

A LOGINPR procedure file may be created containing JCL desired for each login or batch job. For instance, after testing for interactive, TRMDEF could be used to set special desired characteristics for your terminal. Execution of this command file is not automatic, but is triggered by a one-time execution of the UPROC command. If your prolog is long, you may wish to include RECOVER processing.

When the FSE editor is entered, the STARTUP procedure from FSEPROC is executed. The system version of this procedure is currently empty. If you wish to define editor directives which are always executed, make a copy of FSEPROC in your files with desired modifications. NOS will then execute your FSEPROC file instead of the system file.

LOGINPR and FSEPROC must be indirect files.

*** NOS/VE Command Files ***

A PROLOG command file may be created containing SCL desired for each login or batch job. For instance, after testing for interactive, CHANGE_TERMINAL_ATTRIBUTES could be used to set special desired characteristics for your terminal.

An EPILOG command file may be created to be executed at each logout or batch job termination.

When EDIT_FILE is entered, the commands in file SCU_EDITOR_PROLOG are executed. For instance, if you know the keypad or have a layout of it, you may wish to put "SET_SCREEN_OPTION MENU_ROWS=0" into this file to use the bottom line(s) of the screen for editing instead of for displaying the keys.

*** Cray Command Files ***

Before the Cray is used from NOS for the first time, and each time the NOS password is changed, CDEFINE should be used to create a CRAYDEF file. This file frees the user from including CYBER user and password information in each Cray JCL file.

If ICF (Cray Interactive Facility) will be used from NOS, a default PLAY file named ICFPROF may be created which will be executed at each ICF activation. It should contain commands such as /PERIOD to eliminate the need to end each Cray command with a period.

More information about VAX/Cray procedures such as CXCOMMANDS.COM will be included later.

***** ANSI Standard Multi-file Tapes *****

ANSI standard multi-file labelled tapes have each data file delimited by HDR1 and EOF1 labels. In the HDR1 label is the set ID field.

*** VAX ***

The set identifier field is set to the VSN when utilities such as COPY are used to write a multi-file reel.

*** NOS ***

The user defines the multi-file set identifier at the first write of the LABEL with the SI parameter. For ease of recall and compatibility with VAX, the VSN is recommended for the SI. All future reads/writes must use the previously-defined set identifier. If a VAX multi-file reel is read on NOS, the SI field must be set to VAX VSN. If FCOPY is used to create a multi-file tape to be read on a VAX, each FCOPY must be followed by WRITEF to properly create the EOF labels.

*** NOS/VE ***

The multi-file set identifier is created by using the FILE_SET_IDENITIFIER parameter on the initial CHANGE_TAPE_LABEL_ATTRIBUTES command. The label for each successive file is entered on additional CHANGE_TAPE_LABEL_ATTRIBUTE commands. File specifications, i.e., minimum/maximum record and block sizes, are defined with the SET_FILE_ATTRIBUTES command.

***** The CRAY X-MP (UNICOS) *****

The CRAY X-MP/216 at DTRC is a powerful, general purpose computer having two central processing units (CPUs) which share files and are linked together. These CPUs share 16 million 64-bit words of memory. Each CPU achieves its extremely high processing rate (over 200 MFLOPS (million floating point operations per second)) using its scalar and vector capabilities.

*** UNICOS Version 5.1 ***

One operating system for the CRAY X-MP at DTRC is the Unix Cray Operating System (UNICOS), version 5.1, which supports both batch and interactive processing. UNICOS is expected to be available at DTRC within the next year.

***** The CRAY X-MP (COS) *****

The CRAY X-MP/216 at DTRC is a powerful, general purpose computer having two central processing units (CPUs) which share files and are linked together. These CPUs share 16 million 64-bit words of memory. Each CPU achieves its extremely high processing rate (over 200 MFLOPS (million floating point operations per second)) using its scalar and vector capabilities.

*** COS Version 1.17.1 ***

The operating system for the CRAY X-MP at DTRC is the Cray Operating System (COS), version 1.17.1, which supports both batch and interactive processing.

*** Accessing the CRAY X-MP ***

Batch jobs are normally submitted from one of the front-ends using: CSUBMIT or CRAY SUBMIT on the VAXcluster, or CSUBMIT on the CDC CYBER 860. They may also be submitted from a running batch or interactive job using the Cray SUBMIT command.

Interactive access is also from one of the front-ends using: CINT (station code version 4.02) on the VAXcluster, or ICF (Interactive Cray Facility) on the CDC CYBER 860 (NOS).

Both modes of access are described later in this chapter.

*** Cray Datasets ***

On the Cray, information is organized by COS into datasets, which may be on disk, memory-resident, or interactive. A dataset contains one or more files and may be temporary (available only to the job that created it) or permanent.

Each dataset has a disposition code to tell COS what to do with it when it is released. The 2-character alphanumeric disposition codes include SC (scratch - default), PR (print), IN (input), and ST (stage to the front end).

Jobs access local datasets, which may be temporary or permanent. Permanent datasets are made local by the ACCESS statement. Front end files are made local by the FETCH statement.

*** Changing your Cray password ***

Your Cray access password may be changed from a batch job or interactively on the Cray, or from a procedure on the VAXcluster which creates and submits a Cray batch job for you.

Via DCL command CSUBMIT:

```
$ CSUBMIT  /NUPW
```

You will be prompted for your old and new passwords and a Cray job will be submitted on your behalf to change your password. The database on the VAXcluster will be updated with your new password.

If you submit jobs using CSUBMIT, use CSUBMIT to change your password. If you use CRAY SUBMIT or CNEWPW to make the change, the database will not be updated until you use CSUBMIT/NUPW.

Batch:

```
$ CRAY SUBMIT mynewpw.job
```

where your file MYNEWPW.JOB contains:

```
JOB,JN=ssss.
ACCOUNT,AC=ac,US=us,UPW=current_pw,NUPW=new_pw.
```

Interactive:

```
$ CINT                    \
Cray Jobname: jobname      > or CINT /JN=jobname /US=username
Cray Username: username /
!ACCOUNT,AC=ac,US=us,UPW=current_pw,NUPW=new_pw.
!^Z                            <-- ctrl-Z
Cint> QUIT
$                              <-- you are back in DCL
```

Via DCL command CNEWPW:

```
$ CNEWPW  current_pw  new_pw  new_pw  [ ac ]  [ wait ]
```

where new_pw is entered twice for verification

ac — is your Cray account number (may be omitted if it is the same as your current VMS login)

wait — is WAIT — wait for the job to complete and display the .CPR file

anything else — to let the job run on its own (you will have file NUCRPW.CPR when it completes)

This procedure creates and deletes temporary file NUP$W.JOB.

*** Batch Jobs ***

Cray batch jobs are very similar to CDC batch jobs, but with different terminology. A batch job consists of one or more files. The first file is the JCL control statement file. It is followed by source or data files as needed by the JCL file. A typical job consisting of one source and one data file (*) looks like this:

```
JOB,JN=jobname,....
ACCOUNT,AC=job_order_number,US=username,UPW=password.

   <JCL statements>

/EOF                              <-- end-of-file

   <source file>

/EOF                              <-- end-of-file

   <data file>

<eod>                             <-- end-of-data
```

A Cray batch job has at least four datasets:

$CS - the control statement file
(part of $IN, but not accessible to the user)

$IN - the job input dataset. Accessible by its local name, $IN, or as Fortran unit 5.

$OUT - the job output dataset. Accessible by its local name, $OUT, or as Fortran unit 6.

$LOG - a history of the job. Not accessible to the user. $LOG is appended to $OUT when the batch job terminates.

(*) - When executing several programs or one program several times, the /EOF is required only when a program reads until end-of-file. If a program reads a specific number of data records, or has its own pseudo-end-of-file, the /EOF must NOT be present.

** Batch Job Classes **

Batch jobs fall into five service classes: NORMAL, DEFER, BUDGET, PZERO, and SECURE. The US= parameter of the JOB statement specifies the job class (there is no default job class). SECURE jobs may be submitted only from the secure VAX (see below). Type HELP RATES (on the VAX), BEGIN,RATES (on CDC NOS), or RATES (on CDC NOS/VE) for the current rates.

Each class, except SECURE and interactive, is broken into four subclasses determined by the memory requested. The first letter of each subclass is:

S (small)	<= 2 Mwords
M (medium)	<= 8 Mwords
L (large)	<= 12 Mwords
X (extra large)	> 12 Mwords

The subclasses for NORMAL are SNORM, MNORM, LNORM, XNORM; for DEFER: xDEFER; for BUDGET: xBUDGE; and for PZERO: xPZERO. The subclass names appear in the CRAY STATUS display.

The following chart shows for each job class: the maximum number of such jobs to be allowed to execute at the same time. They are listed in order of relative priority, highest priority first.

	maximum # jobs				
job class	IA	S	M	L	X
Interactive	14				
NORMAL		6	4	2	1
DEFER		6	4	2	1
BUDGET		6	4	2	1
PZERO		5	3	1	1
SECURE					

** SECURE Batch Job Class **

Classified processing may be done on the CRAY X-MP by making prior arrangement with Operations. Access to the Cray is available only from a terminal in the secure computer room connected to the secure VAX (node name: DBL07). Batch jobs submitted to the Cray from this terminal must have "US=SECURE" in the job statement; jobs with "US= any_other_class", or with US= omitted, will be rejected. Secure jobs may be submitted at any time but will be executed only during classified time. Secure jobs may access the Mass Storage System in read-only mode.

** From the VAXcluster **

To use the Cray from the VAXcluster, log in to a node which can access the Cray, prepare your Cray batch job using any editor, and submit the job file(s) to the Cray using the CSUBMIT command:

```
$ CSUBMIT filename          -or-     $ CRAY SUBMIT filename
```

or

```
$ CSUBMIT file1,file2,...   -or-     $ CRAY SUBMIT file1,file2,...
```

where filename is a VAXcluster file containing the Cray job
(default file extension: .JOB)

filei is a VAXcluster file containing part of the Cray job
- file1 - the job control statements
- file2 - the next file in the job (perhaps a Fortran source program)
- file3 - the next file in the job (perhaps the data for running the program)

The output will be returned to your file jobname.CPR, where jobname is taken from the job statement of the Cray job (JN parameter).

CSUBMIT remembers your Cray password. It ignores an ACCOUNT statement, if present, and creates one from CSUBMIT qualifiers and your VAXcluster login username and account. CSUBMIT can also change your login password. CRAY SUBMIT requires that there be an ACCOUNT statement in the jobfile.

Files sent to the Cray must not have embedded tabs. See Appendix D: DETAB.

* Killing Batch Jobs *

Cray jobs are identified by their Job Sequence Numbers (jsq). To find the jsq, use

```
$ CRAY  STATUS
   -or-
$ CRAY
CRAY> STATUS
```

To kill a batch job, use

```
$ CRAY  DROP  jsq     <-- terminate executing job with EXIT
                          processing

   -or-

$ CRAY  KILL  jsq     <-- delete a job from the input queue  -or-
                          terminate executing job without EXIT
                           processing  -or-
                          delete the output dataset from the output
                           queue
```

* VAXcluster-to-Cray Examples *

1) `$ CSUBMIT JOB1` -or- `$ CRAY SUBMIT JOB1`

where JOB1.JOB contains:

```
JOB,JN=MYJOB.                                          (1)
ACCOUNT,US=username,UPW=password,AC=account.           (1,4)
CFT.                                                   (1)
SEGLDR,GO.                                             (1)
/EOF
       PROGRAM ADD                                     (2)
       DO 10 I=1,5                                     (2)
          READ (5, *) N1, N2, N3                       (2)
          N = N1 + N2 + N3                             (2)
          WRITE (6, *) N1, N2, N3, N                   (2)
    10 CONTINUE                                        (2)
       END                                             (2)
/EOF
1  2  3                                                (3)
4  5  6                                                (3)
7  8  9                                                (3)
10 11 12                                               (3)
13 14 15                                               (3)
/EOF
```

will submit the job to the Cray with the output returned in file MYJOB.CPR. The ACCOUNT statement (4) is omitted (or ignored) when using CSUBMIT.

2) $ CSUBMIT RUN2.JOB,RUN2.FOR,RUN2.DAT -or-
$ CRAY SUBMIT RUN2.JOB,RUN2.FOR,RUN2.DAT

where RUN2.JOB contains the job control statements ((1) above)
RUN2.FOR contains the Fortran source program ((2) above)
RUN2.DAT contains the data ((3) above)

will submit the combined files to the Cray with the output returned in file MYJOB.CPR. Note that the /EOF records are not required in this format.

3) $ CSUBMIT RUN3 -or- $ CRAY SUBMIT RUN3

where RUN3.JOB contains:

```
JOB,JN=MYJOB.
ACCOUNT,US=username,UPW=password,AC=account.          (4)
FETCH,DN=PROG3,TEXT='PROG3.FOR'.
FETCH,DN=DATA3,TEXT='PROG3.DAT'.
CFT,I=PROG3.
SEGLDR,GO.
```

PROG3.FOR on the VAXcluster contains the program (2) above, with "OPEN (5, FILE='DATA3')" before the "DO 10 ..."

PROG3.DAT contains the data (3) above.

** From the CDC CYBER 860 **

To use the Cray from the CYBER 860, log in, prepare your Cray batch job using any editor, and submit the job file to the Cray using the CSUBMIT command (assumes you have set up the CRAYDEF file for your current CYBER 860 user name and password via a CDEFINE command):

```
/CSUBMIT,lfn.          <-- print at Central Site
/CSUBMIT,lfn,RB=un.    <-- put into output queue for user un
/CSUBMIT,lfn,TO.       <-- put into your wait queue
```

In the last two formats, use QGET to get the file from the queue. See Appendix D for additional parameters. To send the output elsewhere, use the Cray DISPOSE command (see Appendix C).

* Killing Batch Jobs *

Cray jobs are identified by their Job Sequence Numbers (jsq). To find the jsq, use

```
$ CSTATUS
```

To kill a batch job, use

```
$ CDROP,jsq.          <-- terminate executing job

   -or-

$ CKILL,jsq.          <-- delete a job from the input queue  -or-
                          terminate executing job keeping only the
                           dayfile -or-
                          delete an output dataset
```

* CYBER 860-to-Cray Examples *

1) /CSUBMIT,RUN1.

where local file RUN1 contains:

```
JOB,JN=myjob.
ACCOUNT,US=username,UPW=password,AC=account.
FETCH,DN=prog3,SDN=myprog,TEXT='GET,myprog.CTASK.'.
                                                    ^-- indirect file
FETCH,DN=mydata,TEXT='ATTACH,mydata.CTASK.'.     <-- direct file
CFT,I=prog3.
SEGLDR,GO.
```

-or-

```
JOB,JN=myjob.
ACCOUNT,US=username,UPW=password,AC=account.
FETCH,DN=prog3,SDN=myprog,TEXT='GET,myprog.CTASK.'.
                                                    ^-- indirect file

MSACCES,US=user,MPW=mspass.
MSFETCH,DN=mydata.                                <-- direct file
CFT,I=prog3.
SEGLDR,GO.
```

MYPROG and MYDATA on the CDC CYBER 860 contain the program and data (see page 3-1-7, example 3).

** From a Running Cray Job **

A batch job to be submitted from a running Cray job may reside either on the Cray or on one of the front-ends. From within the Cray job, ACCESS or FETCH the file to make it a local file, then SUBMIT it to the COS input queue. (See Appendix C for additional parameters for these Cray commands.)

* Examples *

1) The job is in a permanent dataset on the Cray:

```
JOB,....
ACCOUNT,....
...
ACCESS,DN=myjob,PDN=mypermjob.
SUBMIT,DN=myjob.
...
```

2) The job is in a file on the VAXcluster:

```
JOB,....
ACCOUNT,....
...
FETCH,DN=myjob,TEXT='myjob.job'.     <-- submitted from VAXcluster
   -or-
FETCH,DN=myjob,MF=V3,TEXT='DT3"user pw"::U0n:[user]myjob.job'.
                                     ^-- submitted from CYBER 860
                                         or VAXcluster
SUBMIT,DN=myjob.
...
```

3) The job is in a file on the Mass Store (CDC CYBER 860):

```
JOB,....
ACCOUNT,....
...
MSACCES,US=user,MPW=mspass.
MSFETCH,DN=myjob.
SUBMIT,DN=myjob.
...
```

*** Interactive Jobs ***

CRAY X-MP interactive access is via the Cray Station code on one of the front-ends.

** From the VAXcluster **

The CRAY X-MP is accessed via the VMS Cray Station, which may be entered by the CRAY or CINT command.

The CRAY command puts you into Cray context (indicated by the CRAY> prompt). Among other capabilities, you can examine and manipulate your jobs in the Cray queues.

The CINT command initiates an interactive session on the Cray. If not included in the CINT statement qualifiers, you will then be requested to supply:

```
Cray Jobname:      <-- enter 1-7 alphanumeric characters as the
                       jobname for this session (must be upper case
                       to be able to fetch from the Mass Storage
                       System; should be different for each session)
Cray Username:     <-- enter your User Initials
```

The exclamation prompt (!) indicates that you have reached the Cray. Your first command must be your ACCOUNT statement. Any other commands will be ignored until a valid ACCOUNT statement is read.

```
!ACCOUNT,AC=1222233344,UPW=pw,US=userinit.
```

When you receive another ! prompt, your logon was successful. You may now use any of the commands in Appendix C. Every command MUST end with a terminator (.): if you forget, use the up-arrow to bring the command back and add the terminator.

To execute some Cray Station commands, use ^Z to interrupt CINT. At the Cint> prompt, enter the Station command. When it completes, you will be returned to your interactive session. Note that only a subset of the Cray Station commands may be executed in CINT.

To terminate the Cray interactive session, enter ^Z. At the Cint> prompt, type QUIT to return to the VMS prompt and close the interactive session.

To leave the Cray Station, enter EXIT (or ^Z). This will bring you out of Cray context and back to the VMS prompt.

* VMS Cray Station Commands *

See Appendix D for the syntax of these commands. (CINT) indicates that the command may be executed interactively (via CINT) as well as from the Cray Station (CRAY).

$	Create a temporary VMS subprocess, allowing you to enter DCL commands. To return to Cray context, type LOGOUT.
$	(CINT only) Execute a single DCL command.
+	Display the next page of information in Cray context.
-	Display the previous page of information in Cray context.
@	(CINT) Execute an indirect station command file (containing station commands) in Cray context. (Synonym for PLAY.)
^C	(CINT only) CTRL-C -- Same as ABORT.
^O	(CINT only) CTRL-O -- Toggles interactive output on and off until the next Cray prompt.
^Z	(CINT) CTRL-Z exit the current processing mode. In response to the Cray context prompt (CRAY>), it returns you to DCL; during a Cray interactive session, it returns you to command mode (Cint> prompt). While you are being prompted for command parameters, CTRL-Z cancels the command. You can also terminate the execution of an indirect station command file with CTRL-Z. In response to the Cint> prompt, you are returned to your interactive session.
ABORT	(CINT only) Interrupt the current interactive Cray job step and return to the "!" prompt after first displaying any COS output queued for the terminal.
ATTACH	(CINT only) Redirect Cray interactive terminal output to an alternate device (graphics).
ATTENTION	(CINT only) Interrupt the current interactive Cray job step and enters reprieve processing. If no reprieve processing, ATTENTION is the same as ABORT.
BYE	(CINT only) Terminate an interactive session. Depending on the command qualifiers, the COS interactive job may also be terminated.
CLEAR	Terminate any display command and clear the display portion of the screen.
COLLECT	(CINT only) Store COS interactive output in a VMS file.
COMMENT	Insert comments into an indirect station command file stream.

DATASET	Report the existence of a COS permanent dataset.
DELAY	Suspend execution of an indirect station command file for a specified period of time.
DISCARD	(CINT only) Discard all output from a Cray interactive session until the next COS prompt is issued.
DROP	Terminate a Cray job and returns the associated output dataset. COS job execution enters reprieve processing after the next COS EXIT control statement.
EOF	(CINT only) Send an end-of-file record to a connected COS interactive job. This command is normally required to terminate COS file input from the terminal.
EXIT	(CINT only) Return you from Cray context or Cint command mode to DCL level.
HELP	(CINT) Display information from the station help files or an index of all commands.
ISTATUS	(CINT only) Return the status of your Cray interactive job, including the CPU time used and the last Cray logfile message.
JOB	Display the status of a specific COS job.
JSTAT	Display the status of a specific job and its related tasks.
KILL	Terminate a Cray job immediately.
LOGFILE	Provide access to the station logfile messages.
LOOP	Restart execution of an indirect station command file at the beginning of the file. End looping with ^Z.
MESSAGE	Send a message to the Cray job and station logfiles.
PAUSE	Suspend the execution of an indirect station command file. Control is passed to the terminal, where you can terminate the command file by entering a command or resume it by entering a null line (<RET>).
PLAY	(CINT only) Execute an indirect station command file. (Same as @.)
QUIT	(CINT only) Terminate a Cray interactive session and the corresponding Cray interactive job. (Equivalent to BYE/ABORT.)

RECORD	Start or stop the recording of terminal input to the specified file while in Cray context for later use with the PLAY or @ commands. Exiting Cray context automatically issues a RECORD/OFF.
RELEASE	Release a dataset in the output HOLDING queue due to VMS quota problems.
REMOVE	Delete entries in the dataset staging queue.
RERUN	Immediately end the processing of a COS job and put job back into the input queue, unless the job has terminates or cannot be rerun.
SET	Define terminal working environment for the current session.
SHOW	Display information about the status of the station staging queue.
SNAP	Copy the current contents of the display region into the specified VMS file. If the command is issued from a terminal in line-by-line mode, the last display requested is recorded in the file.
STATCLASS	Display the current Cray job class structure.
STATUS	Display the Cray system status.
STATUS	(CINT only) Same as ISTATUS.
STORAGE	Initiate a COS disk status display providing the following information: device class or status; device name as it is known to COS; percentage of free space and permanent space on each device; number of recovered and unrecovered errors on each device; location of last error.
SUBMIT	Stage the specified VMS file to Cray to be put on the job input queue. The file must contain COS JCL (see CRAY HELP). The first record must be the JOB control statement. By default, the output from the COS job (known as a logfile) is sent to the directory from which the job was submitted.
SUPPRESS	Suppress the echoing of the next typed input line.
SWITCH	Set or clear COS job sense switches.

* Examples *

1) $ cint
   Cray Jobname: ABCD001 <-- any jobname (must be upper case to be able to fetch from the Mass Storage System)
   Cray Username: ABCD <-- user ABCD
   !ACCOUNT,AC=1222233344,UPW=mypw. <-- US=abcd not needed since upper case was used in entry above

   !<your Cray commands>
   !^Z <-- ctrl-Z to leave Cray
   Cint> <Station command> <-- returns to Cray when done
   !^Z <-- ctrl-Z to leave Cray
   Cint> quit <-- terminate Cray session

2) $ cint
   Cray Jobname: efgh002
   Cray Username: efgh
   !ACCOUNT,AC=1222233344,UPW=mypw,US=efgh. <-- US=efgh needed since lower case was used in entry above

   <same as example 1>

3) $ cint /jn=struct /us=efgh <-- any jobname; user EFGH (since this is a VMS DCL command, it is converted to upper case)

   !ACCOUNT,AC=1222233344,UPW=mypw. <-- US=efgh not needed since the VMS control statement is converted to upper case

   <same as example 1>

** From the CDC CYBER 860 **

The CRAY X-MP is accessed via the NOS Interactive Cray Facility (ICF), which may be entered by the APPSW,ICF command from IAF. You enter ICF, log onto the Cray, do your thing (Cray or ICF commands), leave the Cray and ICF. You will then be at the NOS prompt.

Alternatively, you can specify ICF as the application when you log into NOS.

ICF commands have a prefix (normally a slash "/") and can be intermixed with Cray commands. To terminate the Cray session (and ICF), enter /BYE or /LOGOFF.

* ICF Prologue File *

A user prologue may be defined to be executed each time you start an ICF session. This is an 8/12-bit ASCII indirect access file named ICFPROF, with access granted to user SYSTEMX (PERMIT,ICFPROF,SYSTEMX.) We suggest you include "/PERIOD ON" so you don't have to type a period at the end of each Cray command.

* NOS ICF User Commands *

/ABORT	Send abort interrupt to the interactive Cray job (also user-break-2 key (normally %2).
/ATTENTION	Send attention interrupt to the interactive Cray job (also user-break-1 key (normally %1).
/BYE	Terminate this Cray interactive session. (Same as /LOGOFF)
/CONNECT	Create a logical connection between this terminal and some other (slave) terminal.
/DISCARD	Discard output being sent from the Cray to this terminal.
/ENDCONNECT	Terminate a CONNECT.
/ENDPLAY	Terminate reading of a PLAY file.
/EOF	Send an end-of-file to the Cray.
/HELP	Display help information.
/ICFSTATUS	Display general information about the current status of ICF.
/LOGOFF	Terminate this Cray interactive session. (Same as /BYE)
/LOGON	Initiate or reconnect to an existing Cray job.

/PERIOD	Set/reset automatic generation of a terminator on COS commands.
/PLAY	Read data and commands from a NOS file in the user's catalog.
/PREFIX	Change the ICF command prefix letter.
/QUIT	Immediately terminate this Cray interactive session.
/RESUME	Resume the transmission of data to and from the Cray (negate the effect of SUSPEND).
/SUSPEND	Suspend transmission of data to and from the Cray.
/STATUS	Display Cray status.
/*	An ICF comment line.

* Examples *

```
1) /appsw,icf                          <-- / is the NOS prompt
   <a greeting>
   /logon                              <-- / is required;
                                          log onto DTRC Cray
   <a greeting>
   !account,ac=1222233344,upw=mypw.    <-- US=abcd not needed
   !<your Cray or ICF commands>
   !/bye                               <-- to leave Cray and ICF


2) FAMILY: ,abcd,pw,icf                <-- log into ICF directly
   <a greeting>
   /logon                              <-- / is required;
                                          log onto DTRC Cray
   <a greeting>
   !account,ac=1222233344,upw=mypw.    <-- US=abcd not needed
   !<your Cray or ICF commands>
   !/bye                               <-- to leave Cray and ICF
   T1210   - APPLICATION: iaf          <-- switch to another
                                          application such as IAF
```

***** Cray JCL Commands *****

The Cray Job Control Language (JCL) statements are grouped by function in this section. See Appendix C for a description of the syntax for each command. (DTRC) indicates a command or program added at DTRC. Some of the logic structure commands use JCL expressions, which are described later in this section.

*** Job Definition and Control ***

*	Entire line is a comment.
ACCOUNT	Validate a user's Job Order Number, user name and password.
ALTACN	Validate an alternate account number for permanent datasets.
CALL	Read control statements from another file.
CHARGES	Report on job resources.
ECHO	Control logfile messages.
EXIT	On job abort, processing continues with the statement following the EXIT; if no abort, terminate job processing.
IOAREA	Control access to a job's I/O area (containing the DSP and I/O buffers).
JOB	First statement of a job -- gives job parameters.
JOBCOST	(DTRC) Write a summary of job cost and system usage to $LOG.
LIBRARY	Specify search order for procedures during processing.
MEMORY	Request new field length.
MODE	Set/clear mode flags.
NORERUN	Control a job's rerunability.
OPTION	Specify user-defined options.
RERUN	Control a job's rerunability.
RETURN	Return from an alternate control statement file.
ROLLJOB	Protect a job by writing it to disk.
SET	Change value of a JCL symbolic variable.
SWITCH	Turn pseudo sense switches on or off.

*** Dataset Definition and Control ***

ACCESS Make a permanent dataset local.

ASSIGN Create a dataset and assign dataset characteristics.

HOLD Dataset release occurs with implicit HOLD.

NOHOLD Cancel effect of HOLD.

RELEASE Relinquish access to a dataset from a job.

*** Permanent Dataset Management ***

ACCESS Make a permanent dataset local.

ADJUST Redefine size of a permanent dataset.

DELETE Remove a permanent dataset.

MODIFY Change a permanent dataset's characteristic information.

MSCHANG (DTRC) Change the attributes of a Mass Storage System file.

NEWCHRG (DTRC) Change permanent file account number.

PERMIT Grant/deny access to a permanent dataset.

SAVE Make a dataset permanent.

SCRUBDS Write over a dataset before release.

*** Permanent Dataset Staging ***

See Chapter 3 for staging to and from the Mass Storage System.

ACQUIRE Get a front-end dataset and make it permanent.

DISPOSE Stage dataset to the front-end; release a local dataset; change disposition characteristics.

FETCH Get a front-end dataset and make it local.

MSACCES (DTRC) Supply your Username and password to the Mass Storage System (MSS).

MSFETCH (DTRC) Fetch a file from the MSS.

MSPURGE (DTRC) Purge a file from the MSS.

MSSTORE (DTRC) Store a file on the MSS.

SUBMIT Send local dataset to COS input queue.

*** Permanent Dataset Utilities ***

AUDIT Report on permanent datasets.

*** Local Dataset Utilities ***

BLOCK Convert an unblocked dataset to a blocked dataset.

COPYD Copy blocked datasets.

COPYF Copy blocked files.

COPYNF Copy files from one blocked dataset to another.

COPYR Copy blocked records.

COPYU Copy unblocked datasets.

DS List local datasets.

NOTE Write text to a dataset.

QUERY Determine the current status and position of a local file.

REWIND Position a dataset at its beginning.

SKIPD Skip blocked datasets (position at EOD (after last EOF)).

SKIPF Skip blocked files from current position.

SKIPR Skip blocked records from the current position.

SKIPU Skip sectors on unblocked datasets.

UBBLOCK Convert a blocked dataset to an unblocked dataset.

WRITEDS Initialize a blocked dataset by writing a single file containing a specific number of records of a specific length.

*** Dumps and Other Aids ***

COMPARE Compare two datasets.

DEBUG Interpret a dump.

DUMPJOB Capture job information in dataset $DUMP for display by DUMP.

DUMP Display job information previously captured by DUMPJOB.

FLODUMP Dump flowtrace table.

FTREF Generate Fortran cross-reference.

ITEMIZE Report statistics about a library dataset.

PRINT Write value of JCL expression to the logfile.

SPY Generate a histogram of time usage within a program to locate inefficient code.

*** Logic Structure ***

ELSE IF-loop control.

ELSEIF IF-loop control.

ENDIF IF-loop termination.

ENDLOOP LOOP termination.

EXITIF IF-loop control.

EXITLOOP LOOP control.

IF Begin a conditional block of code.

LOOP Start of an iterative control statement block.

*** Procedures ***

See Section 3-3 for additional information on the creation of procedures.

CALL Transfer control to a procedure.

"call by name"
Execute a complex procedure in a library.

ENDPROC End of a procedure.

PROC Begin an in-line procedure definition block. This is followed by the procedure prototype statement which names the procedure and gives the formal parameter specifications.

RETURN Return control from a procedure to its CALLer.

*** Programming Languages ***

CFT Compile a Fortran source program.

CFT77 Alternate Fortran compiler (slower compile, faster execute).

PASCAL Compile a Pascal source program.

*** Program Libraries ***

See Section 3-4 for a discussion of program libraries (PL).

AUDPL Audit an UPDATE PL.

UPDATE Source and data maintenance.

*** Object Libraries ***

See Section 3-5 for a discussion of object libraries.

BUILD Generate and maintain library datasets.

SEGLDR Segment loader (see Section 3-6).

*** Miscellaneous ***

"call by name"
Execute a program by its local file name.

SID Debug programs interactively or in batch.

SORT Sort/merge.

*** JCL Expressions ***

An expression is a string of operands and operators. It is evaluated from left to right, taking into account parentheses and operator hierarchy. Expressions allow the incrementing of counters, error code checking, and string comparison.

There are four types of operands:

- integer constants (+ddd... or -ddd... - decimal
  nnn...B - octal
  range: 0 to ~10**19)
- literal constants ('ccc...'L - left-justified, zero-filled
  'ccc...'R - right-justified, zero-filled
  'ccc...'H - left-justified, blank-filled
  range of c: 040 - 176 octal
  default: H)
- symbolic variables (see below)
- subexpressions (its value becomes an operand)

Expressions may be used in IF, ELSEIF, EXITIF, and EXITLOOP.

** Symbolic Variables **

There are 38 symbolic variables: 6 system constants, 7 variables set by COS, and 25 which can be set by the user.

* System Constants *

Symbol	Range	Description
FALSE	0	False
SID	literal	Mainframe ID (C1)
SYSID	literal	COS level ('COS n.nn')
TRUE	-1	True

SN and XM are also available.

* COS-set Variables *

Symbol	Range	Description
ABTCODE	0-nnn	COS job abort code (ABnnn)
DATE	literal	mm/dd/yy
FL	0-77777777	current octal field length
FLM	0-77777777	JOB statement maximum octal FL
PDMST	64-bits	status of most recent Permanent Dataset Manager request
TIME	literal	hh:mm:ss
TIMELEFT	64-bit integer	job time remaining (milliseconds)

* User-set Variables *

Symbol	Range	Description
G0-G7	64-bits	8 global pseudo-registers (can be used to pass data between procedures)
J0-J7	64-bits	8 job (local) pseudo-registers (each procedure level has its own J registers)
JSR	64-bits	Job Status Register containing the previous job step completion code
NOTEXT	64-bits	text field not echoed (default: ON)
PDMFC	64-bits	most recent user-issued PDM request
SSW1-SSW6	64-bits	pseudo sense switches

** Operators **

Operators may be

. arithmetic (+, -, *, /); Underflow and overflow are not detected; division by 0 produces zero

. relational (.EQ., .NE., .LT., .GT., .LE., .GE.); returns -1 (TRUE) or 0 (FALSE)

. logical (.OR., .AND., .XOR., .NOT.); returns a 64-bit value

Operations are performed left to right, taking into account parentheses, with the hierarchy of operators: (*, /), (+, -), relational, .NOT., .AND., .OR., .XOR..

** Strings **

A string is a group of ASCII characters (040-176 octal) to be taken literally. There are two types of strings:

. literal - delimited by apostrophes -- '...'

. parenthetical - delimited by parentheses -- (...)

Literal strings do not include the delimiters. An apostrophe within a literal string is represented by two apostrophes: '...''...'. A null string is indicated by two apostrophes: ''. A literal string is continued by placing an apostrophe and a continuation character at the end of the first line and an apostrophe at the start of the string on the next line:

```
...'This Is A '^
   'Long String.'     becomes     This Is A Long String.
```

Parenthetical strings do not include the delimiters. Spaces are removed; nested parentheses are not treated as separators; literal strings may appear in a parenthetical string. A parenthetical string is continued by placing a continuation character at the end of the first line and continuing the string on the next line:

```
...(This Is A ^
    Long String.)     becomes     ThisIsALongString.
```

***** Procedures *****

A procedure is a group of control statements separate from the job control statement dataset ($CS). Calling a procedure provides a simplified way to process that group of control statements. A procedure may be called by a job repeatedly or by another procedure.

There are two kinds of procedures in COS:

- simple - a sequence of control statements
- complex - a prototype statement (giving the name of the procedure and any parameters), the control statements, and optional data.

*** Simple Procedures ***

A simple procedure has no name or parameters and resides in a non-library dataset. It is invoked by a CALL without the CNS parameter. Control is returned to the caller by a RETURN statement, the end of the first file in the dataset, or an EXIT (when not skipping because of an error condition). A simple procedure has no parameter substitution.

Any COS JCL statement, except PROC and ENDPROC, may be used in a simple procedure. One use might be to access all the datasets needed in several jobs without having to specify them in the individual jobs.

*** Complex Procedures ***

Complex procedures are named and may have parameters described in a prototype statement. Complex procedures are executed by

- "call by name", which may include parameters for substitution in the procedure. The procedure is in $PROC or a local dataset named in a LIBRARY statement.
- CALL,DN=procfyl,CNS, followed by a line containing the procedure name and parameters for substitution. The procedure is the first file in a separate dataset; PROC and ENDPROC are not used.

Complex procedures may appear, delimited by PROC and ENDPROC, in the job control statement dataset ($CS). When PROC is encountered, the procedure is written to $PROC. Subsequent calls to the procedure may then be made using the procedure name (and any substitute parameters).

A complex procedure has the general form:

```
PROC.                          <-- not for CALL
prototype statement
control statements
...
&DATA,dn1.
data for first dataset
...
&DATA,dnn.
data for last dataset
ENDPROC.                       <-- not for CALL
```

** Prototype Statement **

The prototype statement defines the name of the procedure and its formal parameters with their default value(s). It has the form:

name,p1,p2,...,pn.

name - the name of the procedure (1-8 alphanumeric characters)

pi - a formal parameter specification

- posi - positional
- keyi=dval:kval - keyword
  - keyi - formal keyword name
  - dval - optional default value when keyi is omitted from the calling statement
  - kval - optional default value when keyi is specified in the calling statement without a value
- keyi= - no defaults; the caller must supply a non-null value
- keyi=: - no defaults; allows keyi and keyi=

** Temporary Datasets **

One or more temporary datasets may be included in a complex procedure following the control statement. Each starts with

&DATA,dn.

where dn is the required dataset name.

** Parameter Substitution **

Formal parameters are used, preceded by an ampersand (&), within the body of the procedure. On execution, each is replaced by the value supplied or implied in the calling statement. &param is delimited by any character except A-Z, a-z, 0-9, @, $, or %. If the next character is one of these, the underline (_) is used as the delimiter and is removed at execution time.

If too few positional parameters are specified by the caller, null strings are used for the remaining parameters; if too many, the job aborts. Keyword parameters may appear in any order, however, all positional parameters must precede all keywords.

** Apostrophes and Parentheses **

Apostrophes in the calling statement denote literals and are not removed during substitutions; the outer set of parentheses are removed. If you are not sure how a parameter is used in the procedure, enclose it in parentheses.

The following shows parenthetical substitution:

caller	after substitution
value	value
(value1=value2)	value1=value2
value1'.'value2	value1'.'value2
value1(.)value2	value1.value2

*** DTRC "System" Procedures ***

The following DTRC-written procedures have been added to COS as of the date of this page. See Appendix C for more information. For the current list, type "HELP @CRAY CONTENTS" on the VAX.

MSACCES Supply your Username and password to the Mass Storage System

MSAUDIT Sorted audit of Mass Storage System files.

MSCHANG Change the attributes of a Mass Storage System file.

MSFETCH Fetch a file from the Mass Storage System to the CRAY X-MP

MSPASSW Change your Mass Storage System access password.

MSPURGE Purge a Mass Storage System file from the CRAY X-MP

MSSTORE Store a CRAY X-MP file on the Mass Storage System

*** DTRC Procedure Library ***

One procedure library has been added to COS at DTRC:

```
PROCLIB,OWN=PUBLIC.
```

To use:
```
ACCESS,PROCLIB,OWN=PUBLIC.
LIBRARY,PROCLIB:*.
procname,....
```

The following routines are the procedures in PROCLIB as of the date of this page. See Appendix C for more information. For the current list, type "HELP @CRAY CONTENTS" on the VAX.

JOBCOST Write job cost summary to $LOG

NEWCHRG Change the account number of permanent files

*** Examples ***

** Simple Procedures **

1) The first file of dataset GETLIBS contains:

```
ACCESS,DN=MSPROC,OWN=PUBLIC.     <-- the MSS procedures
ACCESS,DN=DTLIB,OWN=PUBLIC.      <-- the DTLIB subroutine library
ACCESS,DN=SUBS.                  <-- your subroutine library
```

This is executed by:

```
CALL,DN=getlibs.
```

** Complex Procedures **

2) As in example 1, but your subroutine library is to be identified by the caller:

```
GETLIBS,SUBS.                    <-- prototype statement
ACCESS,DN=MSPROC,OWN=PUBLIC.     <-- the MSS procedures
ACCESS,DN=DTLIB,OWN=PUBLIC.      <-- the DTLIB subroutine library
ACCESS,DN=SUBS,PDN=&SUBS.        <-- your subroutine library
```

When called by:

```
CALL,DN=getlibs,CNS.
getlibs,othersubs.
```

the third ACCESS expands to ACCESS,DN=SUBS,PDN=othersubs. Note that the name of the procedure is unimportant, since it is the only procedure in the file. "getlibs,othersubs." could be replaced by "*,othersubs".

When called by:

```
CALL,DN=getlibs,CNS.
getlibs,(hislib,OWN=him).
```

the third ACCESS expands to ACCESS,DN=SUBS,PDN=hislib,OWN=him.

When called by:

```
CALL,DN=getlibs,CNS.
getlibs,'hislib,OWN=him'.
```

the third ACCESS expands to ACCESS,DN=SUBS,PDN='hislib,OWN=him'. While this is legal (it says the permanent filename is "hislib,OWN=him"), it is probably an error and, if so, will abort the procedure.

3) Create a procedure library from procedures in the job stream.

```
...
ECHO,OFF.
RELEASE,DN=$PROC.           <-- return existing $PROC
*
PROC.                       <-- write first procedure to $PROC
prototype
procedure body
RETURN...procname
EXIT.
RETURN,ABORT...procname
ENDPROC.                    <-- end of first procedure
*
PROC.                       <-- write next procedure to $PROC
prototype
procedure body
RETURN...procname
EXIT.
RETURN,ABORT...procname
ENDPROC.                    <-- end of procedure
*
...                         <-- more procedures
*
ACCESS,DN=proclib,NA,UQ.    <-- get original (existing) library
SAVE,DN=$PROC,PDN=proclib.  <-- save new library
DELETE,DN=proclib,NA.       <-- delete original library
RELEASE,DN=$PROC.           <-- return new library
ACCESS,DN=proclib.          <-- get new library with its own name
LIBRARY,DN=*:proclib.       <-- add it to the end of the library
                                list
-or-
LIBRARY,DN=proclib:*        <-- add it to the beginning of the
                                library list
ECHO,ON.
...
< use one of the procedures >
...
```

4) Create a procedure library from procedures in a separate file.

```
...
FETCH,DN=myprocs,TEXT='myprocs.pro'.        <-- defaults to AC=ST
CALL,DN=myprocs.
SAVE,DN=$PROC,PDN=proclib,PAM=R.            <-- others may use it
...
```

where VMS file MYPROCS.PRO contains:

```
*           first procedure
PROC.
prototype
procedure body
ENDPROC.
*           next procedure
PROC.
prototype
procedure body
ENDPROC.
*           next procedure
...                          <-- more procedures
*
```

***** Program Libraries *****

Source programs and data may be in separate datasets or may be stored and maintained in program libraries. UPDATE creates and maintains these libraries while AUDPL (see Appendix C) audits them.

*** UPDATE ***

UPDATE is a program for creating and modifying a program library (PL). In addition, UPDATE will extract individual modules for input to a compiler or other program.

By default, 72 columns of information are retained. Fifteen additional characters are retained for each line: an 8-character identifier, a period (.), and a 6-digit sequence number, i.e., id.seq.

UPDATE supports two kinds of text modules or decks:

- a regular deck (beginning with a DECK directive)
- a common deck (beginning with a COMDECK directive) which may be included in decks with a CALL directive

Each type includes all lines following the deck directive until the next deck or modification directive.

History information is retained allowing the deletion, modification, or restoration or previous modifications.

See Appendix C for a description of the UPDATE control statement parameters.

*** UPDATE Directives ***

An UPDATE directive, which must be in upper case, has the following format:

```
m directive_name  [ parameters ]
```

where m is the master character (default: asterisk (*)). There are five categories of directives.

** DECK and COMDECK **

*DECK deck (*DK)
First line of a new deck. <deck> is up to 8 characters, any ASCII character from 41 to 176 octal, except comma, period, blank, colon, equals.

*COMDECK cmdk (*CDK)
First line of a new common deck.

** Compile Directives **

*CALL cmdk (*CA)
Include the contents of a common deck.

*CWEOF
Write an EOF on the compile dataset if anything was written since the last EOF.

*NOSEQ
Do not write sequence numbers.

*SEQ
Write sequence numbers.

*WEOF
Write an EOF on the compile dataset.

*WIDTH dw
Change the data width (default: 72).

*IF, *ELSEIF, *ELSE, and *ENDIF are also available.

** Modification Directives **

*BEFORE id.seq (*B)
Insert before a line.

*COPY p,id1.seq1,id2.seq2 (*CY)
Copy a range of lines from deck or comdeck <p>.

*DELETE id1.seq1 (*D) <-- one line
*DELETE id1.seq1,id2.seq2 <-- a range of lines
*DELETE id1.seq1,.seq2 <-- same (short form)
Delete a line or a range of lines.

*IDENT ident (*ID)
*IDENT ident,K=k1:k2:...,U=u1:u2:...
Identify a set of modifications. You can require that other modification sets be known (K=) or unknown (U=).

*INSERT id.seq (*I)
Insert after a line.

*RESTORE id1.seq1 (*R) <-- one line
*RESTORE id1.seq1,id2.seq2 <-- a range of lines
*RESTORE id1.seq1,.seq2 <-- same (short form)
Restore a line or a range of lines.

** Run Options **

*/comment
A comment line.

*COMPILE p1,p2,...,pj.pk,...,pn (*C)
Write one or more decks, including a range (pj.pk), to the compile and/or source datasets. Use UPDATE,K to force the output order.

*COPY p,id1.seq1,id2.seq2,dn (*CY)
*COPY p,id1.seq1,id2.seq2,dn,SEQ
Copy a range of lines from deck or comdeck <p> to dataset <dn>. SEQ will include sequence numbers.

*LIST
Resume listing input lines. UPDATE,L=0 overrides *LIST.

*MASTER m
Define a new master character for subsequent directives. (default: *)

*NOLIST
Stop listing input lines. *NOLIST overrides UPDATE,IN.

*READ dn (*RD)
Read input from another dataset.

*REWIND dn
Rewind a dataset.

*SKIPF dn
*SKIPF dn,n
Skip file(s) in a local dataset.

*DECLARE and *DEFINE are also available.

** Input Edit Directives **

*EDIT p1,p2,...,pn (*ED)
Remove deleted and yanked lines from specific decks. These lines cannot be retrieved. This is useful for cleaning up a PL.

*MOVEDK dk1:dk2
*MOVEDK dk1:.
Position deck of common deck <dk1> immediately after deck or common deck <dk2> or at the beginning of the PL <.>.

*PURGE id1,id2,...,idj.idk,...,idn..
Remove the effect of a modification set (idi), a range of datasets (idj.idk), or a set and all following (idn..).

*PURGEDK dk
Permanently remove a deck or common deck.

*UNYANK id1,id2,...,idj.idk,...,idn..
Reactivate a deck, comdeck, or modification set previously yanked.

*YANK id1,id2,...,idj.idk,...,idn..
Temporarily delete a deck, comdeck, or modification set previously yanked.

*SKIP and *ENDSKIP are also available.

*** Examples ***

1) Create a PL:

```
JOB,JN=makepl1.
ACCOUNT,....                    <-- omit if using VAXcluster CSUBMIT
UPDATE,P=0,C=0.                 <-- no $PL or $CPL
SAVE,DN=$NPL,PDN=mypl.
/EOF
*DK DECK1
   <lines for deck DECK1>
*DK DECK2
   <lines for deck DECK2>
*DK DECK3
   <lines for deck DECK3>
```

2) Extract, compile and execute deck DECK2 from PL MYPL:

```
JOB,JN=getpl2.
ACCOUNT,....                    <-- omit if using VAXcluster CSUBMIT
ACCESS,DN=$PL,PDN=mypl.
UPDATE.
CFT77,I=$CPL.
SEGLDR,CMD='MAP,PART',GO.
/EOF
*C DECK2
```

3) Create a PL using a common deck, compile and execute:

```
JOB,JN=makepl3.
ACCOUNT,....                    <-- omit if using VAXcluster CSUBMIT
UPDATE,P=0.                     <-- no $PL (required to create)
SAVE,DN=$NPL,PDN=mypl.
CFT,I=$CPL.
SEGLDR,CMD='MAP,PART',GO.
/EOF
*CDK COM3
      common / mycom / a, b, c
      real a, b, c
*DK PROG3
      program prog3
*CALL COM3
      call sub
      print *, 'a,b,c=', a, b, c
      end
*DECK SUB
      subroutine sub
*CA COM3
      a = 1.
      b = 2.
      c = 3.
      return
      end
```

4) Update old source library to new, compile all decks and execute:

```
JOB,JN=job4.
ACCOUNT,....          <-- omit if using VAXcluster CSUBMIT
ACCESS,DN=$PL,PDN=mylib.
UPDATE,F,N.
SAVE,DN=$NPL,PDN=mylib.
CFT,I=$CPL.
SEGLDR,GO.
/EOF
*IDENT DS0620         <-- correction must be unique (initials,date)
*INSERT ALONE.57      <-- correct deck ALONE by insert after line 57
   <FORTRAN statements>
*DELETE FOUR.12,13    <-- correct deck FOUR replacing lines 12-13
   <new lines to replace deletions - optional>
/EOF
   <data lines, if any>
/EOF
```

5) Select routines from source subroutine library on MSS and compile with own program:

```
JOB,JN=job5.
ACCOUNT,....          <-- omit if using VAXcluster CSUBMIT
ACCESS,DN=MSPROC,OWN=PUBLIC.
LIBRARY,DN=MSPROC:*.
MSACCES,UN=un,MPW=mymsspw.
CFT77,ON=MSX.         <-- compile own programs with listing
MSFETCH,DN=LIBR,MDN=DTLIBPC,UN=NSYS.
UPDATE,P=LIBR,Q,L=0.
CFT77,I=$CPL.
SEGLDR,GO.            <-- load and execute
/EOF
    <own FORTRAN decks>
/EOF
*C rtn1,rtn6.rtn8     <-- select decks RTN1, 6, 7, 8 from library
/EOF
    <data records, if any>
/EOF
```

***** Object Libraries *****

BUILD is a utility for creating and maintaining libraries of absolute and relocatable object modules. These libraries can then be used by the loader to locate the program to execute or the subprograms to be loaded with your program.

The BUILD control statement is described in Appendix C.

*** BUILD Directives ***

A directive consists of a keyword and, perhaps, a comma-separated list of dataset or module names. The keyword is separated from its list by a blank. Directives cannot be continue. Multiple directives, separated by a semicolon or period, may appear in one line.

FROM dn1,dn2,...,dnn
: Single dataset for COPY, OMIT, LIST, or a list of datasets (copy dn1 thru dnn-1 to $NBL, dnn is the same as if specified alone. If no COPY, OMIT, dnn is also copied. dni can be a library or sequential dataset (like $BLD).

OMIT fn1,fn2,...,fnn
: List of modules to be excluded. Each fni may be a single name or a group name, i.e., with wildcards - (any 0 or more characters) or * (any single character).

COPY fn1,fn2,...,fnn
: List of modules to be copied. Each fni may be a single or group name, or a rename (ELM=OAK copies ELM and renames it OAK), or an inclusive range such as (first,last) or (first,) or (,last) or (,).

LIST
: Immediately list characteristics of modules in input dataset.

*** DTRC Object Libraries ***

Two object libraries have been added to COS at DTRC:

DTLIB,OWN=PUBLIC - Subprograms written or maintained by the Computer Center
To use: ACCESS,DN=DTLIB,OWN=PUBLIC.
SEGLDR directive: LIB=DTLIB

UTILITY,OWN=PUBLIC - Programs written or maintained by the Computer Center
To use: ACCESS,DN=UTILITY,OWN=PUBLIC.
LIBRARY,UTILITY:*.
program_name,....

*** Examples ***

1) Create a library of subprograms:

```
JOB,JN=JOB1.
ACCOUNT,....
CFT.
BUILD,I=0,OBL=0.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
   <Fortran source subprograms>
/EOF
```

2) Create a library of all subprograms from an UPDATE library:

```
JOB,JN=JOB2.
ACCOUNT,....
ACCESS,DN=$PL,PDN=MYPL.
UPDATE,F.
CFT,I=$CPL.
BUILD,I=0,OBL=0.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
```

3) Add a subprogram to an existing library and have the output list in alphabetical order.

```
JOB,JN=JOB3.
ACCOUNT,....
ACCESS,DN=$OBL,PDN=MYSUBLIB.
CFT.
BUILD,I=0,SORT.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
   <Fortran source subprograms>
/EOF
```

4) Delete subprogram BADSUB from an existing library and list the contents of both old and new libraries.

```
JOB,JN=JOB4.
ACCOUNT,....
ACCESS,DN=$OBL,PDN=MYSUBLIB.
BUILD,B=0.
SAVE,DN=$NBL,PDN=MYSUBLIB.
/EOF
OMIT BADSUB
LIST
```

5) List the contents of an existing library.

```
JOB,JN=JOB5.
ACCOUNT,....
ACCESS,DN=SUBLIB,PDN=MYSUBLIB.
BUILD.OBL=0,NBL=0,B=0.
/EOF
FROM SUBLIB; LIST.
```

***** Loader *****

The loader is responsible for loading all programs, resolving any external references, and optionally initiating execution. Loading can produce either a single absolute module, or a (segmented) absolute program in which different parts of a program reside in memory only when needed.

*** SEGLDR ***

The primary loader is SEGLDR. It is controlled by directives which may appear as the next file in the input stream, in a separate file, or in the loader control statement.

** Control Statement **

See Appendix C for a fuller description of the SEGLDR control statement.

```
SEGLDR,I=dirfile,L=listfile,DN=binfil,LIB=library,ABS=absolute,
       CMD='directives',GO.
```

"SEGLDR." implies SEGLDR,I=$IN,L=$OUT,DN=$BLD,ABS=$ABD.

** Message Levels **

SEGLDR issues messages at the following levels:

ERROR - immediately terminates SEGLDR with no executable output

WARNING - no executable output but processing continues

CAUTION - executable output but a possible error was found

NOTE - SEGLDR has been misused or used ineffectively; executable output is still valid

COMMENT - does not affect execution

** Directives **

Most SEGLDR directives have the format: keyword=value. Comments (anything following an asterisk (*)) may appear anywhere in the directives, including at the end of a directive line. Multiple comments on a line are separated by a semicolon (;). Elements of a list are comma-separated. Directives may be continued by splitting the line after a parameter (the comma is the last non-blank character in the line).

Naming files: ABS, BIN, DEFLIB, LIB, NODEFLIB.

Listing control: COMMENT, ECHO, MAP, TITLE, TRIAL.

Naming modules and common blocks: COMMONS, DUPORDER, DYNAMIC, FORCE, MODULES.

Error message control: DUPENTRY, DUPLOAD, MLEVEL, REDEF, USX.

Entry point and execution control: EQUIV, SET, XFER.

Global heap memory management: HEAP, LOWHEAP, STACK.

Memory allocation and presetting: ALIGN, ORG, PRESET.

Symbolic debugging: DRD, SYMBOLS.

Miscellaneous COS-dependent directives: ABORT, ABSNAME, BCINC, GRANT, NOECHO, NORED, PADINC, SECURE.

Miscellaneous global directives: CASE, CPUCHECK.

Additional information, including directives not discussed here, may be found in SR-0066 Segment Loader Reference Manual.

* comment A comment.

Examples:

```
TITLE=GLOBAL DIRECTIVES
*----------------------
* Global directives
*----------------------
BIN=ABC
TITLE=TREE DIRECTIVES
*--------------------
* Tree directives
*--------------------
TREE
  ROOT(A,B)
ENDTREE
TITLE=SEGMENTS
*-------------
SEGMENT=ROOT
* ROOT directives
```

ABORT=ON ¦ OFF
Control SEGLDR error termination.

Values: ON - abort if errors
OFF - terminate normally even if errors

Default: ABORT=ON

ABS=dn The dataset to contain the absolute module.

Default: $ABD

Examples: ABS=myprog

ALIGN=IGNORE ¦ MODULES ¦ NORMAL
Control the starting locations of modules and commmon blocks.

Values: IGNORE - start each module's local or common block at the word following the previous one (ignore align bit)

MODULES - start each module's local block and common block (if the align bit is set) at an instruction buffer boundary (32 words)

NORMAL - start each module's local or common block with the align bit set at an instruction buffer boundary (32 words)

Default: ALIGN=NORMAL

BIN=dn1,dn2,...
Datasets containing the relocatable modules to be loaded.

Default: BIN=$BLD

Examples: BIN=myfile,yourfile,
theirfyl
BIN=oldfile

CASE=UPPER ¦ MIXED
Control character conversion in directives.

Values: UPPER - convert to upper case
MIXED - do not convert

Default: CASE=UPPER

```
COMMONS=blk1:siz1,blk2:siz2,...
            Specify the order to load common blocks.

            Values:    blki - name of a common block

                       sizi - n - decimal size
                              0 - first occurrence of this block sets
                                  the size
                             (default: 0)

            Examples:  COMMONS=myblk:100000,data1
                                ^-- MYBLK is 100,000 words (no
                                    matter how it is defined); DATA1
                                    has its first encountered length


DEFLIB=deflib1,deflib2,...,deflibn
            Add libraries to SEGLDR's list of default libraries.

            Remarks:   If a specified library is already in the
                       default library list, it is moved to the end of
                       the list.

                       Libraries in DEFLIB are searched after the
                       default system libraries; those in LIB are
                       searched before.

            Examples:  DEFLIB=mylib
                                ^-- add MYLIB to the list
                       = = = = =
                       NODEFLIB; DEFLIB=mylib
                                ^-- the default library list
                                    consists of just one library


DRD         Load for debugging.  Symbol tables are written to $DEBUG
            (or SYMBOLS=dn).

            Default:   Normal load


DUPENTRY=ERROR ¦ WARNING ¦ CAUTION ¦ NOTE ¦ COMMENT ¦ IGNORE
            Specify the message level for a duplicate entry point.

            Default:   DUPENTRY=CAUTION


DYNAMIC=comblk
DYNAMIC=//
           Name a common block to be located after the largest segment
           or the heap (if required).  You control its size.  It is
           always available to the program and cannot be preloaded
           with data.

            Values:    a COMMON block name or // (blank common)
```

Default: no dynamic common blocks

Examples: DYNAMIC=ARRAYS
^-- common block /ARRAYS/ is dynamic

ECHO=ON ¦ OFF

Resume or suppress listing of input directives.

Default: ECHO=OFF

EQUIV=epname(syn1,syn2,...)

Substitute a call to one entry point for a call to another.

Values: epname - the entry point to be used in the substitution

syni - an entry point to be replaced by epname

Examples:
```
  ...
CALL A
  ...
CALL B
  ...

EQUIV=C(A,B)
          ^-- replaces the calls to A and B
              by calls to C
```

FORCE=ON ¦ OFF

Control the forced loading of modules whose entry points are never called.

Default: FORCE=OFF

HEAP=init+inc

(Tasking) Allocate memory for dynamic management.

Values: init - initial decimal number of words

inc - size, in decimal words, of increment when the heap overflows
0 - the heap size is fixed
(ignored if DYNAMIC directive is specified)

Examples: HEAP=10000+2000

```
LIB=lib1,lib2,...
            Libraries to be searched for routines not included in BIN=
            files or default libraries.

            Remarks:  Libraries in DEFLIB are searched after the
                      default system libraries; those in LIB are
                      searched before.

            Examples: ACCESS,DTLIB,OWN=NSYS.      <-- DTRC subroutine
                                                      library
                      ACCESS,sublib.              <-- your subroutine
                                                      library
                      SEGLDR,CMD='LIB=sublib,DTLIB',...


MAP=NONE ¦ STAT ¦ ALPHA ¦ ADDRESS ¦ PART ¦ EPXRF ¦ CBXRF ¦ FULL
            Control the map listing.

            Values:   NONE    - no map
                      STAT    - list load statistics: date/time,
                                longest branch length, last segment,
                                transfer entry point, stack and heap
                                information
                      ALPHA   - STAT + block map for each segment
                                (modules in alphabetical order)
                      ADDRESS - ALPHA but modules in address order
                      PART    - ALPHA + ADDRESS
                      EPXRF   - STAT + entry point cross reference
                      CBXRF   - STAT + common block cross reference
                      FULL    - PART + EPXRF + CBXRF

            Default:  MAP=NONE

            Examples: MAP=STAT
                      MAP=EPXRF,CBXRF


MLEVEL=ERROR ¦ WARNING ¦ CAUTION ¦ NOTE ¦ COMMENT
            Print messages down to and including the level specified
            (has no effect if L=0).

            Default:  MLEVEL=CAUTION

            Examples: MLEVEL=NOTE
                                ^-- print error, warning, caution,
                                    and note messages
```

```
MODULES=mod1:ds1,mod2:ds2,...
            The modules to be included and, optionally, the dataset
            containing a specific module.

            Values:    modi - name of module to be loaded

                       dsi  - optional dataset containing the module

            Examples:  MODULES=sub1:sublib,sub2,sub3:yourlib
                       MODULES=sub4,sub5
                                 ^-- get SUB1 from SUBLIB; SUB3 from
                                     YOURLIB; SUB2, SUB4, SUB5 from
                                     the first dataset containing them


NODEFLIB    Do not search the default libraries.  Search only BIN and
            LIB datasets.

            NOTE: Segmented loads must specify the file containing
                  routine $SEGRES.

            Examples:  NODEFLIB; LIB=sublib,DTLIB,$SCILIB


ORDER=MODULES,COMMONS ¦ COMMONS,MODULES ¦ XMP.EMA
            Load modules before or after commons.

            Values:    XMP.EMA - most efficient allocation on X-MP
                                 having more than 4 million words

            Defaults:  ORDER=MODULES,COMMONS (<=4 million words)
                       ORDER=XMP.EMA         (> 4 million words)


PRESET=ONES ¦ ZEROS ¦ INDEF ¦ -INDEF ¦ value
            Preset uninitialized data areas.

            Values:    ONES   - set to -1
                       ZEROS  - set to 0
                       INDEF  - set to octal 0605054000000000000000
                       -INDEF - set to octal 1605054000000000000000
                       value  - 16-bit value placed in each parcel
                                (0 < value < 177777 octal)

            Default:   PRESET=ZEROS
```

SET=epname:value

Set the value of an entry point.

Values: epname - the entry point name

value - the value it is to have (overrides the value found in the relocatables)

Examples:
```
SET=$RBUFLN:256
SET=$WBUFLN:256
          ^-- change the read or write buffer
              length to 256 characters (to
              change the read/write buffer
              area, use COMMONS=$RFDCOM:265 or
              COMMONS=$WFDCOM:265 (must be 9
              more than the buffer length)
```

STACK=init+inc

(Tasking) Allocate part of heap memory to a stack for reentrant programs.

Values: init - initial size, in decimal words, of a stack
<128 - default used

inc - size, in decimal words, of increments when the stack overflows
0 - stack overflow is not allowed

Default: Static variables unless Tasking or ALLOC=STACK.

Examples: STACK=5000+2000

SYMBOLS=ON ¦ OFF ¦ dn

Specify program symbol table handling.

Values: ON - write symbol table to $DEBUG

OFF - ignore symbol table

dn - write symbol table to dn (dn may not be ON or OFF)

Default: SYMBOLS=ON

TITLE=title
TITLE Define the second line of each page header. A page eject is forced.

Value: title - a string of 0-74 characters
(ends with end-of-line or semicolon)
omitted - clear the second header line

Examples: TITLE=This is a user title, really!

TRIAL Do not generate an executable module. Lets you get the load map, determine optimal memory usage for data, or get the total memory required.

Examples: TRIAL

USX=WARNING ¦ CAUTION ¦ IGNORE
Specify how to treat unsatisfied externals.

Values: WARNING - issue a warning message;
do NOT write executable output
CAUTION - issue a caution message;
write executable output
IGNORE - issue no message;
write executable output

Default: USX=CAUTION

XER=entry Specify the entry point at which the program is to start execution.

Values: entry - the starting entry point name

Remarks: Use this to specify the name of the main program to be executed if it is in a library.

Default: The first primary entry point encountered -- if none, "main" is used.

*** Segmentation ***

To make a large program fit into memory, it may be structured in segments, so that only a portion of the program resides in memory. By using the tree structure directives of SEGLDR, different arrangements of a program can be tried, without changing the program, until the best is achieved.

** Segmentation Directives **

Tree definition: TREE, tree_definition, ENDTREE.

Segment description: SEGMENT, BIN, COMMENT, COMMONS, DUP, ECHO, MODULES, SAVE, TITLE, ENDSEG.

Global: COPY, SAVE, SLT.

BIN=dn1,dn2,...

Datasets containing the relocatable modules to be loaded. Only the first file of each dataset is processed.

Default: BIN=$BLD

Examples:
```
SEGMENT=birch
  BIN=myfile,yourfile,
      theirfyl
  BIN=oldfile
ENDSEG
          ^-- all modules in datasets MYFILE,
              YOURFILE, THEIRFYL, and OLDFILE
              are loaded into segment BIRCH
```

COMMONS=blk1:siz1,blk2:siz2,...

Specify the order to load common blocks.

Values: blki - name of a common block

sizi - n - decimal size
0 - first occurrence of this block sets the size
(default: 0)

Examples:
```
COMMONS=myblk:100000,data1
          ^-- MYBLK is allocated 100,000 words
              (no matter how it is defined);
              DATA1 has its first encountered
              length
```

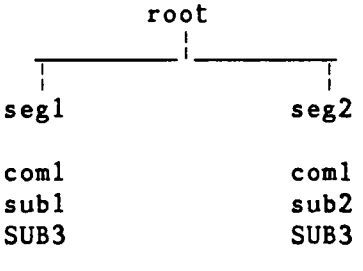
COPY Force the program to execute from a scratch file. This may speed program execution, especially of programs with segments which are loaded many times, because a faster form of I/O is used. SAVE=ON also forces the use of a scratch file.

Default: a scratch file is not used

DUP=mod(seg1,seg2,...)
Specify that a module is to be loaded into several segments. DUP must appear before the definitions of the segments into which the module is to be placed.

An alternate way is to list the module in the MODULES or COMMONS directive of each segment.

Examples:
```
DUP=sub3(seg1,seg2)
SEGMENT=seg1
  MODULES=sub1
  COMMONS=com1
ENDSEG
SEGMENT=seg2
  MODULES=sub2
  COMMONS=com1
ENDSEG
```



ENDSEG End the definition of a segment of a tree structure.

Examples: see SEGMENT

ENDTREE End the definition of a tree structure.

Examples: see TREE

MODULES=mod1,mod2,...
(segment) List the modules to be put into the segment.

Values: modi - module name and optional dataset from which it is to be loaded (mod:ds)

Examples: MODULES=m:binm,n,o
^-- load module M from dataset BINM and modules N and O from the first dataset which contains them

SAVE=ON ¦ OFF

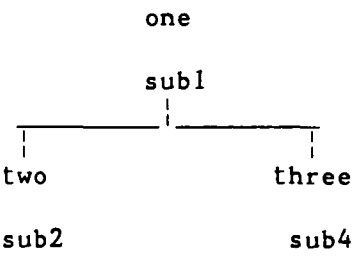
(Global) Specify whether all segments are to be saved (written to disk) before being overlaid. SAVE in a segment overrides the global SAVE.

Values: OFF - do not save each segment
ON - save each segment

Default: SAVE=OFF

Examples:

```
SAVE=ON
TREE
  one(two,three)
ENDTREE
SEGMENT=one
  MODULES=sub1
SEGMENT=two
  MODULES=sub2,sub3
SEGMENT=three
  SAVE=OFF
  MODULES=sub4
ENDSEG
```



SEGMENT=segname

Begin the description of the contents of one segment of a tree.

Examples:

```
SEGMENT=oak
  MODULES=k,l,m
  COMMONS=//,oakcom
ENDSEG
```

TREE

End the global directives and start the definition of a tree structure.

Examples:

```
TREE
  tree structure
ENDTREE
```

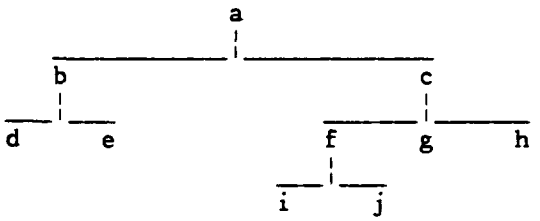
tree segment structure

Define the tree structure, that is, the segments in each branch of the tree. The order of these definitions is unimportant.

Syntax: segname(seg1,seg2,...)

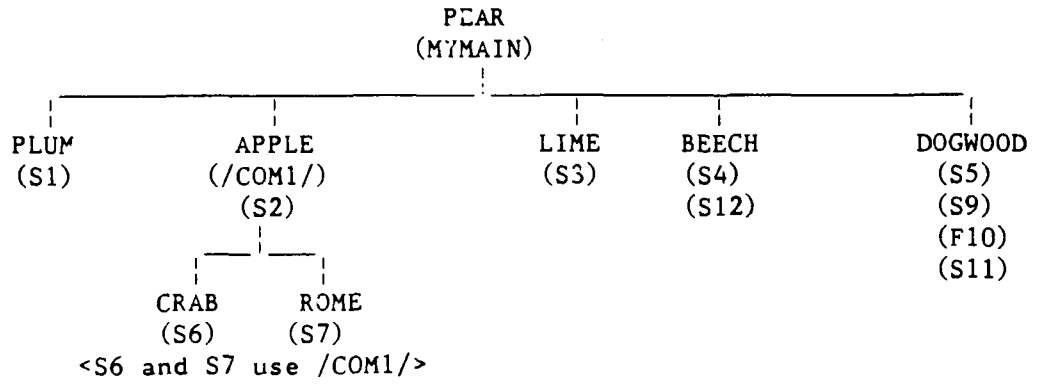
Examples:

```
TREE
  a(b,c)
  b(d,e)
  c(f,g,h)
  f(i,j)
ENDTREE
```



** Sample Tree Diagram **

A block data subprogram defines common /COM1/ which is to be loaded with program S2. /COM1/ is also referred to by S6 and S7.




```
TREE
  pear(plum, apple,lime,beech,dogwood)
  apple(crab,rome)
ENDTREE
SEGMENT=pear
  MODULES=mymain
SEGMENT=plum
  MODULES=s1
SEGMENT=apple
  MODULES=s2
  COMMONS=com1
SEGMENT=line
  MODULES=s3
SEGMENT=beech
  MODULES=s4,s12
SEGMENT=dogwood
  MODULES=s5,s9,f10,s11
SEGMENT=crab
  MODULES=s6
SEGMENT=rome
  MODULES=s7
ENDSEG
```

** Segmentation Cautions **

1. To develop a segmented job, several runs may be required, so relocatable object code should be SAVEd. Common blocks and some system routines may need to be included in lower segments to operate properly.

2. The load map should be checked carefully for any duplicate common block entries. The same common block may appear in more than one segment, each being considered a different common block. References are to the common block in the segment, if none, then to the one on the same branch. If a given common block is to appear only once in a program (the normal case), then it should be placed in the segment nearest to the root segment which can be referenced by all segments which use it.

*** Compile, Load and Save an Absolute Program ***

** Simple Load **

```
JOB,JN=jobname,....
ACCOUNT,....
CFT.
SEGLDR,CMD='ABS=myprog'.
SAVE,DN=myprog,PAM=R.          <-- read only
/EOF
      PROGRAM MYPROG (...
         ...
/EOF
```

** Segmented LOAD **

```
JOB,JN=jobname,....
ACCOUNT,....
CFT.
SAVE,DN=$BLD,PDN=myprogob.        <-- save relocatable modules for
                                      possible re-segmentation
SEGLDR.
SAVE,DN=myprog,PAM=R.             <-- read only
/EOF
   (CFT source program)
/EOF
ABS=myprog
TREE
  ...
ENDTREE
SEGMENT=...
  ...
ENDSEG
SEGMENT=...
  ...
ENDSEG
  ...
/EOF
```

***** The Mass Storage System *****

The Mass Storage System (MSS) is a large capacity on-line mass storage device. It is a cost effective extension to the Cray, CDC and VAXcluster disk systems and conventional magnetic tape storage. Specifically, the MSS, which is part of the CDC CYBER 860 (NOS), offers:

- More than 20 times the on-line storage of the VAXcluster system; more than 40 times the on-line storage of the CRAY X-MP.
- On-line access to files which previously had to be stored on magnetic tape because of size restrictions and/or infrequent use.
- Reduced storage charges for these on-line files.

*** MSS Security ***

To provide adequate security for MSS users, you must submit your MSS (CYBER 860) password in any non-CDC (NOS) job or interactive session which will manipulate MSS files. To protect your MSS files, you must change this password at least every 90 days using the PASSWOR command on the CDC CYBER 860 (NOS), the HFT PASSWORD command on the VAXcluster, the MSPASSW command on the CRAY X-MP or the CDC 860 (NOS/VE).

*** MSS File Purge ***

MSS files may be purged by the Computer Center if the job order number is invalid or has been cancelled.

To recover purged files, call User Services, Code 3511, (301) 227-1907. A fee will be charged for this service. After the files have been restored, you must change to your valid job order number:

on 860 (NOS):	CHANGE,mfn/CP or BEGIN,NEWCHRG
on 860 (NOS/VE):	MSCHANG mfn CP=1
on Cray (COS):	see page 4-1-4 (MSCHANG)
on VAXcluster:	see page 4-1-8 (MSSNEWCHRG)

*** MSS Backup for Critical Files ***

In addition to normal file backup, critical direct files may be backed up and stored off-station. These files are available in the event of a catastrophe (such as fire) at the Carderock Computer Center.

For a file to be designated as "critical", it must have the attribute Backup Requirement (BR) set to critical (CR). This is done by specifying "BR=CR" if the file is critical, or "BR=Y" if it is not, when the file is made permanent. The default is BR=Y meaning on-station backup. For example (on NOS):

```
DEFINE,lfn=mfn/BR=CR.    <-- store a critical file
CHANGE,mfn/BR=CR.        <-- make a file critical
CHANGE,mfn/BR=Y.         <-- make a file non-critical
```

Files designated for this off-station backup service will be charged a higher rate.

*** Using the MSS from the Cray ***

A description of the syntax of these commands may be found in Appendix C.

ACQUIRE Transfer a file from the MSS as a local dataset and make it permanent on the Cray.

Examples:
```
ACQUIRE,DN=SOURCE,SDN=MYFILE,PDN=MYFILE,MF=N1,^
        TEXT='USER,user,pw.ATTACH,MYFILE.CTASK.'.
               ^-- transfer your direct MSS file
                   MYFILE as local dataset SOURCE
                   and make it a permanent dataset
                   named MYFILE

ACQUIRE,DN=DATA46,PDN=DATA46,MF=N1,^
        TEXT='USER,user,pw.'^
        'ATTACH,DATA46/UN=ABCD,PW=filepw.CTASK.'.
               ^-- transfer user ABCD's MSS file
                   DATA46 (assuming you have
                   permission to read the file) as
                   local dataset DATA and make it
                   a permanent dataset named DATA46
```

DISPOSE Transfer a Cray local dataset to the MSS.

Examples:
```
DISPOSE,DN=FT13,MF=N1,SDN=MYOUT13,DC=ST,^
        TEXT='USER,user,pw.'^
             'PURGE,MYOUT13/NA.'^
             'DEFINE,MYOUT13.'^
             'CTASK.'.
               ^-- local dataset FT13 is
                   transferred to the MSS where it
                   will be known as MYOUT13
```

FETCH Transfer a file from the MSS as a local dataset. It is released at the end of the job.

Examples:
```
FETCH,DN=SOURCE,SDN=MYFILE,MF=N1,^
      TEXT='USER,user,pw.ATTACH,MYFILE.CTASK.'.
               ^-- transfer your MSS file MYFILE as
                   local dataset SOURCE

FETCH,DN=ABDATA,MF=N1,TEXT='USER,user,pw.'^
      'ATTACH,ABDATA/UN=ABCD,PW=filepw.CTASK.'.
               ^-- transfer user ABCD's MSS file
                   ABDATA as local dataset ABDATA

FETCH,DN=SOURCE,SDN=MYFILE,MF=N1,^
      TEXT='USER,user,pw.GET,MYINDF.CTASK.'.
               ^-- transfer your CYBER 860 indirect
                   file MYFILE as local dataset
                   SOURCE
```

The following procedures provide access to the Mass Storage System. They have been made part of COS at DTRC.

MSACCES Supply your Username and password to the MSS. MSACCES is required before you can use the MSx commands.

```
Example:   MSACCES,US=myid,MPW=mymsspw.
```

MSAUDIT Sorted audit of Mass Storage files.

```
Examples:  MSAUDIT.          <-- short audit of your MSS files

           MSAUDIT,LO=X,SHOWPW=1.
                        ^-- full audit showing each file's
                            password, if any

           MSAUDIT,L=audout,LO=X,UN=otheruser.
                        ^-- full audit of another user's
                            files you are allowed to see
                            with output in local dataset
                            AUDOUT
```

MSCHANG Change Mass Storage System file attributes.

```
Examples: MSCHANG,MDN=myfile,CT=PUBLIC.
                        ^-- make your MSS file MYFILE
                            public

          MSCHANG,MDN=oldname,NMDN=newname.

          MSCHANG,MDN=myfile,CP=1.
                        ^-- change the account number of
                            file MYFILE to your current
                            MSS charge number
```

MSFETCH Fetch a direct file from the MSS.

```
Examples:  MSFETCH,DN=infyl,MDN=mydata.
                        ^-- your file in transparent mode

           MSFETCH,DN=prog,MDN=othrpgm,UN=ABCD,PW=pgmpw.
                        ^-- another user's file
```

MSPASSW Change Mass Storage System access password.

```
Example:   MSPASSW,OLD=oldpw,NEW=newpw.
```

MSPURGE Purge an MSS file.

```
Example:   MSPURGE,DN=myfyle.
```

MSSTORE Store a file on the MSS as a direct file.

```
Examples:  MSSTORE,DN=out1,MDN=outfyl1,NA=1.
                              ^-- overwrite if file already exists

           MSSTORE,DN=fyl2,MDN=file2,DF=CB.
                              ^-- file is stored in CDC Display
                                  Code
```

*** Using the MSS from the VAXcluster ***

A description of the syntax of these commands may be found by typing "HELP <command>" on the VAXcluster.

HFT HYPERchannel (direct) File Transfer.

Examples:

```
HFT ACCESS /U=ABCD /A=1222233344 /P=MSS_password
                ^-- gain access to the MSS

HFT CHANGE "MYFILE/AC=newac,CT=PU"
                ^-- change account number of MSS
                    file MYFILE and make it public

HFT DEFAULT
                ^-- display your current ACCESS
                    values

HFT DELETE MYFILE
                ^-- delete MSS file MYFILE

HFT DIRECTORY
                ^-- audit your MSS file names

HFT DIRECTORY "LO=F"
                ^-- full audit of your MSS files

HFT FETCH MYPROG MYPROG.FOR
                ^-- fetch your MSS file MYPROG and
                    make it permanent file
                    MYPROG.FOR

HFT PASSWORD
old password
new password
new password repeated
                ^-- change your MSS password

HFT PERMIT "MYFILE/UN=xxxx,M=R"
                ^-- give read access to user xxxx

HFT STORE MYPROG.FOR "MYPROG/CT=S"
HFT STORE MYPROG.FOR "MYPROG/CT=S" /DELETE
                ^-- store your file MYPROG.FOR on the
                    MSS as MYPROG (/DELETE will
                    delete your VAXcluster permanent
                    file)
```

MSSAUDIT Audit your MSS files in a variety of formats.

```
        Examples:  MSSAUDIT  S     <-- get a sorted short audit of
                                       your MSS files at the terminal

                   MSSAUDIT  F  MSSAUDIT.LIS
                                ^-- put a sorted full audit of your
                                    MSS files into file MSSAUDIT.LIS

                   MSSAUDIT  0  UN=xxxx      (0 = zero)
                                ^-- display a sorted list of the MSS
                                    files owned by user xxxx
                                    (assuming you have permission to
                                    see them)
```

MSSBACKUP Store several files in a single file on the MSS, retaining each file's characteristics. Fetch individual files from the MSS file previously stored by MSSBACKUP.

```
        Examples:  MSSBACKUP  STORE  *.*  VMS0322
                                ^-- store all your files in a BACKUP
                                    file on the MSS
                                    (0322 is the date)

                   MSSBACKUP  LIST  VMS0322  KEEP
                                ^-- list the contents of the above
                                    BACKUP file on MSS at your
                                    terminal, keeping the .MSSBCK
                                    file for later FETCHes today

                   MSSBACKUP  FETCH  VMS0322  RD*
                                ^-- fetch the files beginning with
                                    RD (do not replace any existing
                                    versions)

                   MSSB  DELETE  VMS0322
                                ^-- Delete the BACKUP file from MSS
```

MSSDELETE Delete several MSS files.

```
        Examples:  MSSDELETE MYFILE
                                ^-- same as HFT DELETE "MYFILE"

                   MSSD F1,F2,F3,F4,F5
                                ^-- delete 5 MSS files
```

MSSNEWCHRG

Change the account number on your MSS files.

Examples: MSSNEWCHRG 1222233344 1234567890
^-- change job order number for
all files currently stored with
account number 1-2222-333-44 to
1-2345-678-90

*** Using the MSS from the CDC CYBER 860 ***

The MSS is just a peripheral on the CDC CYBER 860 and is under the control of NOS. All NOS files on the CYBER 860, whether they reside on disk or the MSS, are accessed by the standard NOS permanent file commands.

NOS/VE does not have direct access to the MSS. The following commands provide access to the Mass Storage System. A description of their syntax may be found in Appendix H.

CHANGE_LINK_ATTRIBUTES (chala)
Change individual link attributes for communication between dual-state partners.

```
Examples:  chala pw=mymsspw
                          ^-- required to access the MSS
                              (see also MSACCES)
```

DISPLAY_LINK_ATTRIBUTES (disla)
Display individual link attribute values.

```
Examples:  disla
           CHARGE  :
           FAMILY  : nlfam
           PROJECT :
           USER    : AMDS
```

GET_FILE (getf)
Copy a NOS file to NOS/VE.

```
Examples:  getf  my_file  myfile
                          ^-- Get MSS file MYFILE and store
                              as NOS/VE file MY_FILE
```

REPLACE_FILE (repf)
Copy a NOS/VE file to NOS direct file, replacing any existing file.

```
Examples:  repf  my_file  myfile
                          ^-- copies NOS/VE file MY_FILE to
                              MSS as MYFILE, replacing any
                              existing MSS/NOS file with the
                              same name
```

```
MSACCES  Access the Mass Storage System.

         Examples:    MSACCES  mymsspw


MSAUDIT  Obtain a sorted audit of your MSS files.

         Examples:  MSAUDIT          <-- short audit of your MSS files

                    MSAUDIT,LO=F,SW=Y
                                    ^-- full audit showing each file's
                                        password, if any

                    MSAUDIT  audout  s  UN=other
                                    ^-- short audit of another user's
                                        files you are allowed to see
                                        with output in file AUDOUT in

                    MSAUDIT  F='V******'
                                    ^-- all files starting with "V"
                                        your current catalog


MSCATLIST  The NOS CATLIST command.


MSCHANG  Change the attributes of a Mass Storage System file.

         Examples:  MSCHANG  myfile  CT=PU
                                    ^-- make MYFILE a public file

                    MSCHANG,myfile,CP=1
                                    ^-- change the account number

                    MSCHANG  myfile  NFN=newfile  M=E
                                    ^-- change the name of the file and
                                        make it execute-only


MSFETCH  Fetch a file from the Mass Storage System.

         Examples:  MSFETCH,mssfyl1,in1
                                    ^-- MSSFYL1 is retrieved and stored
                                        as file IN1 in your current
                                        catalog
                    MSFETCH  mssfyl2  in2  D64
                                    ^-- MSSFYL2 is retrieved, converted
                                        from 64-character NOS Display
                                        Code and stored as file IN2 in
                                        your current catalog
```

MSPASSW Change your Mass Storage System access password.

```
Examples:  MSPASSW,OLD=mymsspw,NEW=numsspw
             -or-
           MSPASSW  mymsspw  numsspw
             -or-
           MSPASSW  N=numsspw  O=mymsspw
                          ^-- the above are the same
```

MSPURGE Purge a file on the Mass Storatge System.

```
Examples:  MSPURGE  F=mymss1
                          ^-- purge MSS file MYMSS1

           MSPURGE  (f1,f2,f3,f4,f5)
                          ^-- purge MSS files F1, F2, F3, F4,
                              and F5
```

MSSTORE Store a file on the Mass Storage System.

```
Examples:  MSSTORE,in1,mssfyl1
                          ^-- IN1 is stored as private, direct
                              file MSSFYL1
           MSSTORE  in2  mssfyl2  D64  PW=fylepw
                          ^-- IN2 is stored as private file
                              MSSFYL2 (even if MSSFYL2 already
                              exists) in CDC Display Code --
                              FYLEPW is the password required
                              for another user to access the
                              file -- if MSSFYL2 does not
                              exist, this will be a direct file

           MSSTORE  in3  mssfyl3  A6   I  PU
                          ^-- IN3 is stored as public, indirect
                              file MSSFYL3 in 64-character
                              Display Code
```

***** DEC VAXcluster -- VMS *****

The Digital Equipment Corporation (DEC) VAXcluster has two 8550 central processing units (CPUs) or nodes, each with 48 megabytes of memory, which share files and are linked together. Access is via DTNET. A separate VAX 6410 for secure processing is located at Carderock and is accessed in the secure computer room.

*** VMS Version 5.3 ***

The operating system for the DEC VAXcluster and the VAX 6410 at DTRC is called VMS, version 5.3-1.

Permanent files (user programs and data files retained for frequent use) reside on disk drives and the Mass Storage System. User files, if not specifically requested on a tape, will be assigned to available disk areas.

*** Accessing the VAXcluster ***

To access the VAXcluster, set your terminal to 8-bit, no parity, then:

- dial (301) 227-5200 <-- this will connect you with DTNET at 1200 baud (see page 1-1-4 for higher speeds)
- after the phone call completes, or if you are hardwired into DTNET, press the RETURN key until it displays the DTNET> prompt
- enter "connect dt4" (or "c dt4") to connect to DT4 (similarly for DT3)
- in response to the Username: prompt, enter your User Initials
- in response to the Password: prompt, enter your login password (the default VAX prompt is $)

*** Login Password ***

Your initial login password is your username, usually your user initials. This is entered in response to

Password:

the first time you log in. This password MUST be changed during your first session.

To change your login password, type

SET PASSWORD

You will be prompted for the current password, the new password, and the new password again (to insure there were no transmission problems).

Your password should be changed frequently, and must be changed at least every 90 days.

*** Logout Procedures ***

To terminate your session, get rid of any unwanted permanent files (remember that new versions of a file may be made frequently during the session with up to five retained and costing you money). You may also want to get rid of any journal files made by EDT (.JOU) or EVE (.TJL).

When this is done, or immediately, if the Central Site operator requests it, type LOGOUT. A time and usage summary of the session and a cost estimate will be displayed.

You will be returned to your DTNET session. To leave, type "L". This will disconnect the phone, if you have dialed in.

Note

> If you do not type anything for about 13 minutes, you will be logged off VMS automatically. You are given a 5-minute warning.

*** System News ***

At login, a system bulletin may be displayed. For more details, type NEWS. To see earlier news items, type OLDNews. To see ancient news items, type VERYoldnews.

*** Login Procedure File ***

A Login Procedure File is a file in your home directory with the name LOGIN.COM. It contains commands to be executed each time you log in before you are given the $ prompt. Commands and qualifiers should be spelled in full to allow for possible future changes in the operating system.

Any command may be in LOGIN.COM. You may want to see who is logged in ($ SHOW USERS /FULL), or look at your home directory files ($ DIRECTORY) or all your files ($ DIRECTORY [...]), or define one or more of your HELP libraries ($ ASSIGN UOn:[myid]mylib HLP$LIBRARY_5). You should also define your home directory with a logical name (such as your first name, but NOT your username) using ($ DEFINE myname UOn:[xxxx]). Then, you need only type myname: to refer to your home directory, which you may need to do frequently. For suggestions of other commands, symbols and logical names you might include, type "HELP LOGIN.COM_Hints".

*** Files ***

1. Because VMS at DTRC automatically deletes the low version number when more than 5 versions of a file are created, you should not use different versions of a file for different purposes. Instead use the file type field.

2. To reduce your file space and, therefore, your costs, you may wish to do a "PURGE [xxxx...]" every now and then to remove all low versions (or "PURGE [xxxx...] /KEEP=2" to keep the highest two versions.

3. When editing with EDT or EVE, a journal file is created of all your editing commands for use in re-editing your file if your editing session is aborted (^Y or a line disconnect). (If your editing session ends normally (EXIT or QUIT), the journal file is deleted.) You should check periodically for any journal files and delete them if they are no longer needed. Use the command "DIRectory /DATE [...]*.JOU,*.TJL" to see them.

*** Batch Jobs ***

A batch job is a procedure which is submitted by the SUBMIT command. By default, the job will be executed on either DT3 or DT4. If your job must run on a specific node, use the /QUEUE=DTn_BATCH qualifier (n is the desired node number). See page 1-3-1 ff for a table of the nodes on which specific software is available.

** Killing Batch Jobs **

When a job is SUBMITted, a message is displayed giving the "entry number". When the job goes into execution, it has a "process ID". To find out these numbers, use

```
$ SHOW QUEUE *BATCH      <-- all VAXcluster batch queues
$ SHOW SYSTEM            <-- process ID and entry number on current
                             node (if the job is in execution)
```

To delete a job which has not gone into execution:

```
$ DELETE  SYS$BATCH  /ENTRY=entry
```

To delete an executing job:

```
$ DELETE  node_BATCH  /ENTRY=entry     <-- any node
   -or-
$ STOP    /ID=pid                      <-- current node -- pid is
                                           last 4 digits of process
                                           ID (leading zeros may be
                                           omitted)
```

*** Accessing Other Networks ***

DTRC also has access to the following networks:

DDN - the Defense Data Network (with connection to INTERNET)
(host tables allow transfer to some other networks)

OASYS - the DTRC Office Automation System

The following can be reached from our DECnet using SET HOST:

NAVSEA node names: SEAHUB, SEAA, SEAB, SEAC, SEAD, SEAE

** Checking Host Accessibility **

Host accessibility may be verified on the VAX using the FINDHOST command. FINDHOST will search a downloaded version of the name server host tables. You may enter the address, the host name, or any portion of either the host name or address. A listing will be given of all entries that meet the specified search. The search string will be highlighted in the resulting list.

$FINDHost <string>

-or-

$FH <string>

If the requested string is not matched, you will get a message that there were no matches. Call User Services for more information.

** Transferring VMS Files To and From OASYS **

While logged into DTn:

```
ftp dtrc.dt.navy.mil    <-- File Transfer Protocol to OASYS
   -or-                     (dtrc) via Ethernet
ftp dtrc
login                   <-- to log into OASYS
<user name>             <-- your OASYS user name
<password>              <-- your OASYS password

get                     <-- get a file from OASYS
<OASYS filename>
<VMS filename>

put                     <-- send a file to OASYS
<VMS filename>
<OASYS filename>

bye                     <-- leave ftp
```

** Transferring VMS Files To and From CDC CYBER 860 **

While logged into DTn:

```
ftp cdc860              <-- connect to CDC CYBER 860 / MSS
<CR>                    <-- your name
<password>              <-- your MSS password
<account number>        <-- if requested

get                     <-- get a file from MSS
<MSS filename>
<VMS filename>

put                     <-- send a file to MSS
<VMS filename>              e.g., to make a public indirect
<MSS filename>              file:
                               put myfile.dat 'myfile/ia,ct=pu'

bye                     <-- leave ftp
```

See also page 5-1-8.

** Mail to Users at Other Sites **

Mail may be sent to users at other sites which are accessible via DDN. This is one way to transfer large (or small) text files. Use FTP, Kermit, or some other protocol for binary files.

While logged into VMS:

```
$ mail
MAIL> send
To: wins%"<user@hostname>"   <-- where some typical hostnames
...                              are: dtrc.dt.navy.mil,
                                 dtoal.dt.navy.mil,
                                 icst-is.arpa, gwuvax.gwu.edu)
```

For example, to send a message to "sommer" on dtrc (OASYS B system) from node DT4:

```
$ mail
MAIL> send
To: wins%"sommer@dtrc"       <-- the brackets are optional
...
```

Mail is sent via the VMS mail utility and the Simple Mail Transfer Protocol (SMTP). The "To:" address has one of the following forms:

Destination	Address Syntax	Utility
same VAX	user	local VMS mail
same network	node::user	DECnet
another VAX	wins%"<user@host>"	SMTP
remote host	wins%"<user@host>"	SMTP
remote host routed through other hosts on your network	wins%"<@host,@host:user@host>"	SMTP
remote host on another network routed through a gateway	wins%"<@host,@gateway:user@host>"	SMTP

Note that local VMS and DECnet mail is sent immediately; SMTP mail is sent every 20 minutes.

** Mail From Users at Other Sites **

The following are the Ethernet addresses for CCF computers as of the date of this page. Type "HELP @CCF Network_addr" on the VAX for an up-to-date list.

	computer		address	
	oasys		130.46.1.53	
	dtoa1		130.46.1.2	
	dtrc		130.46.1.3	
	dtoa3		130.46.1.4	
	dtix		130.46.1.5	
	nems		130.46.1.6	
	dt70		130.46.1.7	
	dt18		130.46.1.8	
	dtvms3		130.46.1.12	(DT3)
	dtvms	dtvms4	130.46.1.10	(DT4)
*	cdc860	nos	130.46.1.16	
*, **	sn417		192.91.138.5	(Cray UNICOS)

To access these via DDN add ".dt.navy.mil", e.g., dtvms.dt.navy.mil. Thus, the address for mail to be sent to user ABCD on the VAXcluster via DDN is "abcd@dtvms.dt.navy.mil".

---

* - No mail. This is listed to show the network address.

** - Available only when UNICOS is up.

***** Help Libraries *****

A help library (file type .HLB) contains help modules, that is, modules that provide information about a program, subprogram, procedure, or some general help information such as hints on how to do something. It is created and accessed using the following DCL commands:

LIBRARY	Create, maintain, list, and extract modules from a help library.
HELP	Display the desired helps.

*** The System Help Library ***

The system help library is read using the DCL command HELP. It provides help about the HELP program and lists many topics (VMS features, DCL commands, Hints, and other general information).

*** DTRC Help Libraries ***

Four help libraries have been added to VMS at DTRC:

- CCF - General information about the Computer Center
- CRAY - Routines added to Cray at DTRC
- DTLIB - Subprograms in library DTLIB (Cray, CDC NOS, VMS)
- UTILITIES - Utility programs and procedures

When executing the HELP command, the additional help libraries are accessed by entering '@name', where 'name' is one of the help libraries listed above (e.g., @DTLIB) in response to 'Topic?'. For a table of contents of any of the above libraries, type

```
HELP @name Contents
```

*** User Help Module ***

A help module (default file type .HLP) is a file containing all the help information for one or more programs, procedures, etc. Column 1 of each line identifies the different sections of the help module. A digit indicates a keyword; a slash (/) indicates a qualifier; anything else is part of the help text. For example,

```
1 key-1                     <-- HELP topic
   ...
 help message text
   ...
2 key-2                     <-- HELP sub-topic
   ...
 help message text
   ...
n key-n
   ...
 help message text
   ...
1 key-1                     <-- next HELP topic
```

A "1" line gives the topic name (up to 15 characters, avoid using blanks; replace blanks with an underscore (_)). A "2" line is a sub-topic of the "1"-level topic; a "3" line is a sub-topic of the most recent "2"-level sub-topic; etc. Qualifiers (/ in column 1) will be listed separately by HELP and will all be displayed if the (sub)topic they qualify is selected.

A help module might look something like:

```
1 topic
 <description of topic>
2 Qualifiers
 <optional description of qualifiers>
/topic_qualifier_1
 <description of topic_qualifier_1>
/topic_qualifier_2
 <description of topic_qualifier_2>
/topic_qualifier_3
 <description of topic_qualifier_3>
2 sub-topic_1
 <description of sub-topic>
3 sub-topic_of_sub-topic_1
 <description of sub-sub-topic>
3 Qualifiers_of_sub-topic_1
 <optional description of qualifiers>
/sub-topic_1_qualifier_1
 <description of qualifier_1 of sub_topic 1>
/sub-topic_1_qualifier_2
 <description of qualifier_2 of sub_topic 1>
...
```

*** Hints For Designing Help Displays ***

While help messages can continue without interruption, you may wish to format the messages to fit the screen display. A topic ("1" in column 1) will have 17 lines in the first display; a sub-topic ("2" in column 1) will have 15 lines; a sub-sub-topic ("3" in column 1) will have 13 lines; etc. For all levels, the second and following displays have 20 lines. Level 1 lines should not exceed 78 columns; level 2 lines should not exceed 76 columns; level 3 lines, 74 columns; etc. Longer lines may "wrap around".

Every help library should have a module called "HELP" to describe the help library.

You may wish to have a table of contents module (suggested name "Contents") to list the routine names and give a short description of what each routine does.

If possible, the first help screen for a program, subprogram or procedure should contain all that is needed to use it. Definitions of parameters and qualifiers should be put into sub-topics.

*** Selecting (Sub)topic Names ***

While you may choose anything you want for topic and sub-topic names, we recommend the following conventions:

- use upper case for routine names, parameters, and qualifiers (e.g., AUXPRINT, /CC, /HEADER, JGDATE, FLR below)
- use lower case (first letter upper case) for general information (e.g., Parameters, Qualifiers, Examples, Admin_info below)
- replace blanks with underscores (_) so that the name will be listed as a single element by HELP (e.g., Admin_info below)

*** Create a Help Library ***

The LIBRARY command is used to create a help library.

```
LIBRARY /HELP /CREATE  help_library_name

        -or-

LIBRARY /HELP /CREATE=(option,...)  help_library_name
```

where help_library_name is the name of the library to be created. It will have the default filename help_library_name.HLB.

The following options may be specified:

BLOCKS:n The number of 512-word blocks to be allocated. (default: 100)

HISTORY:n The maximum number of library update history records to be maintained. (default: 20)

KEYSIZE:n The maximum length of module names. (default: 15)

MODULES:n The maximum number of modules the library can hold. (default: 256)

*** Modify a Help Library ***

The LIBRARY command is used to insert, and delete help library modules. Wildcards are allowed in module names.

```
LIBRARY /HELP /INSERT   help_library_name  help_module_name

LIBRARY /HELP /REPLACE  help_library_name  help_module_name

LIBRARY /HELP /DELETE=(module[,...])  help_library_name
```

'LIBRARY /HELP help_library_name help_module_name' is the same as if '/REPLACE' were specified. If '/LOG' is specified, a messages will be displayed for each operation done. (E.g., LIBR /HELP /LOG ...)

*** Compress a Help Library ***

After several inserts, deletes or replaces, there may be a lot of "dead space" in the library. To remove this, that is, to compress the library, use:

```
LIBRARY /HELP /COMPRESS  help_library_name

        -or-

LIBRARY /HELP /COMPRESS=(option,...)  help_library_name
```

/LOG will list the modules as they are copied into the compressed library.

The options available are the same as for /CREATE.

*** List the Contents of a Help Library ***

The LIBRARY command also lists the contents of a help library. The /LIST qualifier, which may be specified alone or with any of the above operations, will provide information about the library including a list of the modules in the library. If /FULL is also specified, the list of modules will include the date and time it was inserted into the library. If /HISTORY is specified, it will show who did what to the library and when. The number of history records retained is defined when the library was created or compressed.

For a list of the library without other operations, use

```
LIBRARY /HELP /LIST                    -or-
LIBRARY /HELP /LIST /FULL              -or-
LIBRARY /HELP /LIST /FULL /HISTORY
```

The list will be displayed on SYS$OUTPUT. To put the listing into a file, use /LIST=filespec.

To list information about specific modules, use /MODULE=(list) where <list> is a comma-separated list of module names with wildcards allowed. The default is /MODULE=*.

To list information about modules inserted after a certain time, use /SINCE (for those inserted today) or /SINCE=date_and_time (for those inserted after a specific date and/or time (e.g., /SINCE=09:00 for those after 9 AM today).

*** Extract a Help Module ***

To extract a help module to make some modifications to it, use

```
LIBRARY /HELP /EXTRACT=(module[,...])
              /OUTPUT=file-spec
              help_library_name
```

If /OUTPUT is specified, the modules are put into file <file-spec>. If /OUTPUT is omitted, they are put into file help_library_name.HLP.

Wildcards are allowed in module names.

*** Accessing your Help Library ***

To access you help library, use

```
HELP /LIBRARY=filespec  [ topic  [ sub-topic ]  ]
```

where <filespec> must be complete (e.g., U09:[abcd]mylib), not just the filename.

*** Adding Your Help Library to the System Helps ***

The DCL HELP command supports many user libraries in addition to the system library. User libraries are added by assigning help library names to HLP$LIBRARY_n, where n is omitted or a digit. HLP$LIBRARY through HLP$LIBRARY_4 are already defined at LOGIN. You may add your own help libraries starting with HLP$LIBRARY_5. For example, you may wish to put

```
$ DEFINE  /NOLOG  HLP$LIBRARY_5  UOn:[myid]mylib1
$ DEFINE  /NOLOG  HLP$LIBRARY_6  UOn:[myid]mylib2
```

into your LOGIN.COM file so that your help library will always be part of the system HELP command for you. The first missing number (in this case "7") will end the list. These will be listed at the end of the last screen of the topic display. To access library "5" above, use "HELP $mylib1", or "@mylib1" at the Topic? prompt.

*** Using HELP ***

The HELP command access the system help library ("HELP"), your library set ("HELP @libname"), or any other help library ("HELP /LIBRary= filespec").

On initial entry into a help library, the help module is displayed, if present, a list of topics, and, perhaps, the library set. At the "Topic?" prompt, enter the name of the topic for which you want help. Only as many characters as are needed to uniquely identify the topic are required. If the name is not unique, all matching topics are displayed.

After the topic has been displayed (may be more than one screen), a list of additional information (sub-topics) may also be shown. At the prompt, enter the sub-topic name.

When you have finished with a level, press RETURN to go up one level. Pressing RETURN at the "Topic?" prompt exits the HELP command. At any prompt (even in the middle of typing an entry, ^Z (CTRL-Z) will terminate HELP.

Enter a question mark (?) at any time to display the most recent (sub)topic again. The actual help displayed depends on how you got to the current level. The RETURN key should not be pressed with the "?", since the "?" is recognized immediately. (If a help library is entered from a program other than the HELP command, the RETURN is required after the "?".)

If you have forgotten the names of the additional (sub)topics, just enter something you know is not a (sub)topic name (in most cases, "ZZ" is sufficient). This will display an error message and show the valid (sub)topic names.

The up-arrow key may be used to bring back your most-recent entry, which may be edited and resubmitted.

*** Sample Help Modules ***

The following are sample help modules for a program, a subprogram, a procedure, general information; and a HELP help module.

** A Program **

The following is a portion of the help module for the AUXPRINT program.

```
1 AUXPRINT                                                  <-- topic
 List a file on an auxiliary printer (one attached to an
 interactive terminal).

   Format:                                          !  Defaults

      AUXPRINT  file-spec  [ /[NO]CC      ]    !  /NOCC
                           [ /[NO]HEADER  ]    !  /NOHEADER
                           [ /LENGTH=l    ]    !  /LENGTH=66
                           [ /SKIP=s      ]    !  /SKIP=0;
                                               !  /SKIP ==> /SKIP=10
                           [ /WIDTH=w     ]    !  /WIDTH=80;
                                               !  /WIDTH ==>
                                                        /WIDTH=132


2 Parameter                                             <-- sub-topic
 file-spec

 Specifies the name of the file to be printed.

 If omitted, you will be prompted for it.

 Defaults:  extender - .DAT; filename - FOR002

2 Qualifiers                                            <-- sub-topic
 The qualifiers may follow the command name or the file-spec.  If a
 qualifier is specified more than once, only the final value is
 retained.

/CC

 /CC
 /NOCC

   Specifies whether the file has carriage control in column 1 of
   each line.

 Default: /NOCC (that is, the file does not have carriage control
          in  column 1)
```

/HEADER

/HEADER
/NOHEADER

Determines whether the listing will have a heading giving the date and file-spec.

Default: /NOHEADER

2 Admin_info <-- sub-topic

Language: VAX/VMS Fortran 77

Authors: Dan Allen - DTRC Code 189.2
David V. Sommer - DTRC Code 3511

Date written: 10/81 (da)

Dates revised
03/14/85 - dvs - add qualifiers /CC /HEADER /LENGTH /SKIP
10/22/85 - dvs - shorten /CC output by 1 line
systems - change default to /NOHEADER
03/07/86 - dvs - add /WIDTH qualifier
- fix /CC processing when first top-of-page is not first record

** A Subprogram **

This illustrates a subprogram help module. We suggest that such a help have the following sub-topics:

- Parameters (if the routine has them)
- Examples (at least one example to show how to use the routine)
- Admin_info (to show the source language, author, a brief history, and anything else that might be appropriate)

```
1 JGDATE                                                    <-- topic
 Convert any Gregorian date to a relative Julian number or vice versa.

 Usage:   INTEGER jg, jd, gyear, gmonth, gday
             ...
          CALL JGDATE (jg, jd, gyear, gmonth, gday)

 The relative Julian number corresponding to a Gregorian date is the
 number of days since 11/24/-4713 (extrapolating the Gregorian calendar).

 This subroutine is useful in determining the elapsed number of days
 between any two calendar dates.  It can also be used to find the
 calendar date so many days from any given date.
2 Parameters                                                <-- sub-topic
 CALL JGDATE (jg, jd, gyear, gmonth, gday)

        jg     - in  - int - direction of conversion
                             1 - Gregorian to Relative Julian
                             2 - Relative Julian to Gregorian
  jg=1: jd     - out - int - will contain relative Julian number
        gyear  - in  - int - Gregorian year (e.g., 1985)
        gmonth - in  - int - Gregorian month (1-12)
        gday   - in  - int - Gregorian day (1-31)

  jg=2: jd     - in  - int - relative Julian number
        gyear  - out - int - will contain Gregorian year (e.g., 1985)
        gmonth - out - int - will contain Gregorian month (1-12)
        gday   - out - int - will contain Gregorian day (1-31)

2 Examples                                                  <-- sub-topic

        INTEGER jd, gy, gm, gd
           ...
        CALL JDDATE (1, jd, 1985, 2, 25)
        jd = jd + 1000
        CALL JGDATE (2, jd, gy, gm ,gd)

 This example will find the date 1000 days from 02/25/85.
```

2 Admin_info <-- sub-topic

Language: Fortran 77

Author: David V. Sommer - DTRC Code 3511

Date written: 1968 or earlier

Dates revised
03/01/79 - implement on Burroughs 7700
02/01/85 - implement on DEC VAXcluster

** A Command Procedure **

The procedure FLR has the following definition for all users:

```
$ FLR :== @VSYS:FLR
```

Without this definition, the "Format" would have

```
@VSYS:FLR  [ filename]
```

1 FLR <-- topic
Compile Fortran, Link and Run.

Format:

```
FLR  [ filename ]
```

If filename is omitted, you will be prompted for it.

For execution, FOR005, FOR006 and SYS$INPUT are assigned to the terminal. Thus, all Fortran READ, PRINT, READ (5,..., WRITE (6,..., TYPE, and ACCEPT statements will read from or write to the terminal.

Ignore the system message "previous value of SYS$INPUT has been superseded".

** General Information **

The following is a portion of the help module for a discussion of the DTRC accounting for users with more than one account. This module has no sub-topics.

1 Many_accounts
VAXcluster users with more than one account are assigned a username/password for each account. These usernames differ in the fifth character position, e.g., CAWE, CAWEA, CAWEB. The default login directory for each user is device:[username] where all files owned by the same individual are stored on the same device. For example,

```
U01:[CAWE]
U01:[CAWEA]
U01:[CAWEB]
```

ACCESSING FILES OWNED BY YOUR ALTER EGO

The "usernames" belonging to a particular user are members of a VMS "group". By default on the VAXcluster, members of a group have Read and Execute access to all files owned by their fellow group members. User CAWEA wishing to access a file owned by CAWE simply references [CAWE]file.ext .

Of course, these access rights can be changed by the SET PROTECTION and SET FILE /ACL commands. In addition, all members of these special "groups" have GRPPRV privilege which, when invoked, gives a member of the group full control, including file creation and deletion, over all files owned by all members of the group. GRPPRV is invoked by

```
$ SET PROCess /PRIVileges=GRPPRV
```

(this would likely be in your LOGIN.COM)

Then to "copy" a file from one account to another, for example CAWE to CAWEA, user CAWEA would

```
$ COPY  [CAWE]file.ext  []
```

or user CAWE would

```
$ COPY  file.ext  [CAWEA]
```

To simply "move" a file from one account to another, CAWEA would

```
$ RENAME  [CAWE]file.ext  []
$ SET  FILE  /OWNer_uic=CAWEA
```

Finally, the command MYACcount will indicate the account number of the current session or job, while MYACcount /ALL will provide a list of all user/account pairs in the group.

** "HELP" module **

It is recommended, though not necessary, that your help library have a help module named HELP. Such a module will be displayed when you enter the library, and, therefore, should give a brief description of the library and, if appropriate, pointers to related libraries.

The following is the help module HELP for library @CCF:

```
1 HELP
 The CCF help modules provide information of general interest to users
 of the DTRC Central Computing Facility.

 Other help libraries available include:

      @CRAY      - DTRC additions to Cray
      @DTLIB     - subprograms in library DTLIB (formerly NSRDC)
      @UTILITIES - utility programs and procedures

 Last modified: 31-JUL-1990 13:05:35
```

***** Procedures *****

A procedure is a group of control statements in a file (default file type .COM). Calling a procedure provides a simplified way to process that group of control statements. A procedure may call another procedure.

Eight parameters, P1 through P8, are available for you (or another procedure) to pass data or other information to a procedure.

Both string and integer variables may be used in a procedure. Several lexical functions are available to interrogate the system, to manipulate variables, etc. Files may be read or written. And, of course, DCL statements may be executed.

*** DTRC Procedures ***

Type HELP @UTILITIES CONTENTS for a list of procedures (and programs) which have been added to the DTRC VAX/VMS system.

***** Object Libraries *****

An object library (file type .OLB) contains compiled subprograms for use in linking with a program.

The Librarian utility LIBRARY is used to create, maintain, list, and extract modules from an object library.

*** DTRC Object Library ***

One object library has been added to VMS at DTRC:

VSYS:DTLIB - Subprograms written or maintained by the Computer Center

To use: LINK yourobj,DTIB/LIB

*** User Object Module ***

An object module (file type .OBJ) is a file containing one or more compiled subprogram(s). They are produced by compiler such as FORTRAN, COBOL, PASCAL, etc.

*** Create an Object Library ***

The LIBRARY command is used to create an object library.

```
LIBRARY /CREATE  object_library_name

        -or-

LIBRARY /CREATE=(option,...)  object_library_name
```

where object_library_name is the name of the library to be created. It will have the default filename object_library_name.OLB.

The following options may be specified:

BLOCKS:n The number of 512-word blocks to be allocated. (default: 100)

GLOBALS:n The maximum number of global symbols the library can contain. (default: 128)

HISTORY:n The maximum number of library update history records to be maintained. (default: 20)

KEYSIZE:n The maximum length of module names.
(default: 15)

MODULES:n The maximum number of modules the library can hold.
(default: 256)

*** Modify an Object Library ***

The LIBRARY command is used to insert, and delete object library modules. Wildcards are allowed in module names.

LIBRARY /INSERT object_library_name object_module_file

LIBRARY /REPLACE object_library_name object_module_file

LIBRARY /DELETE=(module[,...]) object_library_name

'LIBRARY object_library_name object_module_file' is the same as if '/REPLACE' were specified. If '/LOG' is specified, a message will be displayed for each operation. (E.g., LIBR /LOG ...)

If object_module_file contains several object modules, each will be a separate entity in the object library.

If the qualifier /NOGLOBALS is specified, the global symbols for the modules being inserted will not be put into the global symbol table.

*** Compress an Object Library ***

After several inserts, deletes or replaces, there may be a lot of "dead space" in the library. To remove this, that is, to compress the library, use.

LIBRARY /COMPRESS object_library_name

-or-

LIBRARY /COMPRESS=(option,...) object_library_name

/LOG will list the modules as they are copied into the compressed library.

In addition to the options available for /CREATE:

KEEP Copy the history records, etc., to the compressed library.
(default: do not copy)

*** List the Contents of an Object Library ***

The LIBRARY command also lists the contents of an object library. The /LIST qualifier, which may be specified alone or with any of the above operations, will provide information about the library including a list of the modules in the library. If /FULL is also specified, the list of modules will include the date and timeit was inserted into the library. If /HISTORY is specified, it will show who did what to the library and when. The number of history records retained is defined when the library was created or compressed.

For a list of the library without other operations, use

```
LIBRARY /LIST                -or-
LIBRARY /LIST /FULL          -or-
LIBRARY /LIST /FULL /HISTORY
```

The list will be displayed on SYS$OUTPUT. To put the listing into a file, use /LIST=file-spec.

If the qualifier /NAMES is specified, the names of all global symbols will also be listed.

*** Extract an Object Module ***

To extract an object module to make some modifications to it, use

```
LIBRARY /EXTRACT=(module[,...]  /OUTPUT=file-spec
        object_library_name
```

If /OUTPUT is specified, the modules are put into file <file-spec>. If /OUTPUT is omitted, they are put into file object_module_name.OBJ.

*** Linking with an Object Library ***

If your program uses subprograms in an object library, they can be linked using

```
LINK  your_obj, your_lib/LIBrary
```

where your_obj is the object module for your program
your_lib is your object library
/LIBrary tells the linker that your_lib is an object library

If you are linking more than one object file or using more than one object library, you might use one of the following forms:

```
LINK obj1, obj2, lib1/LIB
LINK obj1, obj2, lib1/LIB, lib2/LIB
LINK obj1, obj2, lib1/LIB, obj3
LINK obj1, obj2, lib1/LIB, obj3, lib3/LIB
```

etc.

***** Text Libraries *****

A text library (file type .TLB) contains text modules, that is, modules containing source programs, documents, notes, data, etc.

The Librarian utility LIBRARY is used to create, maintain, list, and extract modules from a text library.

*** DTRC Text Libraries ***

The following text libraries have been added in VSYS: at DTRC.

DTLIB - Source code for subprograms in library VSYS:DTLIB.OLB

DTLIBCRAY - Source code for subprograms in library DTLIB on the Cray

INCLUDE - Some common block and code segments to INCLUDE in a program or subprogram

UTILITIES - Source code for programs which have been added to VSYS:

*** User Text Module ***

A text module (default file type .TXT) is a file containing a source program, a document, some miscellaneous information, etc.

*** Create a Text Library ***

The LIBRARY command is used to create a text library.

```
LIBRARY /TEXT /CREATE  text_library_name

        -or-

LIBRARY /TEXT /CREATE=(option,...)  text_library_name
```

where text_library_name is the name of the library to be created. It will have the default filename text_library_name.TLB.

The following options may be specified:

BLOCKS:n The number of 512-word blocks to be allocated. (default: 100)

HISTORY:n The maximum number of library update history records to be maintained. (default: 20)

KEYSIZE:n The maximum length of module names. (default: 15)

MODULES:n The maximum number of modules the library can hold. (default: 256)

*** Modify a Text Library ***

The LIBRARY command is used to insert, and delete text library modules.

```
LIBRARY /TEXT text_library_name  text_module_file  /INSERT

LIBRARY /TEXT text_library_name  text_module_file  /INSERT
                                                   /MODULE=module_name

LIBRARY /TEXT text_library_name  text_module_file  /REPLACE

LIBRARY /TEXT text_library_name  text_module_file  /REPLACE
                                                   /MODULE=module_name

LIBRARY /TEXT text_library_file  /DELETE=(module[,...])
```

"LIBRARY /TEXT text_library_name text_module_file" is the same as if "/REPLACE" were specified. If "/MODULE=..." is omitted, the module name will be the filename without the file type. If "/LOG" is specified, a message will be displayed for each operation. (E.g., LIBR /TEXT /LOG ...)

Wildcards are allowed in the module names when deleting.

*** Compress a Text Library ***

After several inserts, deletes or replaces, there may be a lot of "dead space" in the library. To remove this, that is, to compress the library, use:

```
LIBRARY /TEXT /COMPRESS  text_library_name

        -or-

LIBRARY /TEXT /COMPRESS=(option,...)  text_library_name
```

/LOG will list the modules as they are copied into the compressed library.

The options available are the same as for /CREATE.

*** List the Contents of a Text Library ***

The LIBRARY command also lists the contents of a text library. The /LIST qualifier, which may be specified alone or with any of the above operations, will provide information about the library including a list of the modules in the library. If /FULL is also specified, the list of modules will include the date and time it was inserted into the library. If /HISTORY is specified, it will show who did what to the library and when. The number of history records retained is defined when the library was created or compressed.

For a list of the library without other operations, use

```
LIBRARY /TEXT /LIST                  -or-
LIBRARY /TEXT /LIST /FULL            -or-
LIBRARY /TEXT /LIST /FULL /HISTORY
```

The list will be displayed on SYS$OUTPUT. To put the listing into a file, use /LIST=file-spec.

*** Extract a Text Module ***

To extract a text module to make some modifications to it, use

```
LIBRARY /TEXT /EXTRACT=(module[,...]) /OUTPUT=file-spec
        text_library_name
```

If /OUTPUT is specified, the modules are put into file <file-spec>. If /OUTPUT is omitted, they are put into file text_library_name.TXT.

Wildcards are allowed in the module names.

***** Editors *****

VAX/VMS has two widely-user text editors: EDT and EVE; and a Text Processing Utility (TPU) which can be used to create your own editor. EVE is a editor written in TPU. This chapter gives an overview of EDT and EVE.

*** The EDT Text Editor ***

EDT is used to create or modify a file. There are three modes for using EDT: line, keypad (which uses the full screen), and non-keypad. Line mode is very similar to NETED on the CDC CYBER 176 or 750.

** Invoking EDT **

EDT is executed by:

```
$ EDIT  /EDT  file
   or
$ EDIT  file          <-- /EDT is the default editor
```

where file may be a file specification or a logical name.

If the file is an existing file, the first line of the file will be displayed on the screen, followed by an * (the * is the prompt when in line mode). If the file does not exist, [EOB] will be displayed on the first line, followed by the * prompt. You are now ready to edit the file. A journal file of every command you enter is saved temporarily in filename.JOU. If EDT is terminated abnormally (including your session being disconnected), you can recover almost all of your editing by "EDIT /RECOVER file".

To change to screen mode, type "change" or "c" at the * prompt. To return to line mode, enter end-of-file (^Z).

** On-line HELP **

Help is available in both line mode and keypad (change) mode. In line mode, at the * prompt, type "HELP" or "HELP command". Keypad mode uses the PF2 commmand to invoke the help utility. EDT will paint a picture of the keypad and prompt you to push the key for which you need help.

** Terminating EDT **

There are two ways to leave EDT: "EXIT", which saves the file; and "QUIT" which does not save it. If, for some reason, you wish to save the journal file, "EXIT /SAVE" will save both the file and the journal file.

*** The EVE Editor ***

The Extensible VAX Editor, EVE, is a full-screen interactive text editor designed for use with VT100- and VT200-compatible terminals. Some features include multiple files and buffers, two windows, and some word processing commands. Advanced editing commands are entered through the use of a command line.

EVE has its own keypad. The EDT keypad may be used by typing "SET KEYPAD EDT" on the command line. In developing EVE, DEC has attempted to simplify the EDT keypad by reducing the number of keystrokes for each keypad command to one.

** Invoking EVE **

To begin an EVE session, enter

```
$ EVE
   -or-
$ EVE  file
```

A wildcard character, the asterisk, can be substituted for all or some of the characters in a long file name. If one file name matches the specification, that file is edited; otherwise, an error message is issued and no file is used. For example,

```
$ EVE getty.txt
$ EVE this_is_a_long_file_name.and_a_long_file_type
$ EVE this_*.and_*
```

** The Screen **

The screen is divided into four parts. The first part, the window, contains the file's text. If the file is empty, you will only see the [End of file] notice. The second part, the status line, is highlighted, contains the current buffer name, mode, and direction. The third, the command line, displays advanced EVE commands. The fourth part, the message window, displays both informative and error messages.

** On-line Help **

EVE has both keypad help as well as an extensive "word processing" format help menu.

** Terminating EVE **

There are two commands that allow you to leave the EVE environment. To terminate EVE and save the file, type end-of-file (^Z). This will create a new file or another version of an existing file. To leave EVE without saving your changes, press the DO key and then type QUIT. If your editing session ends abnormally, the "EVE /RECOVER file" command can be used to recover your session using journal file file.TJL.

*** Why Use EVE Instead of EDT? ***

EDT users should consider switching to EVE for the following reasons:

. EVE's use of windows allows editing multiple files simultaneously on the same screen. This is useful for making common changes to programs and subprograms or for moving lines from one file to another.

. EVE has more ways of extending the basic editor and saving those extensions for future sessions than EDT.

. EVE's string searching capability is much more flexible than EDT. It includes VMS and UNIX wildcard searching.

. EVE offers "spawn" and "attach" and "DCL" commands to allow the user to work outside of the current process and return to the same active EVE session.

. EVE supports the EDT keypad.

***** Magnetic Tape *****

Magnetic tapes should be used for sequential data for such purposes as:

- Transfer of information to and from other computers and off-line peripherals
- Files which are used infrequently
- Back-up copies of disk files
- Long-term storage of data

Tapes should not be used for scratch files or random information. For safety, two copies on different tapes should be maintained, or for data which is updated, a grandfather-father-son system is advised. It is not wise to mount a tape containing good data, read through it, and write new data at the end. Instead, copy the existing data to a second tape and add the new data to the second tape, retaining the first tape as a back-up.

Processing a file on tape will take considerably more I/O time than on disk and more elapsed time.

Information concerning the physical and logical characteristics of the tape is specified in control statements.

Nine-track tapes are supported on the DEC VAX and CDC CYBER 860 computers; 7-track tapes are supported on the CDC CYBER 860 (NOS only). There are no tape drives on the Cray, so tapes must be accessed via one of the front ends.

*** Tape Labels ***

Tapes may be labelled or unlabelled. Labels should always be used except when writing data for, or reading data from a computer which cannot handle ANSI standard labels.

In general, a labelled tape has volume and end-of-volume labels, and may also have user labels. Each file on the tape may have its own header and trailer labels.

*** Tape Formats ***

Generally, records on tape are fixed or variable length, blocked or unblocked, ASCII or EBCDIC (9-track), BCD (7-track), coded, or binary. Where possible, tapes written by or for another computer should be 9-track, 6250 or 1600 cpi, fixed length, blocked, ASCII.

*** Tape Care and Cleaning ***

Tapes should be stored in closed containers in racks which give them vertical support. Tapes may not be spliced. They should be read and rewound at least every six months. Logs should be kept on contents, format, and creation dates of tapes.

If a tape has many parity errors, cleaning it may help. Even a brand new tape may need cleaning. This off-line process does not destroy the information on the tape. If a tape receives heavy usage, cleaning it after ten or more uses may reduce the incidence of parity errors. A tape can also be certified, which determines whether there are any areas on the tape which do not record properly. Certification DESTROYS current information on the tape (except VSN). To change the VSN, contact the Tape Librarian and request blank labelling or degaussing.

If, after a tape has been cleaned, it still has many parity errors, call User Services to have the tape drive cleaned. If the tape continues to have parity errors, it should be exchanged for a new tape. The information on the old tape is not recovered automatically in this case.

To have a tape cleaned or certified, submit an off-line work request to the Tape Librarian. Users who are not at the Carderock site should call (301) 227-1967.

When possible, slot tapes should be in the Computer Room environment for at least two hours before reading or writing. This allows temperature and humidity to stabilize and should minimize tape problems.

Please notify Code 3511 (User Services), (301) 227-1907, of any unusual tape problems.

*** Tape Assignment ***

Two classes of tape storage are provided in the Computer Center, 'Library' and 'Slot'. Tapes which are used frequently should be permanently stored in the NA cabinet, which is accessible from the CYBER 860 or VAXcluster. These tapes are assigned a permanent external label indicating location by cabinet, shelf and position, such as 'NA2499', and are referred to as 'Library' tapes. The volume serial number (VSN) of a Library tape is the same as the external label and should usually be a labelled tape.

Tapes which are seldom used on the CDC CYBER or VAX computers, which are being transferred between systems, or which are normally retained by the owner are assigned a temporary slot number for up to 24 hours at the computer on which they are to be used. At the end of the day's processing (or earlier at the user's request), these are returned to the ADP Control Center for pickup by the user and will require a new slot number assignment for the next use.

The VSN for a slot tape is 'SLOTxx=id'
where xx is the assigned slot number
id is the user's external sticker on the tape reel (six (6) one-inch-high characters, please, for easy reading by the operator)

Tapes belonging to remote users may be sent to the Tape Librarian. Special slots may be assigned for several weeks' continuous usage (on the CYBER 860, these are C1-9, Y1-9, B1-9, R1-9; on VAXcluster these are V1-9, A1-9, X1-9, S1-9).

All tapes to be used in a job must be supplied by the user as Library tapes and/or Slot tapes. No scratch tapes are available.

Tapes stocked by the Computer Center are of 2400-foot nominal length (10.5 in. diameter). Smaller tapes may be used. For remote slot assignment, assignment of library tapes, or to arrange for the purchase of tapes, contact the Tape Librarian, (301) 227-1967. CYBER procedure BEGIN,TPGET may be used to acquire NA tapes.
Slot tapes may be signed in at the ADP Control Center.

*** Using Tapes on the DEC VAX ***

The DEC VAXcluster has four 9-track tape drives (6250/1600 cpi).

The following VMS control statements are used to access or analyze magnetic tapes:

ALLOCATE	Assign a tape drive to a logical name.
DEALLOCATE	Return a previously allocated device and disassociate the job's logical name from the tape drive.
DISMOUNT	Release a tape volume that was previously mounted.
INITIALIZE	Initialize a magnetic tape.
MOUNT	Mount a magnetic tape and, if labelled, check the label.

The following prodecures have been developed to handle the tape mounting and dismounting for you:

COPYD2T	Copy disk files to a VAX tape using COPY.
COPYT2D	Copy a VAX tape (written by COPY) to disk.
FILEMANAGER	An interactive procedure using the VMS BACKUP utility to create, add to, restore from, or list the contents of a backup tape.
RFTAPE	Read Foreign TAPE (copy tape-to-disk). Reads one or more files from a fixed, blocked or unblocked, ASCII or EBCDIC tape and saves them on disk.
WFTAPE	Write Foreign TAPE (copy disk-to-tape). Writes one or more disk files to a fixed, blocked or unblocked (ASCII or EBCDIC) tape.

** Examples **

1. Initialize a VAX/VMS tape:

```
$! TAPINIT.COM : initialize VAX/VMS tape, default is 1600
$!
$    if p3 .nes. "1600" .and. p3 .nes. "6250" then p3 = "1600"
$!
$    allocate mu: tape                ! get any available tape drive
$!
$    mount tape: /foreign /density='p3' -
                 /comment="mount slot''p1' vsn=''p2' ringin"
$    dismount tape /nounload
$    initialize tape 'p2'
$    deallocate tape
$    exit
$!
$! p1 - 1- or 2-digit slot number or NONE
$! p2 - 6-character VSN
$! p3 - density (6250 or 1600) defaults to 1600
$!
$! created 06/23/88 by CASG
$! last modified 06/24/88 @ 1146 by CASG (add "?" for help)
$!
$! End of TAPINIT.COM
```

The above is a portion of the actual procedure to show just the defaulting of density and how to initialize a tape. To see the full procedure, which includes validation of each parameter, and allows "?" for help for the procedure and each parameter, type "TYPE VSYS:TAPINIT.COM".

*** Using Tapes on the CYBER 860 ***

The CDC CYBER 860 has six 9-track tape drives (four for 6250/1600 cpi and two for 1600/800 cpi), and two 7-track tape drives (800/556 cpi). All drives are available to NOS; two 9-track (6250/1600 cpi) drives are available to NOS/VE.

** NOS **

The following NOS control statements are used to access or analyze magnetic tapes:

LABEL	Mount a magnetic tape and, if labelled, check the label.
LISTLB	List the labels of an ANSI-labelled tape.
RESOURC	Specify that more than one tape drive is required.
TDUMP	Octal and alphanumeric dump of all or part of a file.
VSN	Associate a local file name with one or more volume serial numbers.

* Examples *

The following examples illustrate tape usage in batch jobs. Tapes may also be used interactively (without the job, USER and CHARGE statements).

1. Unlabelled NOS/BE tape to disk:

```
xxxx.            job statement.
USER,xxxx,upw.
CHARGE,1234567890.
DEFINE,disk/CT=PU.
LABEL,tape,F=SI,LB=KU,VSN=NA9999,D=1600,PO=R,R.
COPYBF,tape,disk,5.
UNLOAD,tape.
```

2. Copy old stranger (foreign) tape to new - 6250 multifile:

```
xxxx.
USER,xxxx,upw.
CHARGE,1234567890.
RESOURC,GE=1.                          <-- one additional tape drive
LABEL,t4,VSN=NA9998,D=GE,PO=W,W,F=S,L=softwstr.
VSN,t5=SLOTxx=CA9995.
LABEL,t5,PO=R,R,F=S,D=GE,L=softwstr.
COPY,t5,t4,EL=10,M=coded,PO=E.
UNLOAD,t5.
```

** NOS/VE **

The following NOS/VE control statements are used to access or analyze magnetic tapes:

CHANGE_TAPE_LABEL_ATTRIBUTES
: Change the current magnetic tape label attributes.

DETACH_FILE
: Detach one or more files from a job.

DISPLAY_BACKUP_LABEL_TAPE
: Display the current job default label type for a permanent file backup file on tape.

DISPLAY_TAPE_LABEL_ATTRIBUTES
: Display the current magnetic tape label attributes.

REQUEST_MAGNETIC_TAPE
: Associate a file with a magnetic tape.

SKIP_TAPE_MARK
: Position a tape backward or forward.

* *Examples* *

1. Read an unlabelled tape on VE:

```
/set_working_catalog      $user
/change_block_label_type  file_label=u
/request_magnetic_tape    file=$local.tape  ..
../                       external_vsn=mytape  ..
../                       type=mt9$1600
/copy_file  $local.tape   myfile1
/detach     $local.tape
```

2. Create a multi-file labelled tape:

```
/reqmt  file=$local.tape1  ..
../     external_vsn=TAPE02  ..
../     recorded_vsn=TAPE02  ..
../     ring=false  ..
../     density=mt9$6250
/chatla  f=$local.tape1  ..
../      rf=true
../      file_identifier=file1  ..
../      file_set_identifier=many1
/set_file_attributes  f=$local.tape1  ..
../                   block_type=user_specified_record  ..
../                   record_type=ansi_fixed  ..
../                   maximum_record_length=80
/copf    file1           $local.tape1
/chatla  f=$local.tape1  fi=file2
/copf    file2           $local.tape1
/chatla  f=$local.tape1  fi=file3
/copf    file3           $local.tape1
/distla  f=$local.tape1  do=current_file   " display label written
/detach  $local.tape1
```

***** Other Software *****

This chapter discusses various programming languages and other software packages available on the CCF computers.

ABAQUS A family of modeling capabilities based on the finite element method, designed to provide solutions to a wide range of mostly non-linear structural problems, and programmed around a common data management structure.

Execution: Cray COS: from the VAX: @VSYS:ABACRAY

DEC VAX/VMS: @VSYS:ABA

Post-processing of Cray or VAX runs is done on the VAX: @VSYS:ABAPLOT

Remarks: Processing is normally done on the Cray unless more memory is required than is available.

For Cray processing with .FIL output files, the .INP file must include "*FILE FORMAT,ASCII".

If a plot file is generated on the Cray, each *PLOT statement must include "OUTPUT=ASCII".

References: Machine-readable:

VMS: HELP ABAQUS

Contact: Pete Matula, (301) 227-1936
Mike Brown, (301) 227-1706

C A modern, block-structured programming language designed for portability, system programming, and general-purpose applications. It is derived from Algol-60.

Execution: Cray COS:

```
CPP,'inputfile'.
                    ^-- C Pre-Processor
CC.                 <-- C compiler
SEGLDR,CMD='LIB=$CLIB;STACK'.
```

DEC VAX/VMS:

```
$ CC
```

References: "C - A Reference Manual", Hardison and Steele

Hardware manufacturers' reference manuals

Machine-readable:

VMS: HELP CC

CMS (Code Management System) A source code library maintenance system which can be used for any ASCII file. CMS tracks the history of the file (changes, reason for change, who made the change and when). It can merge modifications; and stores the current and historic versions of the file.

Execution: DEC VAX/VMS:
```
$ CMS
CMS>command
  -or-
$ CMS command
```

References: Machine-readable:

VMS:
```
HELP CMS
  -or-
$ CMS
CMS>help          <-- internal help
```

DataTrieve (DTR)

VAX DataTrieve is a data management system which runs on VMS. It is a tool for defining, storing, updating, and displaying data. The data may reside either in a relational database created through DTR or an existing RMS file. It provides interactive and program-callable access to data, a report writing facility, a graphics capablility, screen formatting support using FMS (Forms Management System), and distributed access on a network connected by DECnet.

Execution: DEC VAX/VMS: $ DTR32

Remarks: Data formats, procedures, and other data structures are stored in the Common Data Dictionary (CDD).

Users wishing to use DTR must have a valid CDD path established for them by User Services.

References: Machine-readable:

```
VMS: HELP DATATRIEVE
        -or-
     $ dtr32
     DTR>help          <-- internal help
```

Contact: User Services

DISSPLA (Display Integrated Software System and Plotting Language)
A library of Fortran subroutines which facilitate plotting. It does not rely upon features particular to any type of graphic device.

Execution: Cray COS: (version 10.0)

```
ACCESS,DN=DISSPLA,OWN=PUBLIC.
SEGLDR,CMD='LIB=DISSPLA'
```

To dispose the meta file DISPLOT for post-processing on the VAX:

```
DISPOSE,DN=DISPLOT,DF=BB,
        TEXT='DISPLOT.DAT'.
```

DEC VAX/VMS: (version 10.5)

```
$ FORTRAN yourfile
$ DISLINK yourfile
 Other libraries (Y or N) <as you
                           need>
```

To post-process files created by "CALL COMPRS":

```
$ RUN VSYS:DISPOP
```

Remarks: Cray post-processing must be done on the VAX.

References: DISSPLA User's Manual

Machine-readable:

VMS: HELP DISSPLA

Contact: User Services

DTLIB A library of subprograms written or supported by the CCF. The contents of DTLIB (formerly call NSRDC) is different on each machine, but generally includes routines in the areas of:

- . character manipulation
- . sorting
- . date/time manipulation
- . debugging aids
- . extraction of job information
- . some of the Fortran 8x intrinsics

Usage: Cray COS: ACCESS,DN=DTLIB,OWN=PUBLIC.

DEC VAX/VMS: $ LINK <obj>, DTLIB/LIBrary

CDC 860 NOS: ATTACH,DTLIB/UN=NSYS.

References: Machine-readable:

Cray: on VAX, "HELP @DTLIB"

VAX: HELP @DTLIB

Contact: User Services

DYNA3D DYNA3D is an explicit three-dimensional finite element code for analyzing the large deformation dynamic response of inelastic solids and structures. A contact-impact algorithm permits gaps and sliding along material interfaces with friction. Using a specialization of this algorithm, such interfaces can be rigidly tied to admit variable zoning without the need of transition regions. Spatial discretization is achieved by the use of 8-node solid elements, 2-node beam elements, 4-node shell elements, 8-node solid shell elements, and rigid bodies. The equations-of-motion are integrated in time by the central difference method. The 1989 version of DYNA3D contains thirty material models and ten equations of state to cover a wide range of material behavior.

Execution: Cray COS:Use VMS

DEC VAX/VMS: @VSYS:DYNA3D

Remarks: This DYNA3D procedure creates a Cray batch job from user responses to pertinent questions. There is an option to have the Cray job submitted by the procedure In the Cray job, the binary plot files are restructured by program CVBIN so that they may be read by the TAURUS graphics post-processor on the VAXcluster.

References:

Cray:

Machine-readable:

VMS: HELP DYNA3D

Contact: User Services

GPSS General Purpose Simulation System (GPSS) is a generalized simulation package.

Execution: DEC VAX/VMS: $ GPSS qualifiers parameters

CDC 860 NOS: ATTACH,GPSS/UN=APPLLIB.
GPSS,parameters.
^-- use FX for fixed format

Remarks: The VMS and CDC versions are different.

References: The IBM document.

General Purpose Simulation System Reference Manual, Simulation Software Ltd. (VAX/VMS version)

Machine-readable:

VMS: HELP GPSS

IMSL (proprietary) The International Mathematical and Statistical Libraries package (edition 10) contains 948 subroutines in the following areas:

- 426 general applied mathematics routines
- 351 statistics routines
- 172 special functions

IMSL 10 was a major revision.

Major enhancements were made in many areas of numerical math. Most statistical analysis subprograms can print results, handle missing values, and implement advances in algorithms. There is no ERROR parameter in the argument list and no need for you to dimension work arrays. Workspace is allocated out of a common area. Informative messages are printed when errors occur. Matrices no longer require packing into one-dimensional arrays. Some user-supplied external subprograms must now be functions.

CHARACTER variables are used in the routines and in the many intermediary routines not explicitly called by the application.

Usage:

Cray COS:
```
ACCESS,DN=IMSL,OWN=PUBLIC.
SEGLDR,...,CMD='LIB=IMSL',....
```

DEC VAX/VMS: add "IMSL/LIBrary to the LINK statement

CDC 860 NOS: may be used only by FTN5 programs and is in two permanent files:

```
IMSLM  - the Math routines
IMSLSS - the Special function
         and Statistics routines
```

If both the mathematics and statistics packages are needed, you must use the following search order:

```
ATTACH,IMSLM,IMSLSS/UN=NSYS.
LIBRARY,IMSLSS,IMSL.
  -or-
LDSET,LIB=IMSLSS/IMSLM.
```

References: The IMSL documentation is in three sections:

MATH/Library V1.0	- general applied mathematics
STAT/Library V1.0	- statistics
SFUN/Library V2.0	- special functions

Also,

Update Guide	- describes the differences with the previous version

Machine-readable:

DEC VAX/VMS: HELP IMSL

Contact: User Services

INGRES A relational database management system marketed by Ingres Corporation. Transactions against the database are done through SQL (an ANSI standard query language) or through forms-based utilities accessed by name or through INGMENU, a user-friendly, forms-based interface to the INGRES utilities.

Execution: DEC VAX/VMS:

```
$ SETINGRES
                ^-- once to define
                    INGRES symbols
$ INGMENU  <data_base>

$ name      <-- a specific utility
```

Remarks: You must be an authorized INGRES user before you may access any of the INGRES utilities, including INGMENU. Call User Services to register.

References: Machine-readable:

VMS: HELP INGRES

Contact: User Services

KERMIT File transfer system to/from microcomputers.

Execution: DEC VAX/VMS: KERMIT

CDC 860 NOS: GET,KERMIT/UN=NSYS.
KERMIT.

Remarks: To use Kermit on the VAX or CDC CYBER, you must have Kermit on your PC (it might be a subset of PROCOMM).

VAX files to be transferred should have carriage return carriage control. Files with Fortran carriage control or with Print control will not transfer properly.

References: Machine-readable:

VMS: $ kermit
Kermit-32> help <-- internal help

NOS: BEGIN,HELP,,KERMIT,outfyl.
^-- a 7-page document

Contact: User Services

LINPACK A package of 40 subroutines obtained from Argonne Laboratories. Lab. These subroutines analyze and solve classes of systems of simultaneous linear algebraic equations. Routines are included for:

- general, banded, symmetric indefinite, symmetric positive definite, triangular, tridiagonal square, and Hermetian matrices
- orthogonal-triangular and single value decompositions of rectangular matrices
- least square problems
- basic linear algebra problems

There are four versions:

precision	prefix	VAXcluster	Cray	NOS
single	S		x	x
double	D	x		
complex	C		x	
complex*16	Z	x		

Usage: Cray COS: part of SCILIB

DEC VAX/VMS: LINK <obj>, VSYS:LINPACK/LIBrary

CDC 860 NOS:
```
GET,LINPACK/UN=NSYS.
LDSET,LIB=LINPACK.
   -or-
LIBRARY,LINPACK.
```

References: "LINPACK Users' Guide", J. J. Dongara, J. R. Bunch, C. D. Moler, G. W. Stewart, SIAM, 1979.

Machine-readable documentation may be listed using:

DEC VAX/VMS:
```
"HELP  LINPACK"
"HELP  LINPACK  x<routine>"
where x<routine> is "x"
followed by the single
precision name
```

Contact: User Services

MMS (Module Management System) used to automate the assembly of software. MMS reads a system file and determines what has changed since the last "system build" and reassembles.

Execution: DEC VAX/VMS:

Remarks: Eliminates recompiling if the program has not changed since the system was last built.

References: Machine-readable:

VMS: HELP MMS

NASTRAN A general-purpose finite element structural analysis program capable of performing a wide range of analysis on models of complex structures, including static stress analysis, natural frequency analysis, buckling analylsis, frequency response analysis, and transient response analysis.

Execution: Cray COS:

```
ACCESS,DN=NASTRAN,ID=RPK,
                    OWN=PUBLIC.
CALL,DN=NASTRAN,CNS.
NASTRAN,I=mydata.
       ^-- simple execution
           (MYDATA must be
            ACCESSed prior to
            this)
```

References: DTNSRDC/CMLD-81-05: NASTRAN Theory and Application Course Supplement

Machine-readable:

VMS: HELP NASTRAN <-- for Cray version

Contact: Tony Quezon, (301) 227-1645

PASCAL A modern programming language designed for general-purpose applications. It is derived from Algol-60.

Execution: Cray COS: PASCAL

DEC VAX/VMS: $ PASCAL

CDC 860 NOS: PASCAL.

References: "Pascal - User Manual and Report", Jensen and Wirth

Hardware manufacturers' reference manuals

Machine-readable:

VMS: HELP PASCAL

PCA (Performance and Coverage Analyzer) Pinpoints performance problems; analyzes programs written in several languages; reports on performance characteristics; can plot a program's use of resources using histograms or tables.

Execution: DEC VAX/VMS: $ PCA

References: Machine-readable:

VMS: HELP PCA

See also: Cray COS: SPY

SPICE A general-purpose circuit simulation program for nonlinear dc, nonlinear transient, and linear ac analyses. Circuits may contain resistors, capacitors, inductors, mutual inductors, independent voltage and current sources, four types of dependent sources, transmission lines, the four most common semiconductor devices: diodes, BJT's, JFET's, and MOSFET's, and a Josephson Junctions model.

Execution: Cray COS:

```
ACCESS,PDN=SPICE,OWN=PUBLIC.
SPICE.
/EOF
   <SPICE data>
```

References: SPICE 2G.2.5 (Program Reference), E. Cohen, University of California (420 pages)

SPICE Version 2G User's Guide, 8 Nov 1982 (73 pages)

Machine-readable:

VMS: . HELP SPICE
. VSYS:SPICE.DOC (the User's Guide)

Contact: User Services

***** Appendix A *****

*** ASCII Character Set ***

char	ASCII (hex)	EBCDIC (hex)	Display (octal)	char	ASCII (hex)	EBCDIC (hex)	Display (octal)
NUL	00	00		(((	28	4D	51
SOH	01	01		)))	29	5D	52
STX	02	02		***	2A	5C	47
ETX	03	03		+++	2B	4E	45
EOT	04	37		,,,	2C	6B	56
ENQ	05	2D		---	2D	60	46
ACK	06	2E		...	2E	4B	57
BEL	07	2F		///	2F	61	50
BS	08	16		000	30	F0	33
HT	09	05		111	31	F1	34
LF	0A	25		222	32	F2	35
VT	0B	0B		333	33	F3	36
FF	0C	0C		444	34	F4	37
CR	0D	0D		555	35	F5	40
SO	0E	0E		666	36	F6	41
SI	0F	0F		777	37	F7	42
DLE	10	10		888	38	F8	43
DC1	11	11		999	39	F9	44
DC2	12	12		:::	3A	7A	63
DC3	13	13		;;;	3B	5E	77
DC4	14	3C		<<<	3C	4C	72
NAK	15	3D		===	3D	7E	54
SYN	16	32		>>>	3E	6E	73
ETB	17	26		???	3F	6F	71
CAN	18	18		@@@	40	7C	74
EM	19	19		AAA	41	C1	01
SUB	1A	3F		BBB	42	C2	02
ESC	1B	27		CCC	43	C3	03
FS	1C	1C		DDD	44	C4	04
GS	1D	1D		EEE	45	C5	05
RS	1E	1E		FFF	46	C6	06
US	1F	1F		GGG	47	C7	07
space	20	40	55	HHH	48	C8	10
!!!	21	4F	66	III	49	C9	11
"""	22	7F	64	JJJ	4A	D1	12
###	23	7B	60	KKK	4B	D2	13
$$$	24	5B	53	LLL	4C	D3	14
%%%	25	6C		MMM	4D	D4	15
&&&	26	50	67	NNN	4E	D5	16
'''	27	7D	70	OOO	4F	D6	17

char	ASCII (hex)	EBCDIC (hex)	Display (octal)
PPP	50	D7	20
QQQ	51	D8	21
RRR	52	D9	22
SSS	53	E2	23
TTT	54	E3	24
UUU	55	E4	25
VVV	56	E5	26
WWW	57	E6	27
XXX	58	E7	30
YYY	59	E8	31
ZZZ	5A	E9	32
[[[	5B	4A	
\\\	5C	E0	75
]]]	5D	5A	
^^^	5E	5F	76
___	5F	6D	65
grave	60	79	
aaa	61	81	
bbb	62	82	
ccc	63	83	
ddd	64	84	
eee	65	85	
fff	66	86	
ggg	67	87	

char	ASCII (hex)	EBCDIC (hex)	Display (octal)
hhh	68	88	
iii	69	89	
jjj	6A	91	
kkk	6B	92	
lll	6C	93	
mmm	6D	94	
nnn	6E	95	
ooo	6F	96	
ppp	70	97	
qqq	71	98	
rrr	72	99	
sss	73	A2	
ttt	74	A3	
uuu	75	A4	
vvv	76	A5	
www	77	A6	
xxx	78	A7	
yyy	79	A8	
zzz	7A	A9	
{{{	7B	C0	61
|||	7C	6A	
}}}	7D	D0	62
~~	7E	A1	
DEL	7F	07	

*** CDC NOS Character Set ***

Display Code	char-acter	punch 026	punch 029 if diff	7-track ext BCD	9-track ASCII (note 6)	9-track EBCDIC (note 6)	note/name
00	:::	2-8			25	6C	colon (1,2)
01	AAA	12-1		61	41	C1	
02	BBB	12-2		62	42	C2	
03	CCC	12-3		63	43	C3	
04	DDD	12-4		64	44	C4	
05	EEE	12-5		65	45	C5	
06	FFF	12-6		66	46	C6	
07	GGG	12-7		67	47	C7	
10	HHH	12-8		70	48	C8	
11	III	12-9		71	49	C9	
12	JJJ	11-1		41	4A	D1	
13	KKK	11-2		42	4B	D2	
14	LLL	11-3		43	4C	D3	
15	MMM	11-4		44	4D	D4	
16	NNN	11-5		45	4E	D5	
17	OOO	11-6		46	4F	D6	
20	PPP	11-7		47	50	D7	
21	QQQ	11-8		50	51	D8	
22	RRR	11-9		51	52	D9	
23	SSS	0-2		22	53	E2	
24	TTT	0-3		23	54	E3	
25	UUU	0-4		24	55	E4	
26	VVV	0-5		25	56	E5	
27	WWW	0-6		26	57	E6	
30	XXX	0-7		27	58	E7	
31	YYY	0-8		30	59	E8	
32	ZZZ	0-9		31	5A	E9	
33	000	0		12	30	F0	(sometimes 00)
34	111	1		01	31	F1	
35	222	2		02	32	F2	
36	333	3		03	33	F3	
37	444	4		04	34	F4	
40	555	5		05	35	F5	
41	666	6		06	36	F6	
42	777	7		07	37	F7	
43	888	8		10	38	F8	
44	999	9		11	39	F9	
45	+++	12	12-6-8	60	2B	4E	plus
46	---	11		40	2D	60	minus
47	***	11-4-8		54	2A	5C	asterisk
50	///	0-1		21	2F	61	slash
51	(((	0-4-8	12-5-8	34	28	4D	left paren
52	)))	12-4-8	11-5-8	74	29	5D	right paren
53	$$$	11-3-8		53	24	5B	dollar
54	===	3-8	6-8	13	3D	7E	equal
55				20	20	40	blank
56	,,,	0-3-8		33	2C	6B	comma
57	...	12-3-8		73	2E	4B	period

Display Code	char-acter	punch 026	punch 029 if diff	7-track ext BCD	9-track ASCII (note 6)	9-track EBCDIC (note 6)	note/name
60	###	0-6-8	3-8	36	23	7B	pound
61	[[[	7-8	12-2-8	17	5B	4A	left bracket
62	]]]	0-2-8	11-2-8	32	5D	5A	right bracket
63	%%%	2-8			25	6C	percent (1,2)
64	"""	4-8	7-8	14	22	7F	quote
65	___	0-5-8		35	5F	6D	underline
66	!!!	11-2-8	12-7-8	52	21	4F	exclam (3)
66	!!!	11-0		52	21	4F	exclam (3)
67	&&&	0-7-8	12	37	26	50	ampersand
70	'''	11-5-8	5-8	55	27	7D	apostrophe
71	???	11-6-8	0-7-8	56	3F	6F	question
72	<<<	12-2-8	12-4-8	72	3C	4C	less than (3)
72	<<<	12-0		72	3C	4C	less than (3)
73	>>>	11-7-8	0-6-8	57	3E	6E	greater than
74	@@@	5-8	4-8	15	40	7C	at
75	\\\	12-5-8	0-2-8	75	5C	E0	reverse slant
76	^^^	12-6-8	11-7-8	76	5E	5F	caret
77	;;;	12-7-8	11-6-8	77	3B	5E	semicolon (4)
55		6-8	0-4-8		20	40	blank (5)

Notes:

(1) In the 63-character set (NOS/BE), Display Code 00 has no character, and 63 is the colon (:). In the 64-character set (NOS), 00 is the colon (:), and 63 is the percent (%).

(2) On 7-track tape, this becomes zero (display 33).

(3) Alternate punches.

(4) Avoid a whole word of semicolons, which is a negative zero and is treated as an end-of-record.

(5) On some terminals, this is transmitted as a binary zero. For these terminals, avoid putting this punch in columns 9-10, 19-20, ..., 79-80, as each will be interpreted as a zero-byte terminator.

(6) When ASCII and EBCDIC tapes are read and converted to Display Code, lower case letters are folded into upper case. A number of other codes are also folded.

***** Appendix B *****

*** Cray UNICOS Commands ***

This appendix is reserved for a description of Cray UNICOS commands. It will be expanded when UNICOS is available at DTRC.

***** Appendix C *****

*** Cray COS JCL Commands ***

Cray COS JCL commands have the following general syntax:

```
verb sep1 param1 sep2 param2 ... sepn paramn term comments
```

verb is the name of the routine to be executed. It consists of an alphabetic character (A-Z, a-z, $, %, @) followed by 0-6 alphanumeric characters for system, local dataset name and system dataset name verbs; or 1-8 alphanumeric characters for library-defined verbs.

sepi are separators and include:

```
 ,     - VERB,parameter.
 (     - VERB(parameter).

 .     - VERB,parameter.      <-- use period if comma
 )     - VERB(parameter)      <-- use right paren if left paren

 ,     - VERB(parameter,parameter)

 =     - VERB(keyword=value)

 :     - VERB(keyword=value1:value2)

 ^     - VERB(...parameters...^      <-- statement continued
         parameters)                 <-- on another line

'...' - VERB(keyword='string')

(...) - VERB(keyword=(value:value))
```

parami are parameters, which may be positional or keyword.
Positional parameters have one of the following formats:

```
value
value1:value2:...:valuen
```

Keyword parameters have one of the following formats:

```
keyword
keyword=value
keyword=value1:value2:...:valuen
```

term is the statement terminator. It is either a period

```
VERB.
VERB,parameters.
```

or a right parenthesis

```
VERB(parameters)
```

comments follow the terminator.

*** Strings ***

The following string representations are used in this appendix:

aa...a 1 or more alphabetic characters

axx...x 1 or more alphanumeric characters, the first alphabetic

xxx...x 1 or more alphanumeric characters

nnn...n 1 or more decimal (unless otherwise stated) digits

*** Some Common Parameters ***

The following parameters are used in many JCL commands. If they have a different meaning or a special condition, it will be mentioned in the individual description.

AM=mode Alternate User Access Mode (see PAM=)

DC=dc Disposition code
- IN - input queue of destination station
- MT - magnetic tape at job origin mainframe
- PR - print at job origin mainframe
- SC - scratch the dataset
- ST - stage to mainframe (make permanent at job origin mainframe)

DF=df Dataset format (blocking; front-end conversion)
- BB - binary blocked (no reblocking, no conversion; for graphics output)
- BD - binary deblocked (same as TR)
- CB - character blocked (front-end converts to ASCII (VAX) or Display Code or ASCII (NOS))
- CD - character deblocked (front-end converts to ASCII (VAX) or Display Code (NOS))
- TR - transparent (no deblocking; no conversion; for object modules, etc.)

(default: CB)

DN=dn Local dataset name (axxxxxx, 7 maximum)

ED=ed Edition number (1-4095)

ERR Suppress error termination messages

EXO=exo Execute option
- ON - execute-only (cannot be read or PSDUMPed)
- OFF - not execute-only

I=idn
IDN=idn Input dataset name (normal default: $IN)

ID=uid Additional permanent dataset ID
(axxxxxxx, 8 maximum)

L=ldn Name of dataset to contain the listing
(default: $OUT)

M=mn Maintenance control word (axxxxxxx, 8 maximum)

MF=mf Front-end computer
N1 - CDC CYBER 180/860A (NOS)
V3 - DEC VAXcluster node DT3 (VMS)
(default: front-end of job origin)

MSG Suppress normal termination messages

NA No abort. If omitted, an error causes the job step to abort.

O=odn
ODN=odn Output dataset name (normal default: $OUT)

OWN=owner Owner of the permanent dataset
(not needed for your own files)

PAM=mode Public Access Mode
E - execute only (same effect as EXO=ON)
M - maintenance only
N - no public access
R - read only
W - write only
Example: PAM=R:W gives read and write permission
(default: N)

PDN=pdn Permanent dataset name (xxxxxxxxxxxxxxx, 15 maximum; enclosed in quotes "..." if other than A-Z,0-9)

R=rd Read control word (axxxxxxx, 8 maximum)

TEXT='text' Text (up to 240 character) to be passed to the front-end, enclosed in apostrophes ('...')

TID=tid Destination terminal
(default: terminal of job origin)

UQ Unique access (required to delete or modify a dataset)
(default: multiple access)

W=wt Write control word (axxxxxxx, 8 maximum)

*** Permanent Dataset Utility Shorthand Notation ***

In the permanent dataset utility commands, wildcards may be used in the PDN, PDS, ID, US, and OWN parameters. An asterisk "*" represents any single character; a minus sign "-" represents zero or more characters. They are illustrated with PDN=.

PDN=ABC-	all permanent dataset names starting with ABC
PDN=A***	all 4-character permanent dataset names starting with A
PDN=-A*-	all permanent dataset names containing the letter A followed by one or more other characters
PDN=-	all permanent dataset names
PDN=***-	all permanent dataset names having 3 or more characters

*** A Word About Continuations ***

If a COS JCL statement is too long to fit on one line, it may be continued by breaking the statement after a parameter, ending the line with a caret (^), and continuing the statement on the next line(s). For example,

```
FETCH,DN=prog3,SDN=myprog,^
      TEXT='GET,myprog.CTASK.'.
```

If a text field (quoted string) is too long, it may be split anywhere by adding an apostrophe (') to close the partial string and a caret to end the first line, and starting the next line with an apostrophe immediately followed by the rest of the string. For example,

```
DISPOSE,DN=FT14,SDN=myout14,DC=ST,MF=N1,TEXT='USER,user,pw.'^
        'PURGE,myout14/NA.DEFINE,myout14.CTASK.'.
```

-or-

```
DISPOSE,DN=FT14,SDN=myout14,DC=ST,MF=N1,^
        TEXT='USER,user,pw.'^
             'PURGE,myout14/NA.'^
             'DEFINE,myout14.'^
             'CTASK.'.
```

*** Summary of Cray JCL Commands ***

The following are Cray JCL statements, except as indicated by:

(DTRC - x) A command, procedure or program added at DTRC. Unless otherwise noted, these are accessed by:

```
ACCESS,DN=x,OWN=PUBLIC.
LIBRARY,DN=x:*.
name,....
```

x is one of: PROCLIB, UTILITY.

* Entire line is a comment.

Syntax: * <comments>

Similar commands: NOS: COMMENT; *
VMS: !

Examples: * This is a comment ---

ACCESS Make a permanent dataset local.

Syntax:
```
ACCESS,DN=dn,PDN=pdn,ID=uid,ED=ed,R=rd,W=wt,M=mn,
       UQ,NA,ERR,MSG,OWN=owner.
```

Parameters: PDN=pdn - If omitted, dn is used.

R=rd - required to read the dataset if R= on SAVE

W=wt - required for ADJUST if W= on SAVE

M=mn - required to DELETE the dataset if M= on SAVE

Similar commands: NOS: ATTACH; GET
VMS: no local file concept

Examples:
```
ACCESS,DN=mylocal,PDN=mypermfile.
ACCESS,DN=mylcl,PDN=yourpermfile,OWN=yourid.
= = = = =
ACCESS,DN=myfile,UQ.
DELETE,DN=myfile.
```

ACCOUNT Validate the user. Follows the JOB statement or, is the first interactive statement.

Syntax:
```
ACCOUNT,AC=ac,US=us,UPW=upw,NUPW=nupw.
```

Parameters: AC=ac - Account number (required)
(10 digits or "S" + 9 digits)

US=us - Username (your 4-character User Initials)

UPW=upw - User password (required)

NUPW=nupw - New user password

Remarks: This must be the first statement of an interactive session. When entered via CDC NOS ICF, US= may be omitted because it is supplied automatically. When entered via the DEC VMS Cray Station, US= may be omitted if you entered it in upper case in response to the CRAY USERNAME: prompt.

See also: JOB; page 1-2-2; Appendix D: CNEWPW

Similar commands: NOS: CHARGE
VMS: no user-specified charging

Examples:
```
ACCOUNT,AC=1234567890,US=xxxx,UPW=mypass.
ACCOUNT,AC=1234567890,US=xxxx,
        UPW=mypass,NUPW=nupass.
```

ACQUIRE Get a front-end dataset and make it local and permanent.

Syntax:
```
ACQUIRE,DN=dn,PDN=pdn,AC=ac,ID=uid,ED=ed,RT=rt,
        R=rd,W=wt,M=mn,UQ,MF=mf,TEXT='text',DF=df,
        OWN=ov,PAM=mode,ERR,MSG.
```

Parameters: AC=ac - acquisition code
IN - input dataset
IT - intertask communication
ST - dataset staged from front end (MF=)
(default: ST)

ED=ed - (defaults: 1 (permanent dataset does not exist)
highest (permanent dataset exists))

RT=rt - retention period (1-4095 days)
(default: 45)

Remarks: If the dataset is permanent, ACQUIRE is the same as ACCESS. If not, then it is the same as FETCH, SAVE,ACCESS.

See also: FETCH, MSFETCH

Similar commands: NOS: ATTACH; GET
VMS: HFT FETCH

Examples: ACQUIRE,DN=myfile,PDN=myfile,TEXT='myfile.FOR'.

ADJUST Redefine size of a permanent dataset.

Syntax: ADJUST,DN=dn,NA,ERR,MSG.

Permissions required: write; UQ on ACCESS

Remarks: ADJUST attempts to close the file. Subsequent references in the same job must reopen it and begin at BOD.

Similar commands: NOS: APPEND
VMS: lengthened automatically; cannot be shortened

Examples: ADJUST,DN=myfile,NA.

ALTACN Validate an alternate account number for permanent files.

Syntax: ALTACN,AC=ac.

Parameters: ac - the alternate account number

Remarks: ALTACN validates the supplied Job Order Number.

To use the validated number, specify the ACN parameter on the SAVE or MODIFY command.

See also: MODIFY, SAVE

Similar commands: NOS: CHANGE

Examples:
```
ALTACN,AC=1222233344.        <-- define the number
...
SAVE,DN=newfyl,ACN.          <-- use the number
ACCESS,DN=oldfyl,PDN=myoldfyl,UQ,....
MODIFY,DN=oldfyl,ACN.        <-- change the number
```

ASSIGN Create a local dataset and assign dataset characteristics.

Syntax: ASSIGN,DN=dn,LM=lm,A=alias,BS=bs,U.

Parameters: LM= - maximum number of 512-word blocks in the dataset
(maximum: 296000; default: 40000)

A= - alternate unit name

BS= - octal number of 512-word blocks for the I/O buffer
(default: 10 octal)

U - unblocked dataset
(default: blocked)

Remarks: See COS Reference Manual for additional parameters.

At system initiation,
ASSIGN,DN=$IN,A=FT05.
ASSIGN,DN=$OUT,A=FT06.
are performed automatically. You may reassign them at any time.

A Fortran OPEN will not recognize an ASSIGNed dataset.

Similar commands: NOS, VMS: ASSIGN

Examples:
```
ASSIGN,DN=myinput,A=FT11.
                  ^-- Fortran program reading from
                      unit 11 will read file MYINPUT
                      instead
```

AUDIT Report on permanent datasets.

Syntax:
```
AUDIT,L=ldn,PDN=pdn,ID=uid,OWN=own,ACN=acn,
      LO=opt:...:opt,SZ=dsz,ACC=opt:opt,
      X=mm/dd/yy:'hh:mm:ss',
      TCR=mm/dd/yy:'hh:mm:ss',
      TLA=mm/dd/yy:'hh:mm:ss',
      TLM=mm/dd/yy:'hh:mm:ss'.
```

Parameters:

L= - list dataset name
(default: $OUT)

PDN= - name of permanent dataset(s) to be listed

ID= - list datasets with this ID
ID - list datasets with null ID

OWN= - list datasets with this ownership value

ACN= - list datasets with this account number

LO= - list options:
- S - short list (PDN, ID, ED; 2 per line) (may not be mixed with other options)
- A - access tracking (owner name, count, time of last and first accesses)
- B - backup info (backup volume name,etc.)
- L - long list (PDN, ID, ED, size (words), retention time, access count, track access flag, public access mode (PAM), creation, last access, last dump time, device name, preferred residency (PR), current residency (CR). (default in batch if no LO)
- N - notes list
- P - permit list (permitted owner name, access mode, access count, time of last access, time of permit creation)
- R - retired dataset list (same as L, but only retired datasets)
- T - text list
- X - extended long list (L plus number of blocks and words allocated)

SZ= - list datasets >= this size (in words)

ACC= - access option parameters
- AM - those datasets belonging to OWN that you are allowed to see
- PAM - those datasets belonging to OWN having any form of public access (R:W:M:E)

X= - list datasets expired as of this date
X - list datasets expired as of now

TCR= - list datasets created since this date
TCR - not allowed
TCR=mm/dd/yy is sufficient

TLA= - list datasets not accessed since this date
TLA - not allowed
TLA=mm/dd/yy is sufficient

TLM= - list datasets modified since this date
TLM - not allowed
TLM=mm/dd/yy is sufficient

Similar commands: NOS: CATLIST
VMS: DIRECTORY; MSSAUDIT

```
Examples:   AUDIT,LO=S          <-- short audit
            AUDIT,LO=P          <-- audit showing who can and
                                    has accessed the datasets
            AUDIT,LO=L:P:N      <-- long audit, permitted
                                    users and notes
            AUDIT,LO=L          <-- long audit
            AUDIT,OWN=PUBLIC.   <-- list public files
```

AUDPL Audit an UPDATE program library (PL).

```
Syntax:     AUDPL,P=pdn,I=idn,L=!dn,M=mdn,*=m,/=c,DW=dw,
              LW=lw,JU=ju,DK=list,PM=list,LO=string,
              CM,NA,NR.

Parameters: P  I  L  *  /  NR  - see UPDATE

            M=  - Modifications dataset name (will contain
                  reconstructed modification sets)
                  (default: $MODS)
            M=0 - No modifications output

            DW= - Data width (number of characters written
                  per line to M dataset)
                  (default: up to DW value on UPDATE stmt)

            LW= - Listing width (number of characters written
                  per line to L dataset
                  (Values: divided into pages:  80,  132;
                           continuous listing: C80, C132)
                  (default: 132, divided into pages)

            JU= - Justification
                   N - identifier name left-justified;
                       sequence number right-justified;
                       no period between
                   L - entire sequence field left-justified
                       with period between
                  (default: identified name right-justified;
                            sequence number preceded by a
                            period and left-justfied)

            DK=dk1:dk2:...:dkn                              (1)
            DK='dk1,dk2,...,dkj.dkk,...,dkn'                (2)
                - Decks for A, C, D, H, I options and PM
                  parameter
                   (For (1): up to 100 decks;
                    for (2): separate single decks with
                             commas, and ranges of decks with
                             periods)
                  (Maximum string length: 96 characters)
                  (default: options apply to all decks)
            DK  - By itself is invalid
```

```
                PM=id1:id2:...:idn                                  (1)
                PM='id1,id2,...,idj.idk,...,idn'                    (2)
                    - Pulled modification sets (reconstructs
                      modification sets for the listed
                      identifiers for the decks listed in DK)
                       (Syntax: same as for DK=)
                PM  - By itself is invalid

                LO=string
                    - Listing options for ldn
                       Text listing (for DK= decks, if specified)
                        A - active lines
                        C - conditional text directives
                            (subset of option D)
                        D - compile dataset generation directives
                            (subset of option A)
                        H - modification histories
                        I - inactive lines
                       Summary options (for the entire PL)
                        K - deck line counts
                        L - identifier list
                        M - modification set cross-reference
                        N - identifier list in ASCII order
                        O - overlapping modification set list
                        P - short summary of the PL
                        S - status of modification set
                        X - common deck cross-reference

                CM  - Copy modifications (reconstructed
                      modification sets) to ldn and mdn

                NR  - Do not rewind modifications or binary
                      identifier list datasets at start or end
                      of AUDPL

        Similar commands:  NOS: UPDATE
                           VMS: CMS; LIBRARIAN; INCLUDE (in Fortran)

        Examples:     AUDPL,P=mypl,LO=P.
                      = = = = =
                      AUDPL,P=mypl,PM=mod2a:mod3c:example,
                            LO=AIKLMNOPSX.
                      COPYF,I=$MODS.


BLOCK   Convert an unblocked dataset to a blocked dataset.

        Syntax:       BLOCK,DN=ldn,BLKSIZE=size.                    (1)

                      BLOCK,I=idn,O=odn,BLKSIZE=size.               (2)

        Parameters:   DN=       - the dataset to be replaced (using an
                                  intermediate dataset $UNBLK)
                                  (ldn is rewound before and after)
```

BLKSIZE= - record length in 64-bit words
(non-foreign datasets only)
((2) - not permitted if previously assigned as foreign; record length and type are taken from the input ASSIGN)

I= - the unblocked input dataset
(idn is not rewound before the copy)

O= - the blocked output dataset
(if previously opened (ASSIGN), odn is not rewound before; otherwise, odn is created)

Remarks: For foreign datasets, the record length and type are taken from the ASSIGN.

BLOCK is intended primarily for postprocessing datasets created by or for certain stations.

Examples:
```
BLOCK,DN=myfile.
            ^-- Replace MYFILE with blocked copy
                of itself
= = = = =
BLOCK,I=myunblk,O=myblk.
            ^-- Copy unblocked file MYUNBLK as
                blocked file MYBLK
```

BUILD Generate and maintain library datasets.

Syntax:
```
BUILD,I=idn,L=ldn,OBL=odn,B=bdn,NBL=ndn,
      SORT,NODIR,REPLACE.
```

Parameters:

I=idn - Directive dataset name (default: $IN)
I - Same as I=$IN
I=0 - No directives

L=ldn - List dataset name (default: $OUT)
L - Same as L=$OUT

OBL=odn - Old object library dataset name (default: $OBL)
OBL - Same as OBL=$OBL
OBL=0 - No old binary library

B=bdn - Dataset with new object modules (default: $BLD)
B - Same as B=$BLD
B=0 - No modules to be added

```
                NBL=ndn - Output new object library dataset name
                          (default: $NBL)
                NBL     - Same as NBL=$NBL
                NBL=0   - No output written

                SORT    - modules are to be output in alphabetical
                          order
                          (default: written in the order they
                                    were first read)

                NODIR   - Do not append the directory to tne
                          output dataset - use to retrieve
                          relocatables
                          (default: append the directory)

                REPLACE - Modules in the new library are replaced
                          and in the same order as in the old
                          library
                          (default: new modules follow the
                                    unreplaced modules in the new
                                    library)
```

Directives: see page 3-5-1.

See also: Section 3-5

Similar commands: NOS: LIBEDIT
VMS: LIBRARIAN

Examples:

```
BUILD,OBL=0,I=0.
SAVE,DN=$NBL,PDN=mylib.
                ^-- create a new library from $BLD
= = = = =
ACCESS,DN=$OBL,PDN=mylib.
BUILD,I=0.
SAVE,DN=$NBL,PDN=mylib.
                ^-- add modules from $BLD to
                    existing library
= = = = =
ACCESS,DN=mylib1.
ACCESS,DN=mylib2.
ACCESS,DN=mylib3.
BUILD,I,OLB=0,B=0.
SAVE,DN=$NBL,PDN=mylib4.
- Directive: FROM mylib1,mylib2,mylib3
                ^-- merge several libraries - if
                    duplicate module names, last
                    found is retained (or use rename
                    form, if desired)
= = = = =
ACCESS,DN=$OBL,pdn=mylib.
BUILD,B=0.
SAVE,DN=$NBL,PDN=mylib.
- Directive: OMIT badpgm
                ^-- remove a module from a library
= = = = =
```

```
ACCESS,DN=xyz,PDN=mylib.
BUILD,I,OBL=xyz,B=0,NBL=$BLD,NODIR.
- Directive: COPY myprog
                ^-- extract module for loading
```

CALL Read control statements from the first file of another dataset or transfer control to a procedure.

Syntax:
```
CALL,DN=dn.          <-- read from another file
CALL,DN=dn,CNS.      <-- call a procedure
```

Parameters:

DN=dn - the dataset containing the statements or procedure (rewound before use)

CNS - Crack Next Statement - the first statement in "dn" is the procedure header; the statement following the CALL is treated as the invocation of the procedure

See also: Section 3-3

Similar commands: NOS: BEGIN
VMS: @name

Examples: Without CNS:

If the first file of dataset XYZ contains:

```
ACCESS,DN=INFYL,PDN=MYFILE.
ACCESS,DN=FILE1,PDN=MYDATA.
```

Then CALL,DN=XYZ. will access both datasets. This might be useful if you have several jobs using the same files, or if you have the same processing to be done by many jobs.

With CNS:

If the first file of dataset XYZ contains:

```
G,FILE,DATA.
ACCESS,DN=INFYL,PDN=&FILE.
ACCESS,DN=FILE1,PDN=&DATA.
```

Then CALL,DN=XYZ,CNS.
```
     *,MYFILE,MYDATA
```
will access the datasets MYFILE and MYDATA. Note that PROC and ENDPROC statements and the procedure name (G) are not used.

"call by name"
Execute a program by its local file name.

Syntax: dn.
dn,parameters.

Parameters: depends upon the local file being executed

Similar commands: NOS: LGO or an lfn
VMS: $ name :== $ dir:name
$ name

Examples: ACCESS,DN=myobj.
myobj.

CFT Compile a Fortran source program.

Syntax CFT,I=idn,L=ldn,B=bdn,C=cdn,E=m,EDN=edn,
OPT=option,MAXBLOCK=mb,INT=il,ALLOC=alloc,
ON=string,OFF=string,TRUNC=nn,AIDS=aids,
CPU=cpu:hdw,UNROLL=r,LOOPMARK[=lmmsgs],
DEBUG,SAVEALL,ANSI.

Parameters:

I=	- Input dataset name (default: $IN)
L=	- Listable output (default: $OUT)
L=0	- List only fatal errors
B=	- Binary load module dataset name (default: $BLD)
B=0	- No binary load modules
C=	- pseudo-CAL output dataset name (default: no dataset)
E=	- Highest level of messages to be suppressed 1 - comment 2 - note 3 - caution 4 - warning 5 - error (default: 3)
EDN=	- Alternate error listing dataset (default: no dataset)

ON= - Options to be enabled
(default: C E L P Q R S T U V)

OFF= - Options to be disabled
(default: A B D F G H I J N O W X Z)
A - abort if errors
B - list sequence number of code generation block
C - list common block names and lengths
D - list DO-loop table
E - recognize compiler directives
F - FLOWTRACE
G - list generated code (use only if requested by User Services)
H - list only first statement of each program unit
I - generate label symbol table
J - one-trip DO-loops
L - recognize listing control statements
M - ignored
N - put null symbols in symbol table
O - identify out-of-bound array references
P - allows double precision
Q - abort on 100 fatal errors
R - round multiply results
S - list source code
T - list symbol table
U - enable recognition of INTEGER*2 declarations
V - vectorize inner DO-loops
W - do not use
X - include cross-reference
Y - ignored
Z - put DEBUG symbol table on $BLD

TRUNC= - number of bits to be truncated
(default: 0; maximum: 47)

AIDS= - number of vectorization inhibition messages
LOOPNONE - no messages
LOOPPART - maximum of 3 per inner loop; 100 per compilation
LOOPALL - all messages
(default: LOOPPART)

OPT= - options (no more than one from each of the following groups; OPT=opt:opt:...):

. constant increment integer optimization:
  NOZEROINC - no incrementation by zero value variables
  ZEROINC - incrementation by zero value variables
  (default: NOZEROINC)

. optimization for 1-line DO-loop replacement with $SCILIB call:
  SAFEDOREP - no replacement if DO-loop has potential dependencies or equivalenced variables
  FULLDOREP - alway replace
  NODOREP - never replace
  (default: SAFEDOREP)

. move invariant code outside of DO-loop:
  INVMOV - enable
  NOINVMOV - disable
  (default: INVMOV)

. instructions moving over a branch instruction:
  UNSAFEIF - enable
  SAFEIF - disable
  (default: SAFEIF)

. bottom loading of scalar loops:
  BL - enable
  NOBL - disable
  (default: BL)

. B and T register allocation:
  BTREG - allocate maximum of 24 scalars to T regs
  NOBTREG - allocate to memory
  (default: NOBTREG)

. compilation of loops with specific ambiguous dependencies in vector and scalar versions:
  CVL - enable
  NOCVL - disable
  (default: enabled)

. update scalar temporaries in DO-loops:
  KEEPTEMP - enable
  KILLTEMP - disable
  (default: enable)

```
MAXBLOCK=   - number of words in a block of code to
              optimize or vectorize
MAXBLOCK=1  - disable
              (default: 2310)

INT=        - integer lengths
               64 - full 64-bit integers
               24 - short 24-bit integers
              (default: 64)

ALLOC=      - static memory allocation
               STATIC - all memory
               STACK  - read-only constants and
                        DATA, SAVE and common
                        block entities
               HEAP   - deferred implementation
              (default: STATIC)

CPU=         - mainframe type and hardware charac-
               teristics for running generated code
               cpu type:
                CRAY-XMP - 1, 2 or 4 processors
                CRAY-X1  - single-processor
                CRAY-X2  - dual-processor
                CRAY-X4  - quad-processor
               (default: compiling machine)

              hardware characteristics:
                [NO]EMA  - extended memory
                [NO]CI   - compressed index
                [NO]GS   - gather/scatter
                [NO]CIGS - compressed index gather/
                           scatter
                [NO]VPOP - vector popcount
                           functional unit
                [NO]AVL  - two vector logical
                           functional units
                [NO]BDM  - bidirectional memory

UNROLL=     - iteration count for unrolling inner
              DO-loops
              (range: 0 <= r <= 9)
              (default: 3)
UNROLL=0    - turn off unrolling

LOOPMARK=   - draw DO-loop brackets in source
              listing
               MSGS   - reasons for not vectorizing
               NOMSGS - no messages
              (default: NOMSGS)
LOOPMARK    - same as LOOPMARK=NOMSGS
```

DEBUG - put sequence number labels in Debug Symbol Table
(forces ON=IW and MAXBLOCK=1)
(default: debugging turned off)

SAVEALL - allocate user variables to static storage; compiler-generated variables to B or T registers

ANSI - flag non-ANSI usage

Remarks: CFT compiles faster than CFT77, but executes more slowly.

Production programs should be compiled using CFT77 and the resulting $BLD file saved.

See also: CFT77

Similar commands: NOS: FTN5
VMS: FORTRAN

Examples:
```
CFT.
CFT,I=$CPL.      <-- from UPDATE
CFT,LOOPMARK=MSGS.
CFT,B=myobj.
```

CFT77

Compile a Fortran 77 source program.

Syntax
```
CFT77,I=idn,L=ldn,B=bdn,C=cdn,E=m,OPT=option,
      INTEGER=il,ALLOC=alloc,ON=string,
      OFF=string,TRUNC=nn,CPU=cpu:hdw,DEBUG,
      LIST,STANDARD.
```

Parameters: I L B C ALLOC TRUNC CPU DEBUG - same as CFT

E= - same as CFT, except E=5 not allowed

OPT= - at most one from each of the following groups (OPT=opt:opt):

. optimization:
- FULL - attempt full optimization
- OFF - no optimization (fast compile)
- NOVECT - scalar optimization only

(default: FULL)

. constant increment integer optimization:
- NOZEROINC - no incrementation by zero-value variables
- ZEROINC - incrementation by zero-value variables

(default: NOZEROINC)

```
                INTEGER= - integer length
                           64 - full 64-bit integers
                           46 - short 46-bit integers
                          (default: 46)

                ON=      - M - enable the loopmark option
                               (same as CFT,LOOPMARK=MSGS)
                           (default: P Q R)
                OFF=     - (default: A F G H J M O S X Z)

                LIST     - full compilation listing (sets ON=CGSX)
                           DO NOT USE -- specify ON=CMSX instead

                STANDARD - flag non-standard Fortran 77 usage

        Remarks:  CFT77 compiles much more slowly than CFT, but
                  may execute faster.  OPT=OFF does not vectorize
                  and will, therefore, run slower.

                  Production programs should be compiled using
                  CFT77 and the resulting $BLD file saved.

        See also: CFT

        Similar commands:  NOS: FTN5
                           VMS: FORTRAN

        Examples: CFT77.
                  CFT77,I=$CPL.     <-- from UPDATE
                  CFT77,B=myobj,ON=M.

CHARGES Report on job resources.

        Syntax:   CHARGES,L=ldn,MSG=msgopt,SR=options.

        Parameters:  MSG - controls the display of messages in the
                           system log
                            ON  - output to $LOG and $SYSLOG
                            OFF - output not displayed in log

                     SR  - control display of system resources
                            CPU   - CPU, I/O wait, and CPU wait times
                                    since start of job
                            DS    - permanent dataset statistics
                                    (synonym: DISK)
                            FSU   - FSS (buffer memory in IOS) usage
                            GRU   - generic resource usage
                            JNU   - job name and user number
                            JSQ   - job sequence number
                            MM    - job size (memory) statistics
                                    (synonym: MEMORY)
                            MULTI - % of time spent in each CPU
                            NBF   - number of blocks received from/
                                    queued to a front end
                                    (synonym: FE)
```

RDM - job and permanent data usage and limits
TASK - CPU, I/O wait, and CPU wait times broken down by task; and totals for job
WT - time spent waiting in input queue (synonym: QWAIT)
(default: all statistics)

Remarks: CHARGES is invoked automatically at job end.

Similar commands: NOS: ENQUIRE
VMS: CHARGES; ^T

Examples: CHARGES,SR=DS:MM:TASK

COMPARE Compare two datasets.

Syntax: COMPARE,A=adn,B=bdn,L=ldn,DF=df,ME=maxe,CP=cpn,
CS=csn,{CW=cw|CW=cw1:cw2},ABORT=ac.

Parameters: A= - input dataset names - error if adn=bdn
B=

L= - name of dataset for list of differences
(default: $OUT;
may not be same as adn or bdn)

DF= - input dataset format
B - binary - datasets compared logically with difference listed in octal
T - text - differences printed as text
(default: T)

ME= - maximum number of differences to be printed
(default: 100)

CP= - amount of context printed, that is, the number of records on either side of a difference to be printed
(applies only to DF=T)
(default: 0)

CS= - amount of context to be scanned, that is, the number of records on either side of a discrepancy to be scanned
(applies only to DF=T)
(default: 0)

CW= - compare width - either compare columns 1 through cw or columns cw1 through cw2 (default: CW=1:133)

ABORT= - abort the job step after ac or more differences have been found
ABORT - same as ABORT=1 (default: 1)

Similar commands: NOS: VERIFY; VFYLIB
VMS: DIFFERENCES

Examples:
```
ACCESS,DN=one,PDN=myfile1.
ACCESS,DN=two,PDN=myfile2.
COMPARE,A=one,B=two,CS=5.
```

COPYD Copy blocked datasets.

Syntax:
```
COPYD,I=idn,O=odn,S=m.
```

Parameters: S=m - shift count (number of ASCII blanks to be inserted at the start of each line) (maximum: 132)
S - same as S=1 (default: 0)

See also: COPYF; COPYNF; COPYR; COPYU

Similar commands: NOS: COPY; COPYSBF
VMS: COPY

Examples:
```
COPYD,I=myprog,S=25.
          ^-- copy shifted file to $OUT
              (source program centered on wide
              paper)
```

COPYF Copy blocked files.

Syntax:
```
COPYF,I=idn,O=odn,NF=nf,S=m.
```

Parameters: I O S - same as COPYD

NF=nf - decimal number of files to copy
NF - copy through EOD (default: 1)

Remarks: After the copy, both datasets are positioned after the EOF for the last file copied. If BFI=OFF is specified on the ASSIGN, compressed blanks are expanded.

See also: COPYD; COPYNF; COPYR; COPYU

Similar commands: NOS: COPY; COPYBF; COPYCF; COPYSBF
VMS: COPY

Examples: COPYF,I=FT02. <-- print Fortran unit 2 on $OUT.

COPYNF Copy files from one blocked dataset to another.

Syntax: COPYNF,I=idn,O=odn,NF=n.

Parameters: I O - same as COPYD

NF=n - deciaml number of files to copy.
NF - copy through EOD
(default: 1)

Remarks: After the copy, the input dataset is positioned after the EOF for the last file copied; the output dataset is after the EOF of the last record copied.

See also: COPYD; COPYF; COPYR; COPYU

Similar commands: NOS: COPYBF; COPYCF

Examples: COPYNF,I=mydata,O=files,NF=3.
^-- copy 3 files from dataset MYDATA to dataset FILES

COPYR Copy blocked records.

Syntax: COPYR,I=idn,O=odn,NR=nr,S=m.

Parameters: I O S - same as COPYD

NR=nr - decimal number of records to copy
NR - copy through EOF
(default: 1)

Remarks: After the copy, both datasets are positioned at the end of the last record copied. If BFI=OFF is specified on the ASSIGN, compressed blanks are expanded.

See also: COPYD; COPYF; COPYNF; COPYU

Examples: COPYR,I=myfile,O=recs,NR=342.

COPYU Copy unblocked datasets.

Syntax: COPYU,I=idn,O=odn,NS=ns.

Parameters: I O - same as COPYD

NS=ns - number of sectors to copy
NS - copy through EOD
(default: 1)

See also: COPYD; COPYF; COPYNF; COPYR

Examples: COPYU,I=unfy11,O=unfy12,NS.

&DATA Defines the beginning of data within a procedure.

Syntax: &DATA,dn.

Parameters: dn - the name of the dataset to contain the data which follows this statement

Remarks: All lines following an &DATA up to the next &DATA or ENDPROC are written to the specified dataset.

Similar commands: NOS: .DATA
VMS: OPEN,WRITE,CLOSE

Examples:
```
PROC,MYPROC.
   ...
ENDPROC.
&DATA,IN1.
1.73, 2.6, 4
4.62, 9.7, 6
0,0,0
&DATA,IN2.
06Test01
12Ship 472-396X
```

DDA Dynamic Dump Analyzer (selectively examine the contents of a program memory dump).

Syntax: DDA,I=idn,S=sdn,L=odn,DUMP=ddn,LOG=ldn,ECHO=edn.

Parameters: I= - the directives to be executed
(default: $IN)

S= - symbolic dataset name
(default: $DEBUG)

L= - output listing
(default: $OUT)

DUMP= - the dataset with the dump to be analyzed
(default: $DUMP)

LOG= - the dataset to receive a copy of all input to and output from the debugger
(default: $DBLOG)

ECHO= - the dataset to receive a copy of all input to the debugger
(default: $DBECHO)

Remarks: Like DEBUG, DDA interprets the contents of a program memory dump created during abort exit processing. Unlike DEBUG, you can give directives to dynamically select the information to display.

Directives: See SR-0311, COS Symbolic Debugging Package Reference Manual (formerly SR-0112).

See also: DEBUG

Similar commands: NOS: FTN5,DB=PMD
VMS: FORTRAN/DEBUG

Examples: See DUMPJOB

DEBUG Interpret a dump.

Syntax:
```
DEBUG,S=sdn,L=ldn,DUMP=ddn,CALLS=n,TASKS,
      SYMS=sym[:sym],NOTSYMS=nsym[:nsym],
      MAXDIM=dim,BLOCKS=blk[:blk],
      NOTBLKS=nblk[:nblk],RPTBLKS,PAGES=np.
```

Parameters:

S= - Debug symbolic tables
(default: $DEBUG)

L= - Listable output
(default: $OUT)

DUMP= - Dump dataset name
(default: $DUMP)

CALLS= - Number of routine levels to display
(default: 50)

TASKS - Trace back through all existing tasks
(default: only through tasks running when dump taken)

```
                SYMS=     - List of symbols to be displayed
                            (Maximum: 20 symbols)
                            (default: all symbols)
                NOTSYMS=  - List of symbols to be skipped
                            (Maximum: 20 symbols)
                            (default: all symbols displayed)

                MAXDIM=   - Maximum number of each dimension to be
                            displayed
                            (default: 20:5:2:1:1:1:1)

                BLOCKS=   - List of common blocks to include
                            (Maximum: 20 symbols)
                BLOCKS    - Include all common blocks
                NOTBLKS=  - List of common blocks to exclude
                            (overrides BLOCKS)
                            (Maximum: 20 symbols)
                NOTBLKS   - Exclude all but subprogram block

                RPTBLKS   - Repeat blocks (display with each
                            subprogram
                            (default: display once)

                PAGES=    - Page limit
                            (default: 70)

        Similar commands:  NOS: FTN5,DB=PMD
                           VMS: FORTRAN/DEBUG

        Examples:    See DUMPJOB.


DELETE  Remove a permanent dataset.

        Syntax:      DELETE,DN=dn,NA,ERR,MSG,PARTIAL.

                     DELETE,PDN=pdn,ID=uid,OWN=owner,ED=ed,M=mn,
                            NA,ERR,MSG.

        Parameters:  PARTIAL - delete the contents of the file, but
                               not the information about the file

                     ED=ed   - edition number (1-4095)
                               unsigned - specific edition
                               +n       - delete n highest editions
                               -n       - keep   n highest editions
                               ALL      - all editions
                              (default: highest edition)

        Remarks:     The first form is used if the permanent file has
                     already been ACCESSed.

                     The second form does not ACCESS the file.
```

See also: Appendic C: CDELETE

Similar commands: VMS: CREATE a new version, PURGE/KEEP=1;
DELETE; PURGE

Examples:
```
ACCESS,myfile,UQ.
DELETE,DN=myfile,PARTIAL.
= = = = =
DELETE,PDN=myfile,ALL.
= = = = =
DELETE,PDN=A**.
            ^-- delete all datasets with
                3-character names starting with
                "A"
```

DISPOSE Stage a dataset to the front-end; release a local dataset; change disposition characteristics.

Syntax:
```
DISPOSE,DN=dn,SDN=sdn,DC=dc,MF=mf,SF=sf,ID=uid,
        TID=tid,R=rd,W=wt,M=mn,TEXT='text',DF=df,
        WAIT|NOWAIT,DEFER,NRLS.
```

Parameters:

DN=dn - required

SDN=sdn - staged dataset name (1-15 characters)
(default: dn; required for CYBER 860)

DC=dc - to 860: DC=ST is required
to VAX: DC=PR with TEXT='any' makes a file with Fortran carriage control; DC=ST (with TEXT='any') makes a file with carriage return carriage control

SF=sf - special forms (1-8 alphanumeric characters)
(default: no special forms)

DF=df - TR or CB or BB
(default: CB)

WAIT
NOWAIT - wait or don't wait until dataset has been staged to the front-end
(default: NOWAIT)

DEFER - disposition occurs at end-of-job or when the dataset is RELEASEd

NRLS - after disposition, the dataset remains local (use WAIT)

See also: MSSTORE

Similar commands: NOS: ROUTE
VMS: FICHE (DTRC); PRINT; XEROX (DTRC)

Examples:
```
DISPOSE,DN=out1,DC=PR.
                ^-- to VAX (assumed job origin)
= = = = =
DISPOSE,DN=out2,SDN=mymss,MF=N1,DC=ST,^
        TEXT='USER,user,pw.'^
             'PURGE,mymss/NA.'^
             'DEFINE,mymss.'^
             'CTASK.',WAIT.
             ^-- send to MSS
= = = = =
DISPOSE,DN=out3,MF=V3,^
        TEXT='myvax.dat',WAIT.
             ^-- send to VAXcluster
= = = = =
DISPOSE,DN=DISPLOT,DC=ST,DF=BB,TEXT='plot.dat',^
        WAIT.
             ^-- DISSPLA output file to VAX for
                 post processing
```

DS List local datasets.

Syntax: DS.

Remarks: The information displayed includes alis, size, position (e.g., EOF), last operation, and open status.

Similar commands: NOS: ENQUIRE,F

Examples: DS.

DSDUMP Dump a dataset in octal or hexadecimal.

Syntax:
```
DSDUMP,I=idn,O=odn,DF=df,IW=n,NW=n,IR=n,NR=n,
       IF=n,NF=n,IS=n,NS=n,Z,DB=db,DSZ=sz.
```

Parameters:

I= - (synonym: DN=idn)

O= - dataset to receive the dump
(default: $OUT)

DF= - dataset format
B - blocked
U - unblocked
(default: B)

IW= - decimal/octal number of the initial word for each record/sector
(defaults: 0 (Z specified);
1 (Z omitted))

```
NW=  - decimal/octal number of words to dump
       (default: 1)
NW   - through end of record/sector

IR=  - decimal/octal number of the initial record
       for each input file - only if DF=B
       (defaults: 0 (Z specified);
                  1 (Z omitted))
NR=  - decimal/octal number of records per file
       to dump - only if DF=B
       (default: 1)
NR   - all records in each file

IF=  - decimal/octal number of the initial file in
       idn - only if DF=B
       (defaults: 0 (Z specified);
                  1 (Z omitted))
NF=  - decimal/octal number of files to dump -
       only if DF=B
       (default: 1)
NF=0 - all files in the dataset

IS=  - decimal/octal number of the initial
       sector - only if DF=U
       (defaults: 0 (Z specified);
                  1 (Z omitted))
NS=  - decimal/octal number of sectors to dump -
       only if DF=U
       (default: 1)

Z    - the zero-base for the initial-value
       parameters (IW, IR, IF, IS)
        Z    - each Ix is relative to 0;
               output refers to word, record,
               file, and sector numbers start
               at 0
                 DSDUMP,...,IW=4096.  is same as
                 DSDUMP,...,Z,IW=4095.
        no Z - each Ix is relative to 1
       (does not affect Nx parameters)

DB=  - numeric base for displaying the data words
        OCTAL or O - octal
        HEX   or H - hexadecimal

DSZ= - size of data items to dump
        WORD   or W - words   (64 bits)
        PARCEL or P - parcels (16 bits)
       (default: WORD)
```

Similar commands: NOS: TDUMP

```
Examples:    DSDUMP,I=myfile,NW=25,NR=5,DB=H.
                        ^-- hexadecimal dump of first 25
                            words of first 5 records of
                            MYFILE
```

DUMP Display job information previously captured by DUMPJOB.

Syntax: DUMP,I=idn,O=odn,FWA=fwa,LWA=lwa,JTA,NXP,V,DSP,
FORMAT=f,CENTER.

Parameters:

- I= - dataset containing the memory image (default: $DUMP)
- FWA= - first word address to dump (default: word 0 of Job Communication Block (JCB))
- LWA= - last word address to dump (default: 200 of JCB)
- LWA - the limit address
- LWA=0 - no memory
- JTA - dump Job Table Area (default: no JTA dump)
- NXP - dump No Exchange Package, B, T, cluster, and semaphore registers (default: these are dumped; NXP overrides V if both specified)
- V - dump vector registers (default: do not dump vector registers)
- DSP - dump Logical File Tables (LFTs) and Dataset Parameter Tables (DSPs) (default: do not dump LFTs and DSPs)
- FORMAT= - format for dumping FWA through LWA
  - D - data - decimal integer and ASCII
  - G - data - floating-point or exponential and ASCII
  - I - instr - CAL mnemonics and ASCII
  - M - data - each 16-bit parcel displayed as 1 hex and 4 octal digits
  - C - data - octal integer and ASCII
  - P - data - 16-bit parcel
  - X - data - hex integer and ASCII
- CENTER - dump 100 (octal) words on each side of P-register address in P format

Examples: See DUMPJOB.

DUMPJOB Capture job information in dataset $DUMP for display by DUMP or DEBUG or DDA.

Syntax: DUMPJOB.

Examples:

```
...
EXIT.
DUMPJOB.
DUMP,....  -or-  DEBUG,BLOCKS,....  -or-  DDA,....
```

ECHO Control logfile messages.

```
Syntax:      ECHO,ON=class1:...:classm,OFF=class1:...:classn

Parameters:  ON=  - list of classes whose messages are to be
                    written to the log file
                    ("ON" is the same as "ON=ALL")
             OFF= - list of classes whose messages are NOT to
                    be written to the log file
                    ("OFF" is the same as "OFF=ALL")
             classi - ABORT  - job failure
                      EXPINF - dataset statistics messages
                      JCL    - messages in user's JCL
                      PDMERR - PDM errors
                      PDMINF - PDM dataset information
                      ALL    - all classes

Remarks:     The ECHO state after returning from a procedure
             call is the same as before the call, regardless
             of any changes made in the procedure.
             Within a procedure, the ECHO state is that of the
             caller, unless changed within the procedure.

Similar commands:  VMS: /LOG on some commands

Examples:    ECHO,OFF.
```

ELSE See IF.

ELSEIF See IF.

ENDIF See IF.

ENDLOOP See LOOP.

ENDPROC See PROC.

EXIT On job abort, processing continues with the statement following the EXIT; if no abort, terminate job processing.

```
Syntax:  EXIT.

Similar commands:  NOS: EXIT
                   VMS: ON condition

Examples: ...
          EXIT.
          DUMPJOB.
          DUMP.
          ...
```

EXITIF See IF.

EXITLOOP See LOOP.

FETCH Get a front-end dataset and make it local.

Syntax:
```
FETCH,DN=dn,SDN=sdn,AC=ac,TEXT='text',MF=mf,
      DF=df.
```

Parameters:

DN= - local dataset name

SDN= - staged dataset name (front-end dataset name)
(default: dn)

AC= - acquisition code (where the dataset is to be acquired)
IN - input (job) dataset - use SUBMIT to run the job
IT - intertask communication
MT - magnetic tape at the front end
ST - staged dataset from the front end
(default: ST)

MF= - mainframe computer identifier
N1 - MSS
V3 - DT3
(default: front end of job origin)

DF= - dataset format (BB, BD, CB, CD, TR)
(default: CB)

Remarks: FETCH defaults to DF=CB, MSFETCH defaults to DF=TR.

See also: MSFETCH

Similar commands: VMS: HFT FETCH (get an MSS file, DTRC)

Examples:
```
FETCH,DN=SOURCE,TEXT='PROG.FOR'.
= = = = =
FETCH,DN=FT11,DF=TR,^
      TEXT='[ABCD.SUBD1]CRAYBIN.DAT'.
             ^-- binary data file from a VAX
                 subdirectory of user ABCD
= = = = =
FETCH,DN=SORC,SDN=mssname,MF=N1,^
      TEXT='USER,name,pw.^
           'GET,mssname.CTASK.'
             ^-- get an indirect MSS (860) file
```

FLODUMP Dump flowtrace table of a program abort.

Syntax: FLODUMP,L=ldn.

Parameters: L= - dataset to contain the report
(default: $OUT)

Examples:
```
...
EXIT.
DUMPJOB.
FLODUMP.
```

FTREF Generate Fortran cross-reference.

Syntax: FTREF,I=idn,L=ldn,CB=op,TREE=op,ROOT=root,
END=end,LEVL=n,DIR=dir,NORDER,MULTI.

Parameters: I= - input dataset containing the cross-reference table listing and Fortran source program (ON=XS)

CB= - global common block cross references
PART - routines using a common block
FULL - use of common block variables
NONE - no output information
(default: PART)

TREE= - static calling tree
PART - entry names, external calls, calling routines, common block names
FULL - PART plus static calling tree
NONE - no output information
(default: PART)

ROOT= - if TREE=FULL, this defines the name of the routine to be used as the root of the tree
(default: the routine not called by any other routine;
if more than one, the first alphabetically)

END= - if TREE=FULL, this defines the name of the routine to be used as the end of any branch of a tree
(default: complete trees are generated)

LEVEL= - if TREE=FULL, this is the maximum length of any branch
(default: the entire program)

DIR= - dataset containing processing directives
(default: no directives)

NORDER - list subprograms in input order
(default: list in alphabetical order)

MULTI - summarize multitasking subroutine usage

Directives: The following may be in the DIR= dataset:

ROOT - list of modules to be used as roots of separate trees
ROOT,md1,md2,...,mdn.

SUBSET - list of modules to be processed
SUBSET,md1,md2,...,mdn.
(default: all modules)

CHKBLK - list of common blocks to be checked for locked variables
CHKBLK,blk1,blk2,...,blkn.

CHKMOD - list of external calls to be checked for calling from a locked area
CHKMOD,mod1,mod2,...,modn.

Similar commands: NOS: FTN5,LO=
VMS: FORTRAN /CROSS_REFERENCE

HOLD Specify that dataset release occurs with implicit HOLD.

Syntax: HOLD,GRN=grn.

Parameters: GRN=grn - generic resource name

Remarks: This prevents return of resources to the system and is useful when dataset assignment is done by applications over which the user has no control.

See also: NOHOLD

IF Begin a conditional block of code.

Syntax:
```
IF(expression)
  <do if true>
ELSEIF(expression)
  <do if true>
ELSE.
  <do if all other tests fail>
ENDIF.

EXITIF.                  <-- exit unconditionally
EXITIF(expression)       <-- exit if exp is true
```

Parameters: exp - a valid JCL expression

Remarks: Literal strings, '...', in an IF/ELSEIF expression are limited to 8 characters (one machine word).

Similar commands: NOS: IF; IFE
VMS: IF

Examples:

```
ACCESS,DN=MYPROG,NA.
IF(PDMST.NE.1)
  UPDATE(Q=MYPROG)
  CFT(I=$CPL,ON=A)
  NOTE(DN=SLIN,TEXT='ABS=MYPROG')
                    ^-- create input directive
                        file for SEGLDR
  SEGLDR(I=SLIN)
  SAVE(DN=MYPROG,NA)
  EXITIF.
  EXIT.
*.
*.     Error while generating MYPROG
*.
  EXIT.
ENDIF.
MYPROG.
====================
```

Same as above, but in a procedure, with SEGLDR directives in a data file in the procedure:

```
PROC.
DOMYPROG.
   ...      <-- omit NOTE command
ENDPROC.
&DATA,SLIN
   ...
ABS=MYPROG
```

IOAREA Control access to a job's I/O area (containing the DSP and I/O buffers).

Syntax: IOAREA, { LOCK ¦ UNLOCK }

Parameters: LOCK - the limit address is set to the base of the DSPs, denying direct access to the user's DSP and I/O buffers. When locked, system I/O routines can gain access.

UNLOCK - the limit address is set to JCFL, allowing access to these areas.

Examples:

```
IOAREA,LOCK.
```

ITEMIZE Report statistics about a library dataset.

Syntax: ITEMIZE,DN=dn,L=ldn,NREW,MF=n,T,BL,E,B,X.

Parameters: DN= - (default: $OBL)

NREW - no rewind
(default: rewind before and after)

NF= - number of files to be listed
(default: 1)
NF - all files

T - truncate lines after 80 characters
(if specified, E, B, X may not be used)

BL - burstable listing (each heading is at top of a page
(default: page eject only when current page is nearly full)

E - list all entry points (binary library datasets only)

B - E plus code and common block information
(B overrides E)

X - B plus external information
(X overrides B)

Restrictions: . an UPDATE PL is recognized only if it is the only item in a dataset
. standard COS blocked datasets only

Similar commands: NOS: ITEMIZE
VMS: LIBRARIAN

Examples: ITEMIZE,DN=myreloc
ITEMIZE,DC=mylib,X.

JOB First statement of a job - gives job parameters.

Syntax: JOB,JN=jn,MFL=fl,T=tl,OLM=olm,US=jcn.

Parameters: JN=jn - job name (1-7 alphanumeric characters)

MFL=fl - maximum field length (decimal) for the job - fl is rounded up to the nearest multiple of 512 words, or the amount needed to load CSP (Control Statement Processor)
(default: 768000)
MFL - the system maximum (3,532,800)

T=t1 - job time limit (decimal seconds)
(default: 30; max: 200000)
T - the system maximum (~194 days!)
NOTE: your job will not run because
this exceeds the DTRC maximum!

OLM=olm - maximum size of $OUT; olm is the
number of 512-word blocks (each block
holds about 45 lines)
(default: 8192; maximum: 65536)

US=jcn - job class (1-7 alphanumeric characters)
jcn is one of:
NORMAL, DEFER, BUDGET, PZERO, SECURE
Job is dropped to a lower class if it
doesn't fit the requested job class.
(default: NORMAL, if it fits)
(see page 3-1-4 for the job class
limits and SECURE restrictions)

Remarks: The JOB statement may be continued.

See also: ACCOUNT

Examples:
```
JOB,JN=jobname1.
ACCOUNT,....
<rest of job>
```

JOBCOST (DTRC - UTILITY) Write a summary of the job cost and system usage to $LOG.

Syntax: JOBCOST

Remarks: A subroutine version is available in DTLIB.

Examples:
```
ACCESS,DN=UTILITY,OWN=PUBLIC.
LIBRARY,DN=UTILITY:*.
JOBCOST.     <-- the cost to this point in job
< execute your program >
JOBCOST.     <-- the cost of running your program
```

LIBRARY Specify the library dataset search order for control statement verbs.

Syntax: LIBRARY,DN=dn1:dn2:...:dn64,V.

Parameters: DN= - up to 64 library names to be searched - an asterisk means add the listed names to the current searchlist
V - list the current library searchlist in the logfile

Similar commands: NOS: LIBRARY; LDSET,LIB= (not subs)

Examples:
```
LIBRARY,DN=THISLIB:YOURLIB.
                        ^-- the searchlist contains
                            2 libraries
LIBRARY,DN=THATLIB:*,V.
                        ^-- the searchlist now has
                            3 libraries and are
                            listed in the logfile
LIBRARY,,V.             <-- list the current
                            searchlist in the logfile
```

LOOP Start of an iterative control statement block.

Syntax:
```
LOOP.
...
EXITLOOP.
EXITLOOP(expression)
...
ENDLOOP.
```

Parameters: exp - a valid JCL expression

Similar commands: NOS: WHILE

Examples: Merge two datasets for 60 records:
```
  SET,J1=0.
  SET,J2=60.
  LOOP.
    EXITLOOP(J2.EQ.0)
    IF(J1.EQ.0)
      COPYR,I=DSIN1,O=OUTDS.
      SET,J1=1.
    ELSE.
      COPYR,I=DSIN2,O=OUTDS.
      SET,J1=0.
    ENDIF.
    SET,J2=J2-1.
  ENDLOOP.
  REWIND,DN=DSIN1:DSIN2:OUTDS.
```

MEMORY Request new field length.

Syntax:
```
MEMORY.
MEMORY,FL=fl.
MEMORY,FL=fl,{ USER | AUTO }.
```

Parameters:
```
FL=fl  - the decimal number of words of field
         length; "FL" allocates the job maximum
USER   - field length is retained until the next
         request
AUTO   - field length is reduced automatically at
         the end of each job step
```

Similar commands: NOS: MFL

Examples:
```
MEMORY,FL,USER.          <-- get and hold the maximum
                             field length
MEMORY,AUTO.             <-- resume automatic mode
                             (FL reduces after next job
                             step)
MEMORY,FL=32978.         <-- get and hold 32978 words
                             (user mode)
MEMORY,FL=32978,AUTO.
                         ^-- get 32978 words for next
                             job step only
```

MODE Set/clear mode flags.

Syntax:
```
MODE,FI=option,BT=option,EMA=option,AVL=option,
     ORI=option.
```

Parameters:
```
option - ENABLE or DISABLE
FI     - floating-point error interrupts
         (default: ENABLE)
BT     - bidirectional memory transfers
         (default: ENABLE)
EMA    - extended memory addressing
         (default: DISABLE)
AVL    - second vector logical function unit
         (default: DISABLE)
ORI    - operand range error interrupt
         (default: ENABLE)
```

Similar commands: NOS: MODE
VMS: ON condition

MODIFY Change a permanent dataset's characteristics.

Syntax:
```
MODIFY,DN=dn,PDN=pdn,ID=uid,ED=ed,RT=rt,R=rd,
       W=wt,M=mn,NA,ERR,MSG,EXO=exo,PAM=mode,ACN.
```

Parameters:
```
RT=rt - new retention period
RT=   - reset to default

ACN   - use the alternate account number
```

Remarks: If the file has control words (M=, R=, W=), they must all be specified in the ACCESS.

See also: ALTACN; NEWCHRG; SAVE; Appendix D: CNEWCHRG

Similar commands: NOS: CHANGE
VMS: SET PROTECTION

Examples:
```
ACCESS,DN=mylocal,PDN=myperm,UQ,....
MODIFY,DN=mylocal,PAM=R.
```

MSACCES (DTRC) Supply username and password to the Mass Storage System.

Syntax: MSACCES,US=us,MPW=mpw,AC=ac.

Parameters: us - user initials/username
(default: the executing VAX user initials)

mpw - MSS password

ac - account/charge number
(default: the executing VAX account number)

Remarks: MSACCES is required before using the MSx commands.

Similar commands: VMS: HFT ACCESS (DTRC)

Examples:
```
MSACCES,MPW=mymsspw.
MSAUDIT,.... -or- MSCHANG,.... -or- MSFETCH,....
             -or- MSPASSW,.... -or- MSPURGE,....
             -or- MSSTORE,....
= = = = =
MSACCES,US=other,MPW=otherpw,AC=otherac.
             ^-- access the MSS as another user
```

MSAUDIT (DTRC) Sorted audit of Mass Storage files.

Syntax: MSAUDIT,MPW=mpw,L=ldn,LO=lo,SHOWPW=showpw,UN=un.

Parameters: mpw - your MSS password

lo - list options
F - full audit (4 lines per file + cost per month and per day)
S - short audit (length, filename, CT, M (permissions), number of uses, indirect/direct)
I - intermediate audit (short plus number of uses, date created, date last accessed, number of streams (direct files), password (if requested), charge number (your files), cost per day)
(default: LO=F)

showpw - enter anything to include each file's password (your files only) in the output list (LO=S or I)
(default: passwords are not included)

un - Username (User Initials) of the owner of the MSS files to be audited
(default: your own files)

Remarks: MSACCES is required before using the MSx commands.

MSAUDIT provides a sorted listing of your files on the Mass Storage System (4 lines per file) and two shorter forms (1 line per file).

See also: AUDIT

Similar commands: NOS: BEGIN,AUDIT; CATLIST
VMS: DIRECTORY/FULL; MSSAUDIT

Examples:
```
MSAUDIT,mymsspw.
              ^-- 4 lines per file listing of
                  your MSS files on $OUT
====================
MSAUDIT,mymsspw,L=audout,LO=I,SHOWPW=x.
              ^-- 1 line per file listing
                  (including each file's password)
                  written to local file AUDOUT
====================
MSAUDIT,mymsspw,L=hisout,LO=S,UN=other.
              ^-- short listing of MSS files of
                  user OTHER in file HISOUT
```

MSCHANG Change Mass Storage System file attributes.

Syntax:
```
MSCHANG,MDN=mdn,NMDN=nmdn,PW=pw,CT=ct,M=m,BR=br,
        PR=pr,NA=na,AC=ac,CP=cp.
```

Parameters:

mdn - MSS filename whose attributes are to be changed

nmdn - new MSS filename

pw - new password
0 - clear the password

ct - file permit Category Type

ct	meaning
P or PR or PRIVATE	private
S or SPRIV	semiprivate
PU or PUBLIC	public

m - alternate user permission mode for semiprivate and public files

m	meaning
E (EXECUTE)	you can execute; others can read or execute concurrently
R (READ)	all can read or execute concurrently

RU	(READUP)	all can read or execute; one (other) user can rewrite the file
RA	(READAP)	all can read or execute; one (other) user can lengthen the file
RM	(READMD)	all can read or execute; one (other) user can lengthen or rewrite the file
U	(UPDATE)	all can read or execute; you can rewrite the file
A	(APPEND)	all can read or execute; you can lengthen the file
M	(MODIFY)	all can read or execute; you can lengthen or rewrite the file
W	(WRITE)	you can read, execute, lengthen, rewrite, or shorten the file; others have no concurrent access

br - backup requirements

br	meaning
CR	off-station backup
Y	on-station backup

pr - preferred residence

pr	meaning
M	alternate storage - MSS
N	no preference

na - one of:
0 - abort on errors
non-0 - do not abort on errors
(default: NA=0)

ac - may alternate users obtain information about the file? (Y or N)

cp - account number is to be replaced by the one currently in effect
non-0 - change the account number

MDN is required; the defaults for the others is to leave them unchanged.

Remarks: MSACCES is required before using the MSx commands.

Similar commands: NOS: CHANGE
VMS: HFT CHANGE

```
        Examples:   MSACCES,UN=myid,MPW=mymsspw.

                    MSCHANG,MDN=myfile,NMDN=newname.
                                ^-- change MSS file MYFILE to NEWNAME

                    MSCHANG,MDN=myfile,NMDN=newname,NA=1.
                                ^-- change MSS file MYFILE to
                                    NEWNAME (don't abort if MSS file
                                    NEWNAME already exists)

                    MSCHANG,MDN=myfile,CT=PU.
                                ^-- make MSS file MYFILE public

                    MSCHANG,MDN=myfile,PW=mypw.
                                ^-- put a password on MSS file MYFILE

                    MSCHANG,MDN=myfile,BR=CR.
                                ^-- make MSS file MYFILE a critical
                                    file with off-station backup

                    MSCHANG,MDN=myfile,BR=Y.
                                ^-- make MSS file MYFILE a non-
                                    critical file with on-station
                                    backup

                    MSCHANG,MDN=myfile,CP=1.
                                ^-- change the account number to the
                                    one in effect on the MSS

MSFETCH  (DTRC) Fetch a file from the Mass Storage System.

        Syntax:     MSFETCH,DN=dn,MDN=mdn,DF=df,UN=un,PW=pw.

        Parameters: dn  - the local dataset name

                    mdn - the MSS dataset (file) name
                          (default: MDN=dn)

                    df  - data format
                           TR - transparent (no conversion)
                           CB - character blocked (convert from
                                CDC display code)
                          (default: DF=TR)

                    un  - Username (User Initials) of the owner of
                          the MSS file
                          (omit for your own files)

                    pw  - optional MSS file password

        Remarks:    MSACCES is required before using the MSx commands.

                    MSFETCH defaults to DF=TR, FETCH defaults to
                    DF=CB.
```

See also: ACQUIRE, FETCH

Similar commands: NOS: ATTACH
VMS: HFT FETCH (DTRC)

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSFETCH,DN=in1,MDN=mymsfyl.
MSFETCH,DN=in2,MDN=hisfyl,UN=him,DF=CB,PW=fylepw.
```

IN1 is your file MYMSFYL transferred without conversion.

IN2 is file HISFYL belonging to user HIM converted from CDC Display Code (FYLEPW is the password HIM requires for access to the file).

MSPASSW Change Mass Storage System access password.

Syntax: MSPASSW,OLD=oldpw,NEW=newpw.

Parameters: oldpw - your current MSS access password

newpw - your new MSS access password

Remarks: MSACCES is required before using the MSx commands.

Similar commands: NOS: PASSWOR
VMS: HFT PASSWORD

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSPASSW,OLD=mymsspw,NEW=newmsspw.
```

MSPURGE (DTRC) Purge a file from the Mass Storage System.

Syntax: MSPURGE,MDN=mdn.

Parameters: mdn - the MSS dataset (file) name
(default: MDN=dn)

Remarks: MSACCES is required before using the MSx commands.

Similar commands: NOS: PURGE
VMS: HFT DELETE; MSSDELETE (both DTRC)

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSPURGE,MDN=mssfyl1.
```

MSSTORE (DTRC) Store a file on the Mass Storage System.

Syntax: MSSTORE,DN=dn,MDN=mdn,DF=df,CT=ct,NA=na,PW=pw,
BR=br,M=m,PR=pr,AC=ac.

Parameters: dn - the local dataset name

mdn - the MSS dataset (file) name
(default: MDN=dn)

df - data format
TR - transparent (no conversion)
CB - character blocked (convert from CDC display code)
(default: DF=TR)

ct - Category type
P - private
PU - public
S - semi-private
(default: CT=P)

na - No Abort
0 - abort if file already exists on the MSS
1 - replace the old MSS file, if one exists
(default: NA=0)

pw - optional MSS file password

br - backup requirements

br	meaning
CR	off-station backup
Y	on-station backup

(default: BR=Y)

m - alternate user permission mode for semiprivate and public files

m	meaning
E (EXECUTE)	you can execute; others can read or execute concurrently
R (READ)	all can read or execute concurrently
RU (READUP)	all can read or execute; one (other) user can rewrite the file
RA (READAP)	all can read or execute; one (other) user can lengthen the file

RM	(READMD)	all can read or execute; one (other) user can lengthen or rewrite the file
U	(UPDATE)	all can read or execute; you can rewrite the file
A	(APPEND)	all can read or execute; you can lengthen the file
M	(MODIFY)	all can read or execute; you can lengthen or rewrite the file
W	(WRITE)	you can read, execute, lengthen, rewrite, or shorten the file; others have no concurrent access

br - backup requirements

br	meaning
CR	off-station backup
Y	on-station backup

pr - preferred residence

pr	meaning
M	alternate storage - MSS
N	no preference

(default: PR=N)

ac - may alternate users obtain information about the file? (Y or N)

Remarks: MSACCES is required before using the MSx commands.

See also: DISPOSE

Similar commands: NOS: DEFINE
VMS: HFT STORE (DTRC)

Examples:

```
MSACCES,UN=myid,MPW=mymsspw.
MSSTORE,DN=in1,MDN=mssfyl1.
MSSTORE,DN=in2,MDN=mssfyl2,BR=CR.
MSSTORE,DN=in3,MDN=mssfyl3,DF=CB,NA=1,PW=fylepw.
```

IN1 is stored as private file MSSFYL1.

IN2 is stored as private file MSSFYL2 with off-station backup.

IN3 is stored as private file MSSFYL3 (even is MSSFYL3 already exists) in CDC Display Code. FYLEPW is the password required for another user to access the file.

NEWCHRG (DTRC - PROCLIB) Change permanent file account number.

Syntax: NEWCHRG,OLD=oldchrgno,ID=id.

Parameters: OLD= - the account number to be changed

ID=id - change all files having this ID
ID - change all files having a null ID
(default: change all IDs)

Remarks: NEWCHRG changes from the specified account number to the "current" number of the Cray job (from the ACCOUNT or most recent ALTACN statement).

See also: ALTACN; MODIFY; Appendix D: CNEWCHRG

Similar commands: NOS: BEGIN,NEWCHRG

Examples:
```
JOB,JN=....
ACCOUNT,AC=....
ACCESS,PROCLIB,OWN=PUBLIC.
LIBRARY,PROCLIB:*.

NEWCHRG,OLD=1222233344.
            ^-- change all files from acc unt
                1-2222-333-44 to the current one
= = = = =
...
NEWCHRG,OLD=1222233344,ID=myid.
            ^-- change all files WITH ID=MYID
                from account 1-2222-333-44 to
                the current one
= = = = =
...
ALTACN,AC=5666677788.
NEWCHRG,OLD=12222433344.
            ^-- change all files from account
                1-2222-333-44 to 5-6666-777-88
```

NOHOLD Cancel the effect of HOLD.

Syntax: NOHOLD,GRN=grn.

Parameters: GRN=grn - generic resource name

See also: HOLD

NORERUN Control a job's rerunability.

Syntax: NORERUN,option.

Parameters: option - ENABLE - declare a job nonrerunable if any of the nonrerunable functions are done

DISABLE - stop monitoring nonrerunable functions (if a job has already been declared nonrerunable, that status is not changed)

(default: ENABLE)

See also: RERUN

Similar commands: NOS: NORERUN

Examples: NORERUN,DISABLE.

NOTE Write text to a dataset.

Syntax: NOTE,DN=dn,TEXT='text'.

Parameters: DN= - the dataset to be written (at its current position)

DN - write to $OUT

TEXT= - up to 153 character to be written

Similar commands: NOS: NOTE
VMS: OPEN,WRITE,CLOSE

Examples:
```
NOTE,DN=UIN,TEXT='*COMPILE myprog,mysub'.
REWIND,UIN.
UPDATE,I=UIN,....
```

OPTION Specify user-defined options.

Syntax:
```
OPTION,LPP=n,PN={ p | ANY },STAT=stat,BS=bsz,
       ST=dev,DEF=pdev,XSZ=mxsz:mnsz,RDM,SEQ,
       UNB,BLK,NOF,OVF,SPD=sect,BFI=bfi,
       LM=mxsz,SZ=dsz.
```

Parameters: LPP=n - number of lines per page for job listings (0-255 decimal)

LPP=0 - do not change the current setting (default: 66)

PN=p - select a processor (p is 1 or 2)

PN=ANY - any available processor (if invalid, job aborts with an error message) (default: ANY)

BS - buffer size (# of octal 512-word blocks in circular I/O buffer)
(default: system defined; BS and UNB are mutually exclusive)

ST - storage device type
SCR - scratch
PERM - permanent

DEF - preferred device types

XSZ - maximum and minimum transfer sizes in octal sectors
(default: system defined; normally half the buffer size)

RDM - ramdom dataset
(default: sequential; RDM and SEQ are mutually exclusive)

SEQ - sequential dataset
(default: sequential; RDM and SEQ are mutually exclusive)

UNB - unblocked dataset
(default: blocked; UNB and BS are mutually exclusive)

BLK - blocked dataset
(default: blocked; BLK and UNB are mutually exclusive)

NOF - do not overflow to another device
(default: system defined; NOF and OVF are mutually exclusive)

OVF - overflow allowed
(default: system defined; NOF and OVF are mutually exclusive)

LN - maximum number of decimal 512-word blocks for a dataset - job aborts if exceeded

SZ - number of decimal 512-word blocks to reserve for dataset when it is created
(default: system defined)

BFI - blank field initiation (octal ASCII code signaling the beginning of a sequence of blanks)
OFF - no blank compression
(default: octal 33 (ESC))

SPD - dataset is striped

```
                    STAT=   - the level of I/O statistics gathered
                              for local datasets to appear in the
                              user logfile
                              (user level   - accounting information
                               system level - device information)
                               ON   - installation defined
                               OFF  - no statistics
                               FULL - user and system info
                              (default: OFF)
                    STAT    - same as STAT=ON

        Similar commands:  VMS: SUBMIT /QUEUE=
```

PASCAL Compile a Pascal source program.

```
        Syntax:       PASCAL,I=idn,L=ldn,B=bdn,O=list,
                            CPU=cpu:char.

        Parameters:  B=   - generated binary load modules
                            (default: $BLD)

                     O=   - Compiler options, separated by colons
                            (default: A-:BP-:BREG=8:BT-:C-:D+:H2:^
                                      H+24:L+:O+:P-:R+:RV-:S4:S+4:^
                                      ST-:T+:TREG=8:U-:V+:X-:Z+)

                     CPU= - Cray to execute the program
                             cpu  - CRAY-XMP
                                    CRAY-X1  - single-processor
                                    CRAY-X2  - dual-processor
                                    (default: the compiling machine)

                             char - [NO]EMA     - extended memory
                                                  (24-bit A-register
                                                  immediate loads;
                                                  common blocks > 4
                                                  million words)
                                    [NO]CIGS    - compressed index
                                                  scatter/gather
                                    [NO]VPOP    - vector population
                                                  and parity
                                    [NO]READVL  - vector length read
                                                  instructions
                                    MEMSIZE=nK  - (n * 1024) words
                                    MEMSIZE=nM  - (n * 1048576) words
                                    [NO]BDM     - bidirectional memory

        Similar commands:  NOS, VMS: PASCAL

        Examples:    PASCAL,I=mypasc.
```

PERMIT Grant/deny access to a permanent dataset.

```
Syntax:      PERMIT,PDN=pdn,ID=uid,AM=am,RP,USER=ov,ADN=adn,
                NA,ERR,MSG.

Parameters:  PDN=pdn - required

             RP      - remove the permissions

             USER=ov - the name (User Initials) of the user to
                       be granted/denied permission

             ADN=adn  - local dataset with the permit list

Similar commands:  NOS: CHANGE; PERMIT
                   VMS: SET PROTECTION; Access Control List

Examples:    PERMIT,PDN=myfile,USER=abcd,AM=R.
                          ^-- make file readonly for user ABCD
             = = = = =
             PERMIT,PDN=myfile,USER=abcd,AM=N.
                          ^-- remove all permissions for user
                              ABCD
```

PRINT Write the value of a JCL expression to the logfile.

```
Syntax:      PRINT(expression)

Parameters:  exp - any valid JCL expression
                   (maximum length: 8 characters)

Logfile format:  UT060 decimal octal ASCII

Similar commands:  NOS: DISPLAY
                   VMS: WRITE SYS$OUTPUT

Examples:    SET(J1=J1+1)
             PRINT,J1.
```

PROC Begin an in-line procedure definition block. This is followed by the procedure prototype statement which names the procedure and gives the formal parameter specifications.

```
Syntax:      PROC,L=ldn,LIB=plib.
             name,p1,p2,...,pn
                ...
             ENDPROC.

Parameters:  L    - listing dataset to receive the echo of the
                    definition block
                    (default: $LOG)
```

```
                LIB  - procedure library dataset to receive the
                       definition body
                       (default: $PROC)

                name - the name of the procedure (1-8 alpha-
                       numeric characters; should not be the same
                       as a system verb)

                pi   - a formal parameter specification in one
                       of the following formats:

                         pos                - positional
                         key=dvalue:kvalue - keyword
                           key    - formal keyword parameter
                           dvalue - optional default value if
                                    the parameter is omitted
                           kvalue - optional value if the
                                    parameter is specified with
                                    no value
                       special cases:
                         key=  - specify a null value
                         key=: - no defaults, but caller may
                                 specify key= or just key

      See also:    Section 3-3

      Similar commands:  NOS: .PROC
                         VMS: always 8 parameters

      Examples:    PROC.
                   ...
                   ENDPROC.


QUERY Determine the current status and position of a local file.

      Syntax:      QUERY,DN=dn,STATUS=status,POS=pos.

      Parameters:  STATUS= - the JCL symbolic variable name to
                            receive the status of the dataset -
                            return values:
                             value   meaning
                             -----   -------
                              -1     dn is not local
                               0     dn is closed
                               1     dn is open for output
                               2     dn is open for input
                               3     dn is open for I/O
```

POS= - the JCL symbolic variable name to receive the position of the dataset - return values:

value	meaning
-1	position indeterminate (not local, unblocked, closed)
0	BOD (beginning-of-data)
1	EOD (end-of-data)
2	EOF (end-of-file)
3	EOR (end-of-record)
4	mid-record

Remarks: In addition, a logfile message is generated:

QU001 - DN: ldn STATUS: status POS: pos

where status is UNKNOWN, CLOSED, OPEN-O, OPEN-I, OPEN-I/O
pos is N/A, BOD, EOD, EOF, EOR, MID

Similar commands: NOS: ENQUIRE
VMS: no local file concept

Examples:
```
QUERY,DN=myfile,STATUS=J0,POS=J1.
IF(J0.LT.0)
   COMMENT. file myfile is not local
   ...
ELSE.
   COMMENT. file myfile is local
   ...
ENDIF.
```

RELEASE Return a dataset.

Syntax: RELEASE,DN=dn1:dn2:...:dn8,HOLD.

Parameters: DN= - up to 8 dataset names
HOLD - hold generic resource (do not return the allocation to the system pool)

See also: HOLD, NOHOLD

Similar commands: NOS: RETURN

Examples: RELEASE,DN=temp:file1:out.

RERUN Control a job's rerunability.

Syntax: RERUN,option.

Parameters: option - ENABLE - mark job as rerunable regardless of any nonrerunable functions which may have been performed so far in the job
DISABLE - mark the job as nonrerunable
(default: ENABLE)

See also: NORERUN

Similar commands: NOS: NORERUN

Examples: RERUN,ENABLE.

RETURN Return control from a procedure to its CALLer.

Syntax: RETURN.
RETURN,ABORT.

Parameters: ABORT - cause COS to issue a job step abort

Similar commands: NOS: REVERT
VMS: EXIT

Examples: See PROC.

REWIND Position a dataset at its beginning.

Syntax: REWIND,DN=dn1:dn2:...:dn8.

Parameters: DN= - up to 8 datasets to be rewound

Similar commands: NOS: REWIND

Examples: REWIND,DN=temp:out:in1.

ROLLJOB Protect a job by writing it to disk.

Syntax: ROLLJOB.

Remarks: There is no guarantee that a job will remain recoverable.

Examples: ROLLJOB.

SAVE Make a local dataset permanent and define its characteristics.

```
Syntax:       SAVE,DN=dn,PDN=pdn,ID=uid,ED=ed,RT=rt,R=rd,W=wt,
                   M=mn,UQ,NA,ERR,MSG,EXO=exo,PAM=mode,
                   ADN=adn,ACN.

Parameters:   RT=rt     - retention period
              RT=       - set to default

              ADN=adn   - local dataset with the permit list

              ACN       - use the alternate account number

See also:     ALTACN, MODIFY

Similar commands:  NOS: DEFINE; SAVE
                   VMS: CREATE

Examples:     SAVE,DN=out,PDN=ABCOUT.
              = = = = =
              SAVE,DN=prog,PDN=mastprog,M=maint,PAM=R.
                           ^-- the file is world-readable and
                               YOU can't accidentally delete it
```

SCRUBDS Write over a dataset before release.

```
Syntax:       SCRUBDS,DN=lfn.

Parameters:   lfn - the uniquely accessed file to be
                    overwritten

Remarks:      SCRUBDS writes zeros over an existing dataset.

Examples:     ACCESS,DN=myfyl,PDN=myfyle,UQ.
              SCRUBDS,DN=myfyl.
```

SEGLDR Segment loader.

```
Syntax:       SEGLDR,I=idn,L=ldn,DN=bdn1:bdn2:...:bdn8,
                     LIB=lib1:lib2:...:lib8,ABS=adn,
                     CMD='directives',GO.

Parameters:   I=    - Dataset with SEGLDR directives
                      (default: $IN)
              I     - Same as I=$IN

              L=    - Listable output
                      (default: $OUT)
              L     - Same as L=$OUT

              DN=   - Up to 8 binary load dataset(s)
              DN    - Same as DN=$BLD
                      (default: $BLD)
```

```
                LIB= - Up to 8 relocatable object libraries
                       to be searched

                ABS= - Dataset to contain the absolute program
                       (default: $ABD)

                CMD= - Global directives to be processed;
                       treated as first record read from I=idn;
                       separate commands with semicolons
                       (e.g., CMD='BIN=bdn;MAP=PART')

                GO   - Load and execute;
                       ignored for a segmented load
```

Remarks: By default, input load modules are read from $BLD.

Directives: See section 3-6.

Similar commands: NOS: SEGLOAD
VMS: virtual machine

Examples:
```
CFT77,B=myobj.
SEGLDR,DN=myobj,LIB=mylib,CMD='MAP=PART',GO.
```

SET Change the value of a JCL variable.

Syntax: SET(symbol=expression)

Parameters: exp - a valid arithmetic, logical or literal assignment expression - may be delimited by parentheses

Remarks: The job-step aborts if the variable is unknown, is changable only by COS, or is a constant.

Similar commands: NOS: SET
VMS: $ name = value

Examples:
```
SET(J1=J1+1)  <-- increment procedure-local
                  register J1 by 1

SET(G1=(SYSID.AND.177777B))
                ^-- put the low-order 2 characters
                    of the current system revision
                    level into global register G1

SET(G3=((ABTCODE.EQ.74).AND.(G2.EQ.0)))
                ^-- define global register G3
```

SID Debug programs interactively or in batch.

Syntax: SID=adn,I=idn,S=sdn,L=lsn,ECH=edn,CNT=n.

Parameters: adn - absolute dataset name (from LDR,AB=adn)

I= - Input directives
(default: $IN)

S= - Symbol dataset name
(default: $DEBUG)

L= - Listable output
(default: $OUT)

ECH= - Dataset for echoing input directives
(default: no echoing)
ECH - Same as ECH=ldn

CNT= - Breakpoint interrupt count
(default: 0 (no abort))

Similar commands: NOS: CID
VMS: DEBUG

SKIPD Skip blocked datasets (position at EOD (after last EOF)).

Syntax: SKIPD,DN=dn.

Parameters: DN - (default: $IN)

Same as: SKIPF,DN=dn,NF.

Similar commands: NOS: SKIPEI
VMS: OPEN with ACCESS=APPEND in program

Examples: SKIPD,DN=myfile.

SKIPF Skip blocked files from current position.

Syntax: SKIPF,DN=dn,NF=nf.

Parameters: DN=dn - (default: $IN)

NF=nf - decimal number of files to skip forward
NF=-nf - decimal number of files to skip backward
NF - position after the last EOF of the dataset
(default: NF=1)

Similar commands: NOS: SKIPF; SKIPFB; SKIPR

Examples: SKIPF,DN=myfile.

SKIPR Skip blocked records from the current position.

Syntax: SKIPR,DN=dn,NR=nr.

Parameters:
- DN=dn - (default: $IN)
- NR=nr - decimal number of records to skip forward
- NR=-nr - decimal number of records to skip backward
- NR - position after the last EOF of the current file (default: NR=1)

Examples: SKIPR,DN=myfile.

SKIPU Skip sectors on unblocked datasets.

Syntax: SKIPU,DN=dn,NS=ns.

Parameters:
- DN=dn - no default
- NS=ns - decimal number of sectors to skip forward
- NS=-ns - decimal number of sectors to skip backward
- NS - position after the last sector of the dataset (default: NS=1)

Examples: SKIPU,DN=myfile.

SORT Sort/merge.

Syntax:
```
SORT,S=sdn[:sdn...],M=mdn[:mdn...],O=odn,
     DIR=ddn,L=ldn,ECHO,RETAIN,NOVERF.
```

Parameters:
- S= - Input dataset of up to 8 unsorted files
- M= - Input dataset of up to 8 sorted files to be merged (S or M or both must be specified)
- O= - Output dataset (required)
- DIR= - Dataset with SORT directves (default: $IN)
- L= - Listable output (default: $OUT)
- L=0 - No listable output
- ECHO - Write directives to L=ldn (Not allowed if L=0)

RETAIN - Retain input order for equal keys

NOVERF - Do not verify the sort
(default: verify)

Similar commands: NOS: SORT5
VMS: SORT

SPY Generate a histogram on time usage within a program to locate inefficient code.

Syntax:
```
SPY,PREP,BS=bcktsz,D=dbugdn,S=scrtch,
        SUB=rtn1:rtn2:..:rtnn,TS=time.

SPY,POST,ADDRESS,L=listdn,NOLABEL,NOLIB,S=scrtch,
        SUB=rtn1:rtn2:..:rtnn,MINHIT=n.
```

Parameters:

BS= - bucket size in words; each bucket begins on a word address that is a multiple of the bucket size
(default: 4)

D= - dataset containing the program's symbol table
(default: $DEBUG)

S= - dataset where SPY,PREP will write tables for SPY,POST to use

SUB= - list of up to 20 routines to be analyzed

TS= - time slice in microseconds
(default: 500)

ADDRESS - the report will be by address instead of by label

L= - the output report listing dataset
(default: $OUT)

NOLABEL - the bucket size will be an entire routine

NOLIB - exclude library calls to routines whose names begin with "$"

MINHIT= - minimum number of hits required to generate a report line for a bucket or label
(default: 1; 0 is NOT recommended)

Remarks: At SPY's request, COS reads the address of the current machine instruction. A group of addresses is called a bucket; accessing a bucket is called a hit. After execution, SPY generates a report of all buckets, including a bar graph showing where the time has been spent.

Use SEGLDR to create the absolute; LDR mixes code and data making it more difficult to analyze.

Similar commands: NOS: HOTSPOT
VMS: PCA

Examples:
```
CFT,ON=IZ.  -or-  CFT77,ON=Z.  -or-  CAL,SYM.
                  -or-  PASCAL,O=DM3.
SEGLDR,ABS=myabs.          <-- you must create an
                               absolute program
SPY,PREP.                  <-- prepare for SPY
myabs.                     <-- run your program
SPY,POST.                  <-- prepare the report
EXIT.
SPY,POST.
```

Since an absolute module is always created, you could use

```
SEGLDR.
SPY,PREP.
$ABD.
SPY,POST.
EXIT.
SPY,POST.
```

SUBMIT Send a local dataset to the COS input queue.

Syntax: SUBMIT,DN=dn,SID=sf,DID=df,DEFER,NLRS.

Parameters:

DN= - Dataset containing the job (required)

SID= - Source front-end identifier (2 alphameric characters)

DID= - Destination front-end identifier (2 alphameric characters)

DEFER - Defer the SUBMIT until the dataset is released (default: SUBMIT occurs immediately)

NLRS - Do not release the dataset after the SUBMIT; it remains local and read-only (default: dataset is released after the SUBMIT)

Similar commands: NOS: ROUTE,DC=IN; CSUBMIT
VMS: SUBMIT; CRAY SUBMIT

Examples: SUBMIT,DN=myjob1.

SWITCH Turn pseudo sense switches on/off.

Syntax: SWITCH,n=x.

Parameters: n - switch number (1-6)
x - switch position
ON - turned on (set to 1)
OFF - turned on (set to 0)

Similar commands: NOS: SWITCH; OFFSW; ONSW

Examples: SWITCH,2=ON.

UNBLOCK Convert a blocked dataset to an unblocked dataset.

Syntax: UNBLOCK,DN=ldn. (1)

UNBLOCK,I=idn,O=odn. (2)

Parameters: DN= - the dataset to be replaced (using an intermediate dataset $UNBLK)
(ldn is rewound before and after)

I= - the blocked input dataset
(default: $IN)
(idn is not rewound before the copy)

O= - the unblocked output dataset
(if previously marked to be unblocked (ASSIGN), odn is not rewound before; otherwise, odn is replaced)

Remarks: UNBLOCK is intended primarily for postprocessing datasets created by or for certain stations.

Examples:
```
UNBLOCK,DN=myfile.
          ^-- Replace MYFILE with unblocked
              copy of itself
= = = = =
UNBLOCK,I=myblk,O=myunblk.
          ^-- Copy blocked file MYBLK as
              unblocked file MYUNBLK
```

UPDATE Source and data maintenance.

Syntax:

```
UPDATE,P=pdn,I=idn1:idn2:...:idnn,C=cdn,N=ndn,
       L=ldn,E=edn,S=sdn,*=m,/=C,DW=dw,DC=dc,
       ML=n,&,opts.

 where & is one of: F
                    Q[=d1:d2:...:dn]
                    Q='d1,d2,...,dj.dk,...,dn'
```

Parameters:

```
P=   - Program library dataset
       (default: $PL)
P    - Same as P=$PL
P=0  - Required for a creation run

I=   - Input datasets with directives and text
       (Maximum: 100 datasets)
       (default: $IN)
I    - Same as I=$IN
I=0  - No input dataset

C=   - Compile output dataset
       (default: $CPL)
C    - Same as C=$CPL
C=0  - No compile output

N=   - New program library dataset
       (default: creation run:     $NPL
                 modification run: no new PL)
N    - Same as C=$CPL
N=0  - No new PL

L=   - Listable output
       (default: $OUT)
L    - Same as L=$OUT
L=0  - No listable output

E=   - Error dataset name
       (default: $OUT)
E    - Same as E=$OUT
E=0  - Errors written to L=ldn
       (If edn and ldn are the same, ldn is
        used and E=0)

S=   - Source output dataset
       (default: $SR)
S    - Same as S=$SR
S=0  - No source output

*=m  - Master character for directives
       (defaults: creation run:     *
                  modification run: read from
                                    the PL)
```

/=c - comment character
(default: /)

DW= - Data width (number of characters written per line to compile and source datasets
(defaults: creation run: 72
modification run: dw when PL was created)

DW - Same as DW=72 (creation) or use dw when PL was created (modification run)

DC= - Declared modifications option:
ON - mod declaration required
OFF - mod declaration not required
(default: OFF)

ML= - Message level (highest severity level to suppress):
1 - comment
2 - note
3 - caution
4 - warning
5 - error
(default: 3 - suppress COMMENT, NOTE, and CAUTION messages)

F - Full UPDATE mode
(default (F and Q omitted): normal UPDATE mode)

Q= - Quick UPDATE mode
(Maximum: 100 deck names)
(default (F and Q omitted): normal UPDATE mode)

opts - NA - no abort
NR - no rewind of C and S files
IF - write conditional text summary to ldn
IN - write input to ldn
ID - write identifier summary to ldn
ED - write edited card summary to ldn
CD - write compile dataset generation directives to ldn
UM - write unprocessed modifications to ldn and/or edn
SQ - put sequencing in source output in columns dw+1 on (no effect on compile output)
NS - no sequencing in compile output
K - sequence decks according to Q

Similar commands: NOS: UPDATE
VMS: CMS; LIBRARIAN

Examples:
```
UPDATE,I=mysorc,P=0,ID.
                ^-- create $NPL, list identifiers
= = = = =
UPDATE.
CFT,I=$CPL.
...
/EOF
*COMPILE a,b,...
/EOF
```

WRITEDS Initialize a blocked dataset.

Syntax: WRITEDS,DN=dn,NR=nr,RL=rl.

Parameters: DN=dn - required

NR=nr - required - decimal number of records to be written

RL=rl - optional - decimal record length (if non-zero, the first word of each record is the record number as a binary integer starting with 1) (default: 0 (a null record))

Remarks: Writes a single file containing a specific number of records of a specific length. This is useful only for random (direct-access) files, which must be pre-formatted.

Examples: WRITEDS,DN=myfile,NR=1000,RL=125.

***** Appendix D *****

*** DEC VMS DCL Commands ***

DEC VMS DCL (Digital Command Language) commands have the following general syntax:

```
verb       param1  param2  ...           ! comments
@filename  param1  param2  ...  param8    ! comments
RUN        filename                      ! comments
```

verb is the name of the routine to be executed. It consists of an alphabetic character (A-Z, a-z, $, _) followed by 0-30 alphanumeric characters for the name of the command. A procedure (.COM) is executed using an at sign ("@") followed by the name of the procedure file. A user program is executed by the RUN statement.

parami are parameters, which may be positional or keyword.

comments follow an exclamation mark ("!") that is not part of a quoted parameter.

Because VMS has an extensive on-line help facility, the individual DCL commands are not described here. For a list of the help topics, type "HELP". For specific helps, type "HELP topic". The Computer Center maintains the following help libraries which are always available:

HLP$LIBRARY	@CCF	general information about the Computer Center
HLP$LIBRARY_1	@DTLIB	subprograms in library DTLIB (Cray COS, CDC NOS, and DEC VAX/VMS)
HLP$LIBRARY_2	@UTILITIES	commands, programs, procedures, and packages added at DTRC
HLP$LIBRARY_3	@CRAY	DTRC additions to Cray
HLP$LIBRARY_4		Reserved for future use

*** Selected DEC VAX/VMS Commands ***

The following are a few of the DEC VAX/VMS DCL commands:

ALLOCATE Assign a tape drive to a logical name.

```
Syntax:      ALLOCATE  device  logical_name

Parameters:  device    - the logical name of a specific or
                         generic tape drive

             log_name  - the name by which the tape is to be
                         known to the job (1-255 characters)

Examples:    $ ALLOCATE  MU:  tape
                          ^-- next available tape drive
                              starting with MU will be
                              assigned to logical name TAPE
```

DEALLOCATE Return a previously allocated device and disassociate the job's logical name from the tape drive.

```
Syntax:      DEALLOCATE  logical_name
             DEALLOCATE  device_name

             DEALLOCATE  /ALL

Parameters:  log_name  - the name by which the tape is known
                         to the job
             dev_name  - the name of the device
                         (use if the device was not deallocated
                         and the logical name is no longer
                         defined)

Qualifiers:  /ALL - deallocate all allocated devices

Examples:    $ DEALLOCATE  tape
                           ^-- deallocate the tape drive
                               associated with logical name
                               TAPE
             = = = = =
             $ DEALLOCATE  $2$mua0
                           ^-- deallocate tape drive mua0
```

DISMOUNT Release a tape volume that was previously mounted.

Syntax: DISMOUNT device_name

Parameters: device_name - the physical or logical name of the device to be dismounted

Qualifiers: /NOUNLOAD - Do not unload the tape (keeps the device and volume in a ready state (default: /UNLOAD)

Examples: $ DISMOUNT /NOUNLOAD tape
^-- release file TAPE but keep the tape mounted for a future MOUNT

INITIALIZE Initialize a magnetic tape.

Syntax: INITIALIZE device vsn

Parameters: device - the name given the tape in the ALLOCATE

vsn - a 6-character volume serial number (all DTRC Network tapes are NAnnnn, where nnnn is a 4-digit number)

Remarks: HELP INITIALIZE for additional qualifiers

Examples: See page 6-1-6

MOUNT Mount a magnetic tape and, if labelled, check the label.

Syntax: $ MOUNT device,... [vsn,...] [logical_name]
/BLOCKSIZE=mbl /COMMENT="string"
/DENSITY=den /FOREIGN
/[NO]LABEL /RECORDSIZE=mrl
/[NO]UNLOAD /[NO]WRITE

Parameters: device - physical or logical name of the tape drive (for more than one tape, separate with commas or plus signs)

vsn - the volume serial number of the tape(s) as recorded in the tape's label record (0-6 characters) (not with /FOREIGN)

log_name - the logical name to be used (not needed if is a logical name is used for DEVICE)

Qualifiers:

/BLOCKSIZE= - the default block size in bytes (range: 18-65,534; default: 2048)

/COMMENT = - specify additional information to the operator

/DENSITY= - the tape density (1600 or 6250) (default: the density of the first record of the volume)

/FOREIGN - an unlabelled tape

/LABEL - the tape has VAX/VMS ANSI labels
/NOLABEL - the same as /FOREIGN (default: /LABEL)

/RECORDSIZE= - the number of characters in each record - normally used with /FOREIGN and /BLOCKSIZE (mrl <= mbl)

/UNLOAD - unload the tape when DISMOUNTed
/NOUNLOAD - do not unload the tape (default: /UNLOAD)

/WRITE - the tape can be written
/NOWRITE - the tape is read only (default: /WRITE)

Examples:

```
$ MOUNT  tape:  /FOREIGN  /DENSITY=1600  -
         /RECORDSIZE=140  /BLOCKSIZE=5040  -
         /comment="Please mount slot98 ", -
                  "vsn=ABCD01 ring"
             ^-- mount a slot tape for writing
                 blocked records
= = = = =
$ MOUNT mytape  NA9999 /DENSITY=1600
        /comment="Pls mount with NO ring"
             ^-- mount a read-only tape
= = = = =
```

See page 6-1-6 for an example of initializing a tape.

SET MAGTAPE Define default characteristics for subsequent use of a magnetic tape device; position a magnetic tape.

Syntax:

```
SET MAGTAPE  device  /DENSITY  /END_OF_FILE
                     /LOG  /LOGSOFT  /REWIND
                     /SKIP=option
```

Parameters:

device - the logical name of a specific or generic tape drive

Qualifiers: /DENSITY - the default density (1600 or 6250) for writes to a foreign or unlabelled tape

/END_OF_FILE - write a tape mark at the current position on the tape

/LOG - display information about what was done

/LOGSOFT - log soft errors on the error log file

/REWIND - rewind the tape

/SKIP= - position the tape

option	meaning
BLOCK:n	skip <n> blocks
END_OF_TAPE	position at the end-of-tape mark
FILES:n	skip <n> files
RECORD:n	skip <n> records

/UNLOAD - rewind and unload the tape

Similar commands: NOS: BKSP, REWIND, SKIPEI, SKIPF, SKIPFB, UNLOAD, WRITEF

Examples:
```
$ MOUNT  tape:  /FOREIGN
$ SET MAGTAPE  tape:  /DENSITY=6250
                ^-- mount a foreign tape and set the
                    write density to 6250 cpi
= = = = =
$ SET MAGTAPE  /SKIP=FILES:4
                ^-- skip forward 4 files
```

*** Selected DEC VAX/VMS Additions ***

The following are DTRC additions to DEC VAX/VMS:

APRINT (DTRC) Print one or more files on the printer in Annapolis.

Syntax: APRINT file(s) copies delete PRINT_quals

Parameters:

- file - the file(s) to be printed
- copies - number of copies (default: 1)
- delete - DELETE to delete the file(s) after printing (default: keep the files)
- PRINT_quals - P4-P8 may be used for additional qualifiers for the PRINT statement

Remarks: All PRINT qualifiers which we support are available.

The files are places into terminal queue SYS$ANAP.

See also: CAPRINT

Examples:

```
APRINT  myfile.out
APRINT  myfile.out  4
```

AUX (DTRC) Turn an auxiliary printer on or off; for supported printers, send control characters to control character size and page eject.

Syntax: AUX option

Parameters: option - one of:

```
On/off:
 ON      - turn printer on
 OFF     - turn printer off
Page eject:
 TOP     - page eject (leave AUX ON)
 TOPOFF  - page eject (leave AUX OFF)
ALPS:
 ACC     - condensed (17 cpi)
 APC     - Pica (10 cpi)
Brother 2024L:
 BCC     - condensed characters (18 cpi)
 BCCOFF  - condensed characters off
 BEC     - Elite (12 cpi)
 BPC     - Pica (10 cpi)
 BWC     - wide characters (5 cpi)
 BWCOFF  - wide characters off
Okidata MicroLine 82 or 84:
 OCC     - condensed characters (15 cpi)
 OLC     - large (8.3 cpi)
 OPC     - Pica (10 cpi)
 OWC     - wide characters (5 cpi)
 VC132   - same as OCC
 VC80    - same as OPC
```

Remarks: Other printers which use the same control codes may use the corresponding options.

See also: AUXPRINT

Similar commands: NOS: BEGIN,AUX; BEGIN,AUXPRNT

Examples:

```
$ AUX ON
$ TYPE myfile.dat
$ AUX OFF
= = = = =
$ AUX ON
$ AUX BCC      <-- condensed on Brother 2024L
$ TYPE myprog.for
$ AUX BCCOFF
$ AUX OFF
```

AUXPRINT (DTRC) Print one of more files on an axiliary printer (one attached to an interactive terminal).

Syntax: AUXPRINT files /ALLTYPES /CC /COPIES= /CS= /DOUBLE_SPACE /EJECT_AT_END /FF /HEADER /LOG /NEWPAGE /PS= /PW= /SHIFT= /SKIP=

Parameters:
- files - the name of the file or comma-separated list of files to be printed -- wildcards are allowed (defaults: filename: FOR001; type: .DAT)

Qualifiers:
- /ALLTYPES - controls the processing of certain file types (default: /NOALLTYPES)
- /CC - carriage control is in column 1 (default: /NOCC)
- /COPIES= - number of copies (default: 1)
- /CS= - character set (see AUX)
  ALPS:
  ACC, APC
  Brother 2024L:
  BCC, BDC, BEC, BPC, BWC
  Okidata MicroLine 82 or 84:
  OCC, OLC, OPC, OWC
  (default: however the printer is set)
- /DOUBLE - double spacing (default: /NODOUBLE)
- /EJECT - eject to a new page at the end of the last file printed (ignored for /CC) (default: /NOEJECT_AT_END)
- /FF - page eject for <FF> in column 1 (forces /NOCC; /NOFF ignores <FF>) (default: /FF)
- /HEADER - print a header with the filename before printing the file (default: /NOHEADER)
- /LOG - display information about the printing (default: /LOG)
- /NEWPAGE - start each file on a new page (default: /NONEWPAGE)
- /PS= - the page size (number of lines possible per page) (default: /PS=66)
- /PW= - the page width (maximum number of columns per line) -- less than 133 (defaults: /PW=80; /PW or /PW=0 implies /PW=132)

```
                /SHIFT=   - number of columns to shift each line
                            (for /CC, columns 2 on are shifted)
                            (default: /SHIFT=0;
                                      /SHIFT implies /SHIFT=1)
                /SKIP=    - number of lines to skip before
                            printing the file
                            (default: /SKIP=0;
                                      /SKIP implies /SKIP=10)

Remarks:        Other printers which use the same control codes
                as the ALPS, Brother 2024L or Okidata MicroLine
                82 or 84 may use the /CS character sets.

See also:       AUX

Similar commands:  NOS: BEGIN,AUX; BEGIN,AUXPRNT

Examples:       AUXPRINT myprog.for
                = = = = =
                AUXPRINT memo.txt /CS=BEC /CC
                             ^-- print Elite characters on
                                 Brother 2024L printer, each line
                                 has carriage control in column 1
                = = = = =
                AUXPRINT a*.dat /CS=OCC /N /E
                             ^-- print all .DAT files starting
                                 with A using condensed characters
                                 on an Okidata MicroLine 82
                                 printer starting each file on a
                                 new page and ejecting a page
                                 after the last file
                = = = = =
                AUXPRINT myprog.lis /PW
                             ^-- print a wide compilation listing
                                 (assumes wide paper is in the
                                 printer)
```

CAPRINT (DTRC) Convert the record attribute of a file having Fortran carriage control characters in column 1 of each line to "Fortran carriage control" and print on the remote printer in Annapolis.

Syntax: CAPRINT file copies keep PRINT_quals

Parameters:

- file - the file to be printed
- copies - number of copies (default: 1)
- keep - any character will keep the converted file after it has been printed (default: delete the file)
- PRINT_quals - P4-P8 may be used for additional qualifiers for the PRINT statement

Remarks: This is useful for printing CDC output files or any VAX file having column 1 carriage control but a different record attribute.

The files are places into terminal queue SYS$ANAP.

See also: APRINT

Examples:

```
CAPRINT  abcd.out
             ^-- convert and print file ABCD.OUT
CAPRINT  abcd.out  5
             ^-- print 5 copies of ABCD.OUT
CAPRINT  abcd.out  "" keep
             ^-- print 1 copy and keep the
                 converted file (the next version
                 of ABCD.OUT)
```

CNEWCHRG (DTRC) Change the account number on Cray permanent files from the VAXcluster.

Syntax: CNEWCHRG upw old_ac [new_ac] [id] [wait] [type]

Parameters:

upw - Your user password for the generated ACCOUNT statement (the AC= value is taken from your current VAX/VMS session) (default: none - upw is required)

old_ac - the old account number (default: none - old_ac is required)

new_ac - the new account number (if not your current VAX/VMS account number)

id - optional Cray ID qualifier
ID=id - a specific ID
ID - the null ID
(default: all IDs)

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file NUCRAC.CPR)

type - TYPE - type the generated Cray job at your terminal
other - do not type it

Remarks: CNEWCHRG creates and submits a Cray job to make change.

CNEWCHRG works from any node of the VAXcluster. NEWCHRG is a Cray statement.

Any existing file NUCRAC.CPR is deleted before the Cray job is submitted.

This procedure creates and deletes all versions of file NUA$C.JOB.

Similar commands: COS: ALTACN/MODIFY; NEWCHRG
NOS: CHANGE

Examples:

```
CNEWCHRG  myupw  1222233344
                 ^-- change all files from
                     1-2222-333-44 to the current
                     (ACCOUNT) account number
                     without waiting for it to
                     complete
Some time later:

DIRectory  NUCRAC.CPR
                 ^-- see if the job has completed
SET TERMinal /Width=132
TYpe NUCRAC.CPR
                 ^-- look at it
SET TERMinal /Width=80
DELete NUCRAC.CPR;*
                 ^-- delete the file
= = = = =
CNEWCHRG  myupw  1222233344  5666677788  ""  WAIT
                 ^-- change all files from
                     1-2222-333-44 to an alternate
                     account number and wait for it
                     to finish  (note: the "" is the
                     ID parameter - a null string to
                     change all files)
= = = = =
CNEWCHRG  myupw  1222233344  ""  myid  ""  TYPE
                 ^-- change ID=MYID files from
                     1-2222-333-44 to the current
                     (login) account number without
                     waiting for it to complete --
                     type the generated job before
                     submitting it

This will display:

JOB,JN=NUCRAC.
ACCOUNT,US=myid,AC=myvmsaccount,UPW=myupw.
ACCESS,DN=PROCLIB,OWN=PUBLIC.
LIBRARY,DN=PROCLIB:*.
NEWCHRG,OLD=1222233344,ID=myid.

Look at it and delete it sometime later (see
previous example).
```

CNEWPW (DTRC) Change your Cray password.

Syntax: CNEWPW old_pw new_pw new_pw [ac] [wait]

Parameters: old_pw - your current Cray password

new_pw - your new Cray password

new_pw - your new Cray password again for verification

ac - your Cray account number (if not the same as your current VMS login account number)

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file NUCRPW.CPR)

Remarks: CNEWPW creates and submits a Cray job to make change.

CNEWPW works from any node of the VAXcluster. NUPW= is a parameter in the Cray ACCOUNT statement.

Any existing file NUCRPW.CPR is deleted before the Cray job is submitted.

This procedure creates and deletes all versions of file NUP$W.JOB.

Similar commands: COS: ACCOUNT
VMS: SET PASSWORD

Examples:
```
CNEWPW  myold  mynew  mynew
              ^-- change your password without
                  waiting for it to be done
Some time later:
DIRectory  NUCRPW.CPR
              ^-- see if the job has completed
SET TERMinal /Width=132
TYpe NUCRPW.CPR          <-- look at it
SET TERMinal /Width=80
DELete NUCRPW.CPR;*      <-- delete the file
= = = = =
CNEWPW  myold  mynew  mynew  1222233344 WAIT
              ^-- change your password for Job
                  Order Number 1-2222-333-44 and
                  wait for it to complete
```

CSUBMIT (DTRC) Submit a job to the Cray.

Syntax: CSUBMIT file(s) /AC=accountno /US=username
/UPW=password /NUPW
/EOF=string /AFTER=time
/LOG

Parameters: file - one of:
. a single file containing a complete Cray job
. a comma- and/or plus-separated list of files which make up the Cray job
(default filetype: .JOB)

Qualifiers: /AC - if you have multiple account numbers, use /AC to specify an account number other than your current VAXcluster login account

/AC is required if you use /US.

(default: your VAXcluster login account number)

/AFTER - specifies when the job is to be sent to the Cray

(default: the job is queued for immediate submission to the Cray)

/EOF - specifies the embedded COS end-of-file separator contained in the submitted job (if non-alphanumeric characters (including lower case letters) are used, they must be enclosed in quotes)

For example, /EOF="E O F" means that lines containing just the 5-character string "E" space "O" space "F" are to be interpretted as end-of-file. /EOF=DAVE means that lines containing just the string "DAVE" are end-of-files.

(default: /EOF="/EOF")

/LOG - if you have CRAY SET TERM INFORM turned on and you do not want to see the message that your job has been queued, use /NOLOG

(default: /LOG)

/NUPW - indicates that your Cray password is to be changed

You will be prompted for your current Cray password. If it does not match the database password, you are prompted for the password in the database. If they match, you are prompted for your new password, which will be put into the database.

Note: To do nothing more than change your password, use

CSUBMIT /NUPW

If you are changing only the password in the database, no Cray job will be generated. If you are changing your password on the Cray, a dummy job will be created and run with the output in file SETNUPW.CPR

Note: /NUPW cannot be used in a batch job

/UPW - the first time, your password will be entered into the database -- subsequently, use /UPW only if you are using a different /US

(default: /UPW=password in database)

/US - specify a different username for the Cray job (of course, you must be authorized to use the other username and must also supply /AC and /UPW)

Note: /US cannot be used in a batch job

(default: /US=the first 4 letters of your VAXcluster login username)

Remarks: This differs from CRAY SUBMIT in that jobs submitted using CSUBMIT do not need an ACCOUNT statement, CSUBMIT constructs it for you.

The first time you use CSUBMIT, your password (UPW) is added to a database. Every CSUBMIT then uses this database password to generate an ACCOUNT statement for you. Thus, your Cray job files no longer have your password, meaning that every time you change your password, you don't have to change all your Cray job files.

Similarly, for your account number, a single Cray job may now be run under a different account, or even a different username, without changing the job file.

N.B. If there is an ACCOUNT statement in your job, it will be ignored and a new ACCOUNT statement will be generated.

Note that you must be logged into a VAXcluster node which connects to the Cray.

You can still use CRAY SUBMIT and RCSUBMIT to submit Cray jobs. However, these do not use (and cannot modify) the database, and, therefore, require ACCOUNT statements.

See also: CRAY SUBMIT; CNEWPW

Similar commands: NOS: CSUBMIT
NOS/VE: SUBMIT_CRAY

Examples:

```
$ CSUBMIT  myjob  /UPW=mycraypw
             ^-- submit for the first time the
                 Cray job in file MYJOB.JOB using
                 CSUBMIT

$ CSUBMIT  myjob
             ^-- submit the same job again

$ CSUBMIT  otherjob
             ^-- submit another job

$ CSUBMIT  myjob  /AC=5666677788
             ^-- submit the job and charge it to
                 another of my accounts

$ CSUBMIT  myjob  /US=other  /AC=9888877766
                   /UPW=otherpw
             ^-- Submit the job as another user

$ CSUBMIT  /NUPW
             ^-- change your Cray password
                 (assuming you are user ABCD)
Enter ABCD's current CRAY password.
 Password: <pw>          <-- your password entries
                             are not echoed

Enter ABCD's New CRAY password.
 Password: <pw>
 Verification: <pw>
%CX-S-SUB_OK, Job: SETNUPW queued for submission
$
```

```
$ CSUBMIT  /NUPW
             ^-- Change your Cray password
                 (assuming you are user ABCD)
                 when your actual Cray password
                 is not the same as the one in
                 the database -- perhaps you had
                 changed it using CNEWPW or CRAY
                 SUBMITted a job to change it
Enter ABCD's current Cray password.
 Password: <pw>          <-- your password entries
                             are not echoed

ABCD's current Cray password does not match the
 CSUBMIT password.
Please enter ABCD's CSUBMIT password.
 Password: <pw>

Enter ABCD's new Cray password.
 Password: <pw>
 Verification: <pw>      <-- since your current
$                            and new Cray pass-
                             words are the same,
                             the database is
                             updated, but no Cray
                             job is created

$ CSUBMIT  myjcl,myprog.for,mydata1.dat+
           mydata2.dat,mydata3.dat
             ^-- Create and submit a job
                 comprised of the following
                 VAX/VMS files:

                   MYJCL.JOB   - Cray job control
                                 statements
                   MYPROG.FOR  - Cray Fortran
                                 program
                   MYDATA1.DAT - first part of
                                 data file
                   MYDATA2.DAT - second part of
                                 data file
                   MYDATA3.DAT - separate data
                                 file

$ CSUBMIT  myjob  /EOF="The end"
             ^-- (upper case T, the rest is
                 lower case) submit a job with
                 the end-of-file lines as
                 "The end"

$ CSUBMIT  myjob  /AFTER=18:00       (a)
$ CSUBMIT  myjob  /AFTER=TOMORROW    (b)
$ CSUBMIT  myjob  /AFTER=+00:05      (c)
             ^-- Submit the job a) after 6 PM,
                                b) tomorrow,
                                c) in 5 minutes
```

DETAB (DTRC) Remove tabs from a file or convert tab-format Fortran source lines to fixed-format.

Syntax: DETAB in_file_spec out_file_spec
/FORTRAN /LOG /INCREMENT=inc
/TABS=tab_list

Parameters: in_file_spec - the input file containing tabs

out_file_spec - the output file with any tabs removed
(default: next version of in_file_spec)

Qualifiers: /FORTRAN - tab-format lines are converted to fixed-format (the first tab is set at column 7 (or 6 for continuation lines) and remaining tabs are converted to three blanks)
Since tabs are collapsed to three blanks, it is unlikely that a DETABbed line will exceed 72 characters. If any lines do, you will be told how many and the length of the longest line.

/NOFORTRAN - no reformatting is done

/INCREMENT= - tabs are set every <inc> columns

If both /TABS and /INCREMENT are specified, tabs are set at the column(s) specified by /TABS= and every <inc> columns after that.

/LOG - list summary information and any warning messages
(Default: /NOLOG)

/TABS=n - set one tab at column n

/TABS=(n1,n2,...,nn)
- set tabs at these columns

If /INCREMENT=inc is not specified, then the tabs following the last defined tab stop, are each converted to a single blank.

If /INCREMENT=inc is specified, then the tabs following the last defined tab stop will be every inc columns after the last defined tab stop.

(Defaults: /TABS=0 /INCREMENT=8 /NOFORTRAN)

Note: /FORTRAN overrides /TABS and /INCREMENT.

Remarks: This is useful for:

- Preparing files to go to the Cray, Xerox 8700 or Microfiche, which don't recognize the tab character
- Removing tabs in Fortran programs (for sending to another computer (such as the Cray and CYBER 860) which don't recognize the tab-format).
- Changing the tab values while removing them (e.g., changing from every 8 columns, which is the VAX/VMS standard, to every 5 columns).

Examples: DETAB myprog.for /F

PRINTRM1 (DTRC) Print a file on the remote mini at Annapolis (RM1).

Remarks: Since RM1 is no longer available, use APRINT or CAPRINT to print in Annapolis.

QPRINT (DTRC) Print a file on a CDC CYBER 860 central site.

Syntax: QPRINT vaxfile node /ASCII
/DELETE
/JOB=<job_extension>
/NAME=<job_name>
/TID=<terminal_id>

Parameters: vaxfile - file specification of the VAXcluster file to be printed on CDC

node - the remote node on which the file is to be printed. One of:
MFN - the CDC CYBER 860

Qualifiers: /ASCII - controls whether <vaxfile> is to be printed in upper and lower case (/ASCII) or just upper case (/NOASCII)
(default: /NOASCII)

/DELETE - controls whether <vaxfile> is deleted after it has been sent
(default: /NODELETE)

/JOB - the three alphanumeric characters to follow your user initials for the CDC jobname - if fewer than 3 characters, leading zeros are added
(/JOB and /NAME are mutually exclusive)
(default: /JOB=000)

/NAME - the 1- to 7- alphanumeric character CDC job name - if fewer than 7 characters, it is padded on the right with zeros
(/JOB and /NAME are mutually exclusive)
(default: /NAME=xxxxext
where xxxx are the executing user initials
and ext is the job extension (/JOB))

/TID - Specifies where the file is to be printed -- no remote printers are currently supported
(default: print at Central Site)

How it works: The CDC name of the output file is created from the /NAME or /JOB qualifier.

The output in your VAXfile is placed in the SYS$QFT queue for transfer the HYPERchannel to the Mass Storage System (MSS) flagged for the node you requested.

Every 5 minutes or so, the queue transfer program on MFN checks for jobs coming to it and places them into their requested queues.

Remarks: CDC jobs may not have tabs or certain special characters. If /ASCII is not used, lower case will be folded into upper case. You may use RUN VSYS:CMP2FOR to remove tabs and change <FF> in column 1 to '1' before using QPRINT; the DETAB command may be used to remove tabs. Special characters not recognized by CDC will be converted to blanks by CDC.

The file must have Fortran carriage control.

Since RM1 is no longer available, use APRINT or CAPRINT to print in Annapolis.

Similar commands: COS: DISPOSE
NOS: ROUTE

Examples:
```
@VSYS:CMP2FOR myprog.lis
              ^-- prepare compilation listing for
                  printing
QPRINT myprog.lis MFN /NAME=xxxxABC /DELETE
              ^-- xxxx is the user initials;
                  MYPROG.LIS will be deleted
                  after is has been sent
= = = = =
QPRINT /ASCII myprog.out MFN /JOB=1
              ^-- print at with jobname xxxx001
                  in upper and lower case
```

QSUBMIT (DTRC) Submit a job to a CDC CYBER 860 NOS input queue printing on the 860 Central Site Printer.

Syntax: QSUBMIT vaxfile node

Parameters: vaxfile - file specification of the VAXcluster file containing a CDC batch job (embedded end-of-records are indicated by a separate line containing only EOR in columns 1-3)

node - the remote node on which the job is to run -- one of:
MFN - the CDC CYBER 860

Remarks: CDC jobs may not have tabs or certain special characters; lower case will be folded into upper case. Special characters not recognized by CDC will be converted to blanks by CDC.

How it works: The CDC job in your VAXfile is placed in the SYS$QFT queue for transfer the HYPERchannel to the Mass Storage System (MSS) flagged for the node requested.

Every 5 minutes or so, the queue transfer program on MFN checks for jobs to it and places them into its input queue. The output is on a CDC central site printer.

As on CDC, if you want the job's output to be sent somewhere, then

```
ROUTE,OUTPUT,DC=PR,TID=<tid>,DEF.
```

should be placed in your CDC job to cause deferred routing of the entire file to another terminal ID.

See also: QPRINT

Similar commands: COS, NOS, VMS: SUBMIT
NOS/VE: JOB; SUBMIT

Examples: QSUBMIT myfile.cdcjob MFN
^-- submits the CDC job in MYFILE.CDCJOB to the CDC CYBER 860 (MFN) NOS input queue with jobname from the job's JOB statement

RCAUDIT (DTRC) Create and submit a job to audit Cray files.

Syntax: RCAUDIT cpw lo pdn id own acn sz wait

Parameters: cpw - your Cray password

lo - list option ([S], A, B, L, N, P, R, T, X)
0 - use the default

pdn - the file to be audited
0 - use the default
(note: RCAUDIT cannot specifically audit file "0")
(default: all files)

id - the ID for the file
0 - null ID

own - other owner's files
0 - use the default
(default: your files)

acn - restrict audit to this account number
0 - use the default
(default: all account numbers)

sz - restrict audit to files larger than this many words
0 - use the default
(default: all files)

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file RCAUD.CPR)

Note: If P1 and P2 are both specified in the execute line, defaults are used for all other unspecified parameters.

Remarks: Any existing file RCAUD.CPR is deleted before the Cray job is submitted.

This procedure creates and deletes all versions of file RCAUD.JOB.

See also: Appendix C: AUDIT

Similar commands: NOS: BEGIN,AUDIT
VMS: DIRECTORY

```
Examples:   RCAUDIT  mycraypw
                        ^-- short audit of all my files
                            (don't wait)
            = = = = =
            RCAUDIT  mycraypw  0  0  0  0  0  0  WAIT
                        ^-- same (wait for completion)
            = = = = =
            RCAUDIT  mycraypw  x
                        ^-- "X" audit of all my files
            = = = = =
            RCAUDIT  mycraypw  x  "A-"
                        ^-- "X" audit of all files starting
                            with "B" (the "" are needed
                            because the "-" Cray wildcard
                            is the VMS end-of-line
                            continuation character)
            = = = = =
            RCAUDIT  mycraypw  0  0  0  0  1222233344  100000
                        ^-- Short audit of all my files
                            larger than 100000 words under
                            Job Order Number 1-2222-333-44
            = = = = =
            RCAUDIT  mycraypw  x  0  0  abcd
                        ^-- "X" audit of all ABCD's files
                            (that I have permission to see)
```

RCDELETE (DTRC) Delete a Cray permanent file.

```
Syntax:     RCDELETE  pw  pdn  id  ed  m  [ wait ]

Parameters: pw   - your Cray password

            pdn  - the file to be deleted

            id   - the ID for the file

            ed   - the edition
                     n  - a specific edition
                    +n  - delete n highest editions
                    -n  - keep   n highest editions
                   ALL - delete all editions
                  (default:  delete the highest edition)

            m    - mainenance control word
            wait - WAIT  - wait for the job to complete,
                           display, delete the .CPR file
                           (synonyms: YES, TRUE)
                   other - do not wait (Cray job creates file
                           RCDEL.CPR)

Remarks:    Any existing file RCDEL.CPR is deleted before
            THE Cray job is submitted.
```

This procedure creates and deletes all versions
of file RCDEL.JOB.

See also: Appendix C: DELETE

Similar commands: COS: DELETE,PDN=
NOS, VMS: PURGE

Examples:
```
RCDELETE  mycraypw  abcde
             ^-- delete the highest edition of
                 file ABCDE (don't wait)
= = = = =
RCDELETE  mycraypw  abcde  0  0  0  WAIT
             ^-- delete the highest edition of
                 file ABCDE (wait for completion)
= = = = =
RCDELETE  mycraypw  abcde  zyx  +3  ijk
             ^-- delete the high 3 editions of
                 file ABCDE with ID=ZYX and
                 maintenance control word IJK
= = = = =
RCDELETE  mycraypw  abcde  zyx  -2  ijk
             ^-- keep the high 2 editions of
                 file ABCDE with ID=ZYX and
                 maintenance control word IJK
= = = = =
RCDELETE  mycraypw  abcde  0 ALL
```

RCGET (DTRC) Create and submit a job to get a Cray permanent dataset and save it as a VAX/VMS permanent file.

Syntax: RCGET cpw VAXfile pdn id df ed r wait

Parameters:

cpw - your Cray password

VAXfile - the VAX filespec for the file
0 - use the default
.ext - "<pdn>.ext"
(default: "<pdn>.")

pdn - the Cray file to be fetched
0 - use the default
(default: first 15 characters of the VAXfilename)
(note: VAXfile and pdn may not both be "0")

id - the ID of the file
0 - null ID
(default: all files)

df - data format (BB, CB, TR)
0 - use the default
(default: CB)

```
                ed      - edition number
                            0 - use the default
                          (default: the highest edition)

                r       - read control word
                            0 - use the default
                          (default: no read control word)

                wait    - WAIT  - wait for the job to complete,
                                  display, delete the .CPR file
                                  (synonyms: YES, TRUE)
                          other - do not wait (Cray job creates
                                  file RCGET.CPR)
                          (default: nowait)
```

Remarks: Any existing file RCGET.CPR is deleted before THE Cray job is submitted.

This procedure creates and deletes all versions of file RCGET.JOB.

See also:

Similar commands: COS: DISPOSE

Examples:

```
RCGET  mycraypw  zyx.FOR  abcde
                 ^-- get Cray file ABCDE as VAX/VMS
                     file ZYX.FOR (don't wait)
= = = = =
RCGET  mycraypw  zyx.FOR  abcde  0 0 0 0 WAIT
                 ^-- same (wait for completion)
= = = = =
RCGET  mycraypw  ""  abcde
                 ^-- get Cray file ABCDE as ABCDE.
= = = = =
RCGET  mycraypw  .FOR  abcde
                 ^-- Get Cray file ABCDE as ABCDE.FOR
= = = = =
RCGET  mycraypw zyx.out abcde qrs 0 3 0 myreadcw
                 ^-- get Cray file ABCDE,ID=QRS,ED=3
                     with read controlword as ZYX.OUT
= = = = =
RCGET  mycraypw plot.out plotout 0 BB 0 myreadcw
                 ^-- Get Cray file PLOTOUT with
                     DISSPLA output
```

RCSAVE (DTRC) Create and submit a job to save a VAX/VMS file as a Cray permanent dataset.

Syntax: RCSAVE cpw VAXfile pdn id df pam m wait

Parameters:

cpw - your Cray password

VAXfile - the VAX filespec for the file
0 - use the default
.ext - "<pdn>.ext"
(default: "<pdn>.")

pdn - the Cray file to be fetched
0 - use the default
(default: first 15 characters of the VAXfilename)
(note: VAXfile and pdn may not both be "0")

id - the ID for the file
0 - null ID
(default: all files)

df - data format (BB, CB, TR)
0 - use the default
(default: CB)

pam - public access mode
E - execute only
M - maintenance only
N - no public access
R - read only
W - write only
0 - use the default
(e.g., R:W gives read and write permission)
(default: N)

m - maintenance control word
0 - no maintenance control word

wait - WAIT - wait for the job to complete, display, delete the .CPR file (synonyms: YES, TRUE)
other - do not wait (Cray job creates file RCSAV.CPR)

Note: If P1 and P2 are both specified in the execute line, defaults are used for all other unspecified parameters.

Remarks: An LO=X audit is done for file <pdn>.

Any existing file RCSAV.CPR is deleted before The Cray job is submitted.

This procedure creates and deletes all versions of file RCSAV.JOB.

See also:

Similar commands: COS:
VMS:

Examples:

```
RCSAVE  mycraypw  abcde.fgh  zyx 0 0 r
                ^-- make my VAX/VMS file ABCDE.FGH
                    a permanent dataset on the Cray
                    with the name ZYX and having
                    world read access (don't wait)
= = = = =
RCSAVE  mycraypw  abcde.fgh  zyx 0 0 r 0 WAIT
                ^-- same (wait for completion)
= = = = =
RCSAVE  mycraypw  abcde.fgh  "" "" "" r
                ^-- make my VAX/VMS file ABCDE.FGH a
                    permanent dataset on the Cray
                    with the name ABCDE and having
                    world read access (the "" are
                    place holders)
= = = = =
RCSAVE  mycraypw  abcde.fgh  zyx  qrs  0 0 ijk
                ^-- make my VAX/VMS file ABCDE.FGH a
                    permanent dataset on the Cray
                    with the name ZYX, ID=QRS and
                    maintenance control word IJK
                    (no permissions)
= = = = =
RCSAVE  mycraypw  plot.out  plotout  0 0 BB
                ^-- after RCGETting a binary blocked
                    file (perhaps DISSPLA output ),
                    send it back to the Cray
```

RCSUBMIT (DTRC) Submit a job to the Cray from any CCF VAXcluster node.

Syntax: RCSUBMIT job_file [password]

Parameters: job_name - the name of the file containing your Cray job

password - your VAXcluster login password -- for security, you may wish to omit this and be prompted for it (this is not used if you are on a node which is connected to the Cray)

Remarks: RCSUBMIT works from any node of the VAXcluster. CRAY SUBMIT works only on a node which connects directly with the Cray.

RCSUBMIT and CRAY SUBMIT require an ACCOUNT statement in the job file. CSUBMIT does not, and ignores it if it is present. If you normally use CSUBMIT to submit your jobs, you should not use RCSUBMIT (or CRAY SUBMIT).

See also: CRAY SUBMIT; CSUBMIT

Similar commands: COS, VMS: SUBMIT
NOS: ROUTE

Examples: RCSUBMIT crayjob myclustrpw
^-- from a node not connected to the Cray

where file CRAYJOB.JOB contains:

```
JOB,JN=test.
ACCOUNT,AC=jobordrno,US=abcd,UPW=mypw.
DISPOSE,DN=$OUT,TEXT='node::',DEFER.
          ^-- at end-of-job, $OUT will be put
              into file node::TEST.CPR
FETCH,DN=test,TEXT='node::test.for'
          ^-- fetch program from node NODE
CFT,I=test,L=0.
FETCH,DN=FT05,TEXT='node::test.dat'.
          ^-- fetch data from node NODE
SEGLDR,GO.
DISPOSE,DN=FT04,TEXT='node::test.out'.
          ^-- send another output file of the
              program to node NODE
= = = = =
CRAY SUBMIT crayjob
          ^-- from a node connected to the
              Cray (you can use RCSUBMIT, but
              this is faster)
```

*** Cray Station Commands ***

The VAX/VMS Cray Station provides the VMS user with access to the CRAY X-MP. The Cray Station is accessed via two commands: CRAY (all Station commands except interactive) and CINT (interactive access and a subset of the Station commands). The CRAY prompt is CRAY>; the CINT prompt is Cint>.

The following discussion of the Cray station commands is derived from the on-line helps for the CRAY amd CINT commands. Type "CRAY HELP" or "CINT /HELP" at the DCL level, or "HELP" at the CRAY> or Cint> prompt for more detailed information.

CRAY Enter the Cray context utility or executes a single station command when that command is supplied as a parameter.

Syntax: $ CRAY [station_command] /BREAKTHROUGH /REFRESH

Parameters:
- station_command - a single Cray station command to be executed
- omitted - you remain in Cray context until you enter EXIT

Qualifiers:
- /BREAKTHROUGH - a display refresh occurs during command input (valid for refresh mode only) (default: /NOBREAKTHROUGH)
- /REFRESH - enable display refreshing in a split screen Cray context (requires DEC_CRT option enabled)
- /NOREFRESH - standard teletype environment (defaults: /REFRESH (VT100-type terminals) /NOREFRESH (non-VT100 terminals))

See also: CINT

Similar commands: NOS: ICF

Examples: $ CRAY

CINT From the DCL level, enter Cray interactive including a subset of the Cray context commands.

Syntax: $ CINT /HELP /JN=jobname /MML=mml /UPPERCASE /PLAY=play_file /US=username

Qualifiers: /H - display help information without having to enter Cray interactive

/J - the interactive job name (first 7 characters used)

/M - maximum message length

/UP - controls whether input is converted to uppercase (default: /NOUPPERCASE)

/P - the play file to be run

/US - the username (1-15 characters)

Remarks:

See also: CRAY

Similar commands: NOS: ICF

Examples:
```
$ CINT
Cray Jobname: myjob
Cray Username: AMDS
!ACCOUNT,....
!
```

** Cray Context Commands **

The following commands may be executed at the CRAY> prompt. This identified with (CINT) may also be executed at the Cint> prompt.

$ Create a temporary VMS subprocess, allowing you to enter DCL commands.

Syntax: $ [dcl_command]

Parameters: dcl_command - any DCL command

Remarks: Since a subprocess is created, any logical names or process resources created in the subprocess will not be available from the main process.

To return to Cray context, type LOGOUT.

Similar commands: NOS ICF:

Examples: $ show users

\+ Display the next page of information in Cray context.

Syntax: +

Similar commands: NOS ICF:

Examples: CRAY> +

\- Display the previous page of information in Cray context.

Syntax: -

Similar commands: NOS ICF:

Examples: CRAY> -

@ Execute an indirect station command file in Cray context.

Syntax: @file_spec

Parameters: file_spec - a VMS file containing station commands

Remarks: "@" is a synonym for the PLAY command.

See also: PLAY

Similar commands: NOS ICF: /PLAY

Examples: CRAY> @station.COM

ABORT (CINT) Interrupt the current interactive Cray job step and return control to the COS Control Statement Processor (CSP). CSP will then issue the "!" prompt. Any COS output queued for the terminal will be displayed before the prompt is issued.

Syntax: ABORT

See also: DROP, KILL

Similar commands: NOS ICF: ABORT

Examples: CRAY> ABORT

ATTACH (CINT) Redirect COS interactive terminal output to an alternate device.

Syntax: ATTACH [alt_device] /CHAR=(char,pos)
/MRS=max_rec_size
/OFF
/ON

Parameters: alt_device - the alternate device
omitted - the current output device

Qualifiers: /CHAR - route entire record to attached device if character <char> is in position <pos> of the current Cray interactive output record

/MRS - route entire record (no carriage control) to attached device if the length of the current Cray interactive output record exceeds max_rec_size

/OFF - do not route Cray interactive records to to attached device (all other parameters or qualifiers ignored)

/ON - enable routing of Cray interactive records to an attached device

Default: /ON

Remarks: The device specified must not be in use and can be any device that accepts record I/O, such as a graphics terminal.

Similar commands: NOS ICF: /CONNECT

ATTENTION (CINT) Interrupt current interactive Cray job step and enter reprieve processing.

Syntax: ATTENTION

See also: ABORT

Remarks: If reprieve processing not specified, same as ABORT.

Similar commands: NOS ICF: /ATTENTION

Examples: CRAY> ATTENTION

BYE (CINT) Terminate an interactive session and, optionally, the COS interactive job.

Syntax: BYE /ABORT /SAVE

Qualifiers: /ABORT - terminate the associated COS interactive job

/SAVE - the associated COS interactive job remains active and output is saved; if the job reaches a COS threshold for output messages or requires input, the job is suspended; the terminal can be reconnected to the COS interactive job by the INTERACTIVE command

Remarks: BYE /ABORT is equivalent to QUIT.

See also: QUIT

Similar commands: NOS ICF: /BYE, /LOGOFF, /QUIT

Examples: CRAY> BYE

CLEAR Terminate any display command and clears the display portion of the screen.

Syntax: CLEAR

Remarks: CLEAR is only available when Cray context is in refresh mode.

Examples. CRAY> CLEAR

COLLECT (CINT) Store COS interactive output in a VMS file.

Syntax: COLLECT file_spec /ECHO /OFF /ON

Parameters: file_spec - the VMS file to receive the COS interactive output

Qualifiers: /ECHO - display the output generated at the terminal as well as the VMS file
/NOECHO - do not echo the generated output at the terminal; only into the VMS file (default: /ECHO)

/OFF - stop writing COS job output to a VMS file and close the VMS file (ignore other qualifiers

/ON - write COS job output to a VMS file (default: /ON)

Remarks: COLLECT can be used before the interactive job is initiated.

Examples: CRAY> COLLECT mycosfile.out

COMMENT Insert comments into an indirect station command file stream.

Syntax: COMMENT string

Parameters: string - any text

Remarks: The comment line can be 256 characters long, including "COMMENT".

See also: @, MESSAGE

Similar commands: NOS ICF: /*

Examples: COMMENT This is a comment

CONTROL_C (CINT) CTRL-C (^C) performs the same function of the attention command.

Syntax: ^C <-- ^ is the CTRL key

Remarks: Brings you back to the DCL prompt.

See also: ABORT; ATTENTION

Examples:
```
! ^C          <-- leave Cray session abnormally
$             <-- you are back at the DCL level
```

CONTROL_O (CINT) CTRL-O (^O) performs the same function as the discard command.

Syntax: ^O <-- ^ is the CTRL key

Remarks: ^O toggles output on and off until the next Cray prompt.

See also: DISCARD

Examples: ! ^O

CONTROL_Z (CINT) CTRL-Z (^Z) exits the current processing mode.

Syntax: ^Z <-- ^ is the CTRL key

Remarks: In response to the Cray context prompt (CRAY>), you are returned to DCL; in a Cray interactive session, you are returned to command mode. While you are being prompted for command parameters, CTRL-Z cancels the command.

CTRL-Z also terminates the execution of an indirect station command file.

See also: @

Examples:
```
! ^Z            <-- leave Cray session
CRAY> QUIT      <-- terminate Cray session
CRAY> ^Z        <-- terminate Cray context
$               <-- you are back at the DCL level
```

DATASET Test for the existence of a COS permanent dataset.

Syntax: DATASET pdn /ID=id /ED=ed /OV=owner

Parameters: pdn - name of PDS

Qualifiers: /ID= - id of the dataset (1-8 characters)
(default: null)

/ED= - edition number of the dataset (1-4095)
(default: current highest edition number)

/OV= - owner of the dataset

Examples: DATASET,myfile.

DELAY Suspend execution of an indirect station command file for a specified period of time.

Syntax: DELAY seconds

Parameters: seconds - suspension time in seconds

Examples: DELAY 20

DISCARD (CINT) Discard all output from a COS interactive session until the next COS prompt is issued.

Syntax: DISCARD

See also: ^O

Similar commands: NOS ICF: /DISCARD

Examples: DISCARD

DROP Terminate a COS job and return the associated output dataset. COS job execution enters reprieve processing after the next COS EXIT control statement.

Syntax: DROP jsq

Parameters: jsq - job sequence number

Remarks: Use STATUS to obtain the job sequence number (COS jsq).

KILL terminates the job immediately; DROP continues processing after an EXIT statement.

See also: ABORT, KILL

Examples:
```
$ CRAY
CRAY> STATUS
CRAY> DROP 9876
```

EOF (CINT) Sends an end-of-file record to a connected COS interactive job.

Syntax: EOF

Remarks: EOF is normally required to terminate COS file input from the terminal.

Similar commands: NOS ICF: /EOF

Examples: CRAY> EOF

EXIT (CINT) Leave Cray context command mode and return to DCL.

Syntax: EXIT
^Z

Remarks: EXIT will close the file specified in a RECORD command, if it is still open.

See also: RECORD

Similar commands: NOS ICF: /EXIT

Examples: CRAY> EXIT

HELP (CINT) Display help information on the Cray station commands.

Syntax: HELP [station_command]

Parameters: station_command - a specific command for which help is desired
omitted - a list of all available commands

Similar commands: NOS ICF: /HELP

Examples: $ CRAY HELP
= = = = =
CRAY> HELP
= = = = =
CRAY> HELP CINT

ISTATUS (CINT) Get the status of your COS interactive job (with CPU time used and the last COS logfile message).

Syntax: ISTATUS

See also: JSTAT, STATUS

Examples: ISTATUS

JOB Display the status of a specific COS job.

Syntax: JOB jobname /JSQ=jsq

Parameters: jobname - the COS job name

Qualifiers: /JSQ= - the job sequence number from which to start the search for the job

Similar commands: NOS ICF: /STATUS

Examples: JOB myjob4

JSTAT Display the status of a specific job and its related tasks.

Syntax: JSTAT jsq /[NO]CYCLE /[NO]TRANSLATE

Parameters: jsq - the job sequence number

Qualifiers:
- /CYCLE - cycle the display refresh through all the available information
- /NOCYCLE - display only the current page until you enter "+" or "-" (default: /NOCYCLE)
- /TRANSLATE - display the terminal ID field in the VMS UIC equivalent
- /NOTRANSLATE - display it in the station internal form (default: /TRANSLATE)

Remarks: Use STATUS to obtain the COS job sequence number (jsq).

See also: ISTATUS, STATUS

Similar commands: NOS ICF: /STATUS

Examples: JSTAT

KILL Delete a job from the input queue, or immediately terminate an executing job, or delete the job's output dataset from the output queue.

Syntax: KILL jsq

Parameters: jsq - the job sequence number

Remarks: Use STATUS to obtain the COS job sequence number (jsq).

KILL terminates the job immediately; DROP continues processing after an EXIT statement.

See also: ABORT, DROP

Similar commands: NOS ICF: /ABORT

Examples:
```
CRAY> STATUS
CRAY> KILL 9876
```

LOGFILE Provides access to the station logfile messages.

Syntax: LOGFILE [file_spec] /ACQUIRE /ALL
/BEFORE=time /DISPOSE
/ERROR /INTERACTIVE
/JOB /MASTER /NETWORK
/NODE=nodename /[NO]NOTIFY
/OPERATOR /OUTPUT=file_spec
/PRINT /RELEASE
/SINCE=time /SUCCESS
/STMSG /TRANSLATE

Parameters: file_spec - An alternate station logfile to be displayed

Qualifiers: /ACQU - display ACQUIRE and FETCH messages

/ALL - display all messages

/BEFO - display messages from before a specified time

/DISP - display DISPOSE messages

/ERRO - display error messages

/INTE - display interactive processing messages

/JOB - display job submission messages

/MAST - display COS master operator messages

/NETW - display DECnet messages (all nodes)

/NODE= - display DECnet messages (one node)

/NOTI - you will be notified an asychronous LOGFILE operation is performed
(requires /RELEASE)
(default: /NONOTIFY)

/OPER - display operator messages

/OUTP= - VMS file to receive station messages currently being displayed

/PRIN - print station messages currently being displayed

/RELE - close the existing logfile and create a new version

/SINC= - display messages since a specified time

/SUCC - display success, warning, and informational messages

/STMS - display COS station messages and associated replies

/TRAN - display terminal ID field (TID) as the VMS UIC equivalent

/NOTR - display TID in the station internal form (default: /TRANSLATE)

Examples: CRAY> LOGFILE jobname.LOG /SINCE=09:15

LOOP Restart execution of an indirect station command file at the beginning.

Syntax: LOOP

Remarks: CTRL-Z must be issued to terminate looping.

Examples: CRAY> LOOP

MESSAGE Send a message to the COS job logfile.

Syntax: MESSAGE string /JN=jobname
/JSQ=jsq

Parameters: string - the message text (for embedded blanks, enclose in quotes ("..."))

Qualifiers: /JN= - the name of the COS job to receive the message (requires /JSQ)

/JSQ= - the job sequence number of the COS job to receive the message

See also: COMMENT

Similar commands: NOS ICF: /*

Examples: MESSAGE This is a message

PAUSE Suspend execution of an indirect station command file.

Syntax: PAUSE

Remarks: Control passes to the terminal, where you can terminate the command file by entering a command or resume it by entering a null line (<RET>).

Examples: PAUSE

PLAY (CINT) Execute an indirect station command file in Cray context.

Syntax: PLAY file_spec

Parameters: file_spec - a VMS file containing station commands

Remarks: PLAY files cannot themselves contain other (embedded) PLAY commands.

"@" is a synonym for the PLAY command.

Similar commands: NOS ICF: /PLAY

Examples: CRAY> PLAY station.COM

QUIT (CINT) Terminate a Cray interactive session and the corresponding COS interactive job.

Syntax: QUIT

Remarks: QUIT is the equivalent of BYE /ABORT.

See also: BYE

Similar commands: NOS ICF: /BYE, /LOGOFF, /QUIT

Examples:
```
!^Z              <-- leave Cray session
CRAY> QUIT       <-- terminate the Cray session
CRAY> EXIT       <-- terminate the Cray station
```

RECORD Start or stop the recording of terminal input to a file while in Cray context for later use with the PLAY or @ commands.

Syntax: RECORD [file_spec] /ON /OFF

Parameters: file_spec - the file into which terminal input is to be recorded

Qualifiers: /ON - start command recording (file_spec required)

/OFF - end command recording (default: /ON)

Remarks: Exiting Cray context automatically issues a RECORD/OFF.

Examples:
```
RECORD station.com  /ON
   ...
RECORD /OFF
```

REMOVE Delete entries in the dataset staging queue.

Syntax: REMOVE queue_id /LOCKED /SPOOL /STAGE

Parameters: queue_id - an 8-character hexadecimal number from the SHOW QUEUES display (leading zeros can be omitted)

Qualifiers: /LOCKED - controls whether or not locked entries are removed (default: /NOLOCKED)

/SPOOL - remove an entry in the network spooled dispose queue

/STAGE - remove an entry in the Cray staging queue

RERUN Immediately end the processing of a COS job and put it back into the input queue.

Syntax: RERUN jsq

Parameters: jsq - the job sequence number

Remarks: The job input dataset is saved and all output datasets associated with the job are deleted. The job input dataset is then rescheduled so the job can be rerun. No action is taken if the job execution is complete or if COS determines the job cannot be rerun.

Use STATUS to obtain the COS job sequence number (jsq).

SAVE Stages a VMS file to COS disk storage.

Syntax: SAVE file_spec /DELETE /DF=d /ED=ed /ID=id /MN=mn /PDN=pdn /RD=rd /RT=rt /US=us /WT

Parameters: file_spec - the file to be staged

File_spec qualifiers:

/DELE - delete the file when is has been successfully staged to the Cray

/DF= - dataset format: CB, BB, or TR (default: CB)

/ED= - edition number (0-4095) (default: next higher number)

```
                    /ID=    - identification (1-8 alphameric chars)

                    /MN=    - maintenance control word

                    /PDN=   - dataset name to be used
                              (converted to uppercase)
                              (default: the input file name)

                    /RD=    - read permission control word

                    /RT=    - the retention period, in days

                    /US=    - the COS username

                    /WT=    - the write permission control word

          Examples:    SAVE myfile.dat /PDN=mydata /US=ABCD
```

SET TERMINAL Define the terminal working environment.

SET TERMINAL FORTRAN
SET TERMINAL NOFORTRAN

Specify whether the terminal is to interpret output records from a COS interactive session as having FORTRAN carriage control.

Default: NOFORTRAN

SET TERMINAL INFORM
SET TERMINAL NOINFORM

Enable/disable the sending of station messages to the user logged on to VMS at a VAX terminal.

Default: NOINFORM

SET TERMINAL PAGE
SET TERMINAL PAGE=lines
SET TERMINAL NOPAGE

Specify the number of lines of output before a page break.

Default: NOPAGE

Default for lines: determined by the scroll setting

SET TERMINAL REFRESH
SET TERMINAL REFRESH=seconds <-- integer 0-60
SET TERMINAL NOREFRESH

REFRESH provides a split-screen Cray context environment and is supported only on terminals with the DEC_CRT attribute. NOREFRESH provides a line-by-line Cray context environment.

```
        Defaults: REFRESH   (VT100-type terminals)
                  NOREFRESH (non-VT100-type terminals)


SET TERMINAL SCROLL=lines
        Changes the Cray context window size.

        "lines" is the size of the command area (bottom window) and
        must be an integer from 3 to 13.

        Default for lines: 4


SET TERMINAL WIDTH=80
SET TERMINAL WIDTH=132
        Changes the width of the terminal within Cray context.

        Default: 80


SHOW QUEUES  Display entries in the dataset staging queue.

        Syntax:      SHOW  QUEUES  /ACQUIRE  /ALL  /CYCLE  /JOB
                                   /NODE=node_id  /OWNER  /SAVE
                                   /STAGE  /TRANSLATE

        Qualifiers:  /ACQU  - display all entries originating from
                              COS (ACQUIRE or FETCH)
                              (default: /ALL)

                     /ALL   - display all entries
                              (same as /ACQUIRE/JOB/SAVE)
                              (default: /ALL)

                     /CYCL  - cycle the display refresh through all
                              the available information
                     /NOCYC - display only the current page until you
                              enter "+" or "-"
                              (default: /NOCYCLE)

                     /JOB   - display entries originating from VMS
                              (default: /ALL)

                     /NODE= - display entries from a specific DECnet
                              node
                              (valid only from an attached station)

                     /OWNER - display only your entries

                     /SAVE  - display entries for SAVEd datasets
                              (default: /ALL)

                     /STAGE - display all Cray staging entries
```

/TRAN - display the terminal ID field in the VMS UIC equivalent
/NOTRA - display it in the station internal form (default: /TRANSLATE)

Remarks: The following fields are displayed:
- Position in the staging queue (L is a locked entry i.e., one that is being processed)
- Request type (JB=job, AC=acquire/fetch, SV=save)
- Queue ID for use in the REQUEUE and RELEASE commands
- VAX username of entry owner
- Dataset transfer name (job name or dataset name)
- Dataset terminal ID (TID)

Similar commands: NOS ICF: /STATUS

Examples: SHOW QUEUES /OWNER
^-- display all your entries

SNAP Copy the current contents of the display region into a VMS file.

Syntax: SNAP file_spec /[NO]ESCAPE

Parameters: file_spec - VMS file to receive the snapshot

Qualifiers: /ESCAPE - retain escape sequences
/NOESCAPE - remove escape sequences (default: /NOESCAPE)

Remarks: In line-by-line mode, the last display requested is recorded.

Examples: SNAP snap.job123

STATCLASS Display the current COS job class structure.

Syntax: STATCLASS /[NO]CYCLE

Qualifiers: /CYCLE - cycle the display refresh through all the available information
/NOCYCLE - display only the current page until you enter "+" or "-" (default: /NOCYCLE)

Similar commands: NOS ICF: /ICFSTATUS, /STATUS

Examples: STATCLASS

STATUS (CINT) Displays the COS system status.

Syntax: STATUS /ALL /CLASS=class_id /CYCLE /EXECUTING /HOLD /ID=mainframe_id /INPUT /NODE=node_id /OUTPUT /OWNER /RECEIVING /SENDING /TRANSLATE /VAX

Qualifiers:

/ALL - display all COS jobs

/CLAS= - display jobs and datasets of a specific job class (default: /ALL)

/CYCL - cycle the display refresh through all available information

/NOCY - display only the current page until you enter "+" or "-" (default: /NOCYCLE)

/EXEC - display the execution queue status (default: /EXECUTION)

/HOLD - display COS datasets in the hold queue

/ID= - display jobs and datasets originating from a specific mainframe

/INPU - display the input queue status

/NODE= - display the entries for a specific DECnet node

/OUTP - display the output queue status

/OWNE - display only your jobs and datasets

/RECE - display the Cray receiving queue status (default: /RECEIVING)

/SEND - display the Cray sending queue status (default: /SENDING)

/TRAN - display terminal ID field (TID) as the VMS UIC equivalent

/NOTR - display TID in the station internal form (default: /TRANSLATE)

/VAX - display only COS jobs related to this VAX/VMS station (or network of stations)

See also: ISTATUS, JSTAT

Similar commands: NOS ICF: /STATUS

Examples: STATUS

SUBMIT Stage a VMS file to the COS input queue.

Syntax: SUBMIT file_spec /AFTER=time /EOF=eof /PRINT

SUBMIT f1,f2,... /AFTER=time /EOF=eof /PRINT

Parameters: file_spec - single VMS file with a complete COS job

f1,f2,... - two or more files to be combined to create a complete COS job

Qualifiers: /AFTER= - specify when the job is to be sent to the Cray

/EOF= - specify what represents an end-of-file (e.g., /EOF="E O F") (default: /EOF="/EOF")

/PRINT - print the job's output file on COS job completion

/NOPRINT - put the COS job's output into your VMS file COS_jobname.CPR

(default: /NOPRINT)

Remarks: The file must contain a COS job. By default, the job's output (including the dayfile) is sent to the originating directory.

See also: CSUBMIT; RCSUBMIT

Similar commands: NOS: CSUBMIT

Examples:
```
CRAY> SUBMIT myjob1
   -or-
$ CRAY SUBMIT myjob1
= = = = =
CRAY> SUBMIT myjob2,myprog2.for,mydata2.dat
   -or-
$ CRAY SUBMIT myjob2,myprog2.for,mydata2.dat
```

SUPPRESS (CINT) Suppress the echoing of the next typed input line.

Syntax: SUPPRESS

Examples:
```
Cint> SUPPRESS
```

SWITCH Set or clear COS job sense switches.

Syntax: SWITCH jsq ssw /OFF
SWITCH jsq ssw /ON

Parameters: jsq - the COS job sequence number

ssw - the sense switch number (1-6)

Qualifiers: /OFF - turn switch <ssw> off

/ON - turn switch <ssw> on

Remarks: These switches can be used for program synchronization on the Cray.

Examples:
```
CRAY> STATUS                 <-- to get the jsq
CRAY> SWITCH 9876 3 /ON      <-- turn on switch 3
```

***** Appendix E *****

*** References ***

The following manuals describe various features of the Cray, DEC and CDC systems.

** Cray **

SR-0009	Fortran (CFT) Reference Manual
SR-0011	COS Version 1 Reference Manual
SR-0013	UPDATE Reference Manual
SR-0018	CFT77 Reference Manual
SV-0020	DEC VAX/VMS Station Reference Manual
SR-0035	CDC NOS Station Reference Manual
SR-0039	COS Message Manual
SR-0060	Pascal Reference Manual
SR-0066	SEGLDR Reference Manual
SR-0113	Programmer's Library Reference Manual

** DEC **

AA-001AE-GZ	DCL Dictionary
AA-LA16A-TE.	EDT Reference Manual
AA-LA62A-TE	EVE Reference Manual
AA-D034E-TE	VAX Fortran Language Reference Manual
AA-LA98A-TE	VAX/VMS User's Manual
-----	Introduction to VAX/VMS by Terry Shannon

** CDC NOS **

60460420	NOS Full Screen Editor
CMLD-88/15	CDC NOS Full Screen Editor (FSE) User's Guide
60459680	NOS 2 Reference Set Volume 3: System Commands

** CDC NOS/VE **

60464018	NOS/VE Commands and Functions Quick Reference
60464015	NOS/VE File Editor
60485913	Fortran Version 1 for NOS/VE
60464012	Introduction to NOS/VE
60464014	NOS/VE System Usage

** General **

CMLD-87-07	Fortran 77 Extensions - A Comparison
CISD-90/01	Computer Center Reference Manual, Volume 1: Cray, MSS, DEC (this manual)
CISD-90/02	Computer Center Reference Manual, Volume 2: CDC

***** Appendix F *****

*** CCF Computer Systems ***

Cray

C1

Computer:	CRAY X-MP/216
Front-ends:	DEC VAXcluster (station code version 4.01), CDC CYBER 180/860 (N1)
Links to:	Mass Storage System (N1)
Operating system:	COS level 1.17
Services:	batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours Tuesday and Thursday mornings for maintenance
Location:	Central site

DEC VAXcluster

DT3 (V3)

Computer:	VAX 8550
Links to:	CRAY X-MP (C1); CDC CYBER 180/860 with MSS (N1/MFN); DECnet to NAVSEA (SEAHUB, etc.)
Operating system:	VMS 5.3-1
Services:	batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.12 (dtvms3.dt.navy.mil)

DT4 (V4)

Computer:	VAX 8550
Links to:	CRAY X-MP (C1); CDC CYBER 180/860 with MSS (N1/MFN); DECnet to NAVSEA (SEAHUB, etc.)
Operating system:	VMS 5.3-1
Services:	batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
Location:	Central site
Network address:	130.46.1.10 (dtvms.dt.navy.mil or dtvms4.dt.navy.mil)

Secure DEC VAX

SECURE

Computer:	VAX 6410
Links to:	CRAY X-MP (C1)
Operating system:	VMS 5.3-1
Services:	secure batch, secure interactive
Schedule:	24 hours a day, 7 days a week, except a few hours for maintenance
Location:	Central site

Control Data Corporation

MFN (N1)

Computer:	CDC CYBER 180/860A with Mass Storage System
Cray Station ID:	N1
Links via NOS to:	CRAY X-MP (C1)
Links via NOS from:	CRAY X-MP (C1), DEC VAXcluster
Operating systems:	dual state with . NOS version 2.7.1 level 716 . NOS/VE version 1.5.1 level 739
Services:	trillion-bit storage, local and remote batch, interactive
Schedule:	24 hours a day, 7 days a week, except a few hours for maintenance
Location:	Central site
Network address:	130.46.1.16 (cdc860.dt.navy.mil)

OASYS (Office Automation SYStem) composed of:

OASYS
- Computer: Sequent S27
- Links to: Mass Storage System
- Operating system: DYNIX v3.0.17.9 (BSD 4.2 + some 4.3 + some AT&T System V)
- Services: OASYS (Office Automation)
- Schedule: 24 hours a day, 7 days a week, except a few hours Wednesday night for backups
- Location: Central site
- Network address: 130.46.1.53 (oasys.dt.navy.mil)

DTOA1
- Computer: DEC VAX 11/780
- Links to: Mass Storage System
- Operating system: Ultrix-32
- Services: OASYS (Office Automation - primarily Carderock)
- Schedule: 24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
- Location: Central site
- Network address: 130.46.1.2 (dtoa1.dt.navy.mil)

DTRC
- Computer: DEC VAX 11/780
- Links to: Mass Storage System
- Operating system: Ultrix-32
- Services: OASYS (Office Automation - primarily Carderock)
- Schedule: 24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
- Location: Central site
- Network address: 130.46.1.3 (dtrc.dt.navy.mil)

DTOA3
- Computer: DEC VAX 11/780
- Links to: Mass Storage System
- Operating system: Ultrix-32
- Services: OASYS Office Automation - primarily Annapolis)
- Schedule: 24 hours a day, 7 days a week, except a few hours Thursday morning for maintenance
- Location: Central site
- Network address: 130.46.1.4 (dtoa3.dt.navy.mil)

*** Services and Support ***

Accounting for Computer Services: Code 3502		(301) 227-1910
Computer status (recorded message)		(301) 227-3043
Dispatch desk		(301) 227-1967
Manuals		(301) 227-1907
Microcomputer support	Carderock:	(301) 227-4901
	Annapolis:	(301) 267-4987
Tape Librarian		(301) 227-1967
Training		(301) 227-1907
User Services (Scientific and Engineering User Support Branch - Code 3511)	Carderock:	(301) 227-1907
	Annapolis:	(301) 267-3343

Stan Willner (Head)
Sharon Good
Mike Kass
Ed Kennedy
Brenda Peters
Dave Sommer (Annapolis)

Administrative Personnel

35	Computer & Information Services Department (G. Gray)	(301) 227-1270
3501	Assistant for Technical Development and Operations (L. Minor)	(301) 227-1428
3502	Computer Department Business Office	(301) 227-1361
3509	Administrative Office (D. Braxton)	(301) 227-3454
351	Scientific & Engineering Systems Div. (S. Willner)	(301) 227-1907
3511	S&E User Support Branch (S. Willner)	(301) 227-1907
3512	VAX/VMS Systems Branch (M. Brady)	(301) 227-3642
3513	Cray/CDC Systems Branch (J. Wessel)	(301) 227-1271
353	Office Automation Systems Division (R. Yearick)	(301) 227-1428
3531	Unix Systems and Programming Branch (R. Yearick)	(301) 227-1428
3533	OA/Microcomputer Support Branch (P. Hayden)	(301) 227-4901 (301) 267-4987
355	Information Systems Division (E. Kearney)	(301) 227-1184
3551	Business Systems Branch (B. Crum)	(301) 227-1127
3552	Special Project Branch (D. Singla)	(301) 227-1184
357	Communications and Facilities Division (R. Weachter)	(301) 227-1270
3571	Computer Facilities Branch (R. Weachter)	(301) 227-3937
3572	Networks and Communications Branch (T. Smith)	(301) 227-1400

***** Appendix G *****

*** Internal Data Structure ***

1. The following table summarizes word lengths on various computers:

computer	op sys	bits/word	digits/word	characters/word
CRAY X-MP		64	22 octal	8
CDC CYBER 200		64	16 hex	8
CDC CYBER 180	NOS/VE			
CDC CYBER 180	NOS & NOS/BE	60	20 octal	10
CDC CYBER 170	NOS/BE			
DEC VAX		16	4 hex	2
(when used in Fortran)		32	8 hex	4
IBM		32	8 hex	4
Burroughs 7700		48	12 hex	6
Unisys 1100		36	12 octal	4 (ASCII) 6 (Fieldata)

This affects the conversion of programs in four areas:

a. The degree of precision of operations is different. Therefore, convergence factors may need to be increased or decreased in absolute value.

b. Constants and data may need to be changed.

c. Octal and hexadecimal constants used in masking operations are generally affected and require alteration according to their intended use.

d. Since different computers may store a different number of characters per word, DATA statements that store a string of Hollerith characters may position the characters in different relative positions in different words. All variable formats (whether read in as data or created by the programmer) should be checkcd. Better yet, Fortran programs which store Hollerith data in INTEGER or REAL variables should be changed to use the Fortran 77 CHARACTER variables and never need to worry about this problem again. (You may have to worry about the maximum length of a CHARACTER variable, but not how it is stored.)

2. Internal representation of character data is ASCII in the CRAY X-MP and DEC VAX, Display Code in the CDC CYBER, and ASCII, EBCDIC or internal BCD in some other systems.

CHARACTER string	machine	op sys	internal representation
' ' (1 blank)	CRAY X-MP		* oct 20 hex
	CDC 170		55
	CDC 180	NOS	55
	CDC 180	NOS/VE	20
	DEC VAX		20
'0' (1 zero)	CRAY X-MP		* oct 30 hex
	CDC 170		33
	CDC 180	NOS	30
	DEC VAX		30
'FILE48'	CRAY X-MP		* oct 46494C463438 hex
	CDC 170		061014053743
	CDC 180	NOS	061014053743
	CDC 180	NOS/VE	46494C453438
	DEC VAX		3834454C4946
			(8 4 E L I F)

* - the octal representation depends on the position in the word

Hollerith words	machine	op sys	internal machine representation	
<blanks>	CRAY X-MP		0200401002004010020040	oct
			2020202020202020	hex
	CDC 170		5555555555555555555	oct
	CDC 180	NOS	5555555555555555555	oct
	CDC 180	NOS/VE	2020202020202020	hex
	DEC VAX		20202020	hex
<zeroes>	CRAY X-MP		0300601403006014030060	oct
			3030303030303030	hex
	CDC 170		33333333333333333333	oct
	CDC 180	NOS	33333333333333333333	oct
	CDC 180	NOS/VE	3030303030303030	hex
	DEC VAX		30303030	hex
FILE48	CRAY X-MP		0431112304246416020040	oct
			46494C4534382020	hex
	CDC 170		06101405374355555555	oct
	CDC 180	NOS	06101405374355555555	oct
	CDC 180	NOS/VE	46494C4534382020	hex
	DEC VAX		454C4946 20203834	hex
			(E L I F 8 4)	<-- 2 words

3. The character sequence for the CRAY X-MP, DEC VAXcluster and CDC 180 (NOS/VE) is ASCII. Note that numbers precede letters for alphabetic comparisons. The character sequences for CDC 180 (NOS) at DTRC is Display Code (64-character set). CDC NOS Fortran uses the Display Code sequence (letters before numbers); CDC NOS COBOL uses the ASCII6 sequence (numbers before letters). Cray, DEC VAX and CDC NOS/VE use the ASCII sequence.

4. CDC NOS uses some special bit configurations in floating point arithmetic to indicate indefinite and infinite operands. These errors could be caused by referencing program areas not initialized or areas overwritten due to inadequate storage reservation. The CPU will not do any further calculation if it encounters such a number and the job will abort with an error mode 2 or 4.

+ infinity	3777xxxxxxxxxxxxxx	oct
- infinity	4000xxxxxxxxxxxxxx	
+ indefinite	1777xxxxxxxxxxxxxx	
- indefinite	6000xxxxxxxxxxxxxx	

where 'x' is any octal digit, usually 0.

5. CDC NOS/VE uses several exponents in floating point arithmetic to indicate zero:

+ zero	0xxx, 1000 thru 2FFF	hex
- zero	8xxx, 9000 thru AFFF	

6. CDC NOS/VE uses special exponents in floating point arithmetic to indicate indefinite and infinite operands:

+ infinity	D000 thru EFFF	hex
- infinity	5000 thru 6FFF	
+ indefinite	7xxx	
- indefinite	Fxxx	

where 'x' is any hexadecimal digit

7. The word format of integers and floating point numbers differs on the various computers.

	integer	floating point	
CRAY X-MP			
1, 1.0	0000000000000000001	0400014000000000000000	oct
	0000000000000001	4018000000000000	hex
-1, -1.0	1777777777777777777	1400014000000000000000	oct
	FFFFFFFFFFFFFFFF	C001800000000000	hex
2, 2.0	0000000000000000002	0400024000000000000000	oct
	0000000000000002	4002800000000000	hex
4, 4.0	0000000000000000004	0400044000000000000000	oct
	0000000000000004	4003800000000000	hex
DEC VAX			
1, 1.0	00000001	00004080	hex
-1, -1.0	FFFFFFFF	0000C080	
2, 2.0	00000002	00004100	
4, 4.0	00000004	00004180	
CDC CYBER (NOS)			
1, 1.0	0000000000 0000000001	1720400000 0000000000	oct
-1, -1.0	7777777777 7777777776	6057377777 7777777777	
2, 2.0	0000000000 0000000002	1721400000 0000000000	
4, 4.0	0000000000 0000000004	1722400000 0000000000	
CDC CYBER (NOS/VE)			
1, 1.0	0000000000000001	4001800000000000	hex
-1, -1.0	FFFFFFFFFFFFFFFF	C001800000000000	hex
2, 2.0	0000000000000002	4002800000000000	hex
4, 4.0	0000000000000004	4003800000000000	hex

Note the difference in the format of negative integers (and CYBER floating point) numbers:

CRAY X-MP, DEC VAX, CDC NOS/VE	CDC NOS
two's complement of absolute value	one's complement of absolute value

8. Logical variables are represented by:

	CRAY X-MP, CDC	DEC VAX
TRUE	-1	1 in bit 0
FALSE	0	0 in bit 0

9. By default, your program area in central memory is set as follows:

Cray COS	Cray UNICOS	DEC VMS	CDC NOS	CDC NOS/VE
zero *	zero	zero	zero	zero

---

* - when not auto-tasking (HEAP, STACK)

*** Internal Representation ***

** CRAY X-MP **

Words in the CRAY X-MP are 64 bits long. Bits are numbered 0-63 or 63-0.

```
Integer:  bit   0    - the sign bit (0 = positive; 1 = negative) (23)
          bits  1:23 - the absolute value of the integer        (22:0)
          range      - ~ -10**14 to ~10**14

Integer (CFT,INTEGER=64):
          bit   0    - the sign bit (0 = positive; 1 = negative) (63)
          bits  1:63 - the absolute value of the integer        (62:0)
          range      - ~ -10**19 to ~10**19

Real:     bit   0    - the sign of the number                   (63)
          bits  1:15 - the exponent (2000 bias)                 (62:48)
          bits 16:63 - the mantissa                             (47:0)
          range      - ~10**-2466 to ~10**2465
          precision  - ~ 14 decimal digits

Double:   First word:
          bit   0    - the sign of the number                   (63)
          bits  1:15 - the exponent (2000 bias)                 (62:48)
          bits 16:63 - the high order part of the mantissa      (47:0)

          Second word:
          bits  0:15 - unused                                   (63:48)
          bits 16:63 - the low order part of the mantissa       (47:0)
          range      - ~10**-8193 to ~10**8189
          precision  - ~ 29 decimal digits
```

** DEC VAX **

Bytes in the DEC VAX are 8 bits long with bits are numbered 7-0. A word (INTEGER*2 in Fortran) is 16 bits long (15-0). A longword (INTEGER or INTEGER*4) is 32 bits long (31-0).

```
Word (INTEGER*2):
          bit   15    - the sign bit (0 = positive; 1 = negative)
          bits  14:0  - the absolute value of the integer
          range       - -32,768 to 32,767

Longword (INTEGER*4):
          bit   31    - the sign bit (0 = positive; 1 = negative)
          bits  30:0  - the absolute value of the integer
          range       - -2,147,483,648 to 2,147,483,647

F_float (REAL*4):
          bit   15    - the sign of the number
          bits  14:7  - the exponent (excess 128)
          bits   6:0 and
                31:16 - the mantissa
          range       - ~.29*10**-8 to ~1.7*10**38
          precision   - ~ 7 decimal digits

D_float (REAL*8, DOUBLE PRECISION):
          bit   15    - the sign of the number
          bits  14:7  - the exponent (excess 128)
          bits   6:0  and
                63:48 and
                47:32 and
                31:16 - the mantissa
          range       - ~.29*10**-8 to ~1.7*10**38
          precision   - ~ 16 decimal digits

G_float (FORTRAN/G_floating):
          bit   15    - the sign of the number
          bits  14:4  - the exponent (excess 1024)
          bits   3:0 and
                63:16 - the mantissa
          range       - ~.56*10**-308 to ~.9*10**308
          precision   - ~ 15 decimal digits

H_float (REAL*16):
          bit   15    - the sign of the number
          bits  14:0  - the exponent (excess 16,384)
          bits 127:16 - the mantissa
          range       - ~.84*10**-4932 to ~.59*10**4932
          precision   - ~ 33 decimal digits
```

** CDC CYBER (NOS, NOS/BE) **

Words in the CDC CYBER 170 and CYBER 180 (when running NOS or NOS/BE) are 60 bits long. Bits are numbered 59-0.

Integer: bit 59 - the sign bit (0 = positive; 1 = negative)
bits 58:0 - the absolute value of the integer

Integer: bit 59 - the sign bit (0 = positive; 1 = negative)
bits 47:0 - the absolute value of the integer
(if used in multiplication or division)

Real: bit 59 - the sign of the number
bits 58:48 - the exponent (2000 bias)
bits 47:0 - the mantissa with the binary point after bit 0

Double: (Double precision is performed in the software, not in the hardware)
First word:
bit 59 - the sign of the number
bits 58:48 - the exponent (2000 bias)
bits 47:0 - the high order part of the mantissa with the binary point after bit 0

Second word:
bit 59 - the sign of the number
bits 58:48 - the exponent (2000 bias)
bits 47:0 - the low order part of the mantissa with the binary point after bit 0

** CDC CYBER (NOS/VE) **

Words in the CDC CYBER 180 (when running NOS/VE) are 64 bits long. Bits are numbered 0-63.

```
Integer:  bit  0      - the sign bit (0 = positive; 1 = negative)
          bits 1:63   - the absolute value of the integer
          precision   - ~ 19 decimal digits

Real:     bit  0      - the sign of the number
          bits 1:15   - the exponent (4000 bias)
                        1:3 - the following FP (or DP) numbers
                              00x - FP zero
                              0x0 - FP zero
                              011 - standard FP number
                              100 - standard FP number
                              101 - FP infinity
                              110 - FP infinity
                              111 - FP indefinite
          bits 16:63  - the mantissa with the binary point before bit 16
          range       - 4.8*10**(-1234) to 5.2*10**(1232)
          precision   - ~ 14 decimal digits

Double:   First word:
          bit  0      - the sign of the number
          bits 1:15   - the exponent (4000 bias)
                        1:3 - same as for real
          bits 16:63  - the high order part of the mantissa with the
                        binary point before bit 16

          Second word:
          bit  64     - same at bit 0
          bits 65:79  - same as bits 1:15
          bits 80-127 - the low order part of the mantissa with the
                        binary point after bit 0

          range       - 4.8*10**(-1234) to 5.2*10**(1232)
          precision   - ~ 29 decimal digits
```

***** Glossary *****

Alphabetic (CDC - NOS)
The letters A-Z.

Alphabetic (CDC - NOS/VE)
The letters A-Z, a-z.

Alphabetic (Cray - COS)
$, %, @, and the letters A-Z, a-z.

Alphabetic (DEC)
$, _ (underscore), and the letters A-Z, a-z (upper and lower case are the same).

Alphanumeric
Alphabetic and the digits 0-9.

User initials (userid or username)
The 4-character ID assigned to each user by Code 3502. This is used to identify jobs, for charge authorization, to identify permanent and MSS files, magnetic tapes, etc.

***** Index *****

Note - NOS/BE system control statements are flagged with ".
Intercom commands are flagged with @.
UPDATE directives begin with *.
Compiler options are flagged with $.

Primary references are flagged with an asterisk after the page number, for example, 1-1*.

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