ISSUE:	1	2	3					
DATE :	770428	770922	780131					

TITLE: OPERATING SYSTEM
USER's MANUAL

DOCUMENT NO: CSS/006/USM/0010

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AUTHORIZED BY : Jørgen Høg

DISTRIBUTION :

400-571

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2. CDC NO.	3. DOCUMENT NO. CSS/006/USM/0010		DATE 790713	
			4. ISSUE 3	5. DCN NO. 1
6 REL. CAT. ☐ I ☒ II	7. PROGRAM NICS-TARE/CP	8. CONTRACT NO. SC 900 461		9. ECR NO

10. DOCUMENT TITLE OPERATING SYSTEM, USERS MANUAL

THE DOCUMENT IDENTIFIED IN BLOCKS 3 AND 4 HAS BEEN CHANGED AS SHOWN IN BLOK 11. THE CHANGED PAGES AUTHORIZED BY THIS DCN ARE ATTACHED. ALL CHANGES AUTHORIZED THROUGH DCN's CONSTITUTE TOGETHER WITH THE ORIGINAL ISSUE SHOWN IN BLOCK 4 THE CURRENT VERSION OF THE DOCUMENT.

11. DOCUMENT CHANGE

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13. PREPARED BY	Flemming Pedersen	DATE 790807
14. APPROVED BY		DATE
15. AUTHORIZED BY		DATE

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1.   ABSTRACT

This manual describes the use of the CR80 SYSTEM ONE,
OPERATING SYSTEM.
CR80 SYSTEM ONE is the software system for the CR80
processor, produced by CHRISTIAN ROVSING A/S.

This operating system controls a configuration consisting
of:

- CR80 computer
- Operators Console
- Card Reader
- Line Printer
- Diskette based file system.

The operating system controls the interaction between one
or more individual users and the different files and exter-
nal devices. The structure is such that there will be no
destinction between files and external devices.

The file system is structured with files, accessible by all
users, and files, private to the individual users.

The users may log in to the system, work on their files, and
run programs, possibly in parallel.

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2.   APPLICABLE DOCUMENTS

- CR80 MINI COMPUTER HANDBOOK
  CSD/HDBK/0001

3.   INTRODUCTION

The CR80 SYSTEM ONE, operating system consists of one
master process (S) that handles one command at a time.
This master process is created at system genetation, and
the individual users may through LOGIN create user proces-
ses. More than one user may log in to the same system.

A user process has the possibility of working on the
files of its own dedicated user catalog, and to load and
start programs (including both programs on the user cata-
log and system programs on the main catalog). A user pro-
cess has no access to files in other user catalogs.

When the user starts a program by writing the programname
plus possible parameters (e.g. EDIT S:S1 0:01), the user
process creates a child process, called a utility process.
The program (e.g. EDIT) is loaded from a diskette into me-
mory by the user process, if it was not already there. Then
the utility process is started and executes the program.

Communication with external devices and diskette files is
carried out via socalled shares (see CR80 SYSTEM ONE, PRO-
GRAMMING MANUAL), i.e. buffer areas in the user process or
the utility process. Before I/O can take place, the share
must be opened and thereby connected to an external device
or to a diskette file.

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For each external device there exist a named driver process
(operators console: OC, card reader: CR or line printer:LP).
In case the share is connected to a diskette file, a named
file process identifying the file is created. This file pro-
cess plays exactly the same role, seen from the user process
or from the utility process, as a driver process.

Thus, when a program is given a file name as a parameter,
this may as well be the name of one of the above mentioned
driver processes, the direction of transfer taken under con-
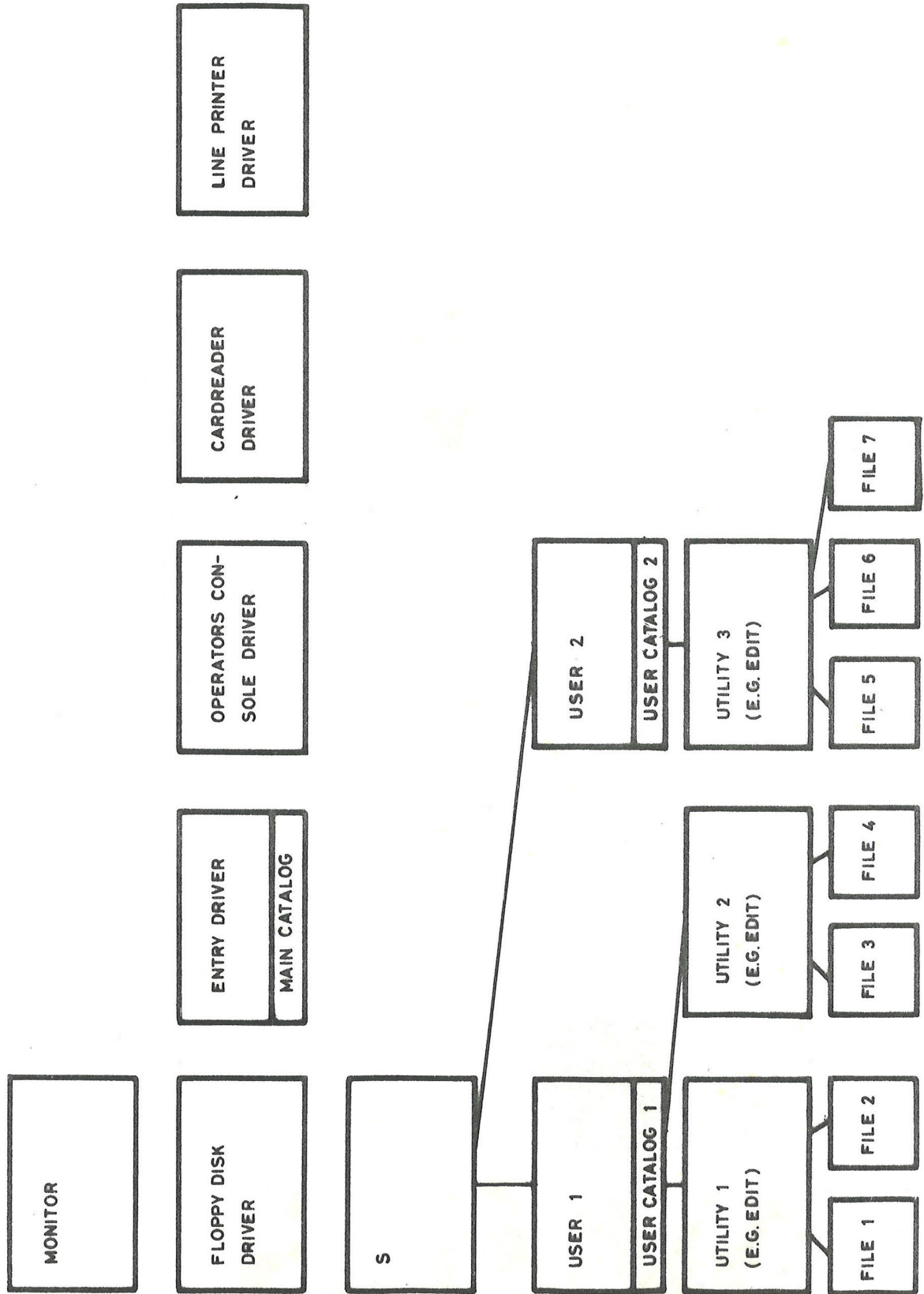sideration (input: OC or CR, output: OC or LP).

On figure 3.1 is shown a possible process layout. Two user
processes are shown (it may be a bit confusing in that they
use the same console, but it is possible), the one with two
utility processes executing, and the other one with one uti-
lity process. Each of the utility processes have created
some file processes.

The two editors(utility) processes share the same program, as
programs are reentranst.

In the same way, the programs for user processes and for file
processes are shared by all such processes.

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FIG. 3.1 A POSSIBLE PROCESS LAYOUT WITH TWO USERS

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4.   SYSTEM REQUIREMENTS

- a CR80 computer (CPU, MBC, bootstrap prom, 60K RAM)

- an operators console (TI Silent 700 or eq.) + AV24 I/F
  (CR8030)

- a card reader (CDC CB1ø5) and parallel IF (CR8034)

- a line printer (CDC CT1A1-B) and parallel IF (CR8034)

- a diskette system:

  Formatter   (Calcomp 1140)
  Drive(s)   (Calcomp 140)
  FD I/F   (CR8033)

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5.   DEFINITIONS

5.1   Process

          A process is an execution of a program. In addition, the
          term is used to describe the memory area that contains
          the necessary data for the execution, together with the
          area that identifies the process to the system. All pro-
          cesses are named.

5.2   File

          A file is a diskette resident sequence of words or charac-
          ters (bytes).

          The only delimiting character is the line feed (OA_{16}) that
          is used as line delimiter.

          The size of a file is determined by the largest number of
          bytes that has ever been written onto it (a file can never
          shrink by writing on it). It is possible to overwrite part
          of a file.

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5.3   Syntax

As delimiter between commands and parameters is used one
or more   spaces.

Semicolon (;) terminates the interpretation of commands
or parameters, and the rest of the line may be used for
comments,

Commas and percents (, %) are treated as line continuation
characters. That is, anything written behind a comma or a
percent is taken as comment, and the command reading is
continued on the next physical line.

A name or a command is a letter followed by any number of
alphanumeric characters. Only the first five and the last
characters are significant.

Examples:

A   is a name
A1   is a name
ABCDEF   is a name
ABCDEXF   is identical to the ABCDEF
1   is not a name
A$C   is not a name

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A file name may in addition to a name, consist of a
period and a suffix. The suffix is equivalent to the
(type, version) of the entry describing the file (see:
CR80 SYSTEM ONE Programming Manual, Entry Procedures).

Suffix:	(type, version)	(hexadecimal)
⟨empty⟩	# 0000	
DAT	# 0100	(data)
TXT	# 0200	(text)
BIN	# 0300	(binary)
OBJ	# 0400	(object)
WRK	# 0500	(work)
CAT	# 0600	(catalog)

It is possible to write a number instead of the suffix
whereby the drive number may be specified explicitely.
The drive number is indicated by the two most signifi-
cant bits of the type.

Example:

ALFA.TXT   denotes a text file on drive 0.
ALFA.#0200 denotes the same file
ALFA.512   denotes the same file
ALFA.#4200 denotes a text file on drive 1.

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5.3.1   Backus-Naur Syntax Definition

$\langle$number$\rangle$:: = $\langle$decimal number$\rangle$ $|$$\langle$radix number$\rangle$ $|$

$\langle$decimal number$\rangle$ :: = $\langle$integer$\rangle$

$\langle$integer$\rangle$ :: = $\{\langle$digit$\rangle\}_1^\infty$, integers must be less than G5536

$\langle$radix number$\rangle$:: = $\langle$integer$\rangle\{\#\langle$integer$\rangle\}_1^\infty$

$\langle$hexa number$\rangle$ :: = $\#\{\langle$hexa digit$\rangle\}_1^\infty$

$\langle$hexa digit$\rangle$ :: = $\langle$digit$\rangle$ A $|$ B $|$ C $|$ D $|$ E $|$ F

$\langle$name$\rangle$ :: = $\langle$letter$\rangle\{\langle$letter$\rangle|\langle$digit$\rangle\}_1^\infty$

$\langle$suffix$\rangle$ :: = $\langle$empty$\rangle|$DAT$|$ TXT$|$ BIN$|$ OBJ$|$
                 WRK $|$ CAT $|\langle$number$\rangle$

$\langle$filename$\rangle$ :: = $\langle$name$\rangle\{.\langle$suffix$\rangle\}_1^\infty$

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```
<num> :: = <number>
<num1> :: = <number>
<num2> :: = <number>


<username> :: = <name>
<programname> :: = <name>
<processname> :: = <name>

<filename1> :: = <filename>
<filename2> :: = <filename>
```

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6.   SYSTEM INITIALIZATION PROCEDURE

Turn the power on:

- at mains supply
- at mains filter
- at diskette formatter
- at line printer
- at card reader
- at operators console (check baud-rate)
- at power supply

Now the boostrap-loader writes on the console:

BC >

Enter 9 to reset memory parity. This should be acknowledged
by 0000 or 0002 and another BC >

Place the system boot diskette in one of the diskette drives
and close the lid.

Enter the drive number on the console.

The bootstrap-loader will now load the system from the dis-
kette into memory and initialize it. A successful load is
acknowledged by 0000.

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Errors may be:

0002:   parity error

0010:   illegal command

0020:   transfer complete, request new block

0040:   check sum error (try again)

0060:   illegal boot entry

0080:   drive not ready (lid open, no diskette, or diskette
                         not accelerated). (try again)

00A0:   diskette hard error (e.g. no power)

00C0:   i/o error

Remove the system diskette.

Now the system is ready for mounting the user's diskettes.

Place the diskettes in the diskette drives and close the lids.

Example:


```
BO>9
0000
BO>0
0000
=> S
MOUNTDISK 0
#

=> S
MOUNTK 1
#
```

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To change a diskette (e.g. in drive 1), the following
sequence must be obeyed.

Press the break key.
The system writes: ⟹
Enter: S and a carriage return
Enter: DEMOUNTDISK 1 and a carriage return.
The system writes #

Now you may open the lid of drive 1 and replace the diskette
by another one.
Close the lid.

If the diskette is new it must be initialized by (this de-
stroys all information on the diskette):

Press the break key.
The system writes: ⟹
Enter: S and a carriage return.
Enter: INITDISK 1 32 and a carriage return.
The system writes: #
(32 is just an example; the initialization takes some time).

Both with a just initialized and with an earlier initialized
diskette you may proceed here.

Press the break key.
The system writes: ⟹
Enter: S and a carriage return
Enter: MOUNTDISK 1 and a carriage return
The system writes: #

Now the newly inserted diskette in drive 1 is ready for use.

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7.   MASTER PROCESS, S

7.1   Introduction

The Master Process, S, controls the main resources of the
system. That is, the memory, the diskette system, and the
external devices. The commands handled by S cover the hand-
ling of the main catalogs of the diskettes and the LOGIN
by users.

S reads and executes one command at a time and returns
after a prompt acknowledge to a waiting state.
To envoke S, an attention message must be sent by pressing
the break key and answering the arrow by an S and a carri-
age return.

The S-process may perform the following commands:

The possible syntax errors from S are stated on page

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7.2   INITDISK ⟨num1⟩ ⟨num2⟩

The command initializes the disk in drive ⟨num1⟩ .

The main catalog of the diskette is initialized to hold
⟨num2⟩ entries, each describing a commonly accessible
file or a used catalog.

By initializing a diskette, all information stored on it
will be lost.

After initdisk, mountdisk must be activated before it is
possible to log in.

Example:

```
=> S
INITDISK 0 32
#

=> S
INITDK 1 32
#
```

Error code:

 0009: disk already mounted

Syntax:

 00BE: syntax error in drive number
 00C1:   drive number specified higher than disk drives.
 00C8:   syntax error in entry number
 00D3:   there exists a user process

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7.3   MOUNTDISK <num>

The diskette in drive <num> is included in the system.
Must be activated after change of a diskette.

Example:

```
=> S
MOUNTK 0
*

=> S
MOUNTKDISK 1
*
```

Error code:

0009: disk already mounted
000B: illegal bit map (the diskette has been removed
       without demounting, run NEWMAP CSS/145/O-D/0100
       on the diskette).

Syntax:

00BE: syntax error in drive number
00C1: drive number specified higher than disk drives
00D3: there exists a user process.

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7.4   DEMOUNTDISK <num>

The command excludes the diskette in drive <num> from the
system.

The command must be activated before a drive is opened
(e.g. to change the diskette).

Note that in order to perform DEMOUNTDISK, all
user processes must have been logged out.

Example:

```
=> S
DEMOUNTKDISK 0
#

=> S
DEMOUK 1
#
```


Error codes:

000A: disk not mounted.

Syntax:

00BE: syntax error in drive number
00C1:   drive number specified higher than disk drives
00D3:   there exists a user process

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7.5   <u>REMOVE</u> ⟨filename⟩

The command removes the entry with ⟨file name⟩ and the
file described by it from the main catalog.

A catalog entry cannot be removed.

If no drive number is indicated in ⟨filename⟩ , the file
is sought on all drives starting with drive 0. If a drive
number is indicated, the file is just sought on that drive.

Error code:

0002:   file not found.

Syntax:

0033:   syntax error in file name
0039:   the file name is specified as type CAT
        (a user catalog)

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7.6   RENAME   <filename1>   <filename2>

The command changes the name and possibly the type of the
file <filename1> to <filename2> . The file must reside in
the main catalog.

It is not possible by a rename command to move the file
from one drive to another.

It is not possible to rename a file neither from nor to
type CAT.

If no drive number is indicated in <filename1> , the file
is sought on all drives starting with   drive 0. If a
drive number is indicated, the file is just sought on
that drive.

Error code:

0001:   file 2 does already exist
0002:   file 1 not found

Syntax:

0014:   syntax error in filename 1
0020:   syntax error in filename 2
002F: one of the filename is specified as type CAT.

7.7   FILES

The command causes a listing of all entries of the main catalogs of all drives.

The listing includes the filename with suffix and the actual size of the files. The unit is segments (each 64 words). The size is printed as a decimal number.

Example:

```
=> S
FILES
DRIVE: 0
FP.CAT.0600        50
DRIVE: 1
S8MNAX.4000        45
S8MXSL.4000         4
S8MXP1.4000        16
S8MXP2.4000        71
COPY.BIN.4300        23
SAVE.BIN.4300        12
CARDS.BIN.4300         29
C8X303.BIN.4300          60
HEXBIN.BIN.4300         13
PATCH.BIN.4300         29
THISIS.4000         2
PARGEN.BIN.4300          26
MERGE.BIN.4300        16
EDIT.BIN.4300         48
USERAN.4000        16
FP.CAT.4600        50
BINCOY.BIN.4300         23
B8AS.BIN.4300        636
BIND.BIN.4300        29
BINHEX.BIN.4300         13
BDPRO.BIN.4300        104
#
```

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7.8   NEWBOOSTRAP   ⟨filename⟩ ⟨num⟩

The command copies the entry describing the file with
⟨filename⟩ into the boot-entry of the diskette in drive
number ⟨num⟩.

The file must reside on drive number ⟨num⟩, and further
be in the main catalog. (A file may be transferred by a
user from his user catalog to the main catalog by the
MAIN command.

The command makes the necessary checksum of the file content.

Prior to envoking the command the entry describing the file
must have been initialized with the following parameters:

ebase(# 19): process base of process to be loaded into CPU
              by the bootstrap loader.

efirst(# 1A): absolute load address within a page.

epage (# 1B): the page bits corresponding to the page into
              which loading will take place.

This initialization may be performed by a user program or
by a system program as f.ex. BIND.

Errors:
0002: file not found

Syntax:
00A6: syntax error in filename
00AB: syntax error in drive number
00AE: drive number specified higher than disk drives.

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7.9   LOGIN   ⟨username⟩

The command causes creation of a user process with
⟨username⟩ . Further user catalogs with ⟨username⟩ are
created on all drives if not already present. A user
catalog is created with a size sufficient to hold 100
files.

The user process announces itself by a prompt: # ,
then it takes commands (see page 29)

Example:


```
=> S
LOGIN FP

-> FP
#
```


Syntax:

0055:   Syntax error in user name
0058:   a user name must not have any suffix.
006D: not enough free memory for the user process
0075:   error during creation of user catalogs (the
        main catalog or the disk is full or one of the
        diskette is not mounted).

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7.10   KILL 〈username〉

The command stops and removes the user process with
〈username〉 and all its children (process started by it).

The command is used for stopping the execution of utility
programmes or system programmes.

Syntax:

009A: syntax error in username
009C: no process with that name
00A3:   the specified process is not a user process.

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7.11   Syntax errors from S:

0014:   name syntax at rename (first name)

0020:   name syntax at rename (second name)

002F: at rename <u>one</u> of the files is specified as type CAT.

0033:   name syntax at remove.

0039:   at remove is specified as type CAT.

0052:   error during file list.

0055:   name syntax at login.

0058:   at login is specified a type different from <empty>

006D: at login, no room for user process.

0075:   at login, error during creation of user catalogues
         (the main catalogue or the disk is full).

009A: name syntax at kill.

009C: at kill, the specified process does not exist.

00A3:   at kill, the specified process is not a child of S
         (is not a user process).

00A6:   name syntax at newbootstrap.

00AB: number syntax at newbootstrap (drive number).

00AE: at newbootstrap, drive number specified higher than
         diskdrives.

00BE: number syntax at mountdisk,demountdisk, or initdisk
         (drive number)

00C1:   at mountdisk,demountdisk, or initdisk,
         drive number specified higher than diskdrives.

00C8:   number syntax at initdisk (number of catalogues).

00D3:   at demountdisk, mountdisk, or initdisk, there exists
         a user process.

00E0:   error at reopening of curin

00E6:   error at reopening of curout

010F: syntax error in command.

anything else: noneexiting command

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8.   USER PROCESS

8.1   Introduction

At LOGIN a user process, identifying the user to the
system, is created. The user process holds the user-
catalogs and executes a small program that interpretes
commands from the user. The commands include file mani-
pulation and running of programmes.

The user process reads commands from operators console
(the driver process named OC). Several commands, sepa-
rated by one or more spaces, may be read from one line
(possibly continued on the next physical line by a comma
or a percent). The acceptance and completion of commands
from a line is acknowledged by a prompt:
#

If any error occurs, the remaining commands of the line
are skipped.

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The user process may perform the following commands:

The possible syntax error from a user process are stated

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8.2   <u>CREATE</u> ⟨filename⟩ ⟨num1⟩ ⟨num2⟩

The command creates one entry on the user catalog of the
user. ⟨filename⟩ will be the name. The drive number is
determined by the two most significant bits of the ⟨suffix⟩

⟨num1⟩ is the area size of the file.
The unit is segments (64 words). The maximum size of a
file is 10 areas.(consecutive pieces of disk space, alloca-
ted one at a time).

⟨num2⟩ is the number of segments transferred at a time to
or from the file. It must conform to the buffer size used
in connection with the file, and thus be 1 for files used
by the system programmes.

Example:

```
CREATE EMPTY 1 1
#
CREATE EMPTY1.4000 1 1
#
FILES
DRIVE: 0
EMPTY.0000      0
DRIVE: 1
EMPTY1.4000     0
#
```

Error Codes:

0001: files does already exist
0003: catalog full (max.100 files in a user catalog)
0007: ⟨num2⟩ greater than ⟨num1⟩

Syntax:

0042: syntax error in filename
0047: syntax error in area size (first number)
004B: syntax error in segments (second number)

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8.3   <u>REMOVE</u> ⟨filename⟩

The command removes the entry with ⟨filename⟩ and the associated file from the user catalog.

If no drive number is indicated in ⟨filename⟩ , the file is sought on all drives starting with drive 0. If a drive-number is indicated, the file is just sought on that drive.

Example:

```
#
REMOVE THIS.TXT
#
FILES
DRIVE: 0
DRIVE: 1
#
```

Error code:

0002: file not found

Syntax:

0011: syntax error in file name

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8.4   RENAME ⟨filename1⟩ ⟨filename2⟩

The command changes the name and possibly the type of the
file ⟨filename1⟩ to ⟨filename2⟩ . The file must reside in
the user catalog.

It is not possible by a rename command to move the file
from one drive to another.

If no drivenumber is indicated in ⟨filename1⟩ , the file
is sought on all drives starting with drive 0. If a drive-
number is indicated, the file is just sought on that drive.

Example:

```
#
FILES
DRIVE: 0
THIS.0000        2
DRIVE: 1
#
RENAME THIS THIS.TXT
#
FILES
DRIVE: 0
THIS.TXT.0200        2
DRIVE: 1
#
```

Error Codes:

0001:   file2 does already exist
0002:   file1 not found

Syntax:

002C: syntax error in filename1
0037:   syntax error in filename2

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8.5   FILES

The command makes a listing of all the user's files. The
files are listed for each drive.

The listing includes the filename with suffix and the
actual size of the files. The unit is segments (each 64
words). The size is printed as a decimal number.

Example:

```
#
FILES
DRIVE: 0
EMPTY1.0000        0
DRIVE: 1
TX.4000      150
EM.4000        0
NDEF.4000      5
X1.4000        9
X2.4000        3
X5.4000       30
P1.WRK.4500      4
#
```

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8.6   <u>MAIN</u> 〈filename〉

The command transfers the file 〈filename〉 from the user's
catalog to the main catalog of the drive, where the file
resides.

If no drivenumber is indicated in 〈filename〉 , the file is
sought on all drives starting with drive 0. If a drivenumber
is indicated, the file is just sought on that drive.

Error Codes:

0001:   A file with 〈filename〉 does already exist in the
        main catalog.
0002:   File not found
0003:   Main catalog full

Syntax:

0053:   syntax error in filename

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8.7   LOAD <program name> $\left\{ \text{<parameter>} \right\}_0^\infty$

A file with <programname> . BIN is sought in the user's
catalogs and, if not found, in the main catalogs. The
search is generally performed on all drives starting with
drive zero. However, if a drivenumber different from zero
is specified in the suffix of the name (see page   )
the file is merely sought on that drive, first in user ca-
talog and then main catalog, if not found in user catalog.

If the program does not reside in memory or if it is not
marked reentrant, the program is loaded into memory from
the file.

A utility process is created, ready to execute the program,
but the process is not started. The process is given a
automatically generated name, that together with process
and program bases, is printed on the console.

Example:

```
LOAD EDIT S:S1 D:OBJ1
OBJECT: P00004, BASE: #2EE0, PROG: #28D1
#
```

This name (P0000 4 in the example) may later be used by the
START and STOP commands.

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The remaining command line (including any parameters) is copied into the newly created utility process, so that it may read the parameters when it is later started. The number of parameters (possibly none) and their meaning depend upon the actual program.

Syntax:

0090: syntax error in programname

00E5: program name with type (suffix) different from BIN or <empty> specified.

0103: program file does not exist.

010E: error at opening the program file.

0166: no room in memory for the process

075D: no room in memory for the program.

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8.8   <u>START</u> <processname>

The command makes the user process start the specified
process, which must be a child of the user process and
waiting for start.

Example:

The editor loaded on page 35   is started.

```
START P00004
*

-> P00004

*
```

Syntax:

009D: the specified process is not waiting for start.
OBCA: syntax error in process name
OBCC: no process exists with the specified name
OBD3:   the specified process is not a child of the user process

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8.9   STOP ⟨processname⟩

The command makes the user process stop the specified
process. It may be started again later on.

Example:


```
=> FP
STOP P00004
=>
```


Syntax:

OBCA: syntax error in process name
OBCC: no process exists with the specified name
OBCD: the specified process is not a child of
        the user process.

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8.10   <program name> $\left\{ \langle \text{parameter} \rangle \right\}_0^\infty$

A file with <programname> . BIN is sought in the user's catalogs and, if not found, in the main catalogs.

If the program does not reside in memory or if it is not marked reentrant, the program is loaded into memory from the file.

A utility process executing the program is created and started. The process is given an automatically generated name, that together with process and program bases, is printed on the console.

The command is equivalent to LOAD <programname> , and START.

Example:

EDIT S:S1 O:OBJ1
OBJECT: P00003, BASE: #2EE0, PROG: #28D1

The remaining command line (including any parameters) is copied into the newly created utility process before it is started. In this way it is possible for the process to read the parameters. The number of parameters (possibly none) and their meaning depend upon the actual program, and must be sought in the description for the specific program.

While a utility process is executing the (parent) user process is waiting and does not take commands. It is however possible to force it to read a command by pressing the BRK key and answering the arrow by the user name. In this way a user may execute several programs in parallel.

Syntax:

0103:   syntax error in programname or program file does not exist.

00E5:   programname with type (suffix) different from BIN or <empty> specified.

010E: error at opening program file

0166:   no room in memory for the process

075D: no room in memory for the program

K

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8.11   LOGOUT

The user catalogs are removed if they are empty. The
user process is stopped and removed by S. The finishing
of the command is acknowledged by a prompt from S.

Example:

*
LOGOUT

-> S
*

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8.12   Syntax errors from user process

0011:   name syntax at remove.

002C: name syntax at rename (first name).

0037:   name syntax at rename (second name).

003F: error during file list.

0042:   name syntax at create.

0047:   number syntax at create (area size)

004B: number syntax at create (block size)

0053:   name syntax at main

0090:   name syntax at load

0095:   name syntax at stop

009B: name syntax at start

009D: at start, process is not waiting for start

00AF: error during program load

00E5:   program name with type different from BIN or
        <empty> specified

0103:   syntax error in command or program file does not exist
        (program name or command misspelled).

010E: error at opening program file.

0166:   error at create process (no room).

01D5:   error at reopening of curin

075D: no room for program

0BCA: name syntax at start or stop

0BCC: at start or stop, process does not exist

0BD3:   at start or stop, process is not a child of this user.