60455250

CONTROL DATA CORPORATION

NETWORK PRODUCTS

INTERACTIVE FACILITY VERSION 1 REFERENCE MANUAL

CDC® OPERATING SYSTEM: NOS 1

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REVISION	DESCRIPTION
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(05-05-78)	
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C	Manual revised to reflect NOS 1.4 and to make miscellaneous editorial and technical corrections.
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	TRMDEF command; expanded use of CLEAR, RETURN, and REWIND commands; capability of retrying after
	time/SRU limit reached; additional information returned from CATLIST command; and network capability
	of recognizing terminal line speed and character set. A description of the access subsystem commands
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PREFACE

The Network Operating System (NOS) was developed by Control Data Corporation to provide the capability of concurrent processing of remote interactive and transaction jobs, in addition to local and remote batch jobs. NOS operates on CDC® CYBER 70, Models 71, 72, 73, and 74, CDC CYBER 170 Series, and CDC 6000 Series computer systems.

The Interactive Facility (IAF) version 1.0 is a network host software product which allows a remote time-sharing terminal user to enter commands (for subsystem selection, file creation, and file maintenance) and to communicate with an executing program.

AUDIENCE

This manual is written for a higher-level language programmer who has had some experience with a time-sharing system. An inexperienced user should refer to the Network Products Interactive Facility User's Guide for a tutorial introduction to IAF.

ORGANIZATION

This manual contains a description of the subsystems available to the user and the procedures for using these subsystem capabilities. However, it does not contain programming information for the subsystems. This information is found in the reference manual for the specific subsystem.

The first three sections of this manual provide an overview of IAF and its file operations and specific procedures for login. This information is particularly useful for an inexperienced user. Sections 4 and 5 describe the command set available to all IAF users. Special capabilities such as program editing and job control are described in section 6. The more experienced user may be interested in the ability to enter control statements, either one at a time or as a batch job image, from the terminal. Sections 7 and 8 describe these features. Also described, in appendix F, are terminal definition commands, which allow the terminal user to change the operating characteristics of the terminal. Messages issued to the terminal during use of the commands and features described in this manual are explained in appendix B.

CONVENTIONS

Throughout this manual, the following conventions are used.

- The word system refers to the combination of the operating system, IAF, and the network, which together provide the capability of user processing in a time-sharing environment.
- (CR) denotes the message transmission key on the keyboard. Depending on the terminal class, this key may be the RETURN, CR, CARRIAGE RETURN, NEW LINE, SEND, or ETX key. For some terminal classes, the RETURN or NEW LINE key also denotes a message terminator, but the message is kept in the terminal buffer until the corresponding SEND or ETX key is pressed, sending all messages in the buffer to IAF. Appendix G supplies more information. IAF and the network respond to the (CR) by positioning the carriage to the first character position on the next line. This manual assumes that all input is terminated and transmitted with a (CR).

- ← designates the backspace character.
- The notation CTRL/x directs the user to press the control key (which is labeled CTRL, CNTL, CNTRL, or similar characters) on the terminal and, while holding this key down, press the key specified by x. For example, CTRL/H means the control key is pressed and held, and the H key is pressed.
- Examples that appear in this manual of actual terminal sessions were produced on a terminal class 1 terminal unless otherwise specified. Uppercase characters represent terminal output; lowercase characters represent user input. (However, user input that is displayed within the text of this manual is shown in uppercase characters.) All terminal activity is either displayed on a screen or printed on continuously fed paper. Examples in this manual assume printing. The vertical spacing in examples does not necessarily coincide with the spacing that appears on the user's terminal.
- References to FORTRAN include both FORTRAN Extended Version 4 (under FTNTS subsystem) and FORTRAN Version 5 (under FORTRAN subsystem).
- Extended memory for the CYBER 170, Models 171, 172, 173, 174, 175, 720, 730, 750, and 760, is extended core storage (ECS). Extended memory for CYBER 170, Model 176 is large central memory (LCM) or large central memory extended (LCME). In this manual ECS refers to all forms of extended memory on the CYBER 170 Series.

RELATED PUBLICATIONS

The following manuals contain additional information for the user. NOS Manual Abstracts is an instant-sized manual that contains a brief description of the contents and intended audience of every manual documenting NOS and its product set. The abstracts manual may be useful in determining which manuals would be of greatest interest to a particular user.

Control Data Publication	Publication Number
ALGOL Version 4 Reference Manual	60496600
ALGOL Version 5 Reference Manual	60481600
APL Version 2 Reference Manual	60454000
BASIC Version 3 Reference Manual	19983900
COBOL Version 4 Reference Manual	60496800
COBOL Version 5 Reference Manual	60497100
COMPASS Version 3 Reference Manual	60492600
CYBER Interactive Debug Version 1 Reference Manual	60481400
CYBER Loader Version 1 Reference Manual	60429800
FORTRAN Extended Version 4 Reference Manual	60497800

Control Data Publication	Publication Number
FORTRAN Version 5 Reference Manual	60481300
Modify Instant	60450200
Modify Reference Manual	60450100
Network Products Interactive Facility Version 1 User's Guide	60455260
Network Products Network Terminal User's Instant	60455270
Network Products Remote Batch Facility Version 1 Reference Manual	60499600
Network Products Transaction Facility Version 1 Reference Manual	60455340
NOS Manual Abstracts	84000420
NOS Version 1 Applications Programmer's Instant	60436000
NOS Version 1 Batch User's Guide	60436300
NOS Version 1 Diagnostic Index	60455720
NOS Version 1 Installation Handbook	60435700
NOS Version 1 Reference Manual, Volume 1	60435400
NOS Version 1 Reference Manual, Volume 2	60445300
NOS Version 1 Systems Programmer's Instant	60449200
PL/I Version 1 Reference Manual	60388100
Text Editor Reference Manual	60436100
Update Version 1 Reference Manual	60449900
XEDIT Version 3 Reference Manual	60455730

Publication ordering information and latest revision levels are available from the Literature Distribution Services catalog, publication number 90310500.

DISCLAIMER

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features or parameters.

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GENERAL DESCRIPTION 1

INTRODUCTION

NOS is a powerful software system that satisfies a wide spectrum of computational needs. Its mass storage and advanced file maintenance techniques permit large amounts of information to be accessed at high speeds. The system is inherently secure, since it assumes that any file (set of information) belongs exclusively to the user creating it and denies any other user's request to access it. However, a user can specify that a file be made available to other users.

IAF is a network product that provides the interactive terminal user with the time-sharing capabilities of NOS. With IAF, NOS can be accessed from any location. The conversational capabilities of IAF permit users to debug their programs much faster than with less interactive batch access modes. Also, IAF can be used from terminals in remote locations, thereby eliminating travel to the computer site by allowing users to work in their own offices.

IAF interfaces with a network software package (called the network) to communicate with terminals. The network provides a standard communication system. It also allows a large variety of terminal types to communicate with IAF by translating input from different terminal types into standard input formats which IAF can process. Other products, such as Transaction Facility (TAF) and Remote Batch Facility (RBF), also interface with the network.

This manual distinguishes network functions from IAF functions to aid in error checking and to allow the user to carry over knowledge of the network to other products (RBF and TAF). Even so, the network interface is largely invisible to the IAF user. In most cases, the user can ignore the existence of the network and can regard communication as with IAF. However, certain commands (appendix F) are available to the IAF user which involve communication only with the network. These network commands change the characteristics of a terminal (for example, changing the backspace character or initiating paper tape operations), change the character code set of a terminal, and send messages to the local operator. Unlike IAF commands, these network commands can be used any time a data path exists between the terminal and the system, including prior to the completion of login.

TERMINALS

IAF and the network provide support for 15 terminal classes. Each terminal class corresponds to an actual terminal or terminals as follows:

Class	Terminal
1	M33, M35, M37, M38 teletypewriters
2	CDC 713-10
3	Reserved for future use
4	IBM 2741
5	M40

Class	Terminal
6	Hazeltine 2000
7	CDC 751-1
8	Tektronix 4000
9	HASP Protocol
10	200 User Terminal
11	CDC 214
12	CDC 711-10
13	CDC 714
14	CDC 731-12, 732-12
15	CDC 734

Due to the flexibility of the network, a computer site may provide support to terminals other than those listed. The user should consult local site personnel to determine if terminal types not listed are supported and to obtain additional operating instructions for supported nonstandard terminals.

Associated with each terminal class are specific terminal operating characteristics. Default values are listed in appendix F. A site can change these default values. If it does, it should provide users with a list of the new values. The user can also change terminal characteristics with the TRMDEF command (section 4) and with the terminal definition commands (appendix F). Important characteristics which may vary from terminal to terminal include:

- Backspace character.
- Cancel character.
- Interruption character.
- Termination character.

SUBSYSTEMS

After identifying himself to the network and IAF, the user can specify a subsystem to be used. The available subsystems are as follows:

Subsystem	Description
Access	Allows communication between users at interactive terminals. A validated user can determine the terminal number of an interactive terminal at which another user is logged in and send messages to that terminal.

Subsystem	Description
BASIC	Provides an elementary programming language used for scientific applications. This language is quickly adaptable to the needs of engineers, businessmen, educators, and other professionals. It requires neither a computer background nor training in higher mathematics.
Batch	Provides the user with a batch control statement capability from the terminal. This subsystem enables a user to type, at a terminal, control statements that normally would have to be entered from a card reader at the central site or from a remote batch terminal or would have to be included in a procedure file or job submitted to the central site.
Execute	Allows a user to execute a previously compiled program. Since compilation accounts for a majority of the time spent on a job, not having to recompile a program each time provides an efficient means of running a frequently used program.
FORTRAN or FTNTS	Translates mathematical language into machine language to solve mathematical and engineering problems. The FORTRAN subsystem (using the FORTRAN Version 5 compiler) or the FTNTS subsystem (using the FORTRAN Extended Version 4 compiler) provides a convenient language for expressing mathematical and scientific problems and a convenient method for data input and output.
Null	Allows the user to perform file manipulations and other time-sharing operations without subsystem association.

INPUT/OUTPUT CONVENTIONS

The following input/output (I/O) conventions and standards apply to an IAF terminal.

LENGTH OF INPUT/OUTPUT LINES

A logical input or output line can consist of a maximum of 150 characters. The physical output line can be any length. If the user attempts to output more characters than the current page width† allows, the additional characters are placed on the next line.

NETWORK MESSAGES DURING INPUT

The following diagnostic messages can appear during input from the terminal.

Message	Description
REPEAT..	Due to a temporary overload condition, the network has discarded the last logical line of input. The user should re-enter this information.

† This characteristic varies, depending on the terminal class. It can be changed using the TRMDEF command (section 4) or one of the terminal definition commands (appendix F).

Message	Description
INPUT STOPPED message	Due to a system overload condition, the network cannot accept terminal input. The user should wait until the message INPUT RESUMED is issued before proceeding. Message is a text string defined by the site.
INPUT RESUMED	The system overload condition has cleared. The user can resume terminal input.
FROM LOP...message	A message has been sent by the local operator. The user can respond to this message by entering the message (MS) command described in appendix F.
ERR..	The user entered a terminal definition command that contained either a format error or a parameter invalid for his terminal type or not supported at his site.

TERMINATION OF INPUT LINE

The user must terminate each line of input information by pressing (CR). This tells the network and IAF that the current input line is complete. The network responds by positioning the carriage at the beginning of the next line. The user can then enter additional input information on the new line.

CORRECTION OF INPUT LINE

The user can correct entry errors in the input line, before pressing (CR), by using the backspace character.† One character (including spaces) is deleted for each backspace character entered. If the beginning of the line is reached, further backspace characters are ignored. For example, when the input line contains

BAX←SJK←←IC

it is interpreted by the system as the BASIC subsystem selection command (or a line of text interpreted as the word BASIC, if the user is in text mode).

DELETION OF INPUT LINE

When the user discovers an error in the command or other input before pressing (CR), he can delete the current input line by entering the cancel line character † followed by (CR). For most terminals, this is CTRL/X or the (character. Default values for each terminal class are given in appendix F.

† This characteristic varies, depending on the terminal class. It can be changed using the TRMDEF command (section 4) or one of the terminal definition commands (appendix F).

The network responds to the cancel line character by printing *DEL* on the next line and positioning the carriage to the beginning of a new line. The following example illustrates the use of the cancel line character.

```
 READY.
10 program t(output)
20 print 6
30 6 format 9*this is a test
*DEL*
30 6 format (*this is it*)
40 end
lnh

10 PROGRAM T(OUTPUT)
20 PRINT 6
30 6 FORMAT (*THIS IS IT*)
40 END

 READY.
```

INPUT TO EXECUTING PROGRAM

A ? output to the terminal normally indicates that the executing program has requested input. However, the program may include question marks in its normal output. Terminal definition commands can be entered in response to any input request, for example, when the user is in text mode or is using Text Editor or XEDIT. If a terminal definition command is entered following a request for input, a new question mark is not sent to the terminal.

PAGE WAIT

Each terminal class defines a certain number of lines of output as a page.† For a display terminal with page wait enabled,† output stops at each page boundary. To display the next page, the user either must enter CR or, for mode 4 terminals, the control character † and CR. For a printing terminal with page wait enabled, the system inserts six line feeds at each page boundary and output continues. If output ceases and the message

OVER..

is displayed at the end of the output, while the present page is not full, another page exists and can be viewed by entering CR.

---

† This characteristic varies, depending on the terminal class. It can be changed using the TRMDEF command (section 4) or one of the terminal definition commands (appendix F).

INTERRUPTION OF EXECUTING PROGRAM

To interrupt an executing program, the user enters the interruption character † followed by ⓒⓡ. The interruption sequence is also called the user break 1 sequence. For most terminals, the interruption character is CTRL/P, CTRL/F, or the : character. Default values for each terminal class are given in appendix F. IAF responds with the message

INTERRUPTED

If output is being transmitted to the terminal when interruption is desired, the user must perform an additional procedure: he must first press the BREAK key (sometimes labeled INT, INTRPT, or ATTN) to suspend terminal output. He can then enter the interruption character to interrupt the program. Synchronous terminals do not have a break character. To interrupt output on these terminals, page wait must have been enabled. The interruption sequence can then be entered only when output ceases at page boundaries.

NOTE

On asynchronous terminals (terminal classes 1 through 8), output can be suspended by pressing any key. However, then the interruption sequence cannot be entered. To use the interruption sequence, the BREAK key must be used to suspend output.

TERMINATION OF EXECUTING PROGRAM

To terminate an executing program, the user enters the termination character † followed by ⓒⓡ. The termination sequence is also called the user break 2 sequence. For most terminals, the termination character is CTRL/T or the) character. Default values for each terminal class are given in appendix F. IAF responds with the message

TERMINATED

If output is being transmitted to the terminal, the user must first suspend terminal output as described previously, and then enter the termination sequence.

USE OF ATTN ON IBM 2741 TERMINALS

Users of IBM 2741 terminals must press the ATTN key before entering the terminal definition control character, cancel character, abort line character, interruption character, or termination character. For further information about these characters, refer to appendix F.

† This characteristic varies, depending on the terminal class. It can be changed using the TRMDEF command (section 4) or one of the terminal definition commands (appendix F).

CONTROL BYTES

The user can design an interactive program to control terminal activity by including control bytes in his output. Control bytes perform operations such as controlling the positioning of the printing element and defining alternate input modes.

A control byte is a 12-bit quantity, right-justified in bit position 0, 12, 24, 36, or 48 of a central memory (CM) word. The user must be careful since data can be mistaken for a control byte. For example, the characters :D typed at the beginning of a line and followed by an end-of-line may log out the user if written to the terminal output file, since the code 0004 is transmitted. The following control bytes are available.

Byte	Description
0001 or 0002	End-of-block
0003	Auto input
0004	Log out user
0005	Initiate ASCII input mode
0006	Initiate transparent input mode
0007	Initiate transparent output mode
0011	Initiate ASCII output mode
0013	End-of-string
0016	Terminal redefinition

The use of these control bytes is described in detail in the NOS Reference Manual, volume 2.

LOGIN AND LOGOUT PROCEDURES 2

INTRODUCTION

This section describes the following topics.

- The login procedure.
- The logout procedure.
- Application switching.

The user cannot harm the system by making incorrect entries or other mistakes at the terminal. Mistakes can have only diagnostic consequences; that is, they only produce error messages (usually ILLEGAL COMMAND or ERR..) and do not damage the operating system, IAF, or the network in any way. Generally, the user is allowed as many chances as necessary to make a correct entry. However, if he is unsuccessful at login four times in succession, the terminal is automatically disconnected. If this happens, the user should check his user name, family, password, and procedures and try again.

LOGIN PROCEDURE

The procedure has three basic steps.

Step	Description
Preparation	The user gathers information he needs before login.
Terminal to network connection	The user connects the terminal to the network.
Login sequence	The user identifies himself as a valid user of the network and of IAF.

PREPARATION

Before attempting to connect the terminal to the network, the user must have the answers to the following:

- What are the characteristics of the terminal being used? These should correspond to a particular terminal class described in appendix F.
- How is the terminal coupled to the computer (data set, acoustic coupler, or hardwired)?
- If the terminal is not hardwired, what is the phone number of the line that corresponds to the class of terminal being used?

- What is the family name? Every user is associated with a family.
- What is the user name? Everyone must have a user name to gain access to the network and IAF at login. The user name is called the user number in some other manuals.
- Is there an associated password? If so, this password must be used along with the user name to gain access to the network and IAF.
- Are charge number and project number required? If so, it is also necessary to enter a valid charge number and project number to gain access to IAF.

TERMINAL TO NETWORK CONNECTION

The user is now ready to perform the steps that connect the terminal to the network prior to the login sequence. The steps are:

- Checking switches.
- Dialing in.
- Identifying terminal.

The following paragraphs describe these steps; figure 2-1 summarizes them. Consulting the manual supplied with the terminal can be helpful in identifying the terms mentioned in these steps.

Checking Switches

To check switches, the user should do the following:

- Find the power switch on the terminal and turn it to the ON position.
- Does the terminal have a duplex switch? If it does, ensure that it is turned to the correct position for proper character echoing. This switch is normally in the HALF position since all released terminal classes have character echoing disabled as a default. Refer to appendix F for a description of enabling and disabling character echoing.
- Does the terminal have a parity switch? If it does, set it to the proper position for the class of the terminal. Values for each terminal class are shown in appendix F.
- Does the terminal have a line-speed switch? If it does, set it to the position that matches the speed or speed range for the line being called.

NOTE

The switch checking procedure varies from terminal to terminal. The user should consult the owner's manual provided with the terminal for instructions on properly configuring the terminal.

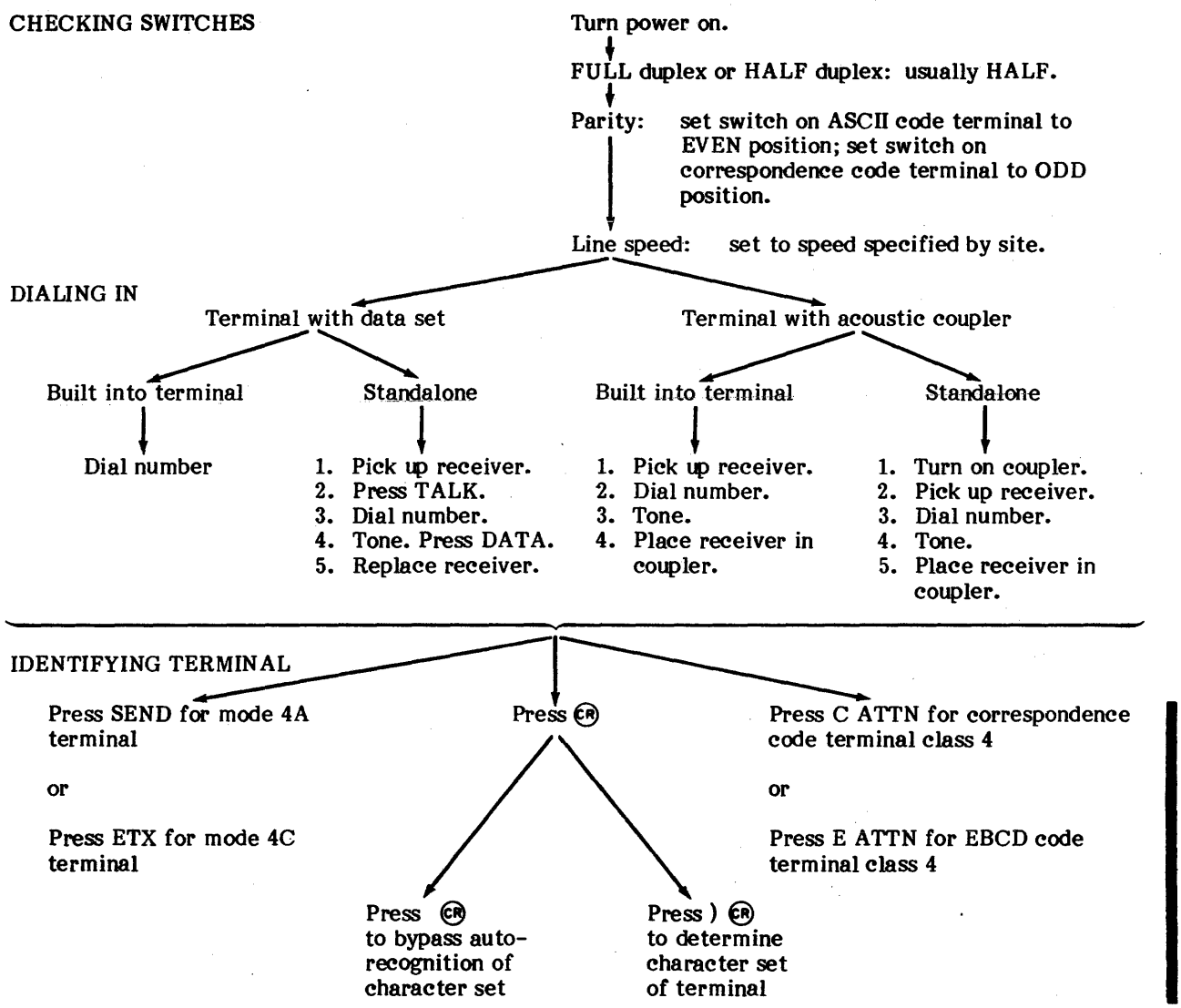


Figure 2-1. Login Procedure

Dialing In

The dial-in procedure connects the terminal to the computer through a data set or an acoustic coupler. Either one may be located in the terminal or as a separate unit beside the terminal. Hardwired terminals are already connected to the computer so the dial-in procedure is not necessary.

If the data set is located in the terminal, a telephone dial is located on the terminal panel. When the terminal is turned on, the dial tone is heard. Dial the computer number. When the connection is made, the terminal is ready to begin terminal identification.

If the data set is separate from the terminal, the user must do the following:

1. Pick up the phone receiver.
2. Press the TALK button on the face of the phone; the button lights.
3. Dial the computer number.
4. When a continuous high-pitched tone sounds, press the DATA button on the face of the phone; the button lights.
5. Replace the phone receiver. Connection is made and the terminal is ready to begin terminal identification.

If the acoustic coupler is located in the terminal, it automatically turns on when power is applied to the terminal. If the acoustic coupler is a separate unit, it must be turned on after power is applied to the terminal. In either case, a standard telephone is used in the following manner.

1. Pick up the receiver and listen for a dial tone.
2. Dial the computer number.
3. A continuous high-pitched tone indicates that the call has been answered and connection has been established.
4. Place receiver in rubber suction cups of acoustic coupler with the cord at the end indicated on the coupler.

Identifying Terminal

Once the connection is established, it may be necessary to identify the terminal to the network. This is required on autorecognition lines, so that the network can determine the line speed and/or character code set of the terminal.

Depending on the terminal type, one of the following procedures is used.

- For mode 4A terminals, press SEND (on these terminals, the SEND key takes the place of the carriage return).
- For mode 4C terminals, press ETX (on these terminals, the ETX key takes the place of the carriage return).

- For asynchronous terminals (terminal classes 1 through 8), press ⓒⓡ. The terminal operator has 60 seconds after connection is made to press ⓒⓡ; otherwise the terminal is disconnected. Entry of ⓒⓡ enables the system to determine the terminal's line speed. When the line speed is recognized, the system issues two line feeds. The user then has 60 seconds to enter either of the following sequences to determine the terminal's character code set.

) ⓒⓡ — Entry of a right parenthesis followed by carriage return enables the system to determine the character code set of the terminal.

  ⓒⓡ — For standard ASCII terminals, entry of only a carriage return bypasses character code set recognition by the system. The character code set is assumed to be ASCII.

  If the user does not respond within 60 seconds, the terminal is disconnected. Automatic identification of the terminal character code set by the system can be bypassed only on a standard ASCII terminal. When the terminal's character code set is recognized, the system issues two additional line feeds to indicate that the terminal identification procedure is complete. The login sequence begins.

  Line speeds which can be recognized for asynchronous terminals are 110, 134.5 (for IBM 2741), 150, 300 (for ASCII and IBM 2741), 600, and 1200 baud. The terminal character code sets which can be recognized are ASCII, typewriter-paired ASCII APL, bit-paired ASCII APL, and, for IBM 2741 terminals only, correspondence code, extended binary-coded decimal (EBCD), correspondence APL, and EBCDIC APL. The message

  UNSUPPORTED CODE SET

  indicates that the character code set that was recognized is not supported at the user's site.

  The user can change his terminal character code set (usually by means of a terminal switch or removable type ball) any time after initial terminal identification using the CD network command (appendix F).

LOGIN SEQUENCE

When the network determines that a data path exists between the terminal and the computer, the login sequence begins. This sequence may vary slightly at some sites due to the flexibility of the network, but is normally a subset of the following. In any case, the user should only respond to the prompts issued.

The login sequence begins with the terminal printing three lines. The first line is in the format

yy/mm/dd. hh.mm.ss. termnam

This information consists of the date given in the format year/month/day, the time in the format hour.minute.second., and a network-supplied terminal name. This terminal name is referenced internally by the network when sending and receiving information. It is of importance to the user if he wishes to communicate problems to site personnel (refer to MS command in appendix F). For example, if the login for the terminal identified by the system as TERM201 began at 12 minutes and 44 seconds after 2 o'clock in the afternoon on February 3, 1979, the first line would read

79/02/03. 14.12.44. TERM201

The second line is the header identifying the site which may give the company name, the operating system, and the version of the operating system. For example:

```
CDC MULTI-MODE OPERATING SYSTEM.        NOS 1.
```

The third line is

```
FAMILY:
```

This line requests the family name assigned to mass storage device(s) containing the user's permanent files. Each system has its own family of permanent file devices. If the user's family is the default for the system, the user need only press CR.

```
FAMILY: CR
```

If this login is being made into an alternate system (two or more sets of permanent file devices), the family name of the user's normal permanent file family must be entered. For example, if the user is assigned to family SYSA, he types on the same line

```
FAMILY: SYSA
```

If the user is not certain whether his family is the default family, he should enter the family name in response to the prompt.

The network next requests the user name (this is called the user number in some other manuals).

```
USER NAME:
```

The user types his user name on the same line and presses CR. For example, if his valid user name is XX234XX, he types

```
USER NAME: XX234XX
```

The network then responds with a request for the password.

```
PASSWORD:
```

The second line results from the network overtyping a variety of characters. This overtyping is done only on hardcopy terminals and its objective is to preserve password secrecy. After creating this row of blackouts, the cursor moves back to the first blackout. The user enters his four- to seven-character password and presses CR.

If the family name, user name, and password are acceptable, the network responds

```
termnam - APPLICATION:
```

The termnam on this line is the same as that on the first line of the login sequence. The user selects IAF by typing IAF on the same line and pressing CR. This might appear as follows for terminal TERM201.

```
TERM201 - APPLICATION: IAF
```

NOTE

IAF is selected automatically if automatic selection has been set in the user's validation file. In this case, the application prompt just described does not appear. The remainder of the procedure is the same.

If the user is validated to access IAF, or if IAF is selected automatically, IAF displays the terminal number and type on the next line. For example:

TERMINAL: 45,NAMIAF

This is terminal 45 in the IAF configuration for this site. NAMIAF also indicates that the terminal is being processed through the Network Access Method (NAM). The user should note his terminal number. If he is accidentally disconnected from the system, he can attempt to recover his job and files using the RECOVER command and his terminal number.

IAF immediately follows this with either

RECOVER/SYSTEM:

or

RECOVER/CHARGE:

The procedures to be used differ slightly depending on the prompt issued. However, for both forms of the prompt (RECOVER/SYSTEM and RECOVER/CHARGE), RECOVER has the same meaning. It is used in special cases in which the user was already logged in and was inadvertently disconnected. He can log back in and try to continue from where he was disconnected by typing RECOVER and the previously associated terminal number in response to either of the RECOVER prompts (Recovery in section 6).

If the RECOVER/SYSTEM response is issued and the user is not attempting a recovery, the user enters the command for the subsystem to be used or any other valid command (sections 4 and 5). The following are the commands for calling subsystems.

Command	Description
ACCESS	To use the access subsystem for interterminal communication.
BASIC	To use the BASIC language.
BATCH,nnnnn	To enter batch control statements interactively from the terminal; nnnnn is optional and specifies the field length to be used (if omitted, 0 is assumed and the operating system manages the field length).
EXECUTE	To execute a previously compiled program.
FORTRAN	To use the time-sharing FORTRAN Version 5 language.
FTNTS	To use the time-sharing FORTRAN Extended Version 4 language.
NULL	To perform file manipulations without subsystem association.

When the user specifies the ACCESS command, IAF responds

READY.

if the user is validated to use the ACCESS command. He can then enter the DIAL or USER command (section 4).

When the user specifies the BATCH command, IAF responds

$RFL,nnnnn.
/

nnnnn is the specified field length.

The user can then enter an IAF command or any valid batch control statement up to 78 characters in length (section 8).

When the user specifies the NULL command, IAF responds

READY.

The user can then enter any valid IAF command.

When the user specifies the BASIC, EXECUTE, FORTRAN, or FTNTS command, IAF responds

OLD, NEW, OR LIB FILE:

The user then specifies whether the file is to be a new file or a copy of an existing file. This is done by entering one of the following commands.

Command	Description
OLD	For a file previously saved as an indirect access permanent file.
NEW	For a new primary file.
LIBRARY	For an indirect access permanent file that resides in the catalog of special user name LIBRARY.

IAF responds

FILE NAME:

The user enters the file name (one to seven characters). If a file called by the OLD or LIBRARY command does not exist, IAF responds

pfn NOT FOUND.

where pfn is the file name specified. The user then reenters the appropriate file command and file name.

If no errors are detected, IAF responds

READY.

Any valid IAF commands can then be entered.

If the RECOVER/CHARGE response is issued and the user is not attempting a recovery, he types CHARGE followed by a valid charge number and project number.

```
CHARGE,chargeno,projectno
```

For greater security, the user can enter the CHARGE command with no parameters. IAF responds with

```
CHARGE NUMBER:

? ▒▒▒▒▒▒▒▒▒▒▒▒
```

The user then types the charge number over the area the system has blacked out and presses ⓒⓡ. IAF then requests the user's project number in the same manner. If the user's charge and project numbers are valid, IAF responds

```
READY.
```

The user then enters the command for the subsystem to be used (refer to the RECOVER/SYSTEM procedures) or any valid command (sections 4 and 5).

ABBREVIATED LOGIN PROCEDURE

The user can shorten the login procedure by entering all of the login information at once. When the FAMILY prompt appears, the user may enter the family name, user name, password, and application on the same line.

```
FAMILY: familyname,username,password,application
```

The information entered must be separated by commas. Any default or unused parameters are indicated by double commas, or in the case of family name, an initial comma. For example, user XX234XX, with password PASS1, in the default family SYSA, can log into IAF with one of the following:

```
FAMILY: SYSA,XX234XX,PASS1,IAF
```

or

```
FAMILY: ,XX234XX,PASS1,IAF
```

When the abbreviated login procedure is used, subsequent login prompts are suppressed.

Combined entries can be provided in response to the USER NAME and PASSWORD prompts as well. In all cases, although the remaining sequence need not be completed on one line, information supplied in the login sequence must be supplied in the proper order: family name, user name, password, application. For example, the following login sequence may occur.

```
FAMILY: SYSA
USER NAME: XX234XX,PASS1
termnam - APPLICATION: IAF
```

IAF can automatically select a subsystem (such as BASIC or batch) for the user at login if this has been specified in the operating system validation file. The validation file determines internal system controls associated with each valid user name. Refer to the discussion of the LIMITS command in section 4 for further information.

LOGOUT AND APPLICATION SWITCHING PROCEDURE

When the user has finished using IAF, he can either log out or switch to another application. The logout procedure ends a user's session at the terminal. Application switching ends a user's session with IAF but allows him to continue processing under the control of another application (such as RBF).

LOGOUT PROCEDURE

To leave IAF and the network, the user enters one of the following:

GOODBYE

or

BYE

or

LOGOUT

The network responds by printing

```
user name            LOG OFF      hh.mm.ss.
user name            SRU          s.sss UNTS.
IAF CONNECT TIME                  hh.mm.ss.
```

and then disconnects the terminal. The first hh.mm.ss. is the time of logout, s.ss is a measure of the system resources used while connected to IAF, and the second hh.mm.ss. indicates how long the user was connected to IAF.

IAF automatically logs out the user if no activity has been registered in any 10-minute period, unless the user is validated for no-timeout terminal status. Refer to the discussion of the LIMITS command for further information.

The user may wish to log out without disconnecting the terminal, to allow another person to use the terminal. To log the present user out of the system and reinitialize the login sequence, the user can enter

HELLO

or

LOGIN

IAF logs out the current user, issues the normal logout messages, and then automatically causes the network to initiate a new login sequence. The new user proceeds as described earlier, starting with the login sequence.

APPLICATION SWITCHING PROCEDURE

If the user wishes to leave IAF control but remain connected to the network and use another application, he can enter one of the following:

BYE,application

GOODBYE,application

HELLO,application

LOGIN,application

LOGOUT,application

In these commands, the term application means a product that uses the network for terminal communications. Possibilities include TAF and RBF. Other site-provided applications may also be available.

If the user is validated to access the named application, the logout message is printed and the terminal is disconnected from IAF and connected to the named application. If the named application is not present in the system, or if the user is not validated to use it, an error message is issued and the prompt

termnam - APPLICATION:

is printed. The user can again enter the name of an application, or he can enter BYE or LOGOUT to log out or HELLO or LOGIN to reinitiate the login sequence.

If the user wishes to be prompted for the application he can enter a logout command followed by a comma. For example, if the user enters

HELLO,

the logout message is printed and the network issues the prompt

termnam - APPLICATION:

The user can then enter the name of an application.

FILE USAGE 3

INTRODUCTION

With the exception of some central memory tables, all data in the system is either a file or a part of a file. This section describes mass storage file organization and explains the fundamentals of file processing. Refer to the NOS Reference Manual, volume 1, for detailed information concerning file structure.

FILE STRUCTURE

A file is the largest collection of information the user can address by name (one through seven characters). It begins with a beginning-of-information (BOI), supplied by the system, and ends with an end-of-information (EOI). The system automatically writes an EOI as the last physical item of information on all files. A file consists of one or more logical records or one or more logical files, each logical file consisting of one or more logical records.

A system logical record, which can be either fixed or variable in length, is a group of related words or characters. In this manual, it is also called a logical record or a record (refer to appendix C). A logical record consists of one or more physical record units (PRUs) and ends with an end-of-record mark (EOR). CDC CYBER Record Manager may define records with different structures and may subdivide a record into its own record types.

A system logical file is one or more system logical records. It ends with an end-of-file mark (EOF). Several NOS utilities allow the user to write logical EOF marks on a file (for example, XEDIT and FORTRAN). In this way, a file actually becomes a multifile file as shown below.

(BOI)...data...(EOR)...data...(EOR)(EOF)...data...(EOR)(EOF)(EOI)

A PRU is the smallest division of data on a device, and its size depends on the device. On all mass storage devices, a PRU is 640 6-bit characters (64 central memory words). The size of a file in PRUs is limited by the user's validation (refer to LIMITS Command in section 4) and the mass storage device on which the file resides (refer to appendix D).

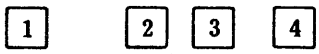
The following is a typical file.

> One line of an invoice forms an item, a complete invoice forms a record, a set of such records forms a file, and the collection of invoice files forms a multifile file.

If a file is positioned at BOI, and the user enters a read operation, the system reads the first logical record. If the user enters a write operation, the system starts writing data on the first PRU and terminates the logical record with an EOR and EOI. If the file is positioned at EOR or EOF, and the user enters a read operation, the system reads the next record, EOF, or EOI. If the user enters a write operation, the system adds the data, an EOR, and an EOI to a new physical record following the current EOR or EOF. A file positioned at EOI is positioned at the last physical record of the file. If the user enters a read operation when a file is positioned at EOI, the system reads the EOI and transmits no data. If the user enters a write operation, the system writes over the existing EOI and adds a new logical record to the file followed by an EOR and EOI.

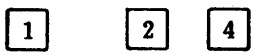
The following examples illustrate possible positions within a file.

File 1 ...data...(EOR)(EOF)(EOI)



File 2 ...data...(EOR)...data...(EOR)(EOF)...

File 3 ...data...(EOR)(EOI)



[1] File positioned at BOI.

[2] File positioned at EOR.

[3] File positioned at EOF.

[4] File positioned at EOI.

[5] File positioned at intermediate point in data.

RESERVED FILE NAMES

Several file names have special significance to the system. In some cases, the system considers these file names to be reserved. In other cases, use of these file names causes unpredictable results. The user should take care when using these file names. The message

RESERVED FILE NAME

indicates that the user has attempted to use one of these file names illegally.

The reserved file names are:

INPUT	SCR1
OUTPUT	SCR2
PUNCH	SCR3
PUNCHB	SCR4
P8	ZZZZZxx
SCR	

ZZZZZxx means that any file whose name begins with ZZZZZ is reserved. Other products used with NOS also reserve file names for internal use. The user should consult the reference manual for the product he is using for additional reserved file names.

TEMPORARY AND LOCAL FILES

During an IAF terminal session, the user can create new files and use existing (permanent) files. Permanent files are either indirect access or direct access files (refer to section 5 for a full description of indirect and direct access files and the commands used to manipulate them). When the user accesses an indirect access file, a copy of the file is made; all changes are made on the copy rather than the permanent file. When the user accesses a direct access file, no copy is made; all changes are made directly on the file.

New files and copies of indirect access files are temporary in nature; that is, they cease to exist when the user logs out of IAF. To retain them, the user must save or replace the files. In this manual, a new file or a copy of an existing indirect access file is called a temporary file.

A local file is any file currently assigned to the job. This includes temporary files as previously described and direct access permanent files that are currently attached to the job.

One type of temporary file, the primary file, has special significance in certain IAF commands. A primary file is a new file created with the NEW or PRIMARY command or a copy of an existing indirect access permanent file retrieved with the OLD or LIBRARY command. Only one primary file is active or available to the user at any given time. For example, the command

```
old,lfn1
```

retrieves a copy of indirect access permanent file LFN1 from permanent file storage for use as the primary file. If the command

```
old,lfn2
```

is entered, a copy of indirect access permanent file LFN2 is retrieved for use as the primary file, and the previous primary file (LFN1) is released. To access LFN1 again, the user must reenter OLD,LFN1 or enter

```
get,lfn1
```

If this command is used, a copy of permanent file LFN1 is retrieved for use as a temporary file, but the current primary file (LFN2) remains the same.

Most operations performed on files by IAF commands are performed on the primary file unless another local file is specified in a command parameter. For example, the command

```
save
```

retains the primary file in the permanent file system. However, the command

```
save,abc
```

retains file ABC in the permanent file system. File ABC could be either the primary file or another temporary file.

There is a close association between the primary file and the subsystem in use when the primary file is saved. Unless the null subsystem is active when the primary file is saved, or unless SS=NULL is specified in the SAVE command, the system sets an internal indicator called the subsystem flag indicating which subsystem is in use. That subsystem is associated with the permanent file and is automatically selected each time the file is retrieved for use as the primary file. For example, if a user operating under the BASIC subsystem issues the command

```
save,abc
```

where ABC is the current primary file name, the BASIC subsystem flag is associated with resulting permanent file ABC. When the user is subsequently operating under another subsystem and enters the command

```
old,abc
```

the current primary file is released, the BASIC subsystem is selected automatically, and file ABC becomes the new primary file. To save the primary file without a subsystem association, the user must either enter the null subsystem before issuing the SAVE command or include SS=NULL in the SAVE command. Retrieving a file saved under the null subsystem does not affect the subsystem in use. The subsystem flag is set only when the user saves the primary file, or when he enters the SAVE or CHANGE command with the SS parameter. If the permanent file named in the command to select a new primary file does not have a subsystem associated with it, the subsystem currently being used remains in effect.

Before any operation on a primary file, the file is automatically rewound (positioned at BOI). However, the user is responsible for the position of all other local files because they are not automatically rewound before each operation. The REWIND command from an IAF terminal, the REWIND statement in FORTRAN, or the RESTORE statement in BASIC can position a file to BOI.

Information (program statements, text, or data) entered from the terminal keyboard is normally stored in the primary file. However, the user can also enter information into any local file, including the primary file, or create new local files using Text Editor or XEDIT. (The Text Editor and XEDIT commands are listed in appendix E.) Refer to the Text Editor Reference Manual or the XEDIT Reference Manual for additional information.

FILE SORTING

IAF sorts a file by line numbers; a file without line numbers cannot be sorted. The user can enter line numbers manually or can use the AUTO command to generate them (refer to Terminal Control Commands in section 4). The line numbers generated by the AUTO command consist of only five digits. When creating a file, the following rules apply.

- Each line of information entered into a primary file must begin with a line number, unless the user is in text or transparent input mode or is using Text Editor or XEDIT.
- Each line of information must have a space between the line number and the information, unless the user is entering a BASIC program.
- Line numbers for FORTRAN and BASIC programs cannot be more than 5 digits; line numbers for all other lines of information can be up to 10 digits.
- Leading zeros on line numbers are permissible but are not required (00120 and 120 are interchangeable). Line numbers with leading zeros can be intermixed with line numbers containing no leading zeros.

When the user is not in text mode, entering numbered lines of information sets an internal indicator called the sort flag. When the sort flag is set, the primary file is sorted automatically whenever the LIST, LNH, RUN, REPLACE, RNH, LENGTH, EDIT, XEDIT, SAVE, or SUBMIT command is entered or a procedure file call is made. Sorting places the statements in numerical order according to the first five digits of the line numbers. To sort the file using more than the first five digits, the number of digits can be specified using the SORT,lfn command (NC parameter) described in section 4.

Blank lines are not normally retained when a file is sorted. A line consisting of a line number followed by zero or one trailing space is automatically deleted whenever the file is sorted. Lines with more than one trailing space are retained. (The RESEQ command retains at most one trailing space on a blank line. Consequently, a RESEQ command, followed by a file sort, causes all blank lines to be deleted from the user's file.)

When entering information from the terminal, the user enters the line number and the statement. After the user presses ⓒⓡ, the text is entered into an area in central memory. Periodically, when this area (16 central memory words) is filled, the text is written to the user's primary file on mass storage as a new logical record. When a sort is performed, these records are rewritten as one logical record. Thus, the entire input is stored as one logical record.

If the message

```
FILE TOO LONG TO SORT.
```

is returned to the user, the file is too long to be sorted automatically by IAF. The user must then enter the SORT,lfn command before proceeding.

However, if the message

```
FILE NOT SORTED.
```

is returned to the user, IAF has attempted to sort the file but has discovered that one or more lines begin with a nonnumeric character or a blank. Thus, a sort was not performed and the sort flag was cleared. The user may enter the SORT,lfn command for more informative diagnostics.

If the user wishes to inhibit automatic sorting of the primary file, he may enter the NOSORT command. This command clears the sort flag and should be entered only when the user desires that the primary file not be sorted and packed into one logical record. The sort flag is reset when IAF receives the first numbered line of source code following the NOSORT command.

The following example illustrates the effect of the NOSORT command. The user selects the proper subsystem and obtains a copy of permanent file A with the command sequence

```
ftnts,old,a
```

If file A is associated with a subsystem flag other than FTNTS or null, that subsystem is selected automatically even though the user specified the FTNTS subsystem. To ensure that the correct subsystem and file have been selected, the user enters the command

```
enquire
```

IAF prints the following status report.

```
TERMINAL:       7, NAMIAF <-- Identifies the terminal being used.
SYSTEM:    FTNTS <---------- Proper subsystem was selected.
FILE NAME: A     <---------- File A is the new primary file.
STATUS:    IDLE
MESSAGE:  <---------------- No message is printed when the status is idle.
```

The user then requests a listing of the file with the command

```
list
```

IAF prints the following copy of the file.

```
 79/07/25. 07.48.51.
PROGRAM   A

00100 PROGRAM TEST (OUTPUT)
00110 DO 1 J=1, 10
00120 PRINT 2,J
00130 2 FORMAT (2X,I2)
00140 1 CONTINUE
00150 STOP
00160 END

 READY.
```

The user then enters the following changes.

```
00120 k=j*j
00130 print 2,k
00140 2 format (2x,i2)
00150 1 continue
00160 stop
00170 end
```

The user then enters the command

```
nosort
```

IAF responds

```
READY.
```

The user then calls for a listing with logical record indications by entering the command

```
list,r
```

IAF lists the unsorted file, indicating the end of each logical record.

```
 79/07/25. 07.50.25.
PROGRAM    A

00100 PROGRAM TEST (OUTPUT)
00110 DO 1 J=1, 10
00120 PRINT 2,J
00130 2 FORMAT (2X,I2)
00140 1 CONTINUE
00150 STOP
00160 END
--EOR--
00120 K=J*J
00130 PRINT 2,K
00140 2 FORMAT (2X,I2)
00150 1 CONTINUE
00160 STOP
00170 END
--EOR--

 READY.
```

If the user requests a listing without entering the NOSORT command, the following output is produced.

```
 79/07/25. 07.50.49.
PROGRAM    A

00100 PROGRAM TEST (OUTPUT)
00110 DO 1 J=1, 10
00120 K=J*J
00130 PRINT 2,K
00140 2 FORMAT (2X,I2)
00150 1 CONTINUE
00160 STOP
00170 END
--EOR--

 READY.
```

To inhibit file sorting while allowing the file to be packed into one logical record, the user enters the following command.

```
pack
```

To then perform text editing on the packed file, the user calls the Text Editor or XEDIT (section 4).

LOCAL FILE CONTROL

The OLD, NEW, and LIBRARY commands change the status of temporary files by releasing the file currently designated the primary file and substituting another file in that status. When the OLD command is entered, the existing primary file is released and a copy of an indirect access permanent file becomes the new primary file. When the NEW command is entered, the existing primary file is released and a new primary file is created. The user can then write data into that file from the terminal. When the LIBRARY command is entered, the existing primary file is released and a copy of an indirect access permanent file, saved under the special user name LIBRARY, becomes the new primary file.

When the existing primary file is released by entry of the OLD, NEW, or LIBRARY command, all other local files are also released unless ND (no drop) is specified with the command. The following is a list of sample commands and their effect on files.

	Files Present at Completion of Command	
Commands	Primary	Other Local Files
BASIC,OLD,A	A	
GET,B	A	B
GET,C	A	B,C
ATTACH,D	A	B,C,D
FTNTS,OLD,A1 (local files are dropped)	A1	
RUN (program A1 creates TAPE1)	A1	
.		
.		
RUN COMPLETE. (IAF response)	A1	TAPE1
.		
.		
GET,B1	A1	TAPE1,B1
GET,C1	A1	TAPE1,B1,C1
SAVE,TAPE1	A1	TAPE1,B1,C1
FTNTS,OLD,A2/ND (local files are retained by using ND parameter)	A2	TAPE1,B1,C1
RUN (program A2 creates TAPE2)	A2	TAPE1,B1,C1
.		
.		
RUN COMPLETE. (IAF response)	A2	TAPE1,TAPE2,B1,C1

Other commands that change the status of local files are:

BYE	GOODBYE	LOGIN	RETURN
CLEAR	HELLO	LOGOUT	

Each command releases some or all local files depending on the format of the command used. The logout commands (BYE, GOODBYE, HELLO, LOGIN, and LOGOUT) release all local files. Different forms of the CLEAR and RETURN commands allow the user to return specified files, all files, or all files except those specified in the command. Section 4 contains complete descriptions of these commands.

IAF COMMANDS 4

INTRODUCTION

After the user has successfully logged into IAF, he can enter the commands necessary to process his job. The four general categories of commands available to the user are:

- Terminal control commands.
- Subsystem selection commands.
- Job processing commands.
- Permanent file commands.

The first three categories are discussed in this section. Permanent file commands are described in section 5.

COMMAND PROCESSING

The minimum number of characters required to specify a command depends upon the specific command and the subsystem currently being used. Three characters are the minimum number checked when a command is entered in all subsystems except the batch subsystem. In the batch subsystem, commands cannot be abbreviated. In all subsystems if more than the minimum number of characters are entered, IAF checks the number given, up to a maximum of seven characters.

For example, if a user is operating under the BASIC subsystem and wants to change to FTNTS, the following are legal and illegal commands for entering FTNTS.

Legal Forms	Illegal Forms	
FTN	F	
FTNT	FT	
FTNTS	FTNx	(x is any alphanumeric character except T)

However, if the user is in the batch subsystem and wants to change to any other subsystem, the name of that subsystem must be entered without abbreviation.

In general, IAF processes each command by checking from one to seven of the characters entered. If the user does not enter a sufficient number of characters to make the command unique, IAF responds

COMMAND NOT UNIQUE.

and the user must then reenter the command using a sufficient number of characters to make it unique. This only occurs with commands in which the first several characters are identical, such as HELP and HELLO. In this case, the entry of HEL would result in the command being declared not unique.

If the command entered is not a valid command or is misspelled, the message

ILLEGAL COMMAND.

is returned. The command entered can be up to 80 characters. A longer command causes the message

COMMAND TOO LONG.

to be issued. IAF prefixes many commands with a $ if they are to be passed on to the operating system for processing. This is done to identify them as IAF commands and to prevent the system from trying to locate and execute a local file of the same name. In these cases, the 80th character of the command entered by the user is truncated. When the user discovers an error in the command or other input before (CR) is pressed, he can either delete the entire line or backspace to the point of the error, correct it, and continue on the same line.

To delete a line, the user first presses the cancel line character (refer to appendix F for default cancel characters for all terminal classes) and then the (CR). The network responds by printing *DEL* on the next line and positioning the carriage to the first character position of a new line.

To backspace and correct a line, the user counts the number of characters (including spaces) to the position of the error and presses the backspace key an equal number of times. The user then corrects the error and continues on the same line. The backspace key depends on the terminal class (refer to appendix F) but is usually the BACK SPACE key, ← key, or CTRL/H keys.

If the user attempts to perform an operation for which he is not validated or if he exceeds his validation limits, IAF responds

ILLEGAL USER ACCESS.

The system maintains validation controls for every user name (refer to LIMITS Command at the end of this section for a complete description).

Alphabetic characters entered in lowercase are automatically translated to uppercase unless the ASCII command is in effect. The ASCII command inhibits translation from lowercase to uppercase. All commands may be entered in uppercase or lowercase in either ASCII or normal character mode.

On all commands that require a numeric value, the number is treated as follows:

- If the number contains an eight or nine, decimal base is assumed.
- The base may be specified by a postradix of B or D; that is, 562D is treated as 562 decimal and 562B is treated as 562 octal.
- Default conversion of numbers is normally decimal.

TERMINAL CONTROL COMMANDS

The terminal control commands allow the user to change the characteristics of the terminal and to vary the source and format of information given to and received from the system. These commands, which can be entered at any time after the user has successfully logged into IAF, are as follows:

Command	Description
ASCII	Allows the user of an ASCII terminal to use the ASCII 128-character set and places the terminal in ASCII mode. On non-ASCII terminals, this command allows the use of up to 128 of the characters defined for the terminal. The ASCII command allows the user to enter lowercase letters that are interpreted by the system rather than translated to uppercase as is done in normal mode. In ASCII mode, characters entered from the terminal are translated into 6/12 display code. On an ASCII terminal, 6/12 display code consists of 95 graphic characters and 33 control characters (the 128-character set). The standard ASCII graphic 64-character set contains only the first 64 (or 63 depending on an installation option) of these 95 characters. In normal mode, the user is restricted to these 64 (or 63) characters. Characters of the ASCII graphic 64-character set are processed internally as 6-bit display code characters. The additional characters that make up the ASCII 128-character set are processed internally as 12-bit display code characters. Refer to appendix A for further information on display codes and character sets. IAF receives all ASCII characters except line feed, carriage return, NUL, EOT, DEL, and the logical backspace character. Control characters (line feed, cancel line, and backspace) are not received unless in special editing mode. Commands can be entered in either uppercase or lowercase regardless of ASCII mode.
AUTO,nnnnn,iiii	Automatically generates five-digit line numbers. The nnnnn parameter specifies the beginning line number; default value is 00100. The iiii parameter specifies the increment value added for each succeeding line number; default value is 10. To exit from auto mode, the user presses the cancel line key followed by (CR), thus deleting the current line. A new command can then be entered on the next line. The line numbering sequence can be altered by deleting the line or backspacing and then entering a new beginning line number rather than a new command (leading zeros are permissible but not required). The user should exercise caution when doing this since the AUTO command is still in effect and continues generating line numbers using the original increment

Command	Description

value. Thus, if a line number is generated that already exists in the file, the original contents of that line are lost and must be reentered. The increment value cannot be altered unless a new AUTO command is entered.

In the following example of the AUTO command, the user deletes a line number to change the numbering sequence and then deletes another line number in order to place a character in column 6.

```
 READY.
auto
00100 program header(input,output)
00110 write 1000
00120   (User enters cancel line character.)
*DEL*
00230 1000 format(15x,*headings*) (User enters entire line.)
00240 write 2000
00250 2000 format(15x,*author*,9x,*title*,15x,
00260    (User enters cancel line character.)
*DEL*
00260+             *publisher*,6x,*cost*) (User enters
00270 stop                                 entire line.)
00280 end
00290   (User enters cancel line character.)
*DEL*
lnh

00100 PROGRAM HEADER(INPUT,OUTPUT)
00110 WRITE 1000
00230 1000 FORMAT(15X,*HEADINGS*)
00240 WRITE 2000
00250 2000 FORMAT(15X,*AUTHOR*,9X,*TITLE*,15X,
00260+             *PUBLISHER*,6X,*COST*)
00270 STOP
00280 END

 READY.
```

BRIEF — **Suppresses all full and partial headers such as those issued by the LIST or RUN command.**

Command	Description
CSET,c	Sets the character set mode of the terminal to the specified mode. c Specifies terminal character set mode. ASCII — Set ASCII mode (ASCII 128-character set). NORMAL — Set normal mode (ASCII graphic 64-character set). The CSET command may also be entered through control statements included in a procedure file. **NOTE** The CSET,NORMAL command affects only the terminal character set, not its auto or brief states.
NORMAL	Reverses the effect of the ASCII, AUTO, BRIEF, CSET, and NOSORT commands on both input and output. IAF initially assumes that this command has been entered. Normal mode uses the ASCII graphic 64-character set. All lowercase letters are converted to uppercase (refer to ASCII command) and all command headers are printed (refer to BRIEF command).
TIMEOUT	Changes a no-timeout terminal to the standard timeout status. In standard timeout status, the user is automatically logged out after 10 minutes of inactivity. Standard status is in effect when bit 10 in access word AW is clear. (Refer to LIMITS Command in this section.) When the bit is set, the terminal remains connected until the user logs out. The TIMEOUT command clears this bit for the session in progress.
TRMDEF,L=lfn, $tc_1=v_1,\ldots,$ $tc_n=v_n$	Changes one or more of the characteristics of a user's terminal (for example, the termination character or page width). The terminal characteristic to be changed, tc_i, is specified by a two-character mnemonic listed in table F-1 in appendix F. Almost all of the parameters available for terminal definition commands can be used in the TRMDEF command. (Exceptions are DL and some IN parameters as noted in appendix F.) The new value, v_i, is any value in the range given for that terminal characteristic in table F-1. It can be a decimal value, a coded value with a special meaning (such as PR for printer), or a single character. If the new value is a single character, it can be given in any of the following formats. Value — Description v — Any alphanumeric character (a character with a display code in the range $0<$display code $\leq 44_8$). v — Any character, including special characters, delimited by dollar signs (for example, $*$). If the

Value	Description
	character is a dollar sign ($), it must be specified using two dollar signs (for example, $$$$).
vvvB	Octal value of an ASCII character (for example, 52B, which would be equivalent to an entry of $*$).
vvD	Decimal value of an ASCII character (for example, 42D, which would be equivalent to an entry of $*$).
Xvv	Hexadecimal value of an ASCII character (for example, X2A, which would be equivalent to an entry of $*$).

NOTE

If a numeric value for a single ASCII character is specified without a pre- or post-radix, the value is assumed to be octal unless it contains an 8 or 9. In this case, it is translated as decimal.

The L parameter specifies an optional file on which the terminal redefinition information is written. If omitted, file OUTPUT is assumed. If another file is specified, the changes are implemented when the file is listed or copied to the terminal.

If the user is accessing any application other than IAF, entry of the TRMDEF command has no effect. If any errors are found in the command, a message is issued and the terminal characteristics in effect before entry of the command remain in effect.

Example:

TRMDEF,IN=PT	This command changes the input device to a paper tape reader, thus allowing the user to read data and commands from a tape. It has the same effect as the corresponding terminal definition command (that is, entry of the control character followed by IN=PT).

SUBSYSTEM SELECTION COMMANDS

The following commands are used to select a specific subsystem. The user should always be aware of the subsystem that is currently active. For example, attempting to execute a FORTRAN program while operating under the BASIC subsystem causes meaningless diagnostic messages to be issued. To determine which subsystem is currently active, enter the ENQUIRE command.

NOTE

The subsystem may be automatically selected by IAF at login if this has been set in the validation file.

A specific subsystem can be associated with an indirect access file so that whenever the user specifies that file as the primary file, the associated subsystem is selected automatically. The subsystem associated with a file is set when the file is saved. If the user includes the SS (subsystem) parameter on the SAVE command, he can specify any of the valid subsystems. If he enters SAVE without the SS parameter and the file is the primary file, the subsystem currently active is set. To save the primary file with no subsystem association, either the user can enter the null subsystem before he saves the file, or he can enter the command

SAVE,lfn/SS=NULL

Automatic subsystem association is made only when the primary file is saved. To associate a subsystem with a temporary file other than the primary file, it must be saved with the SS parameter specified.

Command	Description
ACCESS	Selects the access subsystem. While in the access subsystem, the user can communicate with another interactive terminal using the DIAL and USER commands. The user must be validated to use the access subsystem (refer to LIMITS Command). If the user has the proper validation, IAF responds READY. Otherwise, the message ILLEGAL COMMAND. is returned. The DIAL and USER commands can be entered only when the access subsystem is active.

Command	Description
BASIC,ccc	Selects the BASIC subsystem. The optional ccc parameter enables the user to specify one command in addition to the BASIC command. Any valid command is permitted, as well as all valid parameters for that command. The following example illustrates the use of this option. BASIC,OLD,PRIME In this example, the user selects the BASIC subsystem and makes permanent file PRIME the primary file. The file name (PRIME) is a valid parameter with the OLD command. If ccc is omitted and no primary file is currently defined, IAF responds OLD, NEW, OR LIB FILE: The user can then specify whether the primary file is to be a new file (NEW) or an existing indirect access permanent file (OLD or LIB). LIB is an abbreviation of the command LIBRARY (refer to section 5). The file name (separated by a comma) also can be included in this entry. The entry is terminated by (CR). If the file name is omitted in the reply, IAF responds FILE NAME: The user then specifies the file name.
BATCH,nnnnn	Selects the batch subsystem. Refer to section 8 for a description of this command.
EXECUTE,ccc	Selects the execute subsystem. This subsystem is used only to execute a previously compiled (object code) program. The RUN (or RNH) command must be entered to initiate execution. The optional ccc parameter enables the user to specify one command in addition to the EXECUTE command. Any valid command is permitted, as well as all valid parameters for that command. The following example illustrates the use of this option. EXECUTE,OLD,OBJFILE In this example, the user selects the execute subsystem and makes permanent file OBJFILE the primary file. The file name (OBJFILE) is a valid parameter with the OLD command. If ccc is omitted and no primary file is currently defined, IAF responds OLD, NEW, OR LIB FILE: The user can then specify whether the primary file is to be a new file (NEW) or an existing indirect access permanent file (OLD or LIB). LIB is an abbreviation of the command LIBRARY (refer to section 5). The file name (separated by a comma) also can be included in this entry. The entry is terminated by (CR). If the file name is omitted in the reply, IAF responds FILE NAME:

Command	Description
	The user then specifies the file name.

NOTE

Source language programs cannot be executed under the execute subsystem.

The execute subsystem should be used whenever possible to conserve system resources. Efficiency can be achieved when certain programs are used frequently. For example, a source code program created under FORTRAN must first be compiled before it can be executed. This process is automatic. The user need only enter the RUN command. The program automatically goes through a compilation phase which produces an executable object code (binary) program. The object code program is then executed. Thus, greater efficiency is achieved by retaining the object code program in the permanent file system for later execution under the execute subsystem. This can be accomplished by using the following commands.

RUN,B=lfn	Causes the object code program to be placed on temporary file lfn.
SAVE,lfn/SS=EXECUTE	Retains file lfn as a permanent file and sets the execute subsystem flag.

If this is done, subsequent requests to the file using the OLD command cause the execute subsystem to be selected. Entering the RUN command initiates execution of the object code program.

FORTRAN,ccc

Selects the FORTRAN subsystem, which uses the FORTRAN Version 5 compiler. The optional ccc parameter enables the user to specify one command in addition to the FORTRAN command. Any valid command is permitted, as well as all valid parameters for that command. The following example illustrates the use of this option.

```
FORTRAN,OLD,TAX
```

In this example, the user selects the FORTRAN subsystem and makes permanent file TAX the primary file. The file name (TAX) is a valid parameter with the NEW command.

If ccc is omitted and no primary file is currently defined, IAF responds

```
OLD, NEW, OR LIB FILE:
```

The user can then specify whether the primary file is to be a new file (NEW) or an existing indirect access permanent file (OLD or LIB). LIB is an abbreviation of the command LIBRARY (refer to section 5). The file name (separated by a comma) also can be included in this entry. The entry is terminated by ㊥. If the file name is omitted in the reply, IAF responds

```
FILE NAME:
```

The user then specifies the file name.

Command	Description
FTNTS,ccc	Selects the FTNTS subsystem, which uses the FORTRAN Extended Version 4 compiler. The optional ccc parameter enables the user to specify one command in addition to the FTNTS command. Any valid command is permitted, as well as all valid parameters for that command. The following example illustrates the use of this option. FTNTS,OLD,DATAGEN In this example, the user selects the FTNTS subsystem and makes permanent file DATAGEN the primary file. The file name (DATAGEN) is a valid parameter with the OLD command. If ccc is omitted and no primary file is currently defined, the system responds OLD, NEW, OR LIB FILE: The user can then specify whether the primary file is to be a new file (NEW) or an existing indirect access permanent file (OLD or LIB). LIB is an abbreviation of the command LIBRARY (refer to section 5). The file name (separated by a comma) also can be included in this entry. The entry is terminated by ER. If the file name is omitted in the reply, IAF responds FILE NAME: The user then specifies the file name.
NULL	Selects the null subsystem. IAF responds READY. This command is entered before saving the primary file if the user does not want a specific subsystem flag to be associated with the file. Normally, when a user saves the primary file, an internal indicator called the subsystem flag is set to indicate the subsystem currently in use. That subsystem is automatically selected in each succeeding request for the file using the OLD command. An alternate way of saving the primary file with no subsystem association is to specify the SS=NULL parameter on the SAVE command (section 5). If the user does not specify a subsystem at login time, IAF sets the subsystem specified in the validation file (refer to the IS field under LIMITS Command in this section). Null is the default.

JOB PROCESSING COMMANDS

The job processing commands allow the user to perform a variety of job processing or job-related operations. These commands can be entered at any time after the login to IAF is complete.

Command	Description
APL	Selects the APL (A Programming Language) interactive interpreter. To take advantage of the full capabilities of APL (including the character set), this command can be used in conjunction with the SE and CD terminal definition commands (refer to appendix F).
BEGIN,pname,pfile, p_1,p_2,...,p_n or -pname,pfile,p_1, p_2,...,p_n	Initiates processing of a CDC CYBER Control Language (CCL) procedure. This allows the user to process a procedure file and remain interactive with his job. A procedure is a source file that contains control statements and/or control language statements. It has the same structure as the control statement record in a normal batch job, although the job statement and USER statement required in batch jobs cannot be included. Although the command format and short parameter descriptions are given here, refer to the NOS Reference Manual, volume 1, to obtain further information about CCL procedures and a listing of CCL dayfile messages. The pname and pfile parameters are order dependent. If the user does not specify a parameter, a default value is assumed. Parameters p_i are optional. pname — Name of the procedure to be processed. The default is the next procedure on file pfile. If the default is used, and pfile is at end-of-information, CCL rewinds pfile and calls the first procedure. An exception occurs if pfile is input: in this case, pfile is not rewound. pfile — Name of the file on which procedure pname is located. The default is a site-defined file name (currently the default is file PROCFIL). CCL first searches for a local file named pfile. If pfile is not local, CCL searches for an indirect access file named pfile and does a GET to make it local. p_i — A parameter having one of the following forms. Order dependent forms: fk — A formal keyword that is the same as a keyword used in the procedure header statement. This can be used to specify an alternate value substitution. fk= — Specifies null substitution for the formal keyword fk which appears in the procedure header statement. v — A value of from 1 to 40 characters, or null. To include nonalphanumeric characters, except slash or leading minus, v must be a literal ($-delimited).

Command	Description

Order independent form:

fk=v The value v is substituted for the formal keyword fk which appears in the procedure header statement.

To call procedure pname on file pfile, CCL searches for file pfile and then for procedure pname. If either pfile or pname is not found, the job step aborts.

To create a CCL procedure file from the terminal, the user enters text mode (refer to the TEXT command), uses Text Editor (refer to the EDIT command), or uses XEDIT (refer to the XEDIT command). A CCL procedure file cannot contain line numbers. After leaving text mode, the user can retain the file for future reference by using the SAVE command. The user can make changes to the procedure file using Text Editor or XEDIT. An example of CCL procedure file creation is given in the description of the TEXT command in this section.

BYE,application

Ends a user's session with IAF and either logs him out of the network and disconnects the terminal or places him under the control of another application (such as RBF or TAF).

application Optional parameter specifying an application to which the user wishes to be connected. Control Data supplied applications can be specified by entering TAF or RBF. If the application is available and the user is validated for that application, the user is automatically released from IAF control and placed under the control of the named application. If this parameter is not specified, the user is logged out of the system and the terminal is disconnected. In this case IAF responds by printing

```
usernam  LOG OFF    hh.mm.ss.
usernam  SRU        s.sss UNTS.
```

The network then prints

```
IAF CONNECT TIME  ho.mi.se.
```

usernam User name.

hh.mm.ss. Time of day this command was entered.

Command	Description	
	s.sss	Measure of system resources used during IAF connection. The SRU is a unit of measurement which includes all CPU time, memory usage, and I/O activity since login to IAF.
	ho.mi.se.	Length of time the user was connected to IAF.

NOTE

The user should ensure that all temporary files to be retained are made permanent before issuing this command. All files not saved are released when the BYE command is processed.

CALL,lfn

Initiates processing of KCL (a control language supported under previous operating systems) procedure file lfn. This allows the user to process a procedure file and remain interactive with his job.

A procedure file is a source file which contains control statement images and/or control language statements. It has the same structure as the control statement record in a normal batch job although the job and USER statements required in batch jobs cannot be included.

Optional parameters may also be included in this command. The command format with options is

CALL,lfn,C,S=ccc(oldnam$_1$=newnam$_1$,oldnam$_2$=newnam$_2$,...,
oldnam$_n$=newnam$_n$)

lfn

Specifies name of the procedure file to be processed. The system searches for lfn according to the following indicated order.

1. Current local files (including primary file).
2. System-defined procedure files. This can be a procedure file created by the site and included as part of the system.
3. User's permanent file catalog for indirect access permanent file. File must not have an associated password.

If the specified file cannot be found, the system responds

lfn NOT FOUND.

Command		Description
	C	Replaces the control statement record after the CALL command with lfn.
	S=ccc	Specifies control statement ccc as the first statement in the procedure file to be executed.
	oldnam$_i$= newnam$_i$	Directs that oldnam be replaced with newnam for each occurrence of oldnam in the procedure file. This allows use of the same procedure file to perform several tasks, depending on the parameters specified.

To create a procedure file from the terminal, the user enters text mode (refer to the TEXT command), uses Text Editor (refer to the EDIT command), uses XEDIT (refer to the XEDIT command), or enters auto mode (refer to the AUTO command). Lines within a procedure file may contain line numbers to make maintenance easier. However, the CALL command removes the line numbers before the procedure file is processed. The PACK command compresses the file into one logical record (necessary only with text mode). The file can be retained for future reference as an indirect access permanent file by using the SAVE command. If the user wants to change the procedure file he must use Text Editor or XEDIT unless the file has line numbers. Editing files with line numbers is explained in section 6 under Program Editing.

Refer to the NOS Reference Manual, volume 1, for information concerning the control statements and control language statements available.

CHARGE,chargeno, projectno

Allows the user to specify a valid charge number and project number to be billed for subsequent terminal operations. Certain users are required to enter a charge and project number during the login sequence; all users may issue the CHARGE command as long as the charge and project numbers entered are valid. This command can be entered at any time during the time-sharing session. Both charge number (chargeno) and project number (projectno) parameters are required. The number of system resource units (SRUs) the system used in processing the CHARGE command is printed at the terminal in the BASIC, FORTRAN, FTNTS, or execute subsystem. In the batch subsystem, the last entry in the usage summary is printed at the terminal. In all subsystems, the job SRU accumulator and usage summary are written on the user's dayfile, and the SRU accumulator is set to zero. The SRU is a unit of measurement which represents the total usage of the system by the user. It includes all CPU time, memory usage, and I/O activity. IAF responds

READY.

For greater security, the user can enter the CHARGE command with no parameters. Refer to Login Sequence in section 2 for more information on system response.

Command	Description
CLEAR or CLEAR,*	Releases all local files including the primary file. All files to be retained must be made permanent before entering this command.
CLEAR,*,lfn_1, lfn_2,...,lfn_n	Releases all local files except lfn_1,...,lfn_n.
CONVERT	Converts input from one character set to another. Conversion can be from 63- to 64-character set, or from old time-sharing record (61-character set) to new time-sharing record (63- or 64-character set). Refer to appendix A for a complete description of the CONVERT command and information on character sets.
ⓒⓡ	Causes IAF to reply with an abbreviated status response. IDLE. User has no job active in the system. EXECUTE. User's job is currently being processed. WAIT. User's job is waiting for computer resources to become available. When output has stopped on a page boundary (refer to the terminal definition commands PL and PG in appendix F) the ⓒⓡ does not cause a status response. In this case, ⓒⓡ only causes the network to send the next page of output to the terminal.
DAYFILE,options	Lists the system record of the user's time-sharing activity. Each line of output is in the form hh.mm.ss. message hh.mm.ss. Time of day the message was placed in the dayfile. The formats of the command are DAYFILE,L=lfn,FR=string,OP=op (order independent) or DAYFILE,lfn,string,op (order dependent) L=lfn Specifies file on which the dayfile is to be written. If L=lfn is omitted, L=OUTPUT is assumed and the dayfile output is listed at the terminal.

Command	Description
FR=string	Specifies the literal string† the system is to search for in the dayfile. If the string contains any characters other than letters and numbers, including leading and embedded blanks, it must be enclosed by $ delimiters. Any $ within the string must be replaced with two $'s.

NOTE

IAF commands written to the dayfile are preceded by a $. Hence, the $ preceding the command must be replaced with two $'s, and the command must be enclosed by $ delimiters (for example, $$$OLD$).

The system searches for the string only at the beginning of the field specified by the OP parameter. The portion of the dayfile from the last occurrence of the requested string to the end of the dayfile is printed at the terminal or on the file named. The first character of the time field is a space.

OP=op — Specifies the starting field position; op can be one of the following:

- T — Searches the beginning of the time field for a matching string.
- M — Searches the beginning of the message field for a matching string.
- I — Lists the dayfile from the last occurrence of the message USER DAYFILE DUMPED. The string parameter cannot be specified.
- F — Lists the entire dayfile if no string parameter is specified; searches the beginning of the message field if a string is specified.

If the OP parameter is omitted and the FR parameter is specified, OP=M is assumed; otherwise, OP=F is assumed.

† A literal string is a sequence of characters.

Command	Description

Examples:

DAYFILE,TEMP,COMPASS	The system searches the beginning of the message field for the string, COMPASS, and lists the dayfile, starting at the last occurrence of the string, on file TEMP.
DAYFILE,,$ 09.41.23.$,T.	The system searches the beginning of the time field for 09.41.23. and lists the dayfile from that time at the terminal. There is a blank preceding the time in the time field.
DAYFILE,OP=I	The system prints the portion of the dayfile not listed previously at the terminal.
DAYFILE,DAY,$$$FTN$.	The system searches the beginning of the message field for $FTN and lists the dayfile, from the last occurrence of $FTN, on file DAY.
DAYFILE,,$$$BEGIN$.	The system lists the dayfile from the last time the IAF command BEGIN was used.

DEBUG,option

Activates, terminates, or resumes CDC CYBER Interactive Debug. When activated, it aids the user in debugging compiled programs. One of the following options can be specified.

Option	Description
ON	Activates debug mode; is the default option.
OFF	Terminates debug mode.
RESUME	Resumes debug session suspended by the last execution of the DEBUG SUSPEND command.

For additional information on the use of the debug mode, refer to the CYBER Interactive Debug Reference Manual.

DIAL,nnnn,sss

Sends one-line message sss to the terminal specified by terminal number nnnn. The DIAL command can be entered only if the access subsystem is active. The terminal to receive the message can have any subsystem active; it need not be under the access subsystem or have access validation.

The user determines the appropriate terminal number using the USER command. If the terminal specified is currently receiving output or has an input request outstanding, the message is lost. No further attempt to transmit the message is made. If the message is sent successfully, IAF responds

READY.

Command	Description
EDIT,options	Selects Text Editor.

The formats of the command are

EDIT,FN=lfn_1,M=m,I=lfn_2,L=lfn_3 (order independent)

or

EDIT,lfn_1,m,lfn_2,lfn_3 (order dependent)

FN=lfn_1 Specifies the name of an existing local file to be edited. The FN parameter may also specify a new temporary file name. In this case, the new file is constructed using Text Editor. If the FN parameter is omitted, the primary file name is assumed.† When necessary, the primary file is sorted prior to text editing.

M=m Selects mode of file processing.

ASCII or AS	ASCII mode edit file. This parameter indicates that the user wishes to process the file in ASCII mode. The terminal is automatically put in ASCII mode. After editing is completed, the terminal is put back in its original mode.
NORMAL or N	Normal mode edit file.

If omitted, normal mode is assumed. In a time-sharing session if a terminal is in ASCII mode, the system adds an AS to all EDIT commands when the EDIT statement is entered with no parameters or only lfn_1 (not FN=lfn_1). This does not apply to EDIT statements in procedure files or EDIT statements with more than one positional parameter.

I=lfn_2 Specifies file from which EDIT commands are to be read. If omitted, commands are input from the terminal.

L=lfn_3 Specifies file from which output is to be written. If omitted, output is returned to the terminal.

†If two or more parameters are specified in the command, or if an equated parameter is used, the name of the file to be edited must be specified (the primary file is not assumed).

Command	Description

NOTE

Before entering EDIT, the user should ensure that the file to be edited consists of no more than one logical record (refer to the PACK command for information on compressing files). If the file contains more than one logical record, all records but the first are lost. For additional information, refer to the Text Editor Reference Manual.

Normally, direct entry of information is possible only to the primary file. However, Text Editor allows the user to enter or modify information in all files (including the primary file).

An important feature of Text Editor is its ability to reference direct access permanent files. Since a direct access file cannot be referenced with the OLD command, it cannot become the primary file, and direct entry of information to the file is therefore impossible. Text Editor is one method that is used to accomplish direct entry of source code into a direct access file. Text Editor commands are listed in appendix E.

ENQUIRE

Requests the current job status. An important feature of this command is that it can be entered during job execution. IAF responds

TERMINAL:	nnn,NAMIAF.	
SYSTEM:	Subsystem currently active.	
FILE NAME:	Current primary file name.	
STATUS:	IDLE	No job being processed.
	or	
	EXECUTE	User job being processed.
	or	
	WAIT	User job waiting for computer resources to become available.
MESSAGE:	For execute or wait status, the message line contains the current job status message. For idle status, no message is printed.	

nnn Terminal number.

ENQUIRE,options

Requests information about the system. The formats of the command are

ENQUIRE,OP=$p_1p_2...p_n$,JN=ccc,O=lfn_1,FN=lfn_2

or

ENQUIRE,$p_1p_2...p_n$

Command		Description
	OP=p_i	Specifies any of the following options. More than one option can be specified (for example, ENQUIRE,BDF).

p_i	Description
A	Causes all OP options except S and T to be executed (in the order B, D, R, U, J, L, F).
B	Requests user identification and job information (user number and index, job name and sequence number, family name, pack name, primary file name, subsystem, queue and CPU priorities, maximum and last assigned field lengths).
D	Requests resource demand information. Listing describes both resources (tape units and disk packs) demanded by job and resources currently assigned to the job.
F	Requests status of the user's local files. The information on each file is the same as that listed under the LENGTH command, described in this section.
J	Requests contents of control registers, error flag fields, and succeeding control statements.
L	Requests loader information.
R	Requests amount of resources used (CPU time, mass storage activity, magnetic tape activity, permanent file activity, SRU adder constant value, total SRUs) in decimal.
S	Requests decimal number of SRUs used. The SRU is a unit of measurement which represents the total usage of the system by the user and includes CPU time, I/O activity, and memory usage.
T	Requests accumulated CPU time for this session in decimal.
U	Requests user's current limits on resource usage (seconds, job step SRUs, account block SRUs, dayfile messages, control statements, dispose files, mass storage) in decimal.

Command		Description
	JN=ccc	Requests the status of a batch job initiated with the SUBMIT command or from local batch. The JN parameter is the last three characters of the seven-character job identification name (jobname) the system assigns to the job when it is submitted. If the =ccc is omitted, the status of each batch job in the system with the same user name as that of the terminal user is returned. The possible replies are jobname NOT FOUND. jobname IN INPUT QUEUE. jobname IN PRINT QUEUE. jobname IN PUNCH QUEUE. jobname IN ROLLOUT QUEUE. jobname EXECUTING. jobname IN TIMED/EVENT ROLLOUT QUEUE. The jobname NOT FOUND message usually indicates that the job has been processed and no longer exists in the system. However, this message may also be issued if the JN parameter is entered incorrectly. The jobname EXECUTING message indicates either that the job is executing or that it has been moved out for a higher priority job. Only the status of a job submitted under the current user name can be obtained.
	O=lfn$_1$	Requests that output be placed on alternate file lfn$_1$. If not specified, output is returned to the terminal. If O=lfn$_1$ is the only parameter specified, the system prints option A on file lfn$_1$.
	FN=lfn$_2$	Requests the same information as the F option but only for the file name specified by lfn$_2$. The file name must be a local file. If the file name is misspelled or is not currently associated with the user's job, the system responds FILE NOT FOUND.
GOODBYE,application		Same as BYE, application command.
HELLO,application		If application is specified, this command is the same as the BYE,application command. If application is not specified, this command logs the current user out of IAF, as in the BYE command, but reinitiates the login sequence. Any temporary files that are to be retained must be made permanent before the HELLO command is entered. This form of the command allows a new user to log in without first having to establish communications with the network by dialing the computer site.

Command	Description
HELP	Allows the user to obtain assistance in the use of system commands. If the user at a terminal is not sure of the format of a command or its use, the HELP command provides an easily accessible on-line description of the system command set. IAF responds IF MORE INFORMATION NEEDED, TYPE YES. OTHERWISE, TYPE THE COMMAND NEEDED. ? The user either types YES in reply to the request or enters the command he wishes to have described. A minimum of three characters must be entered if a command is typed. The user must type END after a question mark to terminate the HELP command.
LENGTH,lfn	Requests the file name, length, type, and last status of the local file specified by lfn. If the lfn parameter is omitted, the primary file is assumed. In this case, the primary file is sorted before the length is obtained, unless a NOSORT command precedes the LENGTH command (refer to description of NOSORT command in this section). IAF responds LOCAL FILE INFORMATION. FILENAME LENGTH/PRUS TYPE STATUS lfn length type status lfn — Local file name. length — File length in PRUs (each PRU contains 640 6-bit characters). type — File type: IN. Input file. LI. Library file. LO. Any local file that is neither the current primary file nor a direct access permanent file. PM. Direct access permanent file. PT. Primary file. SY. System file. An * following the file type indicates a locked file (user cannot write on a locked file).

Command	Description
	status File status: EOI File is positioned at end-of-information. EOF File is positioned at end-of-file. EOR File is positioned at end-of-record. I/C File is positioned somewhere between beginning- and end-of-information.
LIBRARY	Retrieves a copy of a permanent file from the catalog of special user name LIBRARY (refer to Library Command in section 5).
LIMITS	Provides a listing of the user's current validation limits. Refer to LIMITS Command in this section.
LIST,lnum,R, F=lfn	Lists at the terminal the contents of the primary file unless the F parameter is specified. The primary file is automatically sorted before listing unless a NOSORT command precedes this command (refer to NOSORT command). lnum Specifies line number of the line where listing is to begin. This parameter is optional and can be specified only if the primary file is being listed. The file should be sorted to obtain correct results. R Specifies that end-of-record and end-of-file marks, if present, are to be indicated in the listing. This optional parameter can be specified only if listing the primary file. The primary file is listed from the beginning- to the end-of-information unless the lnum parameter is specified. F=lfn Specifies listing of local file lfn (optional). The file is not sorted before listing. When this parameter is specified, neither the lnum nor the R option can be supplied. The local file specified is listed from the current position to the end-of-information. IAF responds yy/mm/dd. hh.mm.ss. PROGRAM nnnnnnn (header) . . (program lines) . . READY.

Command	Description
	The header information printed is: yy/mm/dd. Current date. hh.mm.ss. Current time. nnnnnnn File name. This header is not displayed under the batch subsystem.
LNH,lnum,R, F=lfn	Optional form of the LIST command which lists the file without a header.
LOGIN,application	Same as HELLO,application command.
LOGOUT,application	Same as BYE,application command.
NEW	Allows the user to create a new primary file. IAF responds FILE NAME: The user enters a valid file name. When IAF accepts the new file name, it replies READY. The file name specified becomes the new primary file and the previous primary file is released. All other current local files are released.
NEW,lfn/ND	Optional form of the NEW command which allows the user to specify NEW and the file name in one step. If the optional ND parameter is included, the previous primary file is released, but no other local files are.
NOSORT	Prevents the system from automatically sorting the primary file by clearing an internal indicator called the sort flag. Sorting of the primary file is initiated only if the sort flag is set when the LIST, LNH, RUN, RNH, EDIT, XEDIT, LENGTH, SAVE, REPLACE, or SUBMIT command is entered or when a procedure file call is made. IAF responds READY. This command is generally used when making additions and/or modifications to the primary file. When followed by the NOSORT command, the additions and/or modifications create a new logical record in the primary file. The NOSORT command remains in effect only until the next numbered line of source code is entered. This causes the sort flag to be turned on again. Refer to File Sorting in section 3 for an example which illustrates the effect of the NOSORT command.

Command	Description
OLD	Allows the user to access a copy of a file that was previously saved in the permanent file system as an indirect access file and to make it the primary file. IAF responds FILE NAME: The user then enters the selected file name. When the file is found, IAF replies READY. A copy of the selected file becomes the new primary file; any subsystem associated with the file is selected automatically (refer to Temporary and Local Files in section 3 for an explanation of subsystem association). All local files are released following entry of this command.
OLD,lfn=pfn/options	Optional form of the OLD command which allows the user to specify the OLD command, the file name, and special options in one step. All local files are released following entry of this command unless the optional ND keyword is used. Refer to the command description in section 5 for information concerning this command format.
PACK,lfn_1,lfn_2,NR	Compresses several logical records of a local file into one logical record. When the operation is complete, IAF responds READY. The PACK command is entered in one of the four following formats, depending upon the options selected. PACK — Compresses the logical records of the primary file into one logical record. When the primary file is packed, it is not sorted automatically by subsequent operations that normally cause the file to be sorted (that is, LIST, RUN, and so on). Automatic sorting resumes when the user enters the next line of source code or the SORT command. PACK,lfn — Rewinds local file lfn and compresses logical records of the file into one logical record. File lfn is rewound again after the pack. PACK,lfn_1,lfn_2 — Rewinds local file lfn_1, compresses logical records of the file into one logical record, and then writes the file to lfn_2. If lfn_2 currently exists, lfn_1 is written at the current position of lfn_2. File lfn_2 is rewound after the pack; lfn_1 is not. PACK,lfn_1,lfn_2,NR — Same as the preceding format, except that the no rewind (NR) parameter inhibits file lfn_1 from being rewound before the pack, unless it is the primary file. The primary file is rewound after all operations.

Command	Description
PASSWOR,oldpswd, newpswd	Allows validated users to change their password. The user must supply the correct current password (oldpswd) and an alphanumeric new password (newpswd). The maximum length for passwords is seven characters. The minimum length can be set by the installation to be from zero to seven characters; the released value is four. If the user wants secure entry of passwords, he can enter PASSWOR without parameters. IAF responds OLD PASSWORD: ? ⊠⊠⊠⊠⊠⊠⊠⊠⊠ The user types the old password over the blacked-out characters and then presses ⓒⓡ. The system then requests the new password in the same manner. (These blacked-out characters are provided only on hardcopy terminals.) If any part of this command is in error, IAF replies ERROR IN PASSWOR ARGUMENTS. After the password has been changed, IAF replies READY.
PRIMARY,lfn	Makes the temporary file specified by lfn the new primary file while releasing the previous primary file. (Direct access files cannot become primary files.) All other local files are retained.
RECOVER,nnn	Enables the IAF user to resume processing after an accidental disconnect from the system or after a system malfunction that requires the login sequence to be reinitiated. Refer to Recovery in section 6 for a complete description and examples of the use of this command.
RENAME,$nlfn_1$= $olfn_1$,$nlfn_2$= $olfn_2$,..., $nlfn_n$=$olfn_n$	Changes the name of temporary file $olfn_i$ to $nlfn_i$. If file $nlfn_i$ currently exists, it is released. This command cannot be used to change the name of a permanent file. However, a temporary file (including a copy of an indirect access permanent file) can be renamed and then saved in the permanent file system under the new name.
RESEQ	Enables the user to resequence or add line numbers to the current primary file. If the current primary file is a text file, line numbers can be added. Statements that reference line numbers are updated when BASIC programs are resequenced. Refer to Resequencing Line Numbers in section 6 for a complete description and examples of the use of this command.
RETURN,lfn_1, lfn_2,...,lfn_n	Releases local files lfn_1,...,lfn_n. (When using tapes or packs refer to RESOURC control statement, NOS Reference Manual, volume 1.)
RETURN,*	Releases all local files including the primary file. All files to be retained must be made permanent before entering this command. (When using tapes or packs refer to RESOURC control statement, NOS Reference Manual, volume 1.)

Command	Description
RETURN,*,lfn_1, lfn_2,...,lfn_n	Releases all local files except lfn_1,...,lfn_n. (When using tapes or packs refer to RESOURC control statement, NOS Reference Manual, volume 1.)
REWIND,lfn_1, lfn_2,...,lfn_n	Positions local files lfn_1,...,lfn_n at beginning-of-information. Refer to File Structure in section 3 for additional information.
REWIND,*	Positions all local files at beginning-of-information. Refer to File Structure in section 3 for additional information.
REWIND,*,lfn_1, lfn_2,...,lfn_n	Positions all local files except lfn_1,...,lfn_n at beginning-of-information. Refer to File Structure in section 3 for additional information.
RNH	Optional form of the RUN command which allows the user to run the job without a header being printed. The commands are identical in all other respects.
RUN,options	Compiles and/or initiates execution of the primary file or another local file. The primary file is sorted before being compiled unless a NOSORT command precedes this command (refer to description of NOSORT command in this section). IAF responds

```
yy/mm/dd.    hh.mm.ss.   }
                         }   header
PROGRAM      nnnnnnn     }
      .
      .
(data or error messages)
      .
      .
SRU     s.sss UNTS.
RUN COMPLETE.
```

The header information printed is

yy/mm/dd.	Current date.
hh.mm.ss.	Current time.
nnnnnnn	File name.

This header is not displayed under the batch subsystem.

One or more of the following options can be supplied with the RUN command.

RUN,B=lfn or RUN,C=lfn	Compiles the source program and generates binary file lfn containing the resulting object code. The object code is not executed. File lfn can later be executed under the execute subsystem by entering the RUN command. File lfn can be retained as a permanent file using the SAVE (or REPLACE) command.

Command		Description
	RUN,I=lfn	Compiles and/or initiates execution of local file lfn (lfn is assumed to be sorted). In the execute subsystem, no compilation occurs.
	RUN,MA=nnnnn	Uses nnnnn as the octal field length for the current program execution.†
	RUN,MI=nnnnn	Increments the program's current field length by nnnnn octal.†
	RUN,T,q_1,q_2, ...,q_n	This command applies only when running a previously compiled (object code) FORTRAN program in the execute subsystem. It allows the user to rename local files specified in the PROGRAM statement without recompiling the program. Parameters q_1 through q_n specify new local file names to be used in place of those that currently exist in the PROGRAM statement (the parameters are order dependent and must correspond to those they replace).

The following example illustrates the use of the RUN,T command. Assume a FORTRAN program contains the following PROGRAM statement.

```
PROGRAM TEST (INPUT,OUTPUT,AAA,BBB,TAPE1=AAA,
  TAPE2=BBB)
```

Normally, to execute a program containing this statement, the user must define local file AAA. Local file BBB results from the execution of the program. However, the user could change the names of local files AAA and BBB without recompiling the program (if the object program exists) by using the RUN,T command under the execute subsystem. For example:

```
RUN,T,INPUT,OUTPUT,CCC,DDD
```

SETASL,nnnnn — Sets SRU account block limit; allows the user to specify an SRU limit (nnnnn decimal units††) for all operations prior to IAF logout or entry of another CHARGE command. The maximum depends on the user's validation limits and the validation limit associated with his charge number (refer to LIMITS Command at the end of this section). If nnnnn is larger than the maximum value, the system uses the maximum value allowed for the user. The user can enter

```
SETASL,*
```

to set the SRU limit at its maximum.

†If the user exceeds the field length for which he is validated, the message ILLEGAL USER ACCESS is returned to the terminal.

††To enter octal units, use nnnnnB, where nnnnn is an octal number.

Command	Description
SETJSL,nnnnn	Sets SRU job step limit; allows the user to specify an SRU limit (nnnnn decimal units†) for each subsequent individual operation (job step). The maximum value of nnnnn is the same as for SETASL, except nnnnn cannot exceed the current value of the account block SRU limit. If nnnnn is larger than the maximum value, the system uses the maximum value allowed for the user. The user can enter SETJSL,* to set the SRU job step limit at its maximum. If a job exceeds its SRU limit, the system issues the SRU limit message. To continue job execution, the user must enter the S command (refer to Job Suspension in section 6).
SETTL,nnnnn	Sets time limit; allows the user to specify a time limit (nnnnn decimal seconds) for each subsequent job step requiring the central processor. The maximum time limit depends upon the user's validation limits (refer to LIMITS Command at the end of this section). If nnnnn is larger than the maximum value, the system uses the maximum value allowed for the user. The user can enter SETTL,* to set the time limit at its maximum. If a job step exceeds its time limit, the system issues the time limit message. To continue job execution, the user must enter the T command (refer to Job Suspension in section 6). This command is useful when debugging a program that is cycling in a loop.
SORT	Sets an internal indicator called the sort flag. Sorting of the primary file takes place when the next LIST, LNH, RUN, RNH, EDIT, XEDIT, LENGTH, SAVE, REPLACE, or SUBMIT command is entered. The lines of the primary file are then arranged in order using the first five digits of the line number, and the logical records of the file are compressed into one logical record.
SORT,lfn,NC=n	Sorts local file lfn by arranging the statements in order using the first n digits of the line number (where $1 \leq n \leq 10$). If the NC option is omitted, the sort is performed using the first five digits of the line number. The logical records of file lfn are also compressed into one logical record when the sort is performed. When the sort is complete, file lfn is positioned at end-of-information unless it is the primary file, which is automatically rewound. This command forces immediate sorting of the specified file and is commonly used to sort the primary file when it is too long to be sorted automatically by the system. Refer to the description of File Sorting in section 3 for additional information.

†To enter octal units, use nnnnnB, where nnnnn is an octal number.

Command	Description
STATUS	Same as the ENQUIRE command.
SUBMIT	Allows a validated user to create a batch job deck image and submit it to the local batch queue as a deferred batch job. The user cannot interact with a job submitted for processing using this command. Rather, the job is treated in the same manner as a job submitted from the card reader at the local computer site or from a remote batch terminal. Refer to section 7 for a complete description and examples of the use of this command. It is recommended that the user become familiar with all information in section 7 before attempting remote job submittal.
SUMMARY	Same as the ENQUIRE command, except default for SUMMARY lists the resources used during the session rather than current job status (refer to description of ENQUIRE command in this section).
TEXT	Selects text mode. This command allows direct entry of information (program statements, data, or text) into the primary file without specifying line numbers. Commands entered in text mode are interpreted as text and are not processed by the system. IAF responds ENTER TEXT MODE. The input line may consist of a maximum of 150 6-bit characters. Data is added to the end of the file. To terminate text mode, the user should enter the interruption sequence or the termination sequence defined for the terminal in use or the ETX character followed by ⓒⓡ. IAF responds EXIT TEXT MODE. Since a text file does not normally contain line numbers and therefore cannot be sorted (and packed) automatically by the system, a PACK command should be issued after exit from text mode to ensure that the data is in one logical record. The following example uses text mode to create a CCL procedure file which accesses a list of grades, runs a FORTRAN program using the grades as input, and saves the output. A FORTRAN program is used to calculate the grade average, highest grade, and lowest grade from periodic input by classroom instructors. It is created in the following manner.

```
new,exam


 READY.
text
ENTER TEXT MODE.

   program exam(input,output,result,tape1=result)
   dimension i(150)
   imin=100
   imax=0
   itotal=0
   read(1,10)(i(j),j=1,30)
10 format(14(i3,1x))
   do 20 j=1,30
   itotal=itotal+i(j)
   if (i(j) .lt. imax) go to 15
   imax=i(j)
15 if (imin .gt. i(j)) imin=i(j)
20 continue
   avg=itotal/30
   print 30, avg
30 format(17h grade average = ,f5.2)
   print 40, imin
40 format(16h lowest grade = ,i3)
   print 50, imax
50 format(17h highest grade = ,i3)
   end
```

To exit text mode, the user enters either the interruption sequence or the termination sequence. The system responds

```
EXIT TEXT MODE.
```

The user should then enter the PACK command; this ensures that the file is one logical record.

```
pack


 READY.
```

This program is then made into an indirect access permanent file.

```
save


 READY.
```

Command | Description

To correlate this program with input data, a procedure file is created under text mode according to the following:

```
new,grades


 READY.
text
ENTER TEXT MODE.

.proc,average.
get(exam,result)
rewind(result)
ftn(i=exam,l=list)
lgo.
exit.
replace(list)
```

The user then exits from text mode using the interruption sequence or the termination sequence.

```
 EXIT TEXT MODE.
pack


 READY.
```

This file is then made into an indirect access permanent file with the name GRADES.

```
save


 READY.
```

The following data is entered under text mode as a file called RESULT. All other files are released.

```
new,result


 READY.
text
ENTER TEXT MODE.

 54  87  90  63  51  87  88  92  73  76  76  81  83  67
 78  55  97  68  82  84  94  79  88  77  66  78  98  67
 87  99
```

Command	Description

Exit is made from text mode and the file is packed into one logical record.

```
 EXIT TEXT MODE.
pack

 READY.
```

This data file is made into an indirect access permanent file.

```
save

 READY.
```

To make use of the procedure file, the user enters

```
begin,average,grades
```

This gives the printout:

```
GRADE AVERAGE = 79.00
LOWEST GRADE =  51
HIGHEST GRADE =  99
```

USER,usernam

Returns the number of the terminal at which the user specified by usernam is currently logged in. When several terminals are logged in under the same user name, a list of terminal numbers is returned. The USER command can be entered only from the access subsystem. It is used in conjunction with the DIAL command to send a message to a user at an interactive terminal.

XEDIT,options

Selects XEDIT.

The command format is

XEDIT,lfn_1,p_1,p_2,...,p_n.dcs

If lfn_1 is specified, it must be the first parameter listed; if omitted, the separators which would precede and follow lfn_1 must be included. The delimited command sequence (dcs), if used, must follow the period. All other parameters are order independent. A brief description of the XEDIT parameters follows.

lfn_1	Name of the local or permanent file to be edited. If lfn_1 is omitted, the primary file is edited.
p_i	One or more of the following parameters.

Command		Description
	AS	Processes the file in ASCII mode. Upon exiting XEDIT, the terminal is returned to the mode in effect before the editing session. If the user omits the AS parameter, the mode that the terminal is in before he enters the XEDIT command remains in effect.
	B	Processes the job as a batch origin job.
	C	Creates a new file lfn_1 (creation mode).
	FR	Takes the first editing commands from the first line of file lfn_1. If FR and I parameters are both specified, XEDIT executes FR and then I.
	I=lfn_2	Takes editing commands from file lfn_2. If I=0, commands are taken from the dcs field. If I is omitted, commands are taken from file INPUT.
	L=lfn_3	Places XEDIT output on file lfn_3. If L=0, no output is generated. If L is omitted, file OUTPUT is assumed.
	NH	Suppresses printing of the XEDIT header.
	P	Retrieves and edits permanent file lfn_1. Direct access files are attached in write mode. If P is omitted, the file lfn_1 is assumed to be a local file.
	dcs	Delimited command sequence that is processed before XEDIT takes commands from file INPUT or file lfn_2.

XEDIT commands are listed in appendix E. For a complete description of the XEDIT parameters and commands, refer to the XEDIT Reference Manual.

-pname,pfile,p_1, p_2,...,p_n — Optional form of the BEGIN command. Refer to the description of the BEGIN command in this section for more information.

LIMITS COMMAND

Entry of the LIMITS command provides a list of the user's validation limits. Validation limits are the internal system controls associated with each user name which govern use of certain system resources. All limits are set by the site when the user registers. The listing provided describes both the resources available to the user and the extent to which they may be used. All numeric values listed are decimal unless the postradix B appears, signifying an octal value. The following information is listed.

Field	Description
MT†	Maximum number of magnetic tapes the user is allowed to have assigned to his job concurrently.
RP†	Maximum number of auxiliary devices the user is allowed to have assigned to his job concurrently.
TL	Maximum amount of central processor time in seconds allowed for the user's job step (refer to SETTL command).
CM†	Maximum number of central memory words the user is allowed to request. This is the job's maximum field length, expressed as multiples of 100_8 words.
NF	Maximum number of files the user is allowed to have associated with his job concurrently.
DB	Maximum number of deferred batch jobs the user is allowed to have in the system concurrently (refer to description of SUBMIT command in section 7).
FC	Maximum number of permanent files the user is allowed to have in each catalog. This limit applies for each catalog being accessed (main, public auxiliary, or private auxiliary catalogs).
CS	Maximum number of PRUs available to the user for indirect access permanent files.
FS	Maximum number of PRUs available to the user for any given indirect access permanent file.
TC = xxxxx	Initial character set to be used by the terminal. For each user name, xxxxx is one of the following: STANDARD — ASCII graphic 63- or 64-character set. ASCII — ASCII 128-character set.
IS = xxxxx	Initial subsystem for the terminal. For each user name, xxxxx is one of the following: BASIC — BASIC subsystem. BATCH — Batch subsystem.

†For further information about this field, refer to the NOS Reference Manual, volume 1.

Field		Description
	EXECUTE	Execute subsystem.
	FORTRAN	FORTRAN subsystem.
	FTNTS	FTNTS subsystem.
	NULL	Null subsystem.

MS — Maximum number of mass storage PRUs the user is allowed to additionally allocate to his job.

DF — Maximum number of dayfile message requests the user is allowed to issue to the system and/or job dayfiles.

CC — Maximum number of batch control statements processed for a user (excludes time-sharing processed control statements).

OF — Maximum number of job print and punch files the user is allowed to dispose to the output queues.

CP — Maximum number of cards that can be punched from a user's disposed punch file.

LP — Maximum number of lines that can be printed from a user's disposed print file.

EC — Maximum number of extended core storage (ECS) memory words that the user is allowed to request.

SL — Maximum number of SRUs allowed for the user's job (refer to SETASL and SETJSL commands).

CN — Not currently used by the system, but is provided for future expansion of validation control.

PN — Project number to which the user is assigned (not the project number associated with the charge number entered at login with the CHARGE command).

DS — Maximum number of PRUs available to the user for any given direct access permanent file.

AW — Access word; the octal value listed corresponds to the following access options (bit 0 is option 0, bit 1 is option 1, and so forth).

Option	Signifies
0	User can change his password (refer to PASSWOR command).
1	User can use the access subsystem (refer to the ACCESS command).
2	User can create direct access permanent files.

Field	Description	
	Option	Signifies
	3	User can create indirect access permanent files.
	4	User can have system origin status from any job origin if the system console is in debug mode (refer to NOS Reference Manual, volume 1).
	5	User can create and access library type files (refer to NOS Reference Manual, volume 1).
	6	User can assign nonallocatable devices (magnetic tape units) (refer to NOS Reference Manual, volume 1).
	7	User can access system without supplying his assigned charge and project numbers.
	8	User can create and/or replace files on auxiliary devices.
	9	User can access special transaction functions (refer to TAF Reference Manual).
	10	User's terminal is designated as a no-timeout terminal. If this bit is not set, the terminal automatically logs off after 10 minutes of inactivity. With this bit set, the terminal remains connected until the user logs out. The TIMEOUT command (refer to Terminal Control Commands in this section) clears this bit for the session in progress.
	11	User can use the system control point (SCP) facility.
	12	User has special accounting privileges.
	13	User has special privileges for batch jobs.
	14	User can use PROTECT statements.
	24	User can access IAF.
	25	User can access RBF.
	26	User can access TAF.
	27	User can access Message Control System (MCS).
	28	User can access Terminal Verification Facility (TVF).

Bits 29 through 47 may also be set to indicate that the user is validated to access additional applications.

For example, if the access word listed is

```
AW=0000000000300000215
```

Field	Description
	the user is validated for options 0, 2, 3, and 7 and can access IAF and RBF (options 24 and 25), as shown in the following:

```
Options ... 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
        ... 0  1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 0 1 0 0 0 1 1 0 1
AW=     ...    3        0        0        0        0        0     2     1     5
```

If any parameters are included with the LIMITS command, IAF responds

ERROR IN LIMITS ARGUMENTS.

Following is a listing produced by the LIMITS command.

```
          $LIMITS.
                  79/07/25. 07.53.51.       PAGE      1

JLC2016       2016   78/12/29. 79/07/13.

     AB† =,
     AB† =,
     AB† =,
     AB† =,
    MT =           3,
    RP =           2,
    TL =  UNLIMITED,
    CM =       2037B,
    NF =          56,
    DB =           8,
    FC =  UNLIMITED,
    CS =        4096,
    FS =          64,
    PA† = EVEN      ,
    RO† =     SYSTEM,
    PX† = HALF      ,
    TT† = TTY       ,
    TC = STANDARD   ,
    IS = NULL       ,
    MS =       66048,
    DF =        1008,
    CC =  UNLIMITED,
    OF =          12,
    CP =  UNLIMITED,
    LP =  UNLIMITED,
    EC =          0B,
    SL =  UNLIMITED,
     CN =,
     PN =           ,
    DS =        1024,

    AW = 0000000002700000555
```

† These fields do not apply to network terminals but are retained for compatibility with a previous time-sharing system. Their settings have no meaning for an IAF user.

PERMANENT FILE COMMANDS 5

GENERAL DESCRIPTION

All IAF users can access permanent files after the login procedure to IAF is complete. Validated users can also create permanent files (refer to LIMITS Command at the end of section 4 for information concerning user validation limits).

The user name supplied during login represents a specific catalog in the permanent file system. The catalog contains a list of files saved under that user name as well as pertinent information about each file. All permanent file requests are made to this catalog unless an alternate user name or an auxiliary device is specified in the file request. An auxiliary device is a mass storage permanent file device, used to supplement the normal permanent file devices associated with the system (family devices). If an alternate user name is specified, the request is made to that user's catalog. If a validated user specifies that the file resides on an auxiliary device, the request is made to a separate catalog on that device. A separate catalog exists on the auxiliary device for each user with files on that device. A user can obtain information about the files in his catalog, and in the catalogs of alternate users he can access, by entering the CATLIST command (refer to CATLIST Command in this section).

User names that contain asterisks (*) represent users with automatic read-only permission to files in catalogs of other users. The user name must match the alternate user name in all characters that are not asterisks. For example, a user with the user name *AB*DE* can access all files in the catalogs of the following users: UABCDEF, UABDDEE, MABCDE1, MAB1DE3.

All permanent files are classified according to the manner in which they are accessed: indirect access or direct access. The mode of access is determined by the command used to create the file. Indirect access permanent files are created with the SAVE or REPLACE command; direct access permanent files are created with the DEFINE command. The command used to create a permanent file also determines the command that must be used to access the file. The user must enter the OLD, LIBRARY, or GET command in requests for indirect access files. The ATTACH command must be entered to request use of a direct access file. The following are the characteristics of each type of file.

Indirect Access

An indirect access file is, as the name implies, a permanent file that cannot be accessed directly by the user. Instead, when access is requested through entry of the OLD, LIBRARY, or GET command, a copy of the permanent file is created. The copy, considered a temporary file, is referenced instead of the permanent file in all subsequent I/O operations. This feature offers protection against endangering the integrity of the permanent file. Several copies of an indirect access file can exist in the system at the same time. If the temporary file is altered, the user must enter the REPLACE command to update the permanent file. If the user is not allowed to update the permanent file, he can create a new indirect access file, reflecting his modifications, by entering the SAVE command and specifying a new file name.

Indirect access permanent files are allocated in blocks of 64 central memory words (one physical record unit). This block size is relatively small compared to the block size of direct access files (refer to appendix D). Thus, permanent files that are small in size are typically indirect access files. This is done to avoid allocation of more mass storage area than is actually required for the file.

Direct Access

A direct access file is a permanent file which, upon request, becomes linked directly to the user's job. Unlike indirect access files, a copy of the permanent file is not created for user access. Use of a direct access file is requested by entering the ATTACH command, and all subsequent I/O operations are performed on the permanent file itself. Although a copy of the permanent file is not created, a local file name may be specified in the request for a direct access file. This allows the user to reference the file by a name other than its permanent file name. Because data is written directly on the permanent file rather than on a copy, care must be taken when modifying a direct access file.

Direct access files have a write interlock feature; that is, if a user has attached the file in write mode, it cannot be attached by another user. Similarly, a user cannot attach the file in write mode until all users currently accessing the file in alternate modes have released it.

Direct access permanent files are allocated in large blocks (refer to appendix D) and are generally used as large data base files. When a user creates a direct access file, it is placed on the device with the most space available, unless a specific device type is specified in the request. If more than one device of the type specified exists, the file is placed on the device with the most space available.

In summary, the file access mode depends on the command used to create the file. Direct access files are created with the DEFINE command. Indirect access files are created with the SAVE or REPLACE command. A permanent file cannot be requested as a direct access file one time using the ATTACH command and as an indirect access file later using the OLD, LIBRARY, or GET command. The command that must be used to access the file depends upon the command that was originally used to create the permanent file.

PERMANENT FILE COMMAND FORMAT

The following is the general format of a permanent file request. The optional keywords (kw) and corresponding options must follow the specified file name and the slash character; they are order independent.

pfcmd,lfn=pfn/kw_1=$option_1$,...,kw_n=$option_n$

pfcmd Permanent file command name.

lfn Local file name used when creating or accessing permanent file pfn.

pfn Name under which the file is cataloged in the permanent file directory. If the pfn parameter is omitted, lfn is assumed to be the permanent file name.

The following are the keywords and corresponding options which can be included.

kw	option	Description
UN=	usernam	Alternate user name. This parameter is necessary only if the permanent file involved resides in another user's catalog. To access a file in another user's catalog, the requesting user must have explicit permission (refer to PERMIT command in this section), must have automatic read-only permission (user name contains asterisks for all characters that do not match in the alternate user name), or the file must be semiprivate or public.

kw	option	Description
PW=	passwrd	One- to seven-character password for a file. If specified by file originator, this password must then be given whenever alternate users access the file. For secure entry of the password, the user should specify PW without entering the password in the command. IAF responds with PASSWORD: ? ▒▒▒▒▒▒▒▒ The user types the password over this blacked-out area.
CT=	n	Permanent file category. The file category determines which users can access a file. There are three categories of permanent files.
	P, PR, or PRIVATE	Private file. Files available for access only by the originating user, by those explicitly granted permission (refer to PERMIT command in this section), or by those with automatic read-only permission.
	S OR SPRIV	Semiprivate file. Files available for access by any user knowing the file name, password, and user name and whose permitted mode of access is not NULL (refer to description of permission mode under keyword M). Accesses by alternate users are recorded for the originator of the file. This includes the user name of the alternate user, the number of accesses made, and the date and time of the last access (refer to CATLIST Command in this section).
	PU or PUBLIC	Public file. Files available for access by all users knowing the file name, password, and user name. Only the total number of accesses are recorded for the originator of the file.
M=	m	File or user permission mode.
	W or WRITE	Write mode. Allows the user to write, modify, append, read, execute, or purge the file (modify permission applies only to direct access files).
	M or MODIFY	Modify mode. Allows user to modify information within a direct access file and/or append information at the end of the file. The user can also read or execute the file. This mode applies only to direct access files.
	A or APPEND	Append mode. Allows user to append information at the end of the file.
	R or READ	Read mode. Allows user to read and/or execute the file.
	RM or READMD	Read modify mode. Allows user to read a direct access file with the implication that another user may currently be accessing the file in modify mode. The file can also be executed in this mode. This mode does not apply to indirect access files.

kw	option	Description
	RA or READAP	Read append mode. Allows user to read a direct access file with the implication that another user may currently be accessing the file in append mode. The file can also be executed in this mode. This mode does not apply to indirect access files.
	E or EXECUTE	Execute mode. Allows the user to execute the file.
	N or NULL	Null mode. Removes previously granted permission.
SS=	subsyst	Subsystem to be associated with a file. This keyword can be specified on only the SAVE and CHANGE commands. If the user specifies just SS, the current subsystem is associated with the file. If SS=subsyst is omitted when saving or changing a primary file, the current subsystem is associated with the file. If omitted when saving or changing a nonprimary file, the null subsystem is associated with the file.

subsyst	Description
BASIC	BASIC subsystem
BATCH	Batch subsystem
EXECUTE	Execute subsystem
FORTRAN	FORTRAN subsystem
FTNTS	FTNTS subsystem
NULL	Null subsystem

The user can enter the first three characters of the subsystem name as an abbreviation for the subsystem.

R= r

Type of device on which the permanent file resides or is to reside; r can be any of the following.

r	Device
DE	Extended core storage
DIn	844-21 disk storage subsystem (half track; 1≤n≤8)
DJn	844-4x disk storage subsystem (half track; 1≤n≤8)
DKn	844-21 disk storage subsystem (full track; 1≤n≤8)
DLn	844-4x disk storage subsystem (full track; 1≤n≤8)
DMn	885 disk storage subsystem (half track; 1≤n≤3)
DP	Distributive data path
DQn	885 disk storage subsystem (full track; 1≤n≤3)

n indicates number of units.
x is 1 or 4.

kw	option	Description
		The R keyword can be used in two ways. • It can be specified on the DEFINE command to indicate the type of family device on which the direct access file is to reside. The user should consult his site to determine which devices are available. Appendix D contains a list of the block sizes allocated for each device type. If the file already exists on another device, R is ignored. If an illegal device is specified, the system responds DIRECT ACCESS DEVICE ERROR. If the number of units specified does not agree with the actual number for device types DI, DJ, DK, DL, DM, or DQ, the system issues the message ILLEGAL DEVICE REQUEST. • It can be used in conjunction with the PN and NA keywords on any permanent file command (including DEFINE) to identify an auxiliary device on which the file resides or is to reside. If PN and NA are specified but R is not, the system default device type is assumed. If the device type of the auxiliary device PN conflicts with the device specified by the R parameter, the system issues the message ILLEGAL DEVICE REQUEST. For example, if auxiliary device PN has device type DI and the device type specified by R is DK, a conflict exists and the error message is issued.
S=	space	Amount (in decimal PRUs) of space wanted for a new direct access permanent file (refer to DEFINE command). There are 640, decimal, 6-bit characters in a PRU. The system then creates the file on a device with the specified amount of space available. Unused space is not guaranteed to be available if the user attempts to expand the file at a later date. If no device currently has the specified amount of space available, the system responds PRUS REQUESTED UNAVAILABLE. If S is used in conjunction with the R keyword, only devices of the type specified are checked for adequate space.
PN=	packnam	One- to seven-character pack name used in conjunction with the R keyword to identify an auxiliary device to be accessed in the permanent file request. This parameter is specified only when the file to be accessed resides on an auxiliary device. If the device is currently not available and the NA keyword is not specified in the request, the system responds DEVICE UNAVAILABLE. An auxiliary device is not necessarily a disk pack that can be physically removed as the parameter name implies. Rather, an

kw	option	Description
		auxiliary device can be any mass storage device supported by the system and defined as such by the site. Auxiliary devices are used to supplement the normal mass storage permanent file devices associated with the system (family devices). If two or more auxiliary devices are to be in use concurrently, the user must enter the batch subsystem and issue the RESOURC control statement (refer to the NOS Reference Manual, volume 1, for information concerning the RESOURC statement). The user must be validated to create or replace files on an auxiliary device.
NA		No abort. The NA keyword specifies that if a requested resource is not available, the command is not aborted. NA can be used as follows: • It can be specified on the ATTACH command to indicate that the user wants to wait for the direct access file to become available. If the file is currently being accessed in a mode that conflicts with that specified in the command (interlocked), the user's job is suspended and subsequent terminal entry is not accepted. To terminate the request, enter the termination sequence. • It can be used to prevent a permanent file command from aborting if a specified file does not exist or if the user does not have permission to access the file. For the time-sharing user, this is useful for procedure files which perform their own error processing. • It can be used in conjunction with the PN and R keywords on any permanent file request (including the ATTACH command) for a file that resides on an auxiliary device. If the device is not currently available, the NA keyword directs the system to make the desired auxiliary device available. The system does not make the device available unless the user is validated to have at least one auxiliary device assigned to his job. Use of the NA keyword prevents the job step from aborting when errors occur. If the user is in the batch subsystem, the dayfile message indicating that an error occurred is returned to the terminal even though the job step does not abort. However, in any other subsystem, no indication of an error is given. To ensure that a command with the NA parameter has been processed without error, the user should use the DAYFILE or ENQUIRE,F command.
ND		No drop. The use of the keyword ND in an OLD, NEW, or LIBRARY command prevents local files from being released.
CE		Clear error flag. The use of the keyword CE in the CHANGE command clears the error flag which had previously been set. (Refer to the NOS Reference Manual, volume 1, for more information on file error status.)

PERMANENT FILE PROCESSING COMMANDS

The following permanent file commands are available to the user. The parameters specified have been described in Permanent File Command Format in the preceding pages.

Command	Description
APPEND,pfn,lfn_1,...,lfn_n/ UN=usernam,PW=passwrd, PN=packnam,R=r,NA	Appends temporary files lfn_1,...,lfn_n at the end of the specified indirect access permanent file pfn. The logical structure of the files is retained; that is, EORs and EOFs are appended as well as data. Each temporary file is appended in the order specified in the command. This command can only be used for indirect access permanent files.
ATTACH,lfn_1=pfn_1,lfn_2= pfn_2,...,lfn_n=pfn_n/ UN=usernam,PW=passwrd,M=m, PN=packnam,R=r,NA	Establishes a link to permanent file pfn_i for direct access usage. If pfn_i is omitted, the system assumes lfn_i=pfn_i. A temporary file is not created since user access is directly to the permanent file. The lfn_i parameter is used to reference the attached file by a name other than its permanent file name (pfn_i). If lfn_i specifies the name of a temporary file, the contents of that file are lost when the permanent file is attached. If lfn_i specifies the name of a direct access permanent file that is already attached, that file is released, and the file being attached is referred to by the name lfn_i. In addition, lfn_i cannot specify the primary file name. A direct access file cannot become the primary file. If the M keyword (permission mode) is omitted, the system assumes read permission for the attached file. The M keyword must be specified by all users, including the file originator, if the file is to be modified or if new information is to be added. If the NA keyword is not specified and another user is currently accessing the file in a mode that conflicts with that specified in the command (M keyword), the system responds lfn BUSY. When a direct access permanent file is attached in the write mode, it should be released after use so that it can be attached by other users. When a direct access permanent file is attached in the write mode, the last modification date is incremented even if the file is not altered.

Command	Description
	A direct access permanent file can be released with any of the following commands (refer to section 4 for a description of these commands). • OLD, NEW, or LIBRARY (all local files also released). • GOODBYE, BYE, LOGOUT, HELLO, or LOGIN (all local files also released). • CLEAR or CLEAR,* (all local files also released). • RETURN, lfn (local file specified released) or RETURN,* (all local files also released). A direct access file is also released if the lfn parameter on subsequent GET or ATTACH commands specifies the name of the attached file.
CHANGE,nfn=ofn/PW=passwrd, CT=n,M=m,SS=subsyst,PN= packnam,R=r,NA,CE	Allows the originator of a direct or indirect access permanent file to alter any of several parameters without having to attach and redefine the file or retrieve and save it. This command is valid only for the originator of the file (UN parameter is illegal). The nfn parameter specifies the new permanent file name to be assigned; ofn is the current file name. If no name change is desired, only ofn is specified. To clear the password currently assigned to a file, set the new password equal to zero (PW=0). The CT, M, PW, and SS keywords should be specified only for a change in the parameter associated with that keyword. The PN and R keywords cannot be used to specify a new auxiliary device. They are used only to specify a new auxiliary device on which ofn resides. The use of the CE keyword clears the file error status and allows the change in parameters to be made. If the current permanent file name, ofn, is not in the user's catalog, the system responds ofn NOT FOUND. If the new permanent file name, nfn, already exists in the user's catalog, the system responds nfn ALREADY PERMANENT.

Command	Description
DEFINE,lfn_1=pfn_1,lfn_2= pfn_2,...,lfn_n=pfn_n/ PW=passwrd,CT=n,M=m,R=r, S=space,PN=packnam,NA	Allows a validated user to create a direct access permanent file (pfn_i) and attach it in write mode. If pfn_i is omitted, the system assumes lfn_i=pfn_i. If pfn_i is specified, the lfn_i parameter can be used in two ways. • To reference the direct access file by a name other than its permanent file name (pfn_i). In this case, the direct access file created contains no information initially. Data is placed on the file in succeeding write operations. • To define a temporary file as a direct access permanent file. The temporary file specified must reside on a mass storage device that also supports the residence of direct access permanent files. If the file specified by lfn_i does not reside on such a device, the system responds DIRECT ACCESS DEVICE ERROR. **NOTE** Since IAF users are generally unaware of the type of device that contains their temporary files, this use of the lfn_i parameter is not recommended. If the optional keywords are omitted, the system assumes the following parameters. PW — None. CT — Private file. M — Write mode. R, S — File placed on device with most space available. PN — None. NA — Not applicable unless PN specified. If the user releases the file and then wants to access it at some time in the future, the ATTACH command must be entered (refer to the ATTACH command in this section). For information regarding creation of indirect access permanent files, refer to the SAVE command in this section.

Command	Description
GET,lfn_1=pfn_1,lfn_2= pfn_2,...,lfn_n=pfn_n/ UN=usernam,PW=passwrd, PN=packnam,R=r,NA	Retrieves a copy of the specified indirect access permanent file (pfn_i) for use as a temporary file (lfn_i). This command can only be used for indirect access permanent files. If pfn_i is omitted, the system assumes lfn_i=pfn_i. To reference the temporary file by a name other than its permanent file name (pfn_i), the lfn_i parameter is specified. However, if lfn_i specifies the name of a current local file, the contents of that file are replaced by the copy of pfn_i. The current primary file and subsystem remain the same, unless the file name specified for lfn_i is that of the current primary file. In this case, the contents of the primary file are replaced by the copy of pfn_i, which becomes the new primary file. Furthermore, if pfn_i has a subsystem flag associated with it (refer to SAVE command in this section), that subsystem is selected automatically. For example, if file A is the current primary file and the user enters GET,A=B the copy of permanent file B becomes the new primary file. If a subsystem other than the one currently active is associated with file B, it is selected. In order for the user to access a file in another user's catalog (UN parameter specified), the permission mode must allow the user to read the file.
LIBRARY,lfn=pfn/PW=passwrd, PN=packnam,R=r,NA,ND	Retrieves a copy of the specified indirect access permanent file from the catalog of special user name LIBRARY and makes it the primary file. The permission mode is that which has been granted for private files or specified in the catalog for semiprivate and public files. All local files are released unless the ND keyword is specified. The ATTACH, GET, or OLD command can also be used to access permanent files in the catalog of user number LIBRARY. For additional information, refer to LIBRARY Command at the end of this section.
OLD,lfn=pfn/UN=usernam, PW=passwrd,PN=packnam,R=r, NA,ND	Retrieves a copy of the specified indirect access permanent file for use as the primary file. If a specific subsystem is associated with the file, it is selected automatically. Refer to the description of the SAVE command in this section for additional information on subsystem association. All local files are released unless the ND keyword is specified.

Command	Description
PACKNAM,PN=packnam or PACKNAM,packnam	Enables validated users to direct subsequent permanent file requests to the auxiliary device specified by the PN parameter. This command allows the user to omit the PN keyword in requests for files that reside on that auxiliary device. However, if permanent files on another auxiliary device are to be accessed, the PN keyword can be included in the request or a new PACKNAM command can be entered. The user cannot access permanent files residing on the normal system devices (family devices) while the PACKNAM command is in effect. To access these files again, he must enter the PACKNAM command and set the PN parameter to zero, as follows: PACKNAM,PN=0 or PACKNAM An auxiliary device is not necessarily a disk pack that can be physically removed as the command name implies. Rather, an auxiliary device can be any mass storage device supported and defined as such by the site. Auxiliary devices are used to supplement the normal mass storage permanent file devices associated with the system (family devices). Examples: OLD,FILEA ← Request to normal family device for file FILEA. . . PACKNAM, PN=ABC ← Permanent file requests that follow are made to auxiliary device ABC, unless PN option is specified in the request or a new PACKNAM command is entered. . . . . . GET,DATA ← Request to auxiliary device ABC for file DATA. . . PACKNAM, PN=XYZ ← Permanent file requests that follow are made to auxiliary device XYZ. . . GET,TAPE1 ← Request to auxiliary device XYZ for files TAPE1 and TAPE2. GET,TAPE2 . . PACKNAM, PN=0 ← Clear PACKNAM command. Permanent file requests that follow are made to the normal family devices. . . .
PERMIT,pfn,usernam$_1$=m$_1$, usernam$_2$=m$_2$,..., usernam$_n$=m$_n$/PN=packnam, R=r,NA	Grants user usernam$_i$ permission to access private or semiprivate file pfn. If the permission mode, m$_i$, is omitted, the system assumes read permission.

Command	Description
PURGE,pfn_1,pfn_2,..., pfn_n/UN=usernam,PW=passwrd, PN=packnam,R=r,NA	Removes the specified permanent files from permanent file storage. If the permanent file (pfn_i) does not exist, the system responds pfn NOT FOUND. Write permission is required to purge a permanent file in an alternate user's catalog (UN keyword specified). The PW keyword must also be specified if the file has a password. Direct access files are not actually purged until the last user accessing the file has released it. However, subsequent attempts to access the file are rejected.
REPLACE,lfn_1=pfn_1, lfn_2=pfn_2,..., lfn_n=pfn_n/UN=usernam, PW=passwrd,PN=packnam, R=r,NA	Allows validated users to replace the contents of an indirect access permanent file (pfn_i) with the contents of a temporary file (lfn_i). If the file name for pfn_i is not specified or does not exist, a new permanent file is created. The REPLACE command does not affect the subsystem associated with the permanent file (if any).
SAVE,lfn_1=pfn_1, lfn_2=pfn_2,..., lfn_n=pfn_n/PW=passwrd, CT=n,M=m,SS=subsyst, PN=packnam,R=r,NA	Creates one or more indirect access permanent files. This command allows a validated user to retain a copy of the specified temporary file (lfn_i) in the permanent file system. If the optional keywords are omitted, the system assumes the following values. PW — None. CT — Private file. M — Write mode. SS — Current subsystem when lfn_i is the primary file. Null subsystem when lfn_i is not the primary file. PN — None. R, NA — Not applicable unless PN is specified. Unless the null subsystem is active when the primary file is saved, an internal indicator called the subsystem flag is set to indicate which subsystem is being used. That subsystem becomes associated with the permanent file (pfn_i) and is reselected automatically each time the file is retrieved for use as a primary file (OLD command or when the lfn specified on a GET command is the current primary file). To associate the primary file with a subsystem different from the current subsystem, the user can enter the SS=subsyst parameter. To save the primary file without a subsystem association, the user can enter the SS=NULL parameter. The user can also use the SS parameter to associate a subsystem with a temporary file that is not the primary file.

CATLIST COMMAND

The user can obtain specific information about his permanent files with the CATLIST command. In addition, this command can be entered to obtain specific information about permanent files the user can access in the catalogs of alternate users.

COMMAND FORMAT

The following is the format of the CATLIST command; the optional keywords and corresponding parameters must follow the comma and are order independent.

CATLIST,LO=options,FN=pfn,UN=usernam,L=lfn,PN=packnam,R=r,NA,DN=dn

Keyword	Parameter	Description
LO=	F	Selects a listing of pertinent information about each file in the user's catalog (refer to example 1 under Examples in this section). If an alternate user name is specified (UN parameter), it selects a listing of the names of all files the user can access in the alternate user's catalog (refer to example 2 under Examples in this section). The passwords for files in an alternate user's catalog are not included in the listing; they must be obtained directly from that user.
	FP	Selects a listing of permission information recorded for each alternate user that accessed a specified file in the user's catalog (refer to example 3 under Examples in this section). This option requires that a file name be specified (FN parameter). If an alternate user name is also specified (UN parameter), only the permission information recorded for that user of the specified file is listed. The user names listed include: • Those that have explicit permission to access the file (private or semiprivate file). • Those that have implicit permission to access the file (semiprivate files only). Permission information for alternate users that have accessed public files is not recorded.
	0	Selects a short list that gives only the names of the files in the user's catalog (refer to example 4 under Examples in this section). Files are listed alphabetically and are grouped as indirect access files and direct access files.

Keyword	Parameter	Description
		An asterisk preceding a file name indicates that an error flag is set in the catalog entry for the file. The cause of the error may be any of the following: • Alteration of EOI by the recovery process. • Error in verifying BOI/EOI position. • Error in data and/or permit entries. If the user attempts to attach such a file without specifying the NA keyword, IAF issues an error message stating the reason for the error status. If an alternate user number is specified (UN parameter), the user obtains only the names of the files he can access in the alternate user's catalog. If no LO parameter is specified, the system assumes LO=0.
	P	Selects a short list that gives only the user names of alternate users who accessed the specified private or semiprivate file (refer to example 5 under Examples in this section). This option requires that a file name be specified (FN parameter).
FN=	pfn	Specifies that catalog information is desired only for this permanent file (pfn). This parameter is required when listing permit information (LO=FP, LO=P) but is optional otherwise (LO=F, LO=0). If a user has several files with similar names, he can list information about all of these files using only one FN parameter: when specifying pfn, the user inserts an asterisk in place of any letter that is not the same in all of his file names. Examples: FN=***OPL — Lists information about all files with a six-character file name ending with the letters OPL. FN=M****** — Lists information about all files with a file name beginning with the letter M. Use of the asterisk is not allowed when listing permit information (LO=FP, LO=P).

Keyword	Parameter	Description
		If the short list options are selected (LO=0, LO=P), the message pfn FOUND. is returned if the file (or user name) is located. The message pfn NOT FOUND. is returned if the specified file (or user name) is not located.
UN=	usernam	This parameter has two purposes. • For LO=F and LO=0. Specifies the alternate catalog for which the user wants catalog information (refer to example 2 under Examples in this section). • For LO=FP and LO=P. Specifies the alternate user for which the user wants recorded permission information.
L=	lfn	Specifies the name of a local file to which the CATLIST information is written. If this parameter is omitted, the system assumes L=OUTPUT and the data is returned to the terminal. If an alternate file is specified, the CATLIST information is written at the current position in the file. For example, if lfn is positioned at BOI, the contents of that file are replaced with the CATLIST information. If lfn is positioned at EOI, the CATLIST information is appended to the file as a new logical record.
R=	r	This parameter is used in conjunction with the PN and NA parameters to specify the type of auxiliary device that contains the desired catalog information. If PN and NA are specified but R is not, the system default device type is assumed. If the device type of auxiliary device PN conflicts with the device specified by the R parameter, the system issues the message ILLEGAL DEVICE REQUEST. For example, if auxiliary device PN is device type DI and the device type specified by R is DK, a conflict exists and the error message is issued. The device types are

r	Device
DE	Extended core storage
DIn	844-21 disk storage subsystem (half track; 1≤n≤8)
DJn	844-4x disk storage subsystem (half track; 1≤n≤8)

Keyword	Parameter	Description
		r — Device
		DKn — 844-21 disk storage subsystem (full track; 1≤n≤8)
		DLn — 844-4x disk storage subsystem (full track; 1≤n≤8)
		DMn — 885 disk storage subsystem (half track; 1≤n≤3)
		DP — Distributive data path
		DQn — 885 disk storage subsystem (full track; 1≤n≤3)
		n indicates number of units. x is 1 or 4.
		If the number of units specified does not agree with the actual number for device types DI, DJ, DK, DL, DM, or DQ, the system issues the message ILLEGAL DEVICE REQUEST.
PN=	packnam	The PN parameter identifies an auxiliary device that contains catalog information for all users with files on that device. Unless the PACKNAM command is in effect, the user must specify the PN parameter to obtain the following information from his catalog on an auxiliary device. • Pertinent information about each file that resides on the device (LO=F). • Only the name of each file (LO=0). • Permission information for each alternate user that accessed a specific file (LO=FP). • Only the user number of each alternate user that accessed a specific file (LO=P). If two or more auxiliary devices are in use concurrently, the user must enter the batch subsystem and issue the RESOURC control statement (refer to the NOS Reference Manual, volume 1). The PN keyword can also be specified by alternate users to obtain a list of files and pertinent information about each file they can access on an auxiliary device.

Keyword	Parameter	Description
NA		This keyword is used in conjunction with the PN parameter in requests for catalog information on auxiliary devices. If the device is currently not available, NA directs the system to make it available. If the NA keyword is omitted and the device is not currently available, the system responds DEVICE UNAVAILABLE. The system does not make the device available unless the user is validated to have at least one auxiliary device assigned to his job (refer to LIMITS Command in section 4).
DN=	dn	The device number (1 to 77) specified is searched for the files that are specified by the CATLIST command options.

INFORMATION FORMAT

The format of the first line of information returned for all CATLIST commands is

CATALOG OF usernam FM/family yy/mm/dd. hh.mm.ss.

usernam	The user name entered during login.
family	The name of the set of permanent file devices on which the user's permanent files are stored. If the user specifies the PN parameter in the CATLIST command, the system prints PN/packnam instead of FM/family, where packnam is the name of the device the user specified with the PN parameter.
yy/mm/dd	The date in year/month/day.
hh.mm.ss	The time in hours, minutes, and seconds.

The general format of the information returned for a full CATLIST command (LO=F option) is

```
FILE NAME ACCESS FILE-TYPE LENGTH DN CREATION LAST ACCESS LAST MOD
  PASSWORD MD/CNT INDEX PERM. SUBSYS DATE/TIME DATE/TIME DATE/TIME

                              .
                              .
                    list of files and information
                              .
                              .

xxxxx INDIRECT ACCESS FILE(S).  TOTAL PRUS = nnnnn.

xxxxx DIRECT ACCESS FILE(S).  TOTAL PRUS = nnnnn.
```

The following are descriptions of the various fields.

FILE NAME	Permanent file name.
ACCESS FILE	Type of permanent file. This field can be either direct access (DIR) or indirect access (IND).
ACCESS TYPE	Method of access or category. This field can be either private (PRIVATE), semiprivate (SEMI-PR), or public (PUBLIC).
LENGTH	Length of the file in decimal PRUs.
DN	Device number of the mass storage device on which a direct access file is stored. If the file resides on the master device, this field is replaced by an *.
CREATION DATE/TIME	Time and date of file creation. The format is yy/mm/dd. hh.mm.ss.
LAST ACCESS DATE/TIME	Time and date of the last access to the file.
LAST MOD DATE/TIME	Time and date of the last modification to the file.
PASSWORD	Password associated with the file (field not present if catalog of alternate user name).
MD/CNT	Modification count. This number specifies the number of times the file has been accessed.
INDEX	User index (reserved for system utilities).
PERM.	Permission mode. Entry can be WRITE, MODIFY, APPEND, READ, READMD, READAP, or EXECUTE.
SUBSYS	Subsystem under which the file was saved. Possible entries include FOR, FTNTS, BASIC, EXEC., or BATCH. If this field contains no entry, a subsystem is not associated with the file.
xxxxx	Total of each file type.
nnnnn	Total of PRUs allocated to each file type.

EXAMPLES

The following examples illustrate some of the options available to the user when entering the CATLIST command.

Example 1. Listing of pertinent information about each file in the catalog of JLC2016. The command is entered by user JLC2016 in the form: CATLIST,LO=F.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.34.29.

   FILE NAME ACCESS FILE-TYPE LENGTH DN CREATION LAST ACCESS LAST MOD
    PASSWORD MD/CNT INDEX  PERM. SUBSYS DATE/TIME DATE/TIME DATE/TIME


   1 HEROBAS  IND. PRIVATE          1    79/07/12. 79/07/13. 79/07/13.
                 4          WRITE  BASIC 08.17.15. 08.19.15. 08.19.15.

   2 BASPROG  IND. PRIVATE          1    79/07/26. 79/07/26. 79/07/26.
                 1          WRITE  BASIC 07.48.02. 07.51.02. 07.48.02.

   3 OCTFILE  IND. PRIVATE          1    79/07/26. 79/07/26. 79/07/26.
                 4          WRITE  FTNTS 08.21.05. 08.25.54. 08.22.37.

   4 HEXFILE  IND. PRIVATE          1    79/07/26. 79/07/26. 79/07/26.
                 0          WRITE  FTNTS 08.27.08. 08.27.08. 08.27.08.

   5 ABC      IND. PRIVATE          1    79/07/30. 79/07/30. 79/07/30.
     1234567     1          WRITE  BASIC 08.03.32. 08.04.02. 08.03.32.

   6 TAPE3    IND. SEMI-PR          1    79/07/30. 79/07/30. 79/07/30.
                 9           READ  BASIC 08.06.04. 08.12.33. 08.06.04.

   7 BINTAPE  IND.  PUBLIC          1    79/07/30. 79/07/30. 79/07/30.
     BINARY      2           EXEC  EXEC. 08.07.56. 08.08.12. 08.07.56.

   8 PRIME    IND. SEMI-PR          1    79/07/30. 79/07/30. 79/07/30.
                 6           READ  FORT. 08.17.11. 08.28.33. 08.17.11.

   9 DIRFILE  DIR. PRIVATE          2  * 79/07/30. 79/07/30. 79/07/30.
                 0          WRITE        08.23.08. 08.23.08. 08.23.08.

  10 DIRTEST  DIR. PRIVATE          2  * 79/07/30. 79/07/30. 79/07/30.
                 1          WRITE        08.23.16. 08.27.54. 08.23.16.

        8 INDIRECT ACCESS FILE(S),   TOTAL PRUS =          8.
        2 DIRECT ACCESS FILE(S),     TOTAL PRUS =          4.
```

Subsystem associated with the file.
Blank entry indicates the null subsystem
or no subsystem association.

Example 2. Listing of pertinent information about each file that KXK4277 can access in the catalog of JLC2016. The command is entered by user KXK4277 in the form: CATLIST,LO=F,UN=JLC2016.

```
CATALOG OF KXK4277              FM/NOSCLSH 79/07/30. 08.38.56.
        ALTERNATE CATALOG   JLC2016
   FILE NAME ACCESS FILE-TYPE LENGTH DN CREATION LAST ACCESS LAST MOD
             MD/CNT INDEX  PERM. SUBSYS DATE/TIME DATE/TIME DATE/TIME

   1 ABC       IND. PRIVATE         1    79/07/30. 79/07/30. 79/07/30.
                  1           READ  BASIC 08.03.32. 08.04.02. 08.03.32.

   2 TAPE3     IND. SEMI-PR         1    79/07/30. 79/07/30. 79/07/30.
                  9           READ  BASIC 08.06.04. 08.12.33. 08.06.04.

   3 BINTAPE   IND.  PUBLIC         1    79/07/30. 79/07/30. 79/07/30.
                  2           EXEC  EXEC. 08.07.56. 08.08.12. 08.07.56.

   4 PRIME     IND. SEMI-PR         1    79/07/30. 79/07/30. 79/07/30.
                  6           READ  FORT. 08.17.11. 08.28.33. 08.17.11.

   5 DIRFILE   DIR. PRIVATE         2  * 79/07/30. 79/07/30. 79/07/30.
                  0           READ       08.23.08. 08.23.08. 08.23.08.

   6 DIRTEST   DIR. PRIVATE         2  * 79/07/30. 79/07/30. 79/07/30.
                  1           READ       08.23.16. 08.27.54. 08.23.16.

        4 INDIRECT ACCESS FILE(S),   TOTAL PRUS =          4.
        2 DIRECT ACCESS FILE(S),     TOTAL PRUS =          4.
```

DN indicates device number for direct access files. An * in this column indicates that file resides on master device (refer to appendix C).

Example 3. Listing of permission information recorded for each user that has accessed file PRIME (semiprivate file) in the catalog of JLC2016. The command is entered by user JLC2016 in the form...CATLIST,LO=FP,FN=PRIME.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.21.48.
        FILE NAME PRIME
USER NUMBER    PERM.   ACCESSES  DATE      TIME


  1. KXK4277    READ*          2 79/07/30. 08.19.19.
  2. RXL3530    WRITE*         3 79/07/30. 08.20.24.
```

An asterisk indicates explicit permit (set by PERMIT command) rather than accounting permit (used on semiprivate files).

Example 4. List of current files in the catalog of JLC2016. The command is entered by user JLC2016 in the form...CATLIST,LO=0 (it is not necessary to specify the LO=0 option since it is the default value). The asterisk indicates error status set.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.23.48.

INDIRECT ACCESS FILE(S)

 ABC        BINTAPE    EXAM       HEROBAS    HEXFILE    OCTFILE    TAPE3
 BASPROG    DATA       GRADES     HEROFTN    LIST       PRIME

DIRECT ACCESS FILE(S)

 DIRFILE    DIRTEST

       13 INDIRECT ACCESS FILE(S),    TOTAL PRUS =        18.
        2 DIRECT ACCESS FILE(S),      TOTAL PRUS =         4.
```

Example 5. List of alternate users that have accessed file PRIME in the catalog of JLC2016. The command is entered by user JLC2016 in the form: CATLIST,LO=P,FN=PRIME.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.31.34.
          FILE NAME PRIME
 USER NUMBER(S)


 KXK4277    RXL3530

        2 USER(S)
```

ALTERNATE USER ACCESS

The following examples illustrate the alternatives available to users for accessing files in alternate catalogs.

PRIVATE FILE CATEGORY

Temporary file ABC is retained by user JLC2016 as a private indirect access permanent file using the following command.

```
SAVE,ABC/PW=1234567
```

The following is the entry for file ABC in the catalog of JLC2016. The listing is obtained by entering the CATLIST command in the form: CATLIST,LO=F,FN=ABC.

```
CATALOG OF JLC2016            FM/NOSCLSH 79/07/30. 08.04.11.

   FILE NAME ACCESS FILE-TYPE LENGTH DN CREATION LAST ACCESS LAST MOD
    PASSWORD MD/CNT INDEX  PERM. SUBSYS DATE/TIME DATE/TIME DATE/TIME


   1 ABC      IND. PRIVATE         1    79/07/30. 79/07/30. 79/07/30.
     1234567     1          WRITE  BASIC 08.03.32. 08.04.02. 08.03.32.

        1 INDIRECT ACCESS FILE(S),   TOTAL PRUS =          1.
```

User JLC2016 issues the following command to permit alternate user access.

```
PERMIT,ABC,KXK4277=R,DLH2500=W
```

The following is the permission information recorded in the catalog of JLC2016. The listing is obtained by entering the CATLIST command in the form: CATLIST,LO=FP,FN=ABC.

```
CATALOG OF JLC2016            FM/NOSCLSH 79/07/30. 08.05.18.
          FILE NAME ABC
USER NUMBER   PERM.  ACCESSES  DATE      TIME


  1. KXK4277   READ*         0 79/07/30. 08.04.56.
  2. DLH2500   WRITE*        0 79/07/30. 08.04.57.
```

An asterisk indicates explicit permit flag.

The format of the command required of KXK4277 and DLH2500 to access the file is

```
GET,ABC/UN=JLC2016,PW=1234567 or OLD,ABC/UN=JLC2016,PW=1234567
```

Only the following users can access this private file.

User	Information Necessary for Access	
JLC2016	File name	ABC
KXK4277	File name	ABC
	File password	1234567
	User name	JLC2016
DLH2500	File name	ABC
	File password	1234567
	User name	JLC2016

SEMIPRIVATE FILE CATEGORY

Temporary file TAPE3 is retained by JLC2016 as a semiprivate indirect access permanent file using the following command.

```
SAVE,TAPE3/CT=SPRIV,M=READ
```

The following is the entry for file TAPE3 in the catalog of JLC2016. The listing is obtained by entering the CATLIST command in the form: CATLIST,LO=F,FN=TAPE3.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.06.33.

   FILE NAME ACCESS FILE-TYPE LENGTH DN CREATION LAST ACCESS LAST MOD
    PASSWORD MD/CNT INDEX  PERM. SUBSYS DATE/TIME DATE/TIME DATE/TIME


   1 TAPE3     IND. SEMI-PR          1    79/07/30. 79/07/30. 79/07/30.
                  3           READ  BASIC 08.06.04. 08.06.17. 08.06.04.

        1 INDIRECT ACCESS FILE(S),    TOTAL PRUS =          1.
```

The following is the permission information recorded in the catalog of JLC2016. The listing is obtained by entering the CATLIST command in the form: CATLIST,LO=FP,FN=TAPE3.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.13.21.
          FILE NAME TAPE3
USER NUMBER    PERM.  ACCESSES  DATE      TIME


  1. KXK4277    READ*         4 79/07/30. 08.11.27.
  2. RXL3530    WRITE*        2 79/07/30. 08.12.33.
```

The listing shows that two users have accessed file TAPE3 the indicated number of times. When an alternate user accesses file TAPE3 the first time, the permission information is recorded in the catalog of JLC2016. Each succeeding access increases the access count (ACCESSES). The absence of an asterisk after the permission mode indicates that this is an accounting permit and was not created by a PERMIT command.

The format of the command required of all users, except JLC2016, to access the file is

```
GET,TAPE3/UN=JLC2016 or OLD,TAPE3/UN=JLC2016
```

Users who can access this file are:

User	Information Necessary for Access	
JLC2016	File name	TAPE3
All others	File name	TAPE3
	Password	None required
	User name	JLC2016

PUBLIC FILE CATEGORY

Temporary file BINTAPE is retained by JLC2016 as a public indirect access permanent file using the following command.

```
SAVE,BINTAPE/PW=BINARY,CT=PUBLIC,M=EXECUTE
```

The following is the entry for file BINTAPE in the catalog of JLC2016. The list is obtained by entering the CATLIST command in the form: CATLIST,LO=F,FN=BINTAPE.

```
CATALOG OF JLC2016              FM/NOSCLSH 79/07/30. 08.08.21.

   FILE NAME ACCESS FILE-TYPE LENGTH DN CREATION LAST ACCESS LAST MOD
    PASSWORD MD/CNT INDEX  PERM. SUBSYS DATE/TIME DATE/TIME DATE/TIME


   1 BINTAPE   IND.  PUBLIC         1    79/07/30. 79/07/30. 79/07/30.
     BINARY      2           EXEC  EXEC. 08.07.56. 08.08.12. 08.07.56.

        1 INDIRECT ACCESS FILE(S),   TOTAL PRUS =          1.
```

Permission information is not recorded for accesses to a public file; only the total number of accesses is recorded for the originator of the file.

The format of the command required of all users, except JLC2016, to access file BINTAPE is

```
GET,BINTAPE/UN=JLC2016,PW=BINARY or OLD,BINTAPE/UN=JLC2016,PW=BINARY
```

Users who can access this file are

User	Information Necessary for Access	
JLC2016	File name	BINTAPE
All others	File name	BINTAPE
	Password	BINARY
	User name	JLC2016

LIBRARY COMMAND

The LIBRARY command allows access to indirect access permanent files in the catalog of special user name LIBRARY. Direct access files can also reside in the catalog of LIBRARY although an alternate method must be used to access these files (described later in this section). The file category is private, semiprivate, or public. The permission mode is that which has been granted for private files or specified in the catalog for semiprivate and public files.

When the LIBRARY command is entered, a copy of the specified indirect access permanent file is retrieved. This copy becomes the new primary file and all other local files are dropped unless the ND parameter is used. For example:

```
LIBRARY,ABC75/PW=13479,ND
```

In this example, a copy of indirect access permanent file ABC75 is retrieved and becomes the new primary file; all local files remain associated with the job. Only indirect access permanent files can be accessed with the LIBRARY command.

The following commands can also be entered to access permanent files in the catalog of LIBRARY (differences in command function are described).

ATTACH,lfn=pfn/UN=LIBRARY,PW=passwrd,M=m

This command must be entered to use any direct access permanent files in the catalog of LIBRARY. A temporary file is not created since all I/O operations are performed directly on the permanent file itself. However, if the user wishes to reference the file by a name other than its permanent file name, he can assign a local file name (lfn) in the command. The primary file name remains unchanged.

GET,lfn=pfn/UN=LIBRARY,PW=passwrd

This command retrieves a copy of the specified indirect access permanent file (from catalog of LIBRARY) for use as a temporary file. The primary file remains unchanged unless lfn specifies the name of the current primary file (refer to description of GET command).

OLD,lfn=pfn/UN=LIBRARY,PW=passwrd

The function of this command is identical in all respects to that of the LIBRARY command.

The only files that can be accessed from the catalog of LIBRARY are those that allow alternate user access. All users, except user number LIBRARY, are considered to be alternate users. The rules for alternate user access are summarized as follows:

- Only those users with permission can access private files.
- All users can access semiprivate and public files providing they know the file name, password (if one exists for the file), type of access (direct or indirect), and user number (LIBRARY).

The following forms of the CATLIST command can be entered to obtain a listing of files that can be accessed in the catalog of LIBRARY.

CATLIST,LO=F,UN=LIBRARY (full listing)

CATLIST,UN=LIBRARY (file names only)

ADDITIONAL SYSTEM FEATURES 6

This section contains descriptions of the program editing, line resequencing, job suspension, and recovery features provided for the terminal user.

PROGRAM EDITING

To allow ease of editing the primary file when working with source programs, IAF provides a line editing capability that can be used under any subsystem. For more detailed editing, Text Editor or XEDIT should be used (refer to the Text Editor Reference Manual or the XEDIT Reference Manual). The line editing capability allows the user to

- Insert statements into a program.
- Delete statements from a program.
- Correct statements in a program.

The following example illustrates this program editing capability. The user enters a new primary file.

```
10 let a=1
20 let b=50
30 for i=1 to b
40 a=a*i
50 print "factorial";i,a
60 next i
70 end
```

If the user wishes to insert a statement between line numbers 10 and 20, he types

```
15 let z=20
```

If the user wishes to delete the statement at line 20, he types

```
20
```

Finally, to change the statement at line number 30, the user types

```
30 for i=1 to z
```

Leading zeros are not required even if the statement being deleted or corrected contains line numbers with leading zeros. For example, a line numbered 30 replaces, and is interchangeable with, a line numbered 00030.

When the file is listed, it has the following form.

```
lnh

10 LET A=1
15 LET Z=20
30 FOR I=1 TO Z
40 A=A*I
50 PRINT "FACTORIAL";I,A
60 NEXT I
70 END

 READY.
```

To retain the latest (corrected) version of the primary file, the user enters

```
save
```

If the primary file is a copy of an indirect access permanent file, the user can replace the version in the permanent file system with the corrected version by entering

```
replace
```

To save the corrected file under a new name, the user enters

```
save,lfn=pfn
```

lfn Primary file name.

pfn Permanent file name.

RESEQUENCING LINE NUMBERS

The RESEQ command enables the user to resequence or add line numbers to the primary file. The user should resequence only sorted files. This is done using the following command.

RESEQ,nnnnn,iiii,t

nnnnn New line number of the first statement (five digits maximum); if omitted, IAF assumes nnnnn is 00100.

iiii Increment to be added to nnnnn; if omitted, IAF assumes iiii is 0010.

t **Type of file to be resequenced:**

B	**Files that contain BASIC source code. BASIC statements that contain references to line numbers are updated when the line numbers are resequenced.**
T	Files that contain text source information. A five-digit line number, plus a blank, is added at the beginning of each line. No inspection is made for existing line numbers. Thus, if line numbers currently exist, they are not resequenced or deleted; two sets of line numbers result.
Other	Any number at the beginning of a line is considered a line number and is resequenced according to the nnnnn and iiii parameters; line numbers are added to the beginning of lines where none appear.
Default	The user must change to the correct subsystem before entering the RESEQ command. BASIC programs are resequenced under the BASIC subsystem. If the user resequences a BASIC source file, all line number references are updated. The format of each BASIC statement remains the same unless a new line number reference contains more digits than the original line number reference. Then, any multiple blanks surrounding the original line number reference are used for the expanded number. FORTRAN programs are resequenced under the FORTRAN or FTNTS subsystem; statement numbers and references to statement numbers are not changed.

All parameters supplied in the RESEQ command are order dependent; that is, they must be entered in the order they appear in the command. Omitted parameters must be indicated by a comma if other parameters are to follow. For example, the command

```
RESEQ,50,,T
```

adds line numbers to the primary (text) file without checking for existing line numbers. Thus, the first line is numbered 00050 and each succeeding number is increased by 10 (default value). If the T parameter is not specified in the command, the two preceding commas are not necessary.

If the starting line number (nnnnn parameter) is longer than five digits or if the increment (iiii parameter) causes the line numbers generated to exceed five digits, the message

```
LINE NUMBER LIMIT EXCEEDED.
```

is returned to the terminal. In addition, the message

```
RESEQ NUMERIC PARAM ERROR.
```

is returned if the user enters a nonnumeric value for either the nnnnn or the iiii parameters.

JOB SUSPENSION

A user can suspend his job during program execution by entering the interruption sequence (refer to appendix F for default interruption sequences for all terminal classes). If the program is actively transmitting output to the terminal, the BREAK (or ATTN) key must first be pressed to inhibit output. The interruption sequence can then be entered to suspend the job. IAF responds

```
*INTERRUPTED*
```

If the user's terminal does not have a BREAK key (sometimes labeled INT, INTRPT, or ATTN), a job cannot be suspended while it is transmitting output to the terminal.

NOTE

On asynchronous terminals (terminal classes 1 through 8), output can be suspended by pressing any key. However, then the interruption sequence cannot be entered. To use the interruption sequence, the BREAK key must be used to suspend output.

A job is also suspended automatically by IAF when:

- A successful recovery has been performed (refer to Recovery in this section).
- The job has exceeded its time limit. The time limit is initially set to 64 seconds at login, although the user can change this value through use of the SETTL command (refer to section 4).
- The job or job step has exceeded its SRU limit. The SRU limits are initially set to 320 SRUs at login, although the user can change this value through use of the SETASL or SETJSL commands (refer to section 4).

After a successful recovery, if the job is suspended by the user (interrupted) or by IAF, the user can enter one of the following:

Entry	Description
⏎	Continues output. A portion of the output is lost if the program was transmitting output to the terminal when suspended. When output is complete, program execution continues.
P ⏎	Proceeds. If the program was transmitting output to the terminal when suspended, the system discards the data generated by the program prior to the interruption sequence. The amount of output discarded depends on the program being executed. Program execution continues.
Other ⏎	Stops. Terminates the job step.

If the job is suspended because a job step exceeded its time limit, the message

```
*TIME LIMIT*
ENTER T TO CONTINUE OR CR KEY TO STOP:
```

is issued and the user can enter one of the following:

Entry	Description
T ⓒ	Increases the central processor time limit by an amount defined by the site. Job execution continues.
T,nnnnn ⓒ	Increases the central processor time limit by nnnnn decimal seconds. Job execution continues.
ⓒ	Causes the job to go through normal abort procedures (for example, EXIT processing which can be useful when using procedure files).
Termination character ⓒ	Terminates the job step. Subsequent control statements, if any, are not processed.

If the job is suspended because a job step or the job itself exceeded its SRU limit, the message

```
*SRU LIMIT*
ENTER S TO CONTINUE OR CR KEY TO STOP:
```

is issued. The user can enter one of the following:

Entry	Description
S ⓒ	Increases the SRU limit by an amount defined by the site. Job execution continues.
S,nnnnn ⓒ	Increases the SRU limit by nnnnn decimal units. Job execution continues.
ⓒ	Causes the job to go through normal abort procedures.
Termination character ⓒ	Terminates the job step. Subsequent control statements, if any, are not processed.

The following example illustrates the use of the interruption sequence to interrupt a FORTRAN program.

```
lnh

00100 PROGRAM DO (INPUT,OUTPUT)
00110 INTEGER E
00120 DO 10 E=1,300
00130 WRITE 5,E
00140 5 FORMAT(I3)
00150 10 CONTINUE
00160 READ*,I,J
00170 WRITE 15,I,J
00180 15 FORMAT(I3,I3)
00190 STOP
00200 END
```

```
rnh

  1
  2
  3
  ←————————————————————————————————————— User interrupts the BREAK key to stop output and
 *INTERRUPTED*                             enters the interruption sequence to suspend the job.
CR ←————————————————————————————————————— User continues by pressing CR (some output is lost).
110
111
112
  ←————————————————————————————————————— User again presses the BREAK key to stop output and
 *INTERRUPTED*                             enters the interruption sequence to suspend the job.

p CR ←————————————————————————————————— User enters P CR, directing the system to discard
193                                        data. As execution continues, more data is printed at
194                                        the terminal.
195
196 ←————————————————————————————————— User again suspends the job.
 *INTERRUPTED*
p CR ←————————————————————————————————— User enters P CR, directing the system to discard
? 4,5                                      data. All output has been generated. Program
  4  5                                     execution continues.

SRU      0.863 UNTS.                       The number of times the user would have to enter P
                                           CR before all output has been generated depends on
 RUN COMPLETE.                             the program.
```

In the following example, a program exceeds its allocated time limit. The user enters T to increase the time limit and the program then runs to completion.

```
lnh

00100 PROGRAM T(OUTPUT)
00110 DO 6 I=1,2500
00120 DO 6 J=1,4000
00130 A=1
00140 6 CONTINUE
00150 END

 READY.
settl,10


 READY.
rnh

 *TIME LIMIT*
 ENTER T TO CONTINUE OR CR KEY TO STOP:
t

SRU     66.835 UNTS.

 RUN COMPLETE.
```

RECOVERY

During job processing, recovery may be necessary when:

- The terminal is accidentally disconnected from the system.
- A system malfunction occurs which requires a restart.

The terminal is placed in recovery state whenever it is disconnected from the system without being logged out (providing that it is not already in recovery state). The user has 10 minutes to initiate recovery.

If there is a system malfunction which requires a restart, the user has 10 minutes from the time IAF is restarted to initiate recovery.

To recover, a user completes the login sequence to the point where IAF requests RECOVER/SYSTEM (or RECOVER/CHARGE). For example:

```
79/07/26. 08.05.45. L21T1
 (35) CYBER 174 S/N 620 CLSH.          NOS 1-8J02T/R2B.
FAMILY:  ,jlc2016,jlc2
TERMINAL:     21, NAMIAF
RECOVER/ CHARGE:
```

In response, the user enters

RECOVER,nnn

nnn Terminal number being used when the failure occurred. This number was indicated when the user initially logged in (refer to preceding example). If the same terminal number is indicated when the user logs in to recover, this parameter is not required.

The RECOVER command is valid only when entered in response to the RECOVER/SYSTEM or RECOVER/CHARGE request during the login sequence. If the user's terminal number is not the same as before the failure, the previous terminal number must be entered with the RECOVER command (nnn parameter). This may occur when the failure is due to a dropped line connection. In this case, a different terminal number may be assigned at login because of telephone switching rotaries. If the RECOVER command is not entered where indicated, the user may log out, log in again, and then enter the RECOVER command correctly.

If IAF responds RECOVERY IMPOSSIBLE, one of the following conditions exists.

- The system has no record of the specified user being logged in on the given terminal number within the past 10 minutes.
- The user's system information is incorrect due to system malfunction.

If IAF responds INVALID TERMINAL NUMBER, the terminal number the user entered has a format or size error.

If the user receives either of the preceding messages, he should check the terminal number he entered. If he has not given the correct number, he may reenter RECOVER with the correct terminal number.

If recovery is successful, the system responds

```
RECOVERY COMPLETE.

    LAST COMMAND        = name

    JOB STATUS          = stat

    NEXT OPERATION      = nnnn

ENTER *CR* TO CONTINUE:
```

name Name of last command processed. If source code was being entered, the word source is output.

stat One of the following job status messages.

Message	Description
IDLE	No activity.
EXECUTING	Job is in execution.
OUTPUT AVAILABLE	Output from an executing job is available.
OUTPUT LOST	Output from an executing job is lost.
INPUT REQUESTED	Executing job is requesting input.
INPUT LOST	Last line of input data is lost.

nnnn One of the following next operation messages.

Message	Description
ENTER COMMAND	IAF is ready to process the next command.
RERUN OR CONTINUE	If output, transparent mode input, or auto mode input is lost, and if the output or input are significant, the user should rerun the job.
ENTER DATA	Executing job is requesting input.
REENTER DATA	User should reenter lost input data.
CONTINUE	Executing job is ready to continue processing.

The user must then enter ⓒⓡ to restart his job. If the job was previously transmitting output, the output data normally resumes a few lines prior to where the interruption in service occurred.

In general, recovery in IAF is designed to provide minimum inconvenience to the user with maximum security. However, under certain circumstances, recovery of user information cannot be perfect. The following are two examples of these circumstances.

- In some cases, a few lines of output may be lost when a phone line is disconnected just as a job is being restarted to generate more output. This actually occurs before current output is exhausted.
- If a phone line is disconnected when a user is entering source code, he can normally expect to lose the last few lines of text he has entered.

Whenever the user name and terminal number of a user requesting a recovery state match the user name and terminal number of a user already in a recovery state, the user already in the recovery state remains there and the other user is logged out. If a user is disconnected after logging in but before recovery from a previous disconnect, the latter time is processed as a normal logout to protect the user from an intermittent phone line failure. The user can then log in again and enter the RECOVER command to continue the job.

The following is an example of a normal recovery.

```
79/07/26. 08.07.17. L21T1
 (35) CYBER 174 S/N 620 CLSH.              NOS 1-8J02T/R2B.
FAMILY:
USER NAME: jlc2016
PASSWORD
********
TERMINAL:      21, NAMIAF
RECOVER/ CHARGE: recover,23

RECOVERY COMPLETE.
  LAST COMMAND     = RNH
  JOB STATUS       = IDLE
  NEXT OPERATION   = ENTER COMMAND
ENTER *CR* TO CONTINUE:
```

The user enters ⓒⓡ to continue job processing.

IAF replies

```
READY.
```

The following example illustrates a sample recovery.

```
79/07/26. 08.17.03. L28T1
 (35) CYBER 174 S/N 620 CLSH.            NOS 1-8J02T/R2B.
FAMILY:
USER NAME: jlc2016,jlc2,iaf
TERMINAL:      5, NAMIAF
RECOVER/ CHARGE: char,5923,693n451


 READY.
old,aa

 READY.
lnh

00100 PROGRAM AA (INPUT,OUTPUT)
00110 PRINT 4
00120 4 FORMAT (* ENTER 2 NUMBERS IN THE FORMAT XXX.X XXX.X*)
00130 READ 3,A,B
00140 3 FORMAT(F5.1,1X,F5.1)
00150 C=A*B
00160 PRINT 5,C
00170 5 FORMAT(*A MULTIPLIED BY B EQUALS*,1X,F15.2)
00180 STOP
00190 END

 READY.
rnh

 ENTER 2 NUMBERS IN THE FORMAT XXX.X XXX.X
? ~ <-------------------------------- The user is disconnected before entering data and
                                      logs in again.


79/07/26. 08.18.26. L28T1
 (35) CYBER 174 S/N 620 CLSH.            NOS 1-8J02T/R2B.
FAMILY:
USER NAME: jlc2016,jlc2,iaf
TERMINAL:      5, NAMIAF
RECOVER/ CHARGE: recover,5

RECOVERY COMPLETE.
  LAST COMMAND     = RNH
  JOB STATUS       = INPUT REQUESTED
  NEXT OPERATION   = ENTER DATA
ENTER *CR* TO CONTINUE:<-------------- The user enters (CR) to continue.
?  20.0  20.0 <------------------------ The user enters data.
A MULTIPLIED BY B EQUALS     400.00

SRU       0.686 UNTS.

 RUN COMPLETE.
```

This example illustrates another recovery situation.

```
enquire
TERMINAL:     24, NAMIAF
SYSTEM:   BASIC
FILE NAME: BB
STATUS:   IDLE
MESSAGE:
lnh

10 REM THIS IS A TEST
20 REM PRINT B
30 PRINT "PRINT B"
40 LET B=1+3
50 PRINT B
60 END

 READY.
~_ <-------------------------------- The user is disconnected.


79/07/26. 08.14.16. L32T1
 (35) CYBER 174 S/N 620 CLSH.          NOS 1-8J02T/R2B.
FAMILY:
USER NAME: jlc2016,jlc2,iaf
TERMINAL:     26, NAMIAF
RECOVER/ CHARGE:
   <-------------------------------- The user is disconnected again before recovering.
                                      This is processed as a normal logout.


79/07/26. 08.15.01. L32T1
 (35) CYBER 174 S/N 620 CLSH.          NOS 1-8J02T/R2B.
FAMILY:
USER NAME: jlc2016,jlc2,iaf
TERMINAL:     26, NAMIAF
RECOVER/ CHARGE: recover,24 <------- The user enters the RECOVER command.

RECOVERY COMPLETE.
  LAST COMMAND     = LNH
  JOB STATUS       = IDLE
  NEXT OPERATION   = ENTER COMMAND
ENTER *CR* TO CONTINUE: <----------- The user enters (CR) to continue.
 READY.
lnh

10 REM THIS IS A TEST
20 REM PRINT B
30 PRINT "PRINT B"
40 LET B=1+3
50 PRINT B
60 END

 READY.
```

ERROR CONTROL

When the hardware detects an error condition, the system terminates the job step and dumps the job's exchange package and a portion of the job's central memory to a local mass storage file called ZZZDUMP. The following message is printed.

EXCHANGE PACKAGE/MEMORY DUMP ON FILE ZZZDUMP.

To examine the exchange package and memory dump, rewind and list file ZZZDUMP. Refer to the NOS Reference Manual, volume 1, for more information on the exchange package and error conditions.

REMOTE JOB SUBMITTAL 7

GENERAL DESCRIPTION

Remote job submittal enables a validated IAF user to submit batch job deck images to the system for processing. The batch job image can be created interactively at the terminal and then submitted to the local batch queue by entering the SUBMIT command. The user is no longer interactive with the job once it has been submitted. Instead, the job is treated in the same manner as a job entered from the card reader at the local computer site or from a remote batch terminal (through RBF). The batch job image can consist of control statements, control language statements, program statements, and data. The structure of the batch job image must also be the same as its counterpart on cards (job deck). The user can specify how the job is to be structured through use of the reformatting directives described in this section. Refer to the NOS Reference Manual, volume 1, for information concerning job structure and a description of the control statements available.

SUBMIT COMMAND

The format of the SUBMIT command is

SUBMIT,lfn,q,NR.c

lfn — Specifies name of local file to be submitted for processing as a deferred batch job. If lfn is omitted, the primary file name is assumed. The primary file is sorted before being submitted.

q — Specifies the disposition of job OUTPUT as follows:

- B — The job is processed as a local batch job and file OUTPUT is printed at the central site.
- N — The job is processed as a local batch job and file OUTPUT (including banner page and dayfile) is not printed. The default is N.
- E — The job is processed as a remote batch job and file OUTPUT is routed for printing at a remote batch terminal.

NR — Specifies no rewind option; inhibits rewind of file specified by reformatting directive cREAD (refer to Reformatting the Submit File in this section). If omitted, file specified by cREAD directive is automatically rewound.

c — Specifies escape character used to identify reformatting directives in the file to be submitted (lfn). If omitted, IAF assumes c is a slash.

After the job has entered the batch queue, IAF responds

```
hh.mm.ss.jobname
READY.
```

hh.mm.ss.	Time that the job entered the batch queue (hours, minutes, seconds).
jobname	Seven-character job identification name assigned to the job by the system when it is submitted.

The last three characters of the job identification are entered with the ENQUIRE,JN=ccc command to obtain the status of a job after it has entered the system (refer to ENQUIRE command in section 4).

REFORMATTING THE SUBMIT FILE

The submit file (lfn in the SUBMIT command) is a file which contains the batch job image submitted for processing. The reformatting directives described in this section are provided to aid the user in preparing the submit file. When the SUBMIT command is entered, the submit file is reformatted according to the directives that appear in the file and is then placed in the batch input queue awaiting execution. Thus, several of the directives are provided to format the submit file to meet the structural requirements of a batch job (refer to the NOS Reference Manual, volume 1).

Each line in the submit file preceded by an escape character is recognized as a reformatting directive. The escape character to be used can be defined in the SUBMIT command (/ by default). Throughout this description, the letter c, preceding a directive, denotes the escape character. Reformatting directives can be interspersed throughout the submit file as long as transparent mode is not in effect. Transparent mode is selected by the cTRANS directive; it requires that the user observe special rules when inserting subsequent directives into the file (refer to the description of cTRANS and cNOTRANS directives).

Reformatting directives are not processed unless the first line of the submit file contains the cJOB directive. In addition, the first two statements following the cJOB directive (second and third lines of the submit file) must be a job and USER statement, respectively. All following information is determined by the user. Thus, the first lines of a submit file that is to be reformatted before processing should be

00100 cJOB	Reformatting directive.
00110 JOBNAME,...	Job statement.
00120 USER,...	USER statement.
00130 CHARGE,...	Charge and project numbers, if required.

NOTE

The job and USER statements are required in all batch jobs; they must be present even though the cJOB statement is omitted. If the user submits a job with an illegal USER statement, IAF logs the user out without a dayfile message and decrements his security count. The user can log in again if his security count is greater than zero. For more information on use of the USER control statement, refer to section 8.

Although text mode can be used to create a submit file, it is not necessary since each line may have a leading line number. The cSEQ and cNOSEQ directives determine, during reformatting, if line numbers in the submit file will be retained. The cJOB directive is required when any line numbers are to be removed. The user can include line numbers on the entire submit file and can specify which line numbers are to be removed during reformatting. This is especially useful if the submit file contains a BASIC program where line numbers are a requirement of the language.

The reformatting directives available are described as follows:

Directive	Description
cJOB	Indicates that the submit file is to be reformatted and selects the following default reformatting directives. The default directives remain in effect until specified otherwise. cNOTRANS (disabled by cTRANS) cSEQ (disabled by cNOSEQ) cPACK (disabled by cNOPACK) The cJOB directive must be the first line of the submit file. If omitted, the file is not reformatted.
cEOR	Indicates that an end-of-record mark is to be placed at this point in the submit file during reformatting.
cEOF	Indicates that an end-of-file mark is to be placed at this point in the submit file during reformatting.
cSEQ	Indicates that line numbers will be removed from all subsequent lines during reformatting (default value).
cNOSEQ	Reverses the effect of the cSEQ directive. No attempt is made to remove leading line numbers from subsequent lines.
cPACK	Indicates that all succeeding internal EOR and EOF marks will be removed during reformatting (default value). This directive applies only to internal EOR and EOF marks that currently exist. The cEOR and cEOF reformatting directives are not affected.
cNOPACK	Reverses the effect of the cPACK directive. Requests the system not to discard succeeding internal EOR and EOF marks that currently exist.
cTRANS	Indicates transparent mode. When encountering this directive during reformatting, the system checks the next line of the submit file for an additional reformatting directive. If one exists, it is processed and the following line is checked. This continues until a line that does not contain a reformatting directive is encountered. Transparent mode is then selected and all directives that exist on subsequent lines are ignored until an internal EOR or EOF is encountered (not cEOR or cEOF). The cPACK and cNOPACK directives determine if the internal EOR or EOF will be retained. The line following the internal EOR or EOF mark is then checked for a reformatting directive. If one exists, it is processed and the following line is checked. All directives are processed until a line that does not contain a reformatting directive is encountered. This causes transparent mode to be reset unless a cNOTRANS directive was encountered. This process continues until either the end of the submit file is reached or a cNOTRANS directive following an internal EOR or EOF is encountered.

Directive	Description
	The cTRANS directive is typically used in conjunction with the cREAD directive. This allows the user to copy the contents of an existing file into the submit file at the location of the cREAD directive. Because the file is read in transparent mode, no check for reformatting directives is attempted until an internal EOR or EOF is encountered. The cREAD directive must follow the cTRANS directive and must be located before the first succeeding line that is not a reformatting directive. Otherwise, transparent mode is selected before the cREAD directive is encountered, and the cREAD directive is ignored. The cSEQ or cNOSEQ directive in effect before transparent mode is selected has no effect upon the submit file or the file being read (cREAD) while transparent mode is in effect. However, the cPACK or cNOPACK directive in effect before transparent mode is selected remains in effect after it is selected.
cNOTRANS	Reverses the effect of the cTRANS directive and informs the system that the submit file is to be examined on a line-by-line basis. All directives encountered in the submit file while the cNOTRANS directive is in effect are processed. This directive is initially selected by default; it remains in effect until a cTRANS directive is encountered in the submit file. Caution should be observed in the placement of this directive in the submit file. If transparent mode is selected, this directive can possibly be ignored unless it immediately follows either a cREAD directive in the submit file or an internal EOR or EOF mark.
cREAD,lfn	Requests that the system read the contents of the specified file (lfn) and insert that file in place of the cREAD directive in the submit file, during reformatting. Reading terminates when an EOF or EOI is encountered on lfn. If the file to be read is not currently a local file, the system automatically attempts a GET and then an ATTACH on the file. If the file is not specified in the directive, file TAPE1 is assumed. If the file specified cannot be found, the message NO READ FILE FOUND - lfn is issued to the job dayfile, and the job is terminated. If the read file is found to be busy (direct access files only), the message READ FILE BUSY - lfn is issued to the job dayfile, and the job is terminated. The file specified by lfn in the cREAD directive is automatically rewound before the read operation, unless the NR parameter is specified in the SUBMIT command. In this case, the cREWIND directive must precede the cREAD directive in the submit file to rewind file lfn before the read operation begins. NOS returns all files specified in cREAD directives before completion of the job. If the cPACK directive is in effect at the time of the read, all internal EOR marks are removed. If the cNOPACK directive is in effect, all internal EOR marks are read into the submit file in the proper position during reformatting. Unless transparent mode is in effect when file lfn is read, each line of that file is also checked for a reformatting directive. Any directives contained in the file, except another cREAD, are processed. The cREAD directive cannot be nested. In addition, any directives in effect before the cREAD directive is processed remain in effect for the file being read, unless transparent mode is selected. Then, only the cPACK or cNOPACK directives remain in effect for the file being read.

Directive	Description
	Moreover, only those directives that immediately follow an internal EOR in the file being read are processed. If the file to be read is a binary file, it is recommended that the cTRANS directive be used. This is to ensure that binary data is not mistaken for a reformatting directive. If used, the cTRANS directive should immediately precede the cREAD directive in the submit file.
cREWIND,lfn	Requests that the system rewind file lfn to BOI. If lfn is not supplied, file TAPE1 is assumed. This directive is required only if the NR parameter is included in the SUBMIT command. Otherwise, file lfn is automatically rewound. This directive is used in conjunction with the cREAD directive. Thus, to rewind a file before the read operation begins, this directive must precede the cREAD directive in the submit file.
c_1EC=c_2	Indicates that the escape code character is to be changed from c_1 (current escape code) to c_2 (new escape code). The new escape code is used to recognize all subsequent reformatting directives until further change.

No line in a submit file should exceed 150 6-bit characters. The system processes the first 80 characters of the line as a batch control statement and discards the final 70 characters, which can be used for comments or sequence numbers. These final characters do not appear in the dayfile messages. If any input line exceeds 150 characters, the results are unpredictable.

The following procedure shows how a BASIC program and associated batch control statements are reformatted into the structure of a batch job. This batch job is then submitted from the terminal by means of the SUBMIT command.

A BASIC program for generating factorials is entered at the terminal and made into the following indirect access permanent file.

```
basic
 READY.
new,basprog


 READY.
auto
00100 a=1
00110 z=15
00120 for i=1 to z
00130 a=a*i
00140 print "factorial"i"="a
00150 next i
00160 end
00170
*DEL*
save


 READY.
```

For this program to be submitted as a batch job from a terminal by means of the SUBMIT command, a submit file must include it as part of its coding. This submit file has the batch control statements that direct job execution, according to user requirements, as well as any reformatting directives that structure the batch job according to the user's particular specifications.

This submit file is created and saved as follows:

```
new,sbmtjob

 READY.
auto
```

Line numbers facilitate modification while the file is being created. These line numbers are stripped off during reformatting, unless the user specifies otherwise (NOSEQ).

```
00100 /job
```

The user has chosen the character / to identify reformatting directives. The presence of this directive at the beginning of the submit file indicates that there are other reformatting directives in the file. If the coding is to be used without any reformatting, this directive is not necessary.

```
00110 sjob(t500,cm40000)
```

This is the job statement required at the beginning of every batch job. 500 is the maximum amount of time, in decimal seconds, the user allows the central processor to spend on any one job step. 40000 is the maximum amount of central memory storage, in octal units, the user allows for each job step. Refer to the job statement in the NOS Reference Manual, volume 1.

```
00120 user(jlc2016,jlc2)
```

This is the USER statement with user name JLC2016 and password JLC2. If the user name or password is incorrect, the system logs the user out immediately and decrements the security count (refer to section 8) of the user name under which he was logged in. Refer to section 8 for information concerning restrictions associated with the use of this statement.

```
00130 charge(5923,693n451)
```

This is the CHARGE statement with charge number and project number.

```
00140 basic(l=results,
 k=results)
```

This calls the BASIC compiler, initiates execution of the object code, and puts the listable compiler output and execution output on a file called RESULTS. This is done so the output can be printed out at the user's convenience.

```
00150 replace(results)
```

This makes the output a permanent file so that it is not lost after job execution. A REPLACE is used instead of a SAVE since the user may want to execute this job several times with variations. A REPLACE keeps putting the new information in place of the old.

`00160 rewind(input)`	File INPUT is rewound in preparation for the following command. Ordinarily, the pointer in batch input is at the beginning of the second record, the program. The user wants to copy the entire input file, including the first record of control statements.
`00170 copycf(input,reformt)`	The entire batch job as reformatted is copied to a file called REFORMT.
`00180 replace(reformt)`	The reformatted file is made permanent so that it is not lost after job execution. The user can then list this file to see what the reformatting looks like. A REPLACE is used instead of a SAVE to allow future repetitions of this job.
`00190 dayfile(myday)`	The job execution history is put on a file called MYDAY.
`00200 replace(myday)`	The history file is made a permanent file for future reference.
`00210 exit.`	Normal job processing ends if no errors have been encountered. However, if the system encounters any errors in the preceding statements, it skips to this statement and then executes those that follow.
`00220 replace(results)`	If any errors occurred in the BASIC program, they were listed on file RESULTS. This statement makes the file permanent, for future reference if the job fails.
`00230 dayfile(myday)`	The job execution history is put on a file called MYDAY.
`00240 replace(myday)`	The history file is made a permanent file for future reference, if the job fails.
`00250 /eor`	This reformatting directive causes an end-of-record mark to be placed here in the batch job. This signals the end of the first record, the control statements.
`00260 /noseq`	This reformatting directive tells the system to leave all line numbers that follow this directive when reformatting the submit file. This is necessary since the second record is a BASIC program which requires line numbers.
`00270 /read,basprog`	This reformatting directive inserts file BASPROG at this point. The system first searches local files and then the user's permanent files.
`00280 /eof`	This final reformatting directive puts an end-of-file mark here, indicating the end of the second record and the end of the file. It is included in this example only for clarity. Because the system automatically writes an end-of-file, the directive is not required.

To submit this job, the user enters the IAF command

```
submit(sbmtjob)
```

The file enters the system, and the system immediately assigns it a unique name, consisting of the first four letters of the user's index hash followed by three characters which the system derives from its internal alphabetical sequencing. IAF then prints out the time and the name it has assigned. In this case, it is

```
07.51.02.AIDQAGH.
READY.
```

The reformatting directives are executed, and the resulting file is sent to the batch input queue.

The user is now interested in:

- What does the reformatted input look like?
- What are the results of job execution?

The answers are on the permanent files REFORMT and RESULTS. However, these files do not exist until after job execution. The user can verify completion of job execution by entering the ENQUIRE command (section 4), using the last three characters of system-supplied job name AGH to identify the job.

```
enquire,jn=agh
```

When the reply is

```
AIDQAGH  NOT FOUND.

READY.
```

the user knows the job has finished execution. He can then obtain the following two listings.

```
old,reformt


 READY.
lnh,r
```

This produces the following listing, which includes end-of-record and end-of-file marks.

```
SJOB(T500,CM40000)
USER(JLC2016,JLC2)
CHARGE(5923,693N451)
BASIC(L=RESULTS,K=RESULTS)
REPLACE(RESULTS)
REWIND(INPUT)
COPYCF(INPUT,REFORMT)
REPLACE(REFORMT)
DAYFILE(MYDAY)
REPLACE(MYDAY)
EXIT.
REPLACE(RESULTS)
DAYFILE(MYDAY)
REPLACE(MYDAY)
--EOR--
00100 A=1
00110 Z=15
00120 FOR I=1 TO Z
00130 A=A*I
00140 PRINT "FACTORIAL"I"="A
00150 NEXT I
00160 END
--EOR--
--EOF--

 READY.
get,results


 READY.
lnh,f=results
```

This produces the following listing.

```
00100 A=1
00110 Z=15
00120 FOR I=1 TO Z
00130 A=A*I
00140 PRINT "FACTORIAL"I"="A
00150 NEXT I
00160 END
```

```
FACTORIAL 1 = 1
FACTORIAL 2 = 2
FACTORIAL 3 = 6
FACTORIAL 4 = 24
FACTORIAL 5 = 120
FACTORIAL 6 = 720
FACTORIAL 7 = 5040
FACTORIAL 8 = 40320
FACTORIAL 9 = 362880
FACTORIAL 10 = 3628800
FACTORIAL 11 = 39916800
FACTORIAL 12 = 479001600
FACTORIAL 13 = 6.22702E+9
FACTORIAL 14 = 8.71783E+10
FACTORIAL 15 = 1.30767E+12

READY.
```

ERROR PROCESSING

If the user determines that an error occurred during processing of his job, he can reference a listing of the job dayfile as an aid in identifying the cause of the error. The job dayfile contains a record of the job processing activity and is disposed to the local batch queue or the RBF queue for printing when the job is terminated. However, all output is dropped at job termination when a batch job is submitted from a time-sharing terminal, unless the B or E option is specified in the SUBMIT command. This includes the dayfile output as well as the job output. In this event, the user can make provisions within the job to save the contents of the dayfile if an error in processing occurs. This is done by including the following control statements at the end of the job control statement record (first record of the submit file).

```
    .
    .
EXIT.
DAYFILE(lfn)
REPLACE(lfn)
    .
    .
```

When an error condition occurs during job processing, the system searches the job control statement record for an EXIT statement. If an EXIT statement is found, the error condition is cleared and the control statements that follow are processed. In this case, the contents of the job dayfile are copied to the temporary file specified by lfn. That file is then saved for future reference.

If an error does not occur during job processing, the EXIT statement indicates where to terminate normal control statement processing.

BATCH SUBSYSTEM 8

The batch subsystem extends the capability of the terminal user by allowing him to enter batch control statements as well as the IAF commands. The control statements are entered and processed one at a time, and all output is returned to the terminal unless otherwise specified. Refer to the NOS Reference Manual, volume 1, for a description of the batch control statements available and information concerning their use.

To enter the batch subsystem, the user types

BATCH,nnnnn

nnnnn Initial running field length for subsequent job steps. Entering this value is equivalent to entering the RFL,nnnnn control statement. Refer to the NOS Reference Manual, volume 1, for further information. If nnnnn is omitted, 0 is assumed.

The system responds†

$RFL,nnnnn.
/

nnnnn Specifies field length.

The user can then enter an IAF command or any valid batch control statement up to 78 characters in length. IAF commands cannot be abbreviated under the batch subsystem; the entire command or control statement must be entered to be valid. The user can also end each control statement with a period, but this is not required since the system automatically terminates each line of batch input with a period. However, if comments are included in the control statement, the user is required to enter a terminator (either a right parenthesis or a period). If the command or control statement is not valid or is entered incorrectly, IAF responds

ILLEGAL CONTROL CARD.

Because the processing of certain control statements could enable unauthorized access to dumps of privileged areas of memory, thus violating system security, the following control statements are not processed if entered individually or as the first statement in a procedure file from an IAF terminal.

CKP	PBC
DMD	RBR
DMP	RESTART
LBC	WBR
LOC	

† If the batch subsystem is selected automatically by retrieving an indirect access permanent file with the OLD command, the field length is not given (and may not be the default value). Refer to the description of the SAVE command in section 5 for additional information.

If an attempt is made to enter any of these restricted control statements in the previously discussed manner, the following informative message is printed.

SECURE MEMORY, DUMP DISABLED.

The control statements listed are processed as from a batch job if they are included in a procedure file and are not the first statement (refer to -pname, BEGIN, or CALL command in section 4).

Sequences of loader statements can be entered only if they are in a procedure file. The system must read the entire sequence of loader statements (that is, from the initial loader statement to the completion statement) before acting on any one of them. Refer to the CYBER Loader Reference Manual for further information on loader statements.

All IAF commands for which there is a corresponding batch control statement can be included in a procedure file. The remaining IAF commands cannot be included in procedure files.

The following command allows the user to force the system to process a valid IAF command (cccccc), normally interpreted by the IAF executive, as a control statement.

X,cccccc

For example, to call the BASIC compiler, the user enters

X,BASIC

rather than the command

BASIC

which changes the subsystem from batch to BASIC.

To exit from the batch subsystem, the user must type the entire command (FORTRAN, FTNTS, BASIC, EXECUTE, ACCESS, or NULL) to call one of the other subsystems. The user can also change the subsystem unintentionally by entering the OLD command. The OLD command obtains a different primary file but may also select the subsystem that was active when the specified file was originally saved (refer to the description of the SAVE command in section 5).

NOTE

Although a user can enter any batch control statement from a IAF terminal, the output produced by several of these statements is formatted for transmission to a line printer (137 characters per line). Through use of the LO72 control statement, the user can format the output for transmission to an IAF terminal (72 to 150 characters per line). Refer to the description of the LO72 control statement in the NOS Reference Manual, volume 1.

The IAF user should be extremely cautious in using the USER control statement to specify a different user name, password, and family name. For security reasons, some sites do not permit an IAF user to enter a USER statement, unconditionally logging out any user attempting to do so. At all sites, an invalid user name in a USER statement causes the system to log out the user and decrease the security count of the user name under which he was logged in. The security count is the maximum number of security violations (such as attempting to use an invalid user name) that a user is allowed. A security count is assigned to each user name by site personnel. If the user name has exhausted its security count, the associated user is denied all access to the operating system until the security count is reset by site personnel.

When the USER statement is allowed, all permanent file accesses are performed under the user name specified in the most recently entered USER statement, in accordance with the file limits and validations applicable to that user. However, all job-related restrictions (charge required, memory limits, time limits, and so on) remain those of the user specified during login.

PAPER TAPE OPERATIONS 9

GENERAL DESCRIPTION

Paper tape is used for preparing input off-line (when time is not charged) and entering it on-line (when time is charged). This ensures accuracy and speed when most needed. An input tape can include programs, data, and commands. Accordingly, it is possible for the entire terminal operation, after login, to be run from paper tape.

TELETYPEWRITER

This discussion assumes a typical teletypewriter (model 33) with a paper tape punch and a paper tape reader.

The paper tape punch has four buttons with the following labels and use.

Button	Description
ON	Turns the punch on.
OFF	Turns the punch off.
REL.	Releases the feedwheel so one can freely move the tape through the punch head.
B.SP.	Backspaces the tape one row of holes each time it is pressed. This is used to make corrections when preparing a tape off-line (refer to Corrections in this section).

The paper tape reader has one switch with four positions. Position labels and use are as follows:

Position	Description
START	Starts the reader. After switch is momentarily held in this position, it snaps back to the AUTO position and reading continues.
STOP	Immediately stops reading.
AUTO	This position is used in conjunction with the input and processing of commands and data in tape mode (refer to Tape Mode in this section). It allows the tape reader to be turned off and on so that processing of each command or line of data can be completed before additional input is entered.
FREE	Releases the feedwheel so user can freely slide the tape in and out of the read head.

NOTE

On teletypewriters lacking an AUTO position, reading must be manually restarted each time it has been stopped.

CONTROL CHARACTERS

Each line of input from paper tape must end with a particular sequence of control characters. These are punched by functional keys on the teletypewriter keyboard. The control characters used with paper tape are as follows:

Character	Description
(CR)	Message terminator. This is the RETURN key on the model 33. It moves the print head to the beginning of the line and informs IAF that this line of input is completed.
LF	Line feed. This is the LINE FEED key on the keyboard. It advances the paper roller one line. In normal mode, IAF sends a signal that initiates this feed; in tape mode, this signal is not sent and is therefore required on tape.
CTRL/X-OFF	X-off. The appearance of this character on the tape during reading turns the tape reader off. This character is punched by holding down the CTRL key and pressing the X-OFF key.
RO(n)	Rubout. This is the RUB OUT key on the keyboard. It punches a full row of holes. This row is interpreted as null by the system, and hence this character is used for spacing and overpunching errors. The n parameter specifies the minimum number of times this character should be punched in sequence.

INPUT LINES

The following line formats are used to enter programs, data, and commands. The left half of the page shows an example of the input; the right half of the page shows the control characters that immediately follow the last input character. Each line is terminated with three rubouts to provide separation from the next line. While it is possible that adequate separation is provided with less than three rubouts, this is the recommended number. (IAF punches three rubouts at the end of each line when a tape is produced on-line.)†

PROGRAM LINE

100 PROGRAM TEST (INPUT,OUTPUT) (CR) LF RO(3)

DATA LINE

? 12.44,18.31,29.08 (CR) LF CTRL/X-OFF RO(3)

(The ? is supplied by IAF. The remainder of the line comes from the tape. X-OFF turns the reader off to allow this data to be processed before the next line is read.)

COMMAND LINE

CATLIST,LO=F (CR) LF CTRL/X-OFF RO(3)

(X-OFF turns the reader off to allow processing of the command to be completed before the next line is read.)

† Input lines are blank-padded to an even number of characters.

PUNCHING A TAPE OFF-LINE

The following procedure is used to punch a tape when the teletypewriter terminal is not logged in.

1. Place the teletypewriter in local mode.
2. Turn the paper tape punch on by pressing the ON button located on the punch.
3. Prepare a tape leader of about 30 rubouts (3 inches) either by simultaneously pressing the RUB OUT and REPT keys or, if the terminal has the capability, by punching blank tape.
4. With a pencil, trace the arrow above the punch output onto the tape. This identifies the start of the tape for reading. (It is possible to put the tape in the reader backwards.)
5. Type in the input lines with their appropriate control characters.
6. Add a 3-inch trailer of rubouts or blank tape and tear the tape off.
7. Turn the teletypewriter off.

TAPE MODE

To read and process data and commands from tape, it is necessary that the tape reader be turned off, to allow time for processing, then be restarted. By entering tape mode, the user enables IAF to synchronize tape input with its processing.

The user enters tape mode by using the TRMDEF command (section 4) or a terminal definition command (appendix F) to change the input device to a paper tape reader. To do this with the TRMDEF command, the user enters

```
TRMDEF,IN=PT
```

To perform the same operation with a terminal definition command, the user presses the ESC key† (assuming a model 33 teletypewriter is being used) and enters

```
IN=PT
```

The TRMDEF command can specify the input device to be in character mode (PT or KB) only; to specify the input device is in transparent input mode (XP, XK, or X), a terminal definition command must be used. For all other paper tape operations, the TRMDEF command and terminal definition commands can be used interchangeably. The remainder of this section will use the TRMDEF command in examples.

The network acknowledges entry into tape mode by positioning the carriage to the beginning of the line and then performing one or two line feeds. If the reader switch is in the AUTO position, reading begins automatically; if the reader switch is in the OFF position, reading does not begin until it is manually initiated by momentarily moving the switch to START.

---

†The ESC key is the default control character for terminal class 1. It must be pressed to signal the entry of a terminal definition command. Because the control character differs for some terminals, refer to appendix F for the default values for all terminal classes.

The user exits from tape mode by using the TRMDEF command or a terminal definition command to change the input device back to the keyboard. This can be done with TRMDEF by entering

```
TRMDEF,IN=KB
```

The paper tape punch can also be defined as the output device using the TRMDEF command or a terminal definition command. This can be done by entering

```
TRMDEF,OP=PT
```

The user specifies this command to enter tape mode for outputting information to paper tape. This mode provides the proper X-OFF characters when punching the tape. The user exits this mode by using the TRMDEF command or a terminal definition command to change the output device back to a printer. This can be done by entering

```
TRMDEF,OP=PR
```

PUNCHING A TAPE ON-LINE

To punch a tape with information already contained in a system file, the following procedure is used.

1. If not logged in, log in.
2. If not in tape mode, enter TRMDEF,OP=PT.
3. Type in LIST if the primary file is to be punched; type in LIST,F=lfn if a local file other than the primary file is to be punched. Do not press CR. (The LNH command is permissible.)
4. Turn the punch on.
5. Run a leader of rubouts or blank tape.
6. Press CR. The file is listed and punched simultaneously. The network adds the appropriate control characters at the end of each line.
7. Run a trailer of rubouts or blank tape.

CORRECTIONS

When punching a tape off-line, corrections can be made by backspacing over the incorrect punch (use the B.SP. button on the punch) and punching a rubout over the error (use the RUB OUT key on the keyboard). Then punch in the correct character.

It is also possible to make corrections by using the backspace key as in normal, on-line operation. However, the error and/or any overtyping appear in the printout. When line numbers are being used, an erroneous line can be retyped (and repunched) with the same line number. Although the erroneous and correct versions appear in the printout, IAF retains only the last occurrence of the specific numbered line during processing.

Example:

In this example, the input tape contains only program lines. Commands and input are typed in by the user before and after the tape is read in.

The following is the tape as punched. The left half of the page shows the printed copy produced as the tape is punched; the right half of the page shows the control characters entered at the end of each line but not printed.

```
                                                RO(30)
100 LET FACTOR=1                                  CR  LF  RO(3)
110 INPUT N                                        CR LF  RO(3)
120 FOR I=1 TO N                                  CR  LF  RO(3)
130 LET FACTOR=FACTOR*I                            CR LF  RO(3)
140 PRINT FACTOR                                  CR  LF  RO(3)
150 NEXT I                                         CR LF  RO(3)
160 END                                           CR  LF  RO(30)
```

To demonstrate the use of this tape, it is assumed the user is logged in under the null subsystem. He positions this tape in the reader and sets the reader switch to AUTO. The following is the printout that results from the interaction of user and tape with the terminal. The right half of the page contains explanations of the action.

```
basic ←————————————————————————————————— By typing this command, the user enters
 READY.                                    the BASIC subsystem.

new,fact1 ←————————————————————————————— The user types in this line to establish a
                                           new primary file with the name FACT1.

trmdef,in=pt ←————————————————————————— As soon as this command is typed in and
                                           the CR takes effect, the tape reader goes
                                           on and the entire tape (seven lines) is
                                           read in. The reader runs through the
100 LET FACTOR=1                           trailer of rubouts and then turns itself
110 INPUT N                                off.
120 FOR I=1 TO N
130 LET FACTOR=FACTOR*I
140 PRINT FACTOR
150 NEXT I
160 END

 READY.

trmdef,in=kb ←————————————————————————— The user changes the input device back
                                           to the keyboard.

 READY.
```

```
rnh
 ILLEGAL STATEMENT AT  100
 ILLEGAL STATEMENT AT  130
 ILLEGAL STATEMENT AT  140
BASIC COMPILATION ERRORS
```

The user types in RNH and receives the diagnostics shown. BASIC variables cannot be more than two characters.

```
100 let f=1
130 let f=f*i
140 print f
rnh

? 5
 1
 2
 6
 24
 120

 RUN COMPLETE.
```

The user types in the corrective coding shown.

The user initiates another run with the RNH command. IAF replies with ? He types in 5 and receives the desired printout.

```
trmdef,op=pt


 READY.
lnh

100 LET F=1
110 INPUT N
120 FOR I=1 TO N
130 LET F=F*I
140 PRINT F
150 NEXT I
160 END

 READY.
```

The user wants to punch a new tape containing this corrected program. He enters tape mode and then types LNH but does not press (CR). He turns on the punch, runs off some leader, and then enters (CR). As IAF prints the listing, it also punches a tape with the same information and the control characters (CR), carriage return idle fill, LF, LF idle fill, and NUL(3) at the end of each line. The carriage return idle fill and LF idle fill vary with the terminal class and can be set with the CI and LI terminal definition commands. After this, the user punches a trailer of rubouts and tears off the new tape. He discards the original tape.

Example:

In this example, the input tape contains not only a program but also the commands to execute, modify, list, and save that program and the input data used by that program.

The following is the complete tape as punched. The left half of the page gives the printed copy produced as the tape is punched; the right half of the page shows the control characters entered at the end of each line but not printed.

```
FTNTS                                    RO(30)
NEW,DEMO                                 (CR) LF  CTRL/X-OFF  RO(3)
100 PROGRAM DEMO(INPUT,OUTPUT)             (CR) LF  CTRL/X-OFF  RO(3)
110 DIMENSION II(5)                      (CR) LF  RO(3)
120 READ 10, (II(J),J=1,5)                 (CR) LF  RO(3)
130 10 FORMAT(5I5)                       (CR) LF  RO(3)
140 PRINT 20, (II(J),J=1,5)                (CR) LF  RO(3)
150 20 FORMAT(5I10)                      (CR) LF  RO(3)
160 END                                    (CR) LF  CTRL/X-OFF  RO(3)
RNH                                      (CR) LF  CTRL/X-OFF  RO(3)
11111222223333344444555555                 (CR) LF  CTRL/X-OFF  RO(3)
SAVE,DEMO=TAPE1                          (CR) LF  RO(3)
135 DO 1 I=1,5                             (CR) LF  RO(3)
137 II(I)=II(I)+4444                     (CR) LF  CTRL/X-OFF  RO(3)
139 1 CONTINUE                             (CR) LF  CTRL/X-OFF  RO(3)
RESEQ,100,5                              (CR) LF  CTRL/X-OFF  RO(3)
LNH                                        (CR) LF  CTRL/X-OFF  RO(3)
RNH                                      (CR) LF  CTRL/X-OFF  RO(30)
11111222223333344444555555
REPLACE,DEMO=TAPE1
```

To execute this tape, the user logs in to IAF, positions the tape in the reader, sets the reader switch to AUTO, types the command TRMDEF,IN=PT and, upon pressing (CR), starts the reading of the tape. He then observes the remainder of the action without intervention.

The following is the printout of the execution of the tape. The right half of the page contains explanations of the action.

```
FTNTS
```
When this line is read, the reader stops. As soon as FTNTS is established as the current subsystem, IAF turns the reader back on.

```
NEW,DEMO
```
When this line is read, the reader stops. After a new primary file called DEMO is established, IAF turns the reader back on.

```
100 PROGRAM DEMO(INPUT,OUTPUT)
110 DIMENSION II(5)
120 READ 10, (II(J),J=1,5)
130 10 FORMAT(5I5)
140 PRINT 20, (II(J),J=1,5)
150 20 FORMAT(5I10)
160 END
RNH
```
The seven lines of the program are read without interruption.

After the command to run the program is read, the reader is turned off.

```
? 111112222233333444445555 5
```
After processing reaches the READ statement (line 120) and after IAF prints ?, IAF turns the reader on, and the line of data is read. Then the reader is turned off to allow data processing.

Resulting printout:

```
    11111     22222     33333     44444     55555
END

SRU       0.130 UNTS.
 RUN COMPLETE

 SAVE,DEMO=TAPE1
```
After the SAVE command is read, the reader is turned off. A copy of the program DEMO is made an indirect access permanent file with the name TAPE1. Then the reader is turned back on.

```
135 DO 1 I=1,5
137 II(I)=II(I)+4444
139 1 CONTINUE
```
These three lines of modification are read in from the tape without interruption.

```
 RESEQ,100,5
```
After the RESEQ command is read, the reader is turned off. When resequencing is accomplished according to specifications, the reader is turned back on.

```
 SRU       0.576 UNTS.
```

```
LNH
00100 PROGRAM DEMO(INPUT,OUTPUT)
00105 DIMENSION II(5)
00110 READ 10, (II(J),J=1,5)
00115 10 FORMAT(5I5)
00120 DO 1 I=1,5
00125 II(I)=II(I)+4444
00130 1 CONTINUE
00135 PRINT 20, (II(J),J=1,5)
00140 20 FORMAT(5I10)
00145 END
```

After the LNH command is read from tape, the tape reader is turned off. Then IAF lists the primary file which contains the above modifications in resequenced format. When the listing is completed, the reader is turned on again.

```
RNH

? 1111122222333334444455555
```

After the RNH command is read in, the reader is turned off, and the modified program is executed. IAF prints the ? and then turns the reader on. The line of data is read in from the tape and the reader turned off. The data is processed and results printed.

```
     15555      26666      37777      48888      59999
END

SRU      1.185 UNTS.
 RUN COMPLETE

REPLACE,DEMO=TAPE1
```

This last command is read in and the reader turned off. A copy of this revised version of DEMO replaces the old one that was made an indirect access permanent file under the name TAPE1. It is now the indirect access permanent file that is referenced by the name TAPE1.

The reader is turned back on. It runs through the trailer of rubouts and then turns itself off.

If, at this point, the user has no more tapes to run, he should exit tape mode by entering the TRMDEF,IN=KB command.

CHARACTER SETS AND CODE SETS A

INTRODUCTION

A character set is composed of graphic characters and/or control characters. A code set is composed of the codes that represent each character within a character set.

A graphic character may be displayed at a terminal or printed by a line printer. Examples are the characters A through Z and the digits 1 through 9. A control character initiates, modifies, or stops a control operation. An example is the backspace character that moves the terminal carriage or cursor back one space. Although a control character is not a graphic character, a terminal may produce a graphic representation when it receives a control character.

All references within this manual to the ASCII character set or the ASCII code set refer to the character set and code set defined in the American National Standard Code for Information Interchange (ASCII, ANSI Standard X3.4-1977). References in this manual to the ASCII character set refer to the characters defined by ASCII; references are not necessarily to the coded representations of these characters.

CHARACTER SETS

NOS supports the following character sets.

- ASCII graphic 64- or 63-character set.
- ASCII 128-character set.
- ASCII graphic 95-character set.
- CDC graphic 64- or 63-character set.

The first two sets are of most importance to the time-sharing user. The last two sets are used only in batch operations. The user selects the ASCII graphic 64- or 63-character set with the NORMAL command and the 128-character set with the ASCII command. (The CSET command can also be used to select the character set.) The 64- or 63-character set is assumed unless the user specifies otherwise.

Each site selects either the 64-character set or the 63-character set. The differences between the two are described under Character Set Anomalies in this appendix. Any further reference to the 64-character set implies either the 63- or 64-character set unless otherwise stated.

CODE SETS

NOS supports the following code sets.

- Display code.
- 6/12 display code.
- 12-bit ASCII code.

Display code is a set of 6-bit codes from 00_8 to 77_8.

The 6/12 display code is a combination of 6-bit codes and 12-bit codes. The 6-bit codes are 00_8 through 77_8, excluding 74_8 and 76_8 (refer to Character Set Anomalies for the interpretation of the 00_8 and 63_8 codes). The 12-bit codes begin with either 74_8 or 76_8 and are followed by a 6-bit code. Thus, 74_8 and 76_8 are considered escape codes and are never used as 6-bit codes within the 6/12 display code set. The 12-bit codes are 7401, 7402, 7404, 7407, and 7601_8 through 7677_8. All other 12-bit codes ($74xx_8$ and 7600_8) are undefined.

The 12-bit ASCII code is the ASCII 7-bit code (as defined by ANSI Standard X3.4-1977) right-justified in a 12-bit byte. Assuming that the bits are numbered from the right starting with 0, bits 0 through 6 contain the ASCII code, bits 7 through 10 contain zeros, and bit 11 distinguishes the 12-bit ASCII 0000_8 code from the end-of-line byte. The 12-bit codes are 0001_8 through 0177_8 and 4000_8.

CHARACTER SET ANOMALIES

When an installation selects the 63-character set rather than the 64-character set, NOS interprets two codes differently. The codes are for the colon and percent graphic characters. Tables A-1 and A-2 show the codes for both 63- and 64-character sets. The codes for the colon and percent graphic characters in the 64-character set are unshaded. The codes for the colon and percent graphic characters in the 63-character set are shaded.

When in time-sharing ASCII mode at a 64-character set site, the colon is translated to 6/12 display code 7404_8 on input; on output, the occurrence of the 7404_8 code results in the printing of a colon. The 6/12 display code 00 is not defined on input; however, the occurrence of the 6/12 display code 00 on output at a 64-character set site results in the printing of a colon (the colon is always 63_8 on input and output at a 63-character set site).

When using either the 63- or 64-character set, the use of undefined 6/12 display codes in output files produces unpredictable results and should be avoided. Also, two 00_8 codes may be confused with an end-of-line byte and should be avoided.

CHARACTER SET TABLES

Table A-1 shows the character sets and code sets available to an ASCII code terminal user. The user selects the ASCII graphic 64-character set with the NORMAL command. The characters available in normal mode are listed in the column labeled ASCII Graphic (64 Char). The coded representations for the characters are listed in the column labeled Display Code.

The user selects the ASCII 128-character set with the ASCII command. The characters available in ASCII mode are listed in the column labeled ASCII Character (128 Char). The coded representations for these characters are listed in the column labeled 6/12 Display Code.

The character set tables are designed so that the user can find the character represented by a code (such as in a dump) or find the code that represents a character. To find the character represented by a code, the user looks up the code in the column listing the appropriate code set and then finds the character on the line in the column listing the appropriate character set. To find the code that represents a character, the user looks up the character and then finds the code on the same line in the appropriate column.

The time-sharing user can convert a 6/12 display code file to a 12-bit ASCII code file using the batch control statement FCOPY (refer to the NOS Reference Manual, volume 1). The resulting 12-bit ASCII file can be routed to a line printer but cannot be output at a time-sharing terminal.

Table A-2 gives the octal and hexadecimal ASCII codes for characters. This is useful for commands such as TRMDEF which can specify a character in either octal or hexadecimal ASCII code.

TABLE A-1. TIME-SHARING CHARACTER SETS

ASCII Graphic (64 Char)	ASCII Character (128 Char)	Display Code	6/12 Display Code	12-Bit ASCII Code	ASCII Graphic (64 Char)	ASCII Character (128 Char)	Display Code	6/12 Display Code	12-Bit ASCII Code
: colon †		00†			# num. sign	# num. sign	60	60	0043
Display code 00 is undefined at sites using the 63-character set.					[l. bracket	[l. bracket	61	61	0133
					] r. bracket	] r. bracket	62	62	0135
A	A	01	01	0101	% †	% †	63†	63†	0045
B	B	02	02	0102	: colon	: colon	63	63	0072
C	C	03	03	0103	" quote	" quote	64	64	0042
D	D	04	04	0104	_ underline	_ underline	65	65	0137
E	E	05	05	0105	!	!	66	66	0041
F	F	06	06	0106	& ampersand	& ampersand	67	67	0046
G	G	07	07	0107					
					' apostrophe	' apostrophe	70	70	0047
					?	?	71	71	0077
H	H	10	10	0110	<	<	72	72	0074
I	I	11	11	0111	>	>	73	73	0076
J	J	12	12	0112	@		74		
K	K	13	13	0113	\ rev. slant	\ rev. slant	75	75	0134
L	L	14	14	0114	^ circumflex		76		
M	M	15	15	0115	; semicolon	; semicolon	77	77	0073
N	N	16	16	0116					
O	O	17	17	0117		@		7401	0100
						^ circumflex		7402	0136
						: colon †		7404†	0072
P	P	20	20	0120		%		7404	0045
Q	Q	21	21	0121		` grave accent		7407	0140
R	R	22	22	0122					
S	S	23	23	0123		a		7601	0141
T	T	24	24	0124		b		7602	0142
U	U	25	25	0125		c		7603	0143
V	V	26	26	0126		d		7604	0144
W	W	27	27	0127		e		7605	0145
						f		7606	0146
X	X	30	30	0130		g		7607	0147
Y	Y	31	31	0131					
Z	Z	32	32	0132		h		7610	0150
0	0	33	33	0060		i		7611	0151
1	1	34	34	0061		j		7612	0152
2	2	35	35	0062		k		7613	0153
3	3	36	36	0063		l		7614	0154
4	4	37	37	0064		m		7615	0155
						n		7616	0156
						o		7617	0157
5	5	40	40	0065					
6	6	41	41	0066		p		7620	0160
7	7	42	42	0067		q		7621	0161
8	8	43	43	0070		r		7622	0162
9	9	44	44	0071		s		7623	0163
+	+	45	45	0053		t		7624	0164
-	-	46	46	0055		u		7625	0165
*	*	47	47	0052		v		7626	0166
						w		7627	0167
/	/	50	50	0057		x		7630	0170
(	(	51	51	0050		y		7631	0171
)	)	52	52	0051		z		7632	0172
$	$	53	53	0044		{ left brace		7633	0173
=	=	54	54	0075		| vert. line		7634	0174
space	space	55	55	0040		} right brace		7635	0175
, comma	, comma	56	56	0054		~ tilde		7636	0176
. period	. period	57	57	0056		DEL		7637	0177

† The interpretation of this character or code may depend on its context. Refer to Character Set Anomalies elsewhere in this appendix.

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TABLE A-1. TIME-SHARING CHARACTER SETS (Contd)

ASCII Graphic (64 Char)	ASCII Character (128 Char)	Display Code	6/12 Display Code	12-Bit ASCII Code	ASCII Graphic (64 Char)	ASCII Character (128 Char)	Display Code	6/12 Display Code	12-Bit ASCII Code
	NUL		7640	4000		DLE		7660	0020
	SOH		7641	0001		DC1		7661	0021
	STX		7642	0002		DC2		7662	0022
	ETX		7643	0003		DC3		7663	0023
	EOT		7644	0004		DC4		7664	0024
	ENQ		7645	0005		NAK		7665	0025
	ACK		7646	0006		SYN		7666	0026
	BEL		7647	0007		ETB		7667	0027
	BS		7650	0010		CAN		7670	0030
	HT		7651	0011		EM		7671	0031
	LF		7652	0012		SUB		7672	0032
	VT		7653	0013		ESC		7673	0033
	FF		7654	0014		FS		7674	0034
	CR		7655	0015		GS		7675	0035
	SO		7656	0016		RS		7676	0036
	SI		7657	0017		US		7677	0037

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TABLE A-2. ASCII TO 6/12 DISPLAY CODE CONVERSION

ASCII Character (128 Char)	12-Bit ASCII Code Octal	Hex	6/12 Display Code	ASCII Character (128 Char)	12-Bit ASCII Code Octal	Hex	6/12 Display Code
NUL	4000	00	7640	0	0060	30	33
SOH	0001	01	7641	1	0061	31	34
STX	0002	02	7642	2	0062	32	35
ETX	0003	03	7643	3	0063	33	36
EOT	0004	04	7644	4	0064	34	37
ENQ	0005	05	7645	5	0065	35	40
ACK	0006	06	7646	6	0066	36	41
BEL	0007	07	7647	7	0067	37	42
BS	0010	08	7650	8	0070	38	43
HT	0011	09	7651	9	0071	39	44
LF	0012	0A	7652	: colon †	0072	3A	7404 †
VT	0013	0B	7653	: colon	0072	3A	63
FF	0014	0C	7654	; semicolon	0073	3B	77
CR	0015	0D	7655	<	0074	3C	72
SO	0016	0E	7656	=	0075	3D	54
SI	0017	0F	7657	>	0076	3E	73
				?	0077	3F	71
DLE	0020	10	7660				
DC1	0021	11	7661	@	0100	40	7401
DC2	0022	12	7662	A	0101	41	01
DC3	0023	13	7663	B	0102	42	02
DC4	0024	14	7664	C	0103	43	03
NAK	0025	15	7665	D	0104	44	04
SYN	0026	16	7666	E	0105	45	05
ETB	0027	17	7667	F	0106	46	06
				G	0107	47	07
CAN	0030	18	7670				
EM	0031	19	7671	H	0110	48	10
SUB	0032	1A	7672	I	0111	49	11
ESC	0033	1B	7673	J	0112	4A	12
FS	0034	1C	7674	K	0113	4B	13
GS	0035	1D	7675	L	0114	4C	14
RS	0036	1E	7676	M	0115	4D	15
US	0037	1F	7677	N	0116	4E	16
				O	0117	4F	17
space	0040	20	55				
!	0041	21	66	P	0120	50	20
" quote	0042	22	64	Q	0121	51	21
# number sign	0043	23	60	R	0122	52	22
$	0044	24	53	S	0123	53	23
% †	0045	25	63 †	T	0124	54	24
%	0045	25	7404	U	0125	55	25
& ampersand	0046	26	67	V	0126	56	26
' apostrophe	0047	27	70	W	0127	57	27
(	0050	28	51	X	0130	58	30
)	0051	29	52	Y	0131	59	31
*	0052	2A	47	Z	0132	5A	32
+	0053	2B	45	[left bracket	0133	5B	61
, comma	0054	2C	56	\ reverse slant	0134	5C	75
-	0055	2D	46	] right bracket	0135	5D	62
. period	0056	2E	57	^ circumflex	0136	5E	7402
/	0057	2F	50	_ underline	0137	5F	65

† The interpretation of this character or code may depend on its context. Refer to Character Set Anomalies elsewhere in this appendix.

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TABLE A-2. ASCII TO 6/12 DISPLAY CODE CONVERSION (Contd)

ASCII Character (128 Char)	12-Bit ASCII Code		6/12 Display Code	ASCII Character (128 Char)	12-Bit ASCII Code		6/12 Display Code
	Octal	Hex			Octal	Hex	
` grave accent	0140	60	7407	p	0160	70	7620
a	0141	61	7601	q	0161	71	7621
b	0142	62	7602	r	0162	72	7622
c	0143	63	7603	s	0163	73	7623
d	0144	64	7604	t	0164	74	7624
e	0145	65	7605	u	0165	75	7625
f	0146	66	7606	v	0166	76	7626
g	0147	67	7607	w	0167	77	7627
h	0150	68	7610	x	0170	78	7630
i	0151	69	7611	y	0171	79	7631
j	0152	6A	7612	z	0172	7A	7632
k	0153	6B	7613	{ left brace	0173	7B	7633
l	0154	6C	7614	| vertical line	0174	7C	7634
m	0155	6D	7615	} right brace	0175	7D	7635
n	0156	6E	7616	~ tilde	0176	7E	7636
o	0157	6F	7617	DEL	0177	7F	7637

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PREVIOUS TIME-SHARING CHARACTER SETS

Character sets other than those already described in this appendix were used with previous time-sharing systems. The user can convert files from one character set to another using the CONVERT command.

The format of the command is

CONVERT,p_1,p_2,...,p_n

p_i can be any of the following in any order.

p_i	Description
P=lfn_1	Input on file lfn_1; if omitted, the file named OLD is assumed.
N=lfn_2	Output on file lfn_2; if omitted, the file named NEW is assumed.
RS=n	Maximum record size in characters, where n is 1 to 500. If omitted, assumed maximum record size is 300 characters.
64	Converts 63-character set to 64-character set. If omitted, no 63- or 64-character set conversion takes place (TS must be specified if 64 is not).
TS=t	Converts old time-sharing record (61-character set) to new time-sharing record (63- or 64-character set)†. t may be one of the following terminal types.

t	Terminal Type
TTY† †	ASCII code terminal with standard print
COR† †	Correspondence code terminal with standard print
CORAPL† †	Correspondence code terminal with APL print
MEMAPL† †	Memorex 1240 (ASCII code) terminal with APL print
BLKEDT† †	Block transmission (ASCII code) terminal with standard print
NAMIAF	Virtual network terminal

If t is omitted, it is assumed to be TTY. If TS is omitted, no time-sharing conversion takes place (64 must be specified if TS is not).

† Old time-sharing character set refers to the 61-character set used by preceding systems (for example, early versions of KRONOS 2.1).

† † These parameters are provided for compatability with previous time-sharing systems.

Pj	Description
R	Rewinds input and output files prior to processing. If omitted, no rewinding occurs.
RC=n	Converts n decimal records. If n is omitted, convert to EOF. If RC is omitted, converts one record.
NM	Used in conjunction with TS parameter and specifies that conversion is to normal mode; if omitted, conversion is to ASCII mode. Conversion has the indicated effect on the following characters.
	^ (circumflex) — If TS is specified, display code 70 (circumflex character) is converted to 76. If NM is omitted, conversion s to 7402 (ASCII mode).
	:(colon) — If TS and 64 are specified, display code 63 (colon character) is converted to 00. If NM is omitted, conversion is to 7404 (ASCII mode).

The following conversions are possible as indicated by the legal choice of parameters:

Type of Record	Legal Conversion
63-character set, non-time-sharing record	64
Old time-sharing record	TS or 64 and TS
New normal time-sharing record	64
New ASCII time-sharing record	None

CONVERT command error messages are listed in appendix B.

CENTRAL MEMORY CHARACTER EQUIVALENTS FOR DATA INPUT

The manner in which characters entered from the terminal are interpreted by the system depends on whether the user has specified that the characters belong to the full ASCII set (refer to the ASCII command in section 4). For example, if the user enters the following characters:

aAbBcCdDeE

to be mapped into the full ASCII set (128 characters recognized), the central memory equivalent (in display code) is

59	53	47	41	35	29	23	17	11	5	0 ← Bit position (60-bit central memory word)
76	01	01	76	02	02	76	03	03	76	
04	04	76	05	05	55	00	00	00	00	

However, if the characters are mapped into the subset of the ASCII character set used during normal operation (64 characters recognized), the central memory equivalent (in display code) is

59	53	47	41	35	29	23	17	11	5	0
01	01	02	02	03	03	04	04	05	05	

Characters entered under transparent input mode (refer to the DL and IN terminal definition parameters in appendix F) are not translated into display code. It makes no difference if the ASCII command is in effect (128 characters recognized) or if the characters are entered during normal operation (64 characters recognized). However, the system weights each 8-bit character by 4000_8 and places a 0007_8 control byte at the beginning of the data. The parity selection (parity switch on the terminal and the PA terminal definition parameter) also has an effect on transparent input. If parity (PA) is set to even or odd, the network checks 8 bits of each character entered for parity (performing error processing, if needed) and sets the eighth bit to zero before sending the data to IAF. If PA is set to zero, the network automatically sets the eighth bit to zero without checking parity. If PA is set to none, all 8 bits are sent to IAF exactly as entered.

For example, if the user of an ASCII code terminal with the parity switch set to even and PA set to even enters the following characters in transparent input mode

aAbBcCdDeE

the central memory equivalent is

59	47	35	23	11	0
0007	4141	4101	4142	4102	
4143	4103	4144	4104	4145	
4105	0000	0000	0000	0000	

The characters illustrated are entered from an ASCII code terminal, although any other supported terminal code can also be used.

TERMINAL MESSAGES B

This appendix contains an alphabetical listing of messages of importance to the IAF user. (A list of dayfile messages can be found in appendix B of the NOS Reference Manual, volume 1.) Each message is followed by an explanation of the message and/or the circumstances causing it to be issued, the recommended action, and the routine which issued the message.

Lowercase letters are used within a message to identify variable fields. All messages beginning with lowercase (variable) fields follow those beginning with A through Z. These messages are then alphabetized according to the first nonvariable field.

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
APPLICATION FAILED.	The application has ceased functioning and the user can no longer access it.	Access another application or log off and try later.	NETVAL
APPLICATION NOT PRESENT.	The requested application is currently not available for use.	Enter the name of another application or log off and try later.	NETVAL
APPLICATION RETRY LIMIT.	Four unsuccessful attempts were made to enter a legal application name, after which the terminal was disconnected.	Ensure the accuracy of the entry. If problems persist, contact installation personnel.	NETVAL
ARGUMENT ERROR.	A control statement is syntactically incorrect. Refer to the appropriate control statement or command for further information. When the system processes tape management statements, it issues this message if both ring enforcement options (PO=R and PO=W) or more than one EOT option (PO=I, PO=P, and PO=S) is specified. Also, specification of duplicate parameters (more than one occurrence of a keyword) or multiple equivalent parameters (such as MT/NT, CB/CK, FI/L, R/W, and so forth) is not allowed on tape assignment control statements. The address parameter on DMPECS, DMDECS, LBC, LOC, PBC, or WBR must be numeric.	Recheck parameters.	CONVERT, COPY, COPYBR, COPYBF, COPYEI, COPYX, CPMEM, LO72, RESEX, TCOPY, UPMOD
BUFFER ARG. ERROR.	CM address in call is not less than the field length minus the word count; buffer extends past the job's field length.	Verify that operation does not reference address beyond end of buffer or job's field length.	TCS
CATALOG OVERFLOW - FILES, AT addr.	The number of files in the user's catalog exceeds his limit.	One or more permanent files must be purged in order to save or define additional files.	PFM

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
CATALOG OVERFLOW - SIZE AT addr.	The cumulative size of the indirect access files in the user's catalog exceeds his limit.	One or more indirect access files must be purged or shortened to allow additional permanent file space.	PFM
CCL100-SEPARATOR FOLLOWING VERB MUST BE COMMA OR LEFT PARENTHESIS	Fatal user error. Separator following verb in a CCL statement must be a comma or a left parenthesis.	Change separator following verb to a comma or a left parenthesis.	CCL
CCL101-LAST NON-BLANK CHARACTER MUST BE SEPARATOR	Fatal user error. Last character string of card or line was not followed by a separator or a terminator.	To terminate statement, make last nonblank character a period or right parenthesis. To continue statement on next card or line, make last nonblank character a valid separator.	CCL
CCL103-STATEMENT INCOMPLETE	Fatal user error. A terminator was detected immediately following a verb.	Check statement format (refer to section 4 of NOS Reference Manual, volume 1) and rewrite statement, using a comma or left parenthesis after verb.	CCL
CCL200-PROCEDURE NESTING LEVEL xx EXCEEDED	Fatal user error. Current procedure call forced procedure nesting to exceed limit of xx, which is defined by installation.	Reposition procedure call statements so limit xx is not exceeded.	CCL
CCL201-PROCEDURE NAME MORE THAN 7 CHARACTERS	Fatal user error. Procedure name cannot be greater than 7 characters.	Rename procedure.	CCL
CCL203-PROCEDURE FILE NAME NOT SPECIFIED OR INVALID	Fatal user error with following causes. - File name specified on BEGIN statement was greater than 40 characters. - pfile parameter on BEGIN statement was null, indicating default file name. CCL was installed with default file flag turned off; no default file name is allowed.	- Specify a file name with 40 or fewer characters. - Specify a file name.	CCL

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
CCL204-MULTIPLE EQUIVALENCE SPECIFICATIONS FOR xx	Nonfatal user error. A format keyword has been specified more than once on procedure call statement. Last definition prevails.	If first specification is desired, remove second specification. If second specification is desired, no action is required.	CCL
CCL205-FORMAL PARAMETER LIST DOES NOT INCLUDE -x	Fatal user error. While in equivalence mode, CCL discovered a formal keyword x on procedure call statement that was not specified on header statement.	Remove formal keyword x from procedure call statement.	CCL
CCL206-SYMBOLIC SPECIFICATION INVALID xxx+	Fatal user error. A parameter, xxx, on procedure call statement is followed by a plus sign. Plus sign indicates that CCL is to convert value to display code, and is valid only when preceded by a symbolic name and followed by a D, B, or a null field. (Example: R1+B is a legal value, but 37+R1 is not.)	If plus sign is part of a character string, $-delimit character string. If plus sign should convert a symbolic name to display code, replace xxx with a valid symbolic name. Refer to section 4 of NOS Reference Manual, volume 1 for a list of valid symbolic names.	CCL
CCL207-PROCEDURE NAMED BEGIN IS INVALID	Fatal user error. A procedure must not be named BEGIN.	Select another procedure name.	CCL
CCL211-SPECIFICATION EXCEEDS xx CHARACTERS	Fatal user error. Value on a procedure call statement or default value on a procedure header statement is greater than xx characters. xx is defined by installation.	Specify a value with xx or fewer characters.	CCL
CCL212-SEPARATOR INVALID strng s	Fatal user error. s is illegal separator and strng is character string that precedes s. Any of following conditions produces this error. - On a procedure call statement, the separator preceding a formal keyword or a positionally specified value is not a comma. - Invalid separator is part of a character string. If a valid separator immediately precedes illegal separator s, the string is null. - #DATA or #FILE has been specified on the procedure call statement.	- Change separator s to a comma. - $-delimit character string. - Remove #DATA or #FILE from procedure call statement and specify on procedure header statement.	CCL

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
CCL230-PROCEDURE FILE NOT FOUND	Fatal user error. No local file was found with file name indicated on BEGIN statement. Automatic retrieval of a permanent file with that name was inhibited.	Check file name for errors and correct. If name is correct, retrieve file prior to BEGIN statement.	CCL
CCL231-PROCEDURE NOT FOUND	Fatal user error. Local or permanent file indicated on BEGIN statement was found, but CCL could not find procedure on the file.	Check procedure name for errors and correct. If name is correct, check file for procedure.	CCL
CCL235-FORMAL PARAMETER GT xx CHARACTERS	Fatal user error. Number of characters in a formal keyword on header statement exceeds xx, as defined by installation.	Define a formal keyword with xx or fewer characters.	CCL
CCL237-SEPARATOR FOLLOWING SECOND DEFAULT IS */*	Fatal user error. In form fk=default1/ default2/ on procedure header statement, second / is illegal.	If / is part of default2, $-delimit character string. If not, either remove it or replace it with a comma or period.	CCL
CCL238-FORMAL PARAMETER LIMIT xx EXCEEDED	Fatal user error. Number of formal parameters on procedure header statement has exceeded xx, as defined by installation.	Remove formal parameters from procedure header statement until xx or fewer parameters remain.	CCL
CCL239-PROCEDURE HEADER NOT TERMINATED	Fatal user error. Procedure header statement was not terminated by a period, and no control statements were found after header statement.	Terminate header statement with a period, and add at least one control statement to procedure.	CCL

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
CCL252-PROCEDURE CONTAINS NO CONTROL STATEMENTS	Informative message. A procedure should contain at least one control statement.	None.	CCL
CHARGE ABORTED.	Dayfile message indicating that a central site operator action caused the CHARGE operation to abnormally terminate.	Reenter CHARGE statement.	CHARGE
CHARGE FILE BUSY.	Dayfile message indicating that the file which the system uses to validate charge numbers and project numbers is busy.	Reenter CHARGE statement.	CHARGE
CHARGE ILLEGAL AT THIS HOUR.	Dayfile message indicating that the specified project number cannot be used at this time of day.	Retry during the time the project number is valid.	CHARGE
CHARGE NUMBER EXPIRED.	Dayfile and output file message indicating the charge number expiration date has occurred.	None.	CHARGE
CHARGE NUMBER REQUIRED.	Charge number and project number are required to complete login sequence.	Enter CHARGE command with appropriate charge and project numbers.	CHARGE
COMMAND NOT UNIQUE.	The characters entered do not uniquely specify a command.	Ensure accuracy of entry. Enter a sufficient number of characters to specify a unique command.	IAFEX
COMMAND TOO LONG.	A command longer than 80 characters was entered.	Reenter using a shorter version of the command.	IAFEX
CONFLICTING PARAMETERS.	Input queue type entered more than once.	Reenter with correct parameters.	SUBMIT
CONNECTION PROHIBITED, TRY LATER.	The network is configured so that only one user with a given user name and family name can access the requested application at one time.	Request a different application or log off and try later.	NETVAL

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
CONNECTION REJECTED.	The requested application is already servicing the maximum number of terminals.	Request a different application or log off and try later.	NETVAL
CONTROL STATEMENT LIMIT.	The user has entered too many control statements.	Reduce the number of control statements to a value within the specified limit. Refer to LIMITS command.	TCS
CONVERSION NOT FOUND.	The specified TS conversion table was not found.	Refer to description of CONVERT command for valid TS options.	CONVERT
CONVERSION NOT SPECIFIED.	Neither the TS nor 64 parameter was specified on the CONVERT control statement.	Correct error and retry.	CONVERT
CUMULATIVE LIMIT EXCEEDED.	Dayfile and output file message indicating that one of the installation-defined resource usage accumulators for this project exceeded the maximum allowed. The system does not update these accumulators in PROFILa. Each installation must provide this capability if desired.	None.	CHARGE
CUMULATIVE SRU LIMIT EXCEEDED.	Dayfile and output file message indicating that accumulated SRUs have exceeded the maximum allowed.	None.	CHARGE
DATA BASE ERROR.	Dayfile message indicating that the system has detected an error in its validation file.	Contact installation personnel.	CHARGE, MODVAL
-DEBUG-GARBAGE IN ZZZZZDS FILE.	File ZZZZZDS contains information other than the suspended job of the current session. Retrieval of debug information from session is impossible.	Return file ZZZZZDS and restart debug session.	DEBUG

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
DEBUG-ILLEGAL PARAMETER-p.	User specified an illegal parameter on DEBUG command. The three parameters allowed are ON, OFF, or RESUME.	Reenter DEBUG command with correct parameter.	DEBUG
DEBUG-ONLY ONE PARAMETER ALLOWED.	User entered more than one parameter on the DEBUG command.	Reenter DEBUG command with correct parameter.	DEBUG
-DEBUG-ZZZZZDS FILE NOT FOUND.	User did not suspend the debug session during the current terminal session. Refer to the SUSPEND command (CYBER Interactive Debug Version 1 Reference Manual).	Restart debug session.	DEBUG
DEVICE UNAVAILABLE, AT addr.	Access to the permanent file device requested is not possible. User may have attempted to access files on a device not present in the alternate system.	Determine that device can be made available by system operator and retry.	PFM
DIRECT ACCESS DEVICE ERROR, AT addr.	The file specified already exists on a device other than the device requested or an illegal device type was specified. The device on which the file resides may not contain direct access files because of one of the following reasons. - The device is not specified as a direct access device in the catalog descriptor table. - The device is not specified as ON and initialized in the catalog descriptor table. - The device is a dedicated indirect access permanent file device. If on an alternate system, the user's master device may not have been transferred to that system.	Specify correct device type.	PFM
EMPTY CATALOG.	No entries are present in the catalog.	None.	CATLIST, NDA

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
EOF ENCOUNTERED BEFORE TERMINATION.	An end-of-file was encountered on a CONVERT input file before the specified record count was reached.	Ensure accuracy of input file.	CONVERT
EOI ENCOUNTERED BEFORE TERMINATION.	An end-of-information was encountered on a CONVERT input file before the specified record count was reached.	Ensure accuracy of input file.	CONVERT
ERR..	While entering a terminal definition command, the user made a format error or entered a command which is invalid for his terminal type or not supported at his installation.	Correct format. If format is correct, check validity of command for this terminal type.	CCP
ERROR IN ARGUMENT.	One of the following. - The pfn is blank or fn = lfn. - The user specified no arguments or a blank argument. - The user specified too many files. - The user entered an illegal parameter.	Reenter the command or control statement with correct parameters.	PFILES
ERROR IN FILE CATEGORY.	The user specified an illegal file category.	Refer to description of file categories for valid entry.	PFILES, PURGALL
ERROR IN LIMITS ARGUMENT.	Dayfile message indicating that parameters were included on the LIMITS statement.	Enter LIMITS. without additional parameters.	MODVAL
ERROR IN MODE.	Permanent file mode specified was not recognized.	Refer to description of permanent file modes for valid entry.	PFILES
ERROR IN PASSWOR ARGUMENTS.	PASSWOR control statement or command parameters are incorrect.	Correct control statement or command and reenter.	PASSWOR, MODVAL

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
ERROR IN TRMDEF ARGUMENT.	One or more parameters specified in the TRMDEF command/statement were in error.	Ensure that parameters are in correct format and new values are legal.	TRMDEF
EXCHANGE PACKAGE/MEMORY DUMP ON FILE ZZZDUMP.	The exchange package and memory dump is written on local file ZZZDUMP because the job is of time-sharing origin and file OUTPUT is assigned to a terminal.	To examine the exchange package and dump, list file ZZZDUMP.	CPMEM
EXECUTE ONLY FILE.	The permanent file accessed can only be executed and cannot be read, written, or listed.	Ensure accuracy of entry.	IAFEX
FILE NAME CONFLICT.	Either the user tried to process two files having the same name or he specified a reserved file name.	Correct the control statement so all files have a unique name.	CONVERT, FCOPY, TCOPY, COPY, VERIFY, LIBGEN, UPMOD
FILE NAME ERROR.	File name contains illegal characters or contains more than seven characters.	Ensure that legal file name is specified.	LFM, LIBGEN, LISTLB
FILE NAME ERROR, AT addr.	File name contains illegal characters.	Verify that file name contains only valid characters.	PFM
FILE NAME MISSING.	A file name must be specified before a listing containing the permit information can be obtained with a CATLIST command.	Specify file name with FN parameter.	CATLIST
FILE NOT SORTED.	Primary file has one or more lines without line numbers.	Enter PACK or NOSORT command or use SORT command to obtain more detailed diagnostics.	IAFEX

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
FILE TOO LONG, AT addr.	The local file specified for a SAVE, REPLACE, or APPEND command exceeds the length allowed or the direct access file specified for an ATTACH operation in WRITE, MODIFY, or APPEND mode exceeds the direct access file length limit for which the user is validated.	Reduce length of file or save as a direct access file.	PFM
FILE TOO LONG TO SORT.	Primary file is too long to be sorted automatically.	Enter SORT command to obtain more detailed diagnostics.	IAFEX
FL TOO SHORT FOR PROGRAM.	The user's field length is too short for the program.	Rerun the job with larger field length specification.	TCS, IAJ
FR INVALID FOR THIS OPTION.	User entered a string parameter with the I option.	Reenter DAYFILE command with correct parameter.	DAYFILE
FROM LOP...message	The message was sent by the local operator.	If necessary, the user can respond using the MS command.	CS
ILLEGAL APPLICATION, TRY AGAIN.	The requested application is unknown or unavailable to the user.	Ensure the accuracy of the entry. If problems persist, contact installation personnel concerning validations.	NETVAL
ILLEGAL CHARGE.	Dayfile and output file message indicating one of the following. - The charge or project number does not exist. - The project number is not available to a user with this user number. - The charge or project number exists but is inactive.	Check to see that charge and project numbers are correct and reenter.	CHARGE

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
ILLEGAL COMMAND.	The user entered an illegal command or a command he was not validated to use.	Correct command and reenter.	IAFEX
ILLEGAL CONTROL CARD.	One of the following has occurred. - The control statement could not be identified. - The USER control statement does not have a user number specified. - An invalid parameter was specified or no terminator was detected. - The user included too many parameters on the program call statement (such as LGO). - The user submitted a control statement that he was not validated to use (for example, the use of PASSWOR by user not validated to change password). - The user submitted a control statement that is illegal for a particular job type or file type (for example, the use of a FAMILY statement in a nonsystem origin job).	Ensure accuracy and/or suitability of control statement.	TCS, CHARGE, CONFIG, MODVAL, RESEX, EXU, PASSWOR, 026
ILLEGAL DEVICE REQUEST.	The auxiliary device specified by the PN (pack name) parameter does not match the device type specified by the R (residency) parameter, or the number of units specified by the R parameter does not agree with the actual number of units available for that device type.	Ensure that devices specified by PN and R parameters are of same type, or number of units specified matches number of units available.	PFM
ILLEGAL JOB ORIGIN TYPE FOR TRMDEF.	The TRMDEF control statement was entered from a job that was not of time-sharing origin.	Retry from a time-sharing origin job.	TRMDEF
ILLEGAL LIST OPTION.	The list option specified in a CATLIST command is illegal.	Refer to description of CATLIST command for valid list options.	CATLIST
ILLEGAL PARAMETER.	One of the following. - Parameter value is outside legal bounds. - The user specified a parameter that cannot be included on the command or control statement. - Command/control statement is invalid.	Ensure accuracy of command/control statement.	IAFEX, LISTLB, CATLIST

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
ILLEGAL PASSWORD.	One of the following. - The password entered is greater than seven characters or contains an invalid character. - In the PASSWOR command either an incorrect old password was specified or the new password was unacceptable. - In the MODVAL control statement (for a create or update run) the password for a new user contained fewer characters than the minimum length required by the site. If entered from a K display, the line of input is ignored; otherwise, that particular user number is disregarded.	Correct error and retry.	PASSWOR, MODVAL, PFILES
ILLEGAL QUEUE SPECIFIED.	Queue type specified is illegal.	Retry with valid queue type.	SUBMIT
ILLEGAL TERMINAL CLASS CHANGE ATTEMPTED.	The TC parameter in the TRMDEF command/ statement requested a terminal class that was illegal for the terminal being used.	Change TC parameter value to a value acceptable for the terminal.	TRMDEF
ILLEGAL TERMINAL TYPE FOR TRMDEF.	The TRMDEF command/statement was entered from a terminal that was not a network terminal.	Retry from a network terminal.	TRMDEF
ILLEGAL USER.	Four unsuccessful attempts at login were made after which the terminal was disconnected from the system.	Obtain accurate login information before attempting to log in. Inform site analyst if problem persists.	NETVAL
ILLEGAL USER ACCESS.	The user tried to perform an operation for which he is not validated. Possible causes include attempts to - run a system origin job from nonsystem origin - access a restricted subsystem without proper validation	Ensure accuracy of control statement or determine proper validation requirements via LIMITS statement.	LFM, NETVAL, QFSP, RESEX, IMA

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
	- enter an invalid SRU value - use the V carriage control character without validation		
ILLEGAL USER ACCESS, AT addr.	The user is not validated to create direct access or indirect access files or to access auxiliary devices.	Contact installation personnel concerning validations.	PFM
ILLEGAL USER ACCESS - CONTACT SITE OPR.	The security count for the user number specified has been decremented to zero. Therefore, the user is denied all access to the operating system until the operator resets the security count.	Inform site operator.	CPM, NETVAL, IAJ, ILS
IMPROPER LOGIN, TRY AGAIN.	The family name, user number, or password is not acceptable as entered.	Ensure accuracy of entries and/or accuracy of information.	NETVAL
INCORRECTLY FORMATTED DATA.	A terminal definition parameter specified on the TRMDEF command or via the 0016 control byte was not correct.	Ensure accuracy of entry and retry.	IAFEX
INPUT RESUMED.	The system overload condition has cleared.	Resume terminal input.	CCP
INPUT STOPPED message.	Because of a system overload condition, the network cannot accept terminal input. The message field is an installation-defined text string.	Wait until the message INPUT RESUMED is issued before proceeding.	CCP
INVALID ENTRY, TRY AGAIN	The user entered incorrect characters.	Enter correct characters.	IAFEX
INVALID TERMINAL NUMBER.	The terminal number entered by the user during an attempted recovery contained a format error or size error.	Retry using corrected terminal number.	IAFEX

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
JOB ACTIVE.	The system is unable to process the command because the previous command has not completed.	Retry when current operation is complete.	IAFEX
JOB STEP EXCEEDS ACCOUNT BLOCK.	The user tried to set his job step limit to a value greater than his account block limit or tried to set his account block limit to a value less than his job step limit.	Check values on SETJSL and SETASL statements.	CPM
LINE NUMBER LIMIT EXCEEDED.	The line number encountered or required during a resequencing (RESEQ) operation exceeded 99999.	Examine program and correct line number in error.	RESEQ
LOCAL FILE LIMIT.	The user has too many local files.	Return one or more local files and retry.	LFM, QFM
LOGIN ABORTED, TRY LATER.	Insufficient resources are available to allow the user to gain access to the network.	None.	NETVAL
MESSAGE LIMIT.	The number of messages the job issued has exceeded the limit for which the user is validated. Message functions issued by compilers or applications programs that run at the user's job control point are also counted as user dayfile messages and thus are subject to the user's validated dayfile message limit.	Split job into two or more jobs and retry.	IAJ, IMA
MODVAL ABORTED.	The terminal user was prevented from changing his password because the installation was updating the validation file or another user was modifying his password.	Retry operation at a later time.	MODVAL
NO CONNECT TIME AVAILABLE.	Dayfile message indicating that the user has accumulated the maximum connect time allowed for the specified project number.	Contact installation personnel in order to increase maximum connect time allowed.	CHARGE

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
NO CPU TIME AVAILABLE.	Dayfile message indicating that the user has accumulated the maximum CPU time allowed for the specified project number.	Contact installation personnel in order to increase maximum CPU time allowed.	CHARGE
NO FILE FOUND - filenam.	The file specified in the READ directive of a submit file could not be found.	Ensure that the specified file exists.	SUBMIT
NO PRIMARY FILE.	The command entered requires a primary file.	Establish a primary file with NEW, OLD, or PRIMARY command and reenter original command.	IAFEX
NO READ FILE FOUND - filenam.	The file specified on the /READ directive cannot be found.	Ensure that file name specified is correct and that the file is a local file or a permanent file.	SUBMIT
NO SOURCE FILE SPECIFIED.	No file name was specified on the control statement call.	Perform LISTLB to determine expiration date.	SUBMIT
OUTPUT FILE LIMIT.	The total number of files disposed to the output queue by the job has exceeded the limit for which the user is validated.	If possible, split job into two or more jobs and retry. Otherwise, reduce number of files by copying output to single file and then issuing dispose.	LFM
OVER..	Another page of output exists.	Enter carriage return to view next page of output.	CCP
PASSWORD TOO SHORT.	In the PASSWOR command the new password specified contains fewer characters than the minimum required.	Use a longer password.	PASSWOR, MODVAL

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
PF UTILITY ACTIVE, AT addr.	Because a permanent file utility is currently active, the operation was not attempted; the user should retry the operation.	Wait until PF utility is not active and retry.	PFM
PFM ILLEGAL REQUEST, AT addr.	One of the following. - Illegal command code passed to PFM - Illegal permit mode or catalog type specified - CATLIST request has permit specified without a file name - PERMIT command or macro attempted on a public file	Verify that PFM request is valid.	PFM
PROCEDURE FILE EMPTY.	Procedure file specified contains no data.	Verify that procedure file contains data and retry.	CONTROL
PROJECT NUMBER EXPIRED.	Dayfile and output file message indicating that the project number expiration date has occurred.	None.	CHARGE
PRU LIMIT, AT addr.	The job's mass storage PRU limit was exceeded during preparation of a local copy of an indirect access file.	Return one or more local files and retry.	PFM
PRUS REQUESTED UNAVAILABLE.	No device currently has available the amount of space requested by the S parameter.	If possible, reduce the number of PRUs specified by the S parameter, or retry at another time when space might be available.	PFM
READ FILE BUSY - filenam.	The read file is found to be busy (direct access file only).	Retry after file is not busy.	SUBMIT
RECORD SIZE EXCEEDS 500.	The maximum line length for a record to be converted (500 characters) was exceeded.	Split lines that are too long into two or more lines.	CONVERT

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
RECOVERY IMPOSSIBLE.	During an attempted recovery, one of the following conditions occurred. - The system could find no record of the specified user being logged in on the given terminal number in the past 10 minutes. - Information on the user necessary for recovery was incorrect because of a system malfunction.	None.	IAFEX
REPEAT..	Because of a temporary overload condition, the network has discarded the last logical line of input.	Reenter the information.	CCP, NETVAL
RESEQ NUMERIC PARAM ERROR.	A parameter which is supposed to be numeric contains a nonnumeric character.	Correct error and rerun.	RESEQ
RESERVED FILE NAME.	A reserved file name was incorrectly used.	Choose a nonreserved file name.	OPLEDIT, EDIT, DATADEF, DAYFILE, IAFEX
SECURE MEMORY, DUMP DISABLED.	An attempt was made to dump memory protected by the system.	None.	IAJ
SRU LIMIT ENTER S TO CONTINUE OR CR KEY TO STOP:	The user has exceeded his system resource unit (SRU)limit during a terminal session or job.	To continue, allocate nnnnn additional SRUs with S,nnnnn command or enter S alone to allocate an installation-defined number of SRUs.	IAFEX
SUBMIT FILE EMPTY.	An EOR or EOF was encountered on the submit file before any data was found.	Rewind submit file, verify format of data and that the file is a local file, and retry operation.	SUBMIT

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
SYSTEM BUSY, PLEASE TRY LATER.	The maximum number of terminals allowed for the site are currently active on the system.	Try again at a later time.	IAFEX
SYSTEM CLOSED.	The system is not available for use by terminals.	None.	NETVAL, IAFEX
SYSTEM ERROR.	A software or hardware system error occurred.	Inform site analyst immediately.	MODVAL, PFM
TERMINAL BUSY.	The user attempted to send a message to a terminal which was receiving output or had an input request outstanding. The message was lost.	Retry operation at a later time.	IAFEX
TERMINAL NOT ACTIVE.	The user attempted to send a message to an inactive terminal.	None.	IAFEX
TERMINAL nnnnn TIME OUT.	The terminal has been logged off after no input was received for several minutes. (Limit is set by installation.)	Attempt recovery or log in again.	IAFEX
TIME LIMIT ENTER T TO CONTINUE OR CR KEY TO STOP:	The monitor detected that the time limit for the job step has expired.	To continue, reset time limit with T,nnnnn command or enter T alone to set time limit to an installation-defined default.	IAJ
TIMEOUT.	The user has not responded to a login prompt within the system-specified time interval (usually about 2 minutes) and the terminal was disconnected.	Respond more quickly to prompts.	NETVAL
TL NOT VALIDATED.	The time limit requested exceeds that for which the user is validated.	Request smaller time limit.	CPM, ACCFAM

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
TOO MANY FILES - NOT ALL PROCESSED.	The job had more files than could be processed.	If message resulted from a REWIND operation, issue a series of REWIND statements or commands. Otherwise, reenter the statement or command. Inform the site analyst if this error occurs frequently.	MFILES
TOO MANY PARAMETERS.	More parameters were entered (including null parameters) than are allowed for command.	Ensure accuracy of entry.	GTR, IAFEX
TRMDEF ERRORS.	Errors were found in the TRMDEF command/ statememt. Additional error messages are listed at the terminal or, if the L parameter was included, on the output file specified by L.	Correct error and retry.	TRMDEF
TRMDEF PROCESSING COMPLETE.	The TRMDEF command/statement was processed with no errors.	None.	TRMDEF
UNSUPPORTED CODE SET.	The user attempted automatic recognition of a character code set which is not supported at his installation.	Use a supported code set.	CCP
WRITE ON READ-ONLY FILE lfn AT addr.	Either the user attempted to write on a file with write interlock or the direct access file was not attached in WRITE mode.	Reattach file in write mode or clear write interlock.	CIO, IAFEX
filenam ALREADY PERMANENT, AT addr.	The user has already saved or defined a file with the name specified.	Save or define file using different file name or purge existing file.	PFM
pfn BUSY, AT addr.	The specified direct access file is attached in the opposite mode, or it is currently being accessed by one of the following. - More than 77B users in READ mode - More than 77B users in READAP mode - More than 7777B users in READMD mode	Reissue ATTACH until file becomes available, or issue ATTACH specifying NA option.	PFM

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
lfn EMPTY, AT addr.	The file specified on a SAVE request contains no data.	Verify that file contains data and retry.	PFM
nnn FILE(S) PROCESSED.	The operation was performed on nnn files.	None.	MFILES
tc - INVALID PARAMETER VALUE.	The value assigned to the terminal characteristic parameter specified by tc was not legal.	Correct error and retry.	TRMDEF
proc IS A CCL PROCEDURE.	Procedure specified in CALL statement is a CCL procedure.	Use BEGIN command.	CONTROL
filenam NOT FOUND.	RESTART was unable to retrieve a file named, but not included, on filenam.	Verify that filenam is valid.	RESTART
proc NOT FOUND.	Procedure specified in CALL statement cannot be found.	Verify that procedure name is correct and retry.	CONTROL
pfn NOT FOUND, AT addr.	One of the following. - The specified permanent file could not be found. - The specified user number could not be found. - The user is not allowed to access the specified file. - The user issued an indirect access file command on a direct access file. - The user issued a direct access file command on an indirect access file. If this message occurs in response to the SAVE request, the specified local file is not attached to the control point, is a direct access file, or is an execute-only file.	Verify that file name/ user number is correct, that access permission has been granted, and that correct access is being attempted.	PFM

MESSAGE	SIGNIFICANCE	ACTION	ROUTINE
filenam NOT ON MASS STORAGE, AT addr.	The file to be saved is not on mass storage; the first track of the file is not recognizable.	Verify that file is on mass storage.	PFM
nnnnn RECORDS CONVERTED.	Informative message indicating the number of records (nnnnn) converted from one character set to another.	None.	CONVERT

GLOSSARY C

Account Block	That portion of an IAF session from login to logout or entry of a CHARGE statement which signals a new account block.
Alphanumeric	Consisting of alphabetic and/or numeric characters only.
APL	A programming language. An interactive interpreter available to the user.
Application	A program resident in a host computer that provides an information storage, retrieval, and/or processing service to a remote user via the network. IAF is an example of an application.
Application Switching	The process of leaving the control of one application and entering the control of another, without going through another complete login sequence.
ASCII	American National Standard Code for Information Interchange; the 128-character set utilized by some terminals and the network.
Auxiliary Device	Mass storage permanent file device used to supplement storage provided by the normal permanent file devices associated with the system (refer to family device).
BASIC	1. Beginner's all-purpose symbolic instruction code is an elementary programming language available to the user. 2. Subsystem that uses the BASIC compiler.
BOI	Beginning-of-information.
Catalog	The list of names of permanent files belonging to a particular user name; this list also contains information about the permanent files.
Compile	To translate a program from a higher level programming language (for example, FORTRAN or BASIC) into machine instructions called object code.
Control Statement Record	The first, and possibly only, record on an INPUT file or a SUBMIT file consisting of statement images that start with a job statement and end with the first EOR, EOF, or EOI.

CYBER Record Manager	A software product supported under NOS that allows a variety of record types, blocking types, and file organizations to be created and read. The execution time input/output of COBOL 4, COBOL 5, FORTRAN Extended 4, FORTRAN 5, Sort/Merge 4, ALGOL 4, BASIC, and DMS-170 products is implemented through CYBER Record Manager. The system input/output of NOS is not implemented through CYBER Record Manager. All CYBER Record Manager file processing requests ultimately pass through the operating system input/output routines. COMPASS programs can use either CYBER Record Manager or NOS input/output (CIO).
Direct Access File	A permanent file that can be attached to the user's job. All changes to this file are made on the file itself rather than a temporary copy of the file (refer to indirect access file).
Display Code	A character code set used to represent alphanumeric and special characters (refer to appendix A).
ECS	Extended core storage. An additional memory available as an option. This memory can only be used for program and data storage, not for program execution. Special hardware instructions exist for transferring data between central memory and ECS.
EOF	End-of-file is a boundary within a sequential file but not necessarily the end of a file that can be referenced by name. The actual end of a named file is defined by an EOI. CYBER Record Manager divides files into partitions; therefore, a NOS multifile file is a multipartition file.
EOI	End-of-information.
EOR	End-of-record is the terminator of a logical record.
Empty Record	A PRU that contains no user data (same as zero length PRU); indicates the end of a logical record.
Family Device	Mass storage permanent file device associated with a specific system. A family may consist of 1 to 63 logical devices. Normally, a system runs with one family of permanent file devices available. However, additional families may be introduced during normal operation. This enables the user associated with the additional families to access their permanent files via an alternate system.
Field Length	Number of central memory words required to process a job.

File	Set of information that begins at BOI and ends at EOI and that is referred to by a logical file name. This is the only definition of a file in CYBER Record Manager and the languages that use CYBER Record Manager. In NOS, a file is also defined as that portion of a file terminated by EOF; thus, a multifile file can exist. Generally, when a NOS command has a parameter that is a file name, that parameter refers to the BOI and EOI definition. Files within a multifile file cannot be individually referenced by name. When a NOS command has a parameter that specifies the number of files, that parameter uses the EOF definition.
Flag	A character or bit that signals the occurrence or presence of a particular condition.
FORTRAN	1. Formula Translation, a high-level language consisting of symbols and statements that can be used to create a program closely resembling mathematical notation. 2. The subsystem that uses the FORTRAN Version 5 compiler.
FTNTS	The subsystem that uses the FORTRAN Extended Version 4 compiler.
Indirect Access File	A permanent file that is accessed only by making a temporary copy of the file (GET, OLD, or LIBRARY commands). It is created or altered by saving or substituting the contents of an existing temporary file (REPLACE or SAVE commands).
Interactive	Job processing in which the user and the system communicate with each other, rather than the user submitting his job and receiving output, having no control over the job while processing occurs.
Library File	A permanent file residing under the special user name LIBRARY. Several other definitions exist (refer to the NOS Reference Manual, volume 1.)
Line	Refer to zero byte terminator.
Local File	Any file that is currently associated with a job. Local files include temporary files and attached direct access files.
Local Operator (LOP)	The local operator manages the communications elements of the network. Local operator functions may be performed at the system console, or at a remote terminal.
Locked File	A file on which a user cannot write.
Login	A procedure that must be performed by the terminal user to initially establish communication with an application.

Logical Record	A logical record on mass storage is terminated by an EOR; on tape, it is terminated by the conditions described in the NOS Reference Manual, volume 1, for individual tape formats. Often, a logical record contains more than one CYBER Record Manager record. Because CYBER Record Manager defines a line as a logical record, a NOS logical record may contain several record manager logical records.
Master Device	Mass storage device that contains the user's permanent file catalog, all his indirect access files, and all, part, or none of his direct access files.
Network	A data and message switching and routing system used to provide communication between terminals and applications.
Object Code	Executable machine language instructions. An object code program need not be recompiled each time it is executed.
On-Line	Equipment under direct control of the computer.
Order Dependent	Items which must appear in a specific order.
Order Independent	Items which need not be given in any specific order. Parameters, particularly those with keywords, may be order independent. For example, the UN=usernam parameter in the GET command is order independent.
Parameter	A variable that is given a specific value for a particular purpose or process.
Password	1. A system access word that must be used in addition to the user name at login. 2. A file access word that defines access to a particular file by alternate users.
Permanent File	A file which is created by a user, stored under his user name in the permanent file system, and is removed from permanent file storage only when specified by a user who has write permission.
Permanent File Family	Permanent files which reside on the family devices of a specific system.
Port	The point at which a communication line is attached to the computer.
Post Radix	A letter following a numeral that indicates the base numbering system.
Prefix Character	A character that has a special significance to a program or the operating system.
Primary File	Any temporary file created with the OLD, LIBRARY, PRIMARY, or NEW command. The primary file is assumed to be the file on which most IAF operations are performed unless another file is specified.

Private Auxiliary Device	Auxiliary device associated with a specific user. Only that user may create files on the device, although he may permit other users to access files which reside on the device.
Procedure File	Under NOS, a file containing control language and control statements, but not commands defined only for time-sharing.
PRU	Physical record unit. The amount of information transmitted by a single physical operation of a specified device. A PRU for mass storage devices is 64 central memory words in length. Refer to the NOS Reference Manual, volume 1 or 2, for information concerning tape PRU sizes.
Public Auxiliary Device	Auxiliary device available for access by all validated users knowing the correct pack name. Additional validation is required to create or replace files on an auxiliary device (refer to LIMITS Command in section 4).
Record	A unit of information which is interchangeable with logical records in NOS. In CYBER Record Manager and its language processors, a unit of information produced by a single write request. In FORTRAN, a formatted write produces zero byte terminated records, and an unformatted write produces W type records.
Record Separator	In NOS, another name for an EOR.
Record Type	May have one of several meanings, depending upon its context. In CYBER Record Manager, there are seven record types defined by the RT field in the FIT.
Recovery	The process by which a terminal user re-establishes communication with IAF after an inadvertent disconnection and is able to continue processing at the point of disconnection.
Rollout File	A file containing a job (and system information) that has been temporarily removed from the main processing area of the system.
Rubout Characters	Characters created by pressing the RUB OUT key on the terminal. These are considered null input by the system and these characters are required in paper tape output.
Security Count	The number of security violations the user has left before he is denied access to the system.
Sequence Numbers	The AUTO command adds line numbers at the beginning of each line of a file. If a file uses sequence numbers, zero byte terminated lines or logical records are implied.

Sequential File	A file in which records are accessed in the logical order in which they occur. Any file can be accessed sequentially. Sequential files must be accessed sequentially because no key or address is associated with each record in the files. All CYBER Record Manager files are considered sequential files by NOS.
Source Code	Code input to the computer for later translation into executable machine language instructions (object code).
Special Editing	Mode in which the cancel input character, backspace character, and line feed character are not treated as special characters but are passed to IAF as input data.
SRU	Refer to System Resource Unit.
System File	A file that can be accessed only by a system program.
System Resource Unit (SRU)	A unit of measurement of system usage. The number of SRUs includes the CPU time, memory usage, and I/O activity.
System Utilities	System programs used to perform system functions.
Temporary File	A file created by the user that is not a permanent file, or a copy of a file that already exists in the system. All temporary files no longer exist once they are returned to the system (either specifically or at user logout).
Terminal Name	A network-supplied name used to identify the terminal to the local operator.
Terminal Number	An IAF-supplied number used by the terminal operator during a recovery sequence.
Time Slice (CPU)	The amount of CPU time a job is allowed to use before the system lowers its priority to allow other jobs to execute.
Transparent Mode	Mode in which all characters entered at the terminal are sent to IAF as 7-bit codes (or as 8-bit codes, depending on the parity) without translation. Normally, characters entered at the terminal are translated and stored as 6-bit and/or 12-bit display codes. This mode is initiated either with the 0006 control byte or with the IN=XK or IN=XP terminal definition commands. In former time-sharing systems this mode was referred to as binary mode.
TTY	Teletypewriter.
User Break 1 Sequence	The character or sequence of characters that causes an executing program to be interrupted (also called the interruption sequence).
User Break 2 Sequence	The character or sequence of characters that causes an executing program to be terminated (also called the termination sequence).

User Name	A system access word that must be supplied by the user for validation purposes at login. This is sometimes called the user number.
Validation File	File containing validation information for all users (user names, passwords, resources allowed, and so on).
Write Interlock	Only one person at a time can attach a direct access file in write mode. A file that is attached in write mode is in write interlock.
W Type Record	CYBER Record Manager record type in which user data is preceded by a system-supplied control word. FORTRAN unformatted writes and Sort/Merge use W type records as default record types. EOF and partition boundaries are not equivalent on files with this type of record.
XEDIT	The text editor developed by the University of Minnesota and available for use on NOS.
Zero Byte Terminator	The 12 bits of zero in the low order position of a central memory word. Either the zero byte terminator is used to terminate a line of coded information listed at the terminal or line printer, or it is used to represent cards entered through a card reader. Files with names INPUT and OUTPUT have such terminators while in storage. Any file to be displayed at a terminal must also have such terminators for each line to be displayed correctly. A record with such a terminator in CYBER Record Manager is a zero-byte record (Z type record). The SUBMIT command requires files whose lines are terminated with zero bytes. A record (marked by EOR) in NOS may contain one or several zero-byte records. In display code, two colons create 12 bits of zeros. If two consecutive colons occur in a file that contains zero-byte records, they may be stored in the lower order portion of a word and create a zero-byte record. Files created at a terminal using the AUTO or TEXT command or by using Text Editor or XEDIT contain zero-byte terminated records.
Zero Length PRU/Record	A PRU that contains no user data.

MASS STORAGE DEVICE STATISTICS

D

The mass storage devices supported by the system and the size of blocks allocated for direct access files are as follows:

Device Code	Device	Block Size		
		PRUs	CM Words	Characters
DE	Extended core storage	16	1024	10 240
DIn	844-21 disk storage subsystem (half track; 1≤n≤8)	n*107	n*6848	n*68 480
DJn	844-4x disk storage subsystem (half track; 1≤n≤8)	n*227	n*14 528	n*145 280
DKn	844-21 disk storage subsystem (full track; 1≤n≤8)	n*112	n*7168	n*71 680
DLn	844-4x disk storage subsystem (full track; 1≤n≤8)	n*227	n*14 528	n*145 280
DMn	885 disk storage subsystem (half track; 1≤n≤3)	n*640	n*40 960	n*409 600
DP	Distributive data path	16	1024	10 240
DQn	885 disk storage subsystem (full track; 1≤n≤3)	n*640	n*40 960	n*409 600

In this table, n indicates the unit count for multiunit devices and x is 1 or 4.

If the user's validation permits (refer to LIMITS Command, section 4), the maximum size of an indirect access file is the device limit less the space allocated for catalog information and other files.

The size of a direct access file is limited by the device; it may be limited by validation if the file is to be accessed in write mode. There are no system limitations.

TEXT EDITOR AND XEDIT COMMAND INDEXES E

TEXT EDITOR COMMAND INDEX

This is a list of the commands available under Text Editor. For additional information, refer to the Text Editor Reference Manual.

ADD(S)
ADD(S);n
ADD(S):/string/
ADD(S):/string/;n

ALIGN
ALIGN;n
ALIGN:/string/
ALIGN:/string/;n
ALIGN:/string1/,/string2/
ALIGN:/string1/,/string2/;n

BLANK(S)
BLANK(S);n
BLANK(S):/string/
BLANK(S):/string/;n
BLANK(S):/string1/,/string2/
BLANK(S):/string1/,/string2/;n

CHANGE(S)
CHANGE(S);n
CHANGE(S):/string/
CHANGE(S):/string/;n
CHANGE(S):/string1/,/string2/
CHANGE(S):/string1/,/string2/;n

CLEAR

DEFTAB
DEFTAB:/tabchar/

DELETE(S)
DELETE(S);n
DELETE(S):/string/
DELETE(S):/string/;n
DELETE(S):/string1/,/string2/
DELETE(S):/string1/,/string2/;n

END

ES
ES;n
ES:/string/
ES:/string/;n
ES:/string1/,/string2/
ES:/string1/,/string2/;n

EXTRACT
EXTRACT;n
EXTRACT:/string/
EXTRACT:/string/;n
EXTRACT:/string1/,/string2/
EXTRACT:/string1/,/string2/;n

FIND(S)
FIND(S);n
FIND(S):/string/
FIND(S):/string/;n
FIND(S):/string1/,/string2/
FIND(S):/string1/,/string2/;n

INSERTS:/string1/,/string2/;n

LENGTH;n
LENGTH;*

LINE

LIST(S)
LIST(S);n
LIST(S):/string/
LIST(S):/string/;n
LIST(S):/string1/,/string2/
LIST(S):/string1/,/string2/;n

LISTAB

MERGE:/lfn/
MERGE:/lfn/;n
MERGE:/pfn/
MERGE:/pfn/;n
MERGE:/lfn/,/string/
MERGE:/lfn/,/string/;n
MERGE:/pfn/,/string/
MERGE:/pfn/,/string/;n

NUMBER(S)
NUMBER(S):/string/
NUMBER(S):/string1/,/string2/

RESET

RS:/string/
RS:/string/;n
RS:/string1/,/string2/
RS:/string1/,/string2/;n

SET
SET;n

SET;-n
SET:/string/
SET:/string/;n

STOP

TAB
TAB:/t_1,...,t_n/

WIDTH;n (6 ≤ n ≤ 150)

XEDIT COMMAND INDEX

This is a list of the commands available under XEDIT. For additional information, refer to the XEDIT Reference Manual.

ADD n

ADDLN(S)

BOTTOM

BRIEF
BRIEF+
BRIEF-

CHANGE/string1/string2/n
CHANGE/string1a...string1b/string2/n
CHANGES/string1/string2/m
CHANGES/string1a...string1b/string2/m

COPY(D)fname n
COPY(D)fname/string/n
COPY(D)fname/string1...string2/n
COPY(D)fname/string1- - -string2/n

CR

DBADL n

DEFTAB char

DELETE n
DELETE/string/n
DELETE/string1...string2/n
DELETE/string1- - -string2/n

DELETELN

DELIMIT char

DEOF m

DEOR m

DLBLANKS n

eEDIT

END,fname,mode

EXPLAIN

FBADL n

FILE,fname,mode

FINDLL n

HELP,command

INPUT e

INSERT(B) n

line number

LISTAB

LOCATE/string/n
LOCATE/string1...string2/n
LOCATE/string1- - -string2/n
LOCATE/- - -string2/n

MODIFY

NEXT n
NEXT -n

NOBELLS

OCTCHANGE oct1 oct2 n

PRINT n

QMOD n

QUIT,fname,mode

READ(P) $fname_1$ $fname_2$ ... $fname_n$

REPLACE n

REPLACELN ln n

RESTORE

RMARGIN m

STOP

TAB(S)t_1 t_2 ... t_n ($n \leq 8$)

TEOF
TEOF+
TEOF-

TEOR
TEOR+
TEOR-

TOP

TOPNULL

TRIM
TRIM+
TRIM-

TRUNCATE n

VERIFY
VERIFY+
VERIFY-

WEOF

WEOR

WHERE

WMARGIN lm rm

YQMOD n

Y$ $cmd_1$$ $cmd_2$$ ...$$cmd_n$

Z$ $cmd_1$$ $cmd_2$$ ...$$cmd_n$

.n

-n

TERMINAL DEFINITION COMMANDS F

INTRODUCTION

The network, which IAF uses as a terminal interface, can support many types of terminals. All supported terminals are grouped by the network into 15 terminal classes. Each terminal class has specific operating characteristics. These are defined by a set of parameters referred to as terminal definitions. These terminal definitions are predefined by the network to match closely the operating characteristics of actual terminals. Table F-1 lists these terminal definitions, the default values, and the ranges (in parentheses) for each of the 15 classes.

When a terminal logs in to the network, either it is assumed by the network to be of a certain terminal class, or it is assigned a terminal class by the network that resembles its actual characteristics. In either case, if the characteristics of the terminal do not match those of its assigned terminal class, the user can change the values of the terminal definitions or even change the terminal class, using the terminal definition commands described in this appendix or the TRMDEF command described in section 4.† Terminal definition commands can be entered any time after the terminal identification process is complete (refer to Identifying Terminal in section 2), including during IAF operations. The TRMDEF command can be entered only when IAF is being used.

When the TRMDEF command or a terminal definition command is used to change a value, that change remains in effect until the terminal is disconnected from the network or another TRMDEF or terminal definition command is used to change the value. Even application switching and IAF logout do not change the values of the terminal definitions if the terminal has not been disconnected from the network. Only by disconnecting the phone and redialing (on dial-up terminals) or by entering the TC terminal definition (described in this section) can the values be reset to their default values.

The TRMDEF command is described under Terminal Control Commands in section 4. All of the terminal definition parameters in table F-1 can be used with the TRMDEF command unless stated otherwise.

TERMINAL DEFINITION COMMAND FORMAT

The terminal class or terminal definition values can be changed by entering terminal definition commands. These commands should be entered in the following format.† †

control terminal definition (CR)

Parameter	Description
control	Terminal control character defined for the terminal in use (refer to CT in table F-1).
terminal definition	A two-character mnemonic shown in table F-1, followed by = and the desired terminal class number or parameter value. The range of values is shown in table F-1.
(CR)	Message terminator character for the terminal in use.

† It is also possible to change terminal definitions using control byte 16. Refer to the NOS Reference Manual, volume 2, for information on control bytes.

† †Spaces are included for clarity. They should not be included when entering the command.

As an example, to set the cancel character on a 713 terminal to a ?, press the ESCAPE key and enter

CN=?

On terminals from which it is possible to input multiple logical lines in a single transmission block (more than one line can be entered before transmitting), the terminal definition control character must be the first character in the transmission block. Subsequent input lines in the transmission block are treated as data and sent to IAF. When the terminal definition command is a request for transparent input mode, transparency is not applied to any data in the current transmission block but is applied to the next transmission.

If the user makes a format error while entering a terminal definition command, or enters a command which is invalid for the terminal, the message

ERR..

is printed at the terminal.

In addition to the terminal definition commands, a message command (MS) and a character code set command (CD), which have the same format, are available to the user. These commands are described at the end of this appendix. MS and CD cannot be used as parameters in the TRMDEF command.

TERMINAL DEFINITION PARAMETERS

The following descriptions explain the terminal definition parameters used in the terminal definition commands and the TRMDEF command. Default values are not shown since they vary with the terminal class. Refer to table F-1 for the default values.

TERMINAL CLASS (TC)

The TC parameter specifies a value from 1 to 15 that associates the terminal type with a set of terminal characteristics parameters. Any terminal being used in the network belongs to one of the following 15 terminal classes.

TC	Terminal Type
1	M33, M35, M37, M38 teletypewriters
2	CDC 713-10
3	Reserved for future use
4	IBM 2741
5	M40
6	Hazeltine 2000
7	CDC 751-1
8	Tektronix 4000

TC	Terminal Type
9	HASP Protocol
10	200 User Terminal
11	CDC 214
12	CDC 711-10
13	CDC 714
14	CDC 731-12, 732-12
15	CDC 734

A terminal that is not shown as belonging to a terminal class may still be operational. It can be assigned to a terminal class having similar characteristics and whose parameters have been changed as necessary by site personnel to define correctly the operational characteristics of the terminal. The terminal class which supports the new terminal type has operating parameter values different from the default values shown in table F-1.

Terminals connected to the network through autorecognition lines can be assigned to terminal class 1, 4, 10, or 13 (unless site personnel have configured the network otherwise). When the terminal being used on an autorecognition line is other than terminal class 1, 4, 10, or 13, the TC parameter must be changed to correctly identify the terminal class.

CONTROL CHARACTER (CT)

The CT parameter establishes the character to be used to identify terminal definition commands. When this character is entered as the first character in a logical line (or transmission block), the data following is assumed to be a terminal definition command. Any character in the ASCII 128-character set, except the equals character, can be selected to function as the control character. This character must differ from the characters currently defined for the BS, CN, AL, B1, and B2 parameters. The character specified by the CT parameter is the character represented by control in the terminal definition command format.

BACKSPACE CHARACTER (BS)

The BS parameter specifies the character to be used to delete the previous input character. Any character in the ASCII 128-character set, except the equals character, can be selected to function as the backspace character. This character must differ from the characters currently defined for the CT, CN, AL, B1, and B2 parameters. It is possible to backspace only to the beginning of the current physical line; additional backspaces are disregarded. When a page width of zero is selected, the characters are sent to IAF in multiples of 140 characters regardless of the page width. Backspacing across these 140-character boundaries is not possible.

CANCEL CHARACTER (CN)

The CN parameter specifies the character to be used to cancel the logical line currently being input. Any character in the ASCII 128-character set, except the equals character, can be selected to function as the cancel character. This character can be the same as the AL (abort output line) character but must differ from the characters currently defined for the CT, BS, B1, and B2 parameters. When the cancel character is entered as the last character before (CR) is pressed, the entire logical line in progress is cancelled. If part of the current logical line has already been transmitted to the application, a flag is set to inform the application that the cancel character has been entered. The system responds to a cancel line character by printing *DEL* on the next line and positioning the carriage to the beginning of a new line.

ABORT OUTPUT LINE CHARACTER (AL)

The AL parameter specifies the character to be used to abort an output logical line. Any character in the ASCII 128-character set, except the equals character, can be specified as the abort output line character. This character can be the same as the CN (cancel) character but must differ from the characters currently defined for the CT, BS, B1, and B2 parameters. The current output line is discarded when the abort line character is entered as the only character in a logical line (entering the abort output line character followed by (CR)) while output is in progress.

INTERRUPTION CHARACTER (B1)

The B1 parameter specifies the character that, when entered as the only character in a logical line (interruption character followed by (CR)), causes program interruption. This process is discussed in section 1. The interruption sequence is also called the user break 1 sequence. Any character in the ASCII 128-character set, except equals, can be specified as the interruption character. This character must differ from the characters currently defined for the CT, BS, CN, AL, and B2 parameters.

TERMINATION CHARACTER (B2)

The B2 parameter specifies the character that, when entered as the only character in a logical line (termination character followed by (CR)), causes program termination. This process is discussed in section 1. The termination sequence is also called the user break 2 sequence. Any character in the ASCII 128-character set, except equals, can be specified as the termination character. This character must differ from the characters currently defined for the CT, BS, CN, AL, and B1 parameters.

CARRIAGE RETURN IDLE COUNT (CI)

The CI parameter specifies the number of idle characters to be inserted into the output stream after a carriage return. This command is necessary since the length of time for the return operation varies depending on the type of terminal being used. When a carriage return is entered, the network outputs the specified number of idle characters before outputting the next line. This allows time for the carriage return function and ensures that characters are not lost because of printing attempts during the carriage return operation. The CI parameter can be assigned any value from 0 to 99, or CI=CA can be specified to restore the carriage return idle count to the default value shown in table F-1.

LINE FEED IDLE COUNT (LI)

The LI parameter specifies the number of idle characters to be inserted into the output stream following a line feed. Its purpose is similar to the carriage return idle count (CI) except that the idle characters are output after the line feed instead of after the carriage return. The LI parameter can be assigned any value from 0 to 99, or LI=CA can be specified to restore the line feed idle count to the default value shown in table F-1.

PAGE WIDTH (PW)

The PW parameter establishes the maximum number of characters that a terminal can print on one output line. Page width can be set to any decimal value from 0 to 255. When output occurs at the terminal, the carriage is advanced to the beginning of the next physical line when the number of characters displayed equals the page width. When a page width of zero is selected, the carriage is never advanced to a new physical line because of page width; PW = 0 selects an infinitely long line.

NOTE

The PW parameter should only be used to establish a page width equal to the physical page width of the terminal being used. Setting page width to other values may cause unpredictable results.

PAGE LENGTH (PL)

The PL parameter establishes the maximum number of physical lines that can be printed as one page. Page length can be set to any value from 0 to 255. PL=0 selects an infinitely long page. During output at the terminal, when the number of lines output is one less than the PL parameter selected, a page boundary is reached. If page waiting has been selected (refer to the PG parameter) output stops until an entry is made at the terminal (CR) to continue output of the next page. Even if page waiting is not enabled, the network performs several line feed functions upon reaching a page boundary. This can be useful when separating printout paper into individual pages.

PAGE WAIT (PG)

The PG parameter specifies whether page waiting is to be performed for the terminal. Page waiting is selected by entering PG=Y and cancelled by entering PG=N. Page waiting is in effect only when the output device is defined to be a CRT display. When page waiting is selected, output stops at each page boundary, and terminal input (CR) is required before the next page is displayed. When the current output page is not full, and another page is available for output, the terminal displays

OVER..

at the end of displayed output. When page waiting is in effect, a null input line is used to display the next page (entering CR only); it has no other meaning. Functions normally performed when CR only is entered (for example, continuing after an interruption, causing normal abort processing after a time limit) are not performed when page wait is in effect and a page is available for output. To perform these functions, a space followed by CR should be entered.

In character mode, a page is determined by the number of physical lines specified by the PL parameter. During transparent mode output, the end of transparent output is interpreted as a page boundary.

PARITY SELECTION (PA)

The PA parameter specifies the type of parity that the terminal generates on input and expects on output. Parity can be odd (O), even (E), zero (Z), or none (N). In even, odd, or zero parity, the network checks (or generates) the eighth bit of each character as a parity bit. The network clears the bit before transmitting the character to IAF. If character mode is set and no parity (N) is specified, the network does not check for parity and automatically clears the eighth bit. If transparent mode is set and no parity is specified, the network transmits all eight bits as data without checking parity.

SPECIAL EDITING (SE)

The SE parameter specifies whether the terminal is in special editing mode. Special editing mode is selected by entering SE=Y and cancelled by entering SE=N. When the terminal is in special editing mode, the cancel input, backspace, and line feed characters are sent to IAF as part of input data. If a backspace followed by a line feed is entered, the system responds with a caret and line feed.

Availability of special editing depends on the site. If special editing is not supported at the site, the network responds

```
ERR..
```

to entry of the SE parameter.

TRANSPARENT INPUT MODE DELIMITER (DL)

The DL parameter specifies transparent input mode text delimiters. DL is valid only in a terminal definition command (for example, %DL=TO); it is not allowed as a parameter in the TRMDEF command. Three types of delimiters can be selected: characters, character count, and timeout. Each is optional, but at least one must be selected. A delimiter character can be any character and is specified with Xcc, where cc is a two-hexadecimal-digit representation of the delimiter character in the terminal's character set code. Character count delimiter is specified with Cvalue, where value can be any decimal value from 1 to 4096. The timeout delimiter is selected by including TO, which indicates a timeout of from 200 to 400 milliseconds. Delimiters can be entered in any order; trailing commas can be deleted. Terminal class 4 (IBM 2741) is configured with the RETURN key as the transparent input mode delimiter; terminal classes 12 and 13 are configured with the ETX key as the transparent input mode delimiter. These configurations cannot be changed.

When transparent input mode is initiated, using IN=XK, IN=XP, or IN=X, characters entered are sent to the system as 8-bit characters (if PA=N is specified; otherwise as 7-bit characters with the eighth bit zeroed) without translation, until one of the delimiter values is encountered. Normally, characters entered from the terminal are translated and stored as 6-bit or 12-bit internal display codes (refer to appendix A).

INPUT DEVICE (IN)

The IN parameter specifies the input device as a keyboard in character mode (KB), a keyboard in transparent input mode (XK), a paper tape reader in character mode (PT), a paper tape reader in transparent input mode (XP), or the current input device in transparent input mode (X). The TRMDEF command allows character mode (KB and PT) only; values of XK, XP, and X are illegal. Paper tape input is allowed in keyboard mode, but X-ON characters are sent to start the paper tape reader. For transparent input mode, the transparent input delimiter (DL) character must have been established before transparent input mode is entered or the default delimiter for the terminal class is used.

OUTPUT DEVICE (OP)

The OP parameter specifies the output device as a printer (PR), CRT display (DI), or paper tape punch (PT). It switches between a paper tape punch (PT) and the default device (DI or PR). DI cannot be specified if PR is the default device, and vice versa. Otherwise, printer and CRT display are functionally equivalent except for the page wait feature (page wait applies only for OP=DI). The terminal user can punch a paper tape in any mode, but the proper X-OFF characters are provided only if OP=PT is selected and the terminal is not in transparent mode.

ECHOPLEX MODE (EP)

The EP parameter selects input character echoing. If EP=Y is specified, each character received by the network is echoed to the terminal just as it was received. This mode is effective only for terminals which have echoplex capability. For terminals having a HALF/FULL duplex switch, if this switch is in the HALF position when EP=Y is specified, each subsequent character entered is double printed (initially when it is typed and again when it is echoed by the system). Placing the switch in the FULL position allows only the character echoed to the terminal to be printed.

EP=N clears the EP=Y setting. Characters received by the network after EP=N is specified are not echoed to the terminal. Characters entered at the terminal are not printed when the HALF/FULL duplex switch is in the FULL position. Only system-generated output appears at the terminal. Placing the switch in the HALF position allows keyboard entry to be printed.

MESSAGE COMMAND

The same network mechanism that allows terminal users to perform the functions provided with the terminal definition commands allows them to send messages to the local operator. The local operator is responsible for controlling the communications elements of the network. Functions of the local operator include enabling and disabling terminals and applications, determining the status of the various communications elements, and sending messages to terminals (refer to the NOS Operator's Guide for a more thorough description of local operator functions). If the user is having problems with the network (such as difficulty connecting to IAF), he can communicate these problems to the local operator using the message command. The format of this command is as follows:

control MS=message (CR)

Parameter	Description
control	This is the same terminal control character used in the terminal definition commands.
message	Message of no more than 50 characters (including spaces) to be sent to the local operator.

The format of this command is exactly the same as that of the terminal definition commands; spaces are included for clarity only.

Any response from the local operator is printed in the following format.

FROM THE LOP.. message

CHARACTER CODE SET COMMAND

The character code set command allows a user to change his terminal's character set, usually by means of a switch on the terminal or a removable type ball. This command can be entered any time after the terminal identification part of login is complete. The format of the command is as follows:

control CD=A (CR)

Parameter	Description
control	This is the same terminal control character used in the terminal definition commands.

The format of this command is the same as that of the terminal definition commands; spaces are included for clarity only.

After entering the character code set command, the user has 60 seconds to physically select the terminal character set (for example, change the type ball) and enter one of the following:

Character	Description
) (CR)	The system determines the terminal's new character set.
(CR)	The system bypasses character set recognition (valid for standard ASCII terminals only). The terminal's new character set is assumed to be ASCII.

When the system recognizes the new character set, it issues two line feeds to indicate the user can continue. This is the same procedure used during terminal identification to find the terminal character set (refer to Identifying Terminal in section 2). If no entry is made within 60 seconds after entering the character code set command, the network disconnects the terminal. If the character code set of the terminal is not supported at the site, the network issues the message

UNSUPPORTED CODE SET.

TABLE F-1. TERMINAL DEFINITION PARAMETERS

Terminal Type		M33, M35, M37, M38	CDC 713-10	Reserved	IBM 2741
Parameter	Mnemonic				
Terminal class	TC	1	2	3	4
Control character	CT	ESC (any)†	ESCAPE (any)†		ATTN % (any)†
Backspace character	BS	CTRL/H (any)†	← (any)†		BACKSPACE (any)†
Cancel character	CN	CTRL/X (any)†	CTRL/X (any)†		ATTN ((any)†
Abort output line character	AL	CTRL/X (any)†	CTRL/X (any)†		ATTN ((any)†
User break 1 (interruption character)	B1	CTRL/P (any)†	CTRL/P (any)†		ATTN : (any)†
User break 2 (termination character)	B2	CTRL/T (any)†	CTRL/T (any)†		ATTN) (any)†
Carriage return idle count	CI	2 (0-99, CA)	0 (0-99, CA)		2 (0-99, CA)
Line feed idle count	LI	1 (0-99, CA)	0 (0-99, CA)		1 (0-99, CA)
Page width	PW	72 (0-255)	80 (0-255)		132 (0-255)
Page length	PL	0 (0-255)	0 (0-255)		0 (0-255)
Page wait	PG	N (Y,N)	N (Y,N)		N (Y,N)
Parity	PA	E (Z,O,E,N)	E (Z,O,E,N)		E (Z,O,E,N)
Special editing	SE	N (Y,N)	N (Y,N)		N (Y,N)
Transparent input mode delimiter	DL††	X 0D C2043 (X any C1-C4096 TO)	X 0D C2043 (X any C1-C4096 TO)		X 6D (X 6D)
Input device	IN †††	KB (KB,PT,XK,XP,X)	KB (KB,PT,XK,XP,X)		KB (KB,PT,XK,XP,X)
Output device	OP	PR (PR,PT)	DI (DI,PT)		PR (PR,PT)
Echoplex mode	EP	N (Y,N)	N (Y,N)		N/A

† The equals character cannot be specified.
†† DL is not a legal parameter in the TRMDEF command.
††† XK, XP, and X are not legal values for the IN paramcter in the TRMDEF command.

TABLE F-1. TERMINAL DEFINITION PARAMETERS (Contd)

Terminal Type					
Parameter	Mnemonic	M40	Hazeltine 2000	CDC 751-1	Tektronix 4000
Terminal class	TC	5	6	7	8
Control character	CT	CTRL/P (any)†	ESC (any)†	ESC (any)†	ESC (any)†
Backspace character	BS	N/A	CTRL/H (any)†	← (any)†	CTRL/H (any)†
Cancel character	CN	CTRL/X (any)†	CTRL/X (any)†	CTRL/X (any)†	CTRL/X (any)†
Abort output line character	AL	CTRL/X (any)†	CTRL/X (any)†	CTRL/X (any)†	CTRL/X (any)†
User break 1 (interruption character)	B1	CTRL/P (any)†	CTRL/P (any)†	CTRL/P (any)†	CTRL/P (any)†
User break 2 (termination character)	B2	CTRL/T (any)†	CTRL/T (any)†	CTRL/T (any)†	CTRL/T (any)†
Carriage return idle count	CI	1 (0-99, CA)	0 (0-99, CA)	0 (0-99, CA)	0 (0-99, CA)
Line feed idle count	LI	3 (0-99, CA)	3 (0-99, CA)	12 (0-99, CA)	0 (0-99, CA)
Page width	PW	74 (0-255)	74 (0-255)	80 (0-255)	74 (0-255)
Page length	PL	0 (0-255)	0 (0-255)	0 (0-255)	0 (0-255)
Page wait	PG	N (Y,N)	N (Y,N)	N (Y,N)	N (Y,N)
Parity	PA	E (Z,O,E,N)	E (Z,O,E,N)	E (Z,O,E,N)	E (Z,O,E,N)
Special editing	SE	N (Y,N)	N (Y,N)	N (Y,N)	N (Y,N)
Transparent input mode delimiter	DL††	X 0D C2043 (X any C1-C4096 TO)	X 0D C2043 (X any C1-C4096 TO)	X 0D C2043 (X any C1-C4096 TO)	X 0D C2043 (X any C1-C4096 TO)
Input device	IN†††	KB (KB,PT,XK,XP,X)	KB (KB,PT,XK,XP,X)	KB (KB,PT,XK,XP,X)	KB (KB,PT,XK,XP,X)
Output device	OP	DI (DI,PT)	DI (DI,PT)	DI (DI,PT)	DI (DI,PT)
Echoplex mode	EP	N (Y,N)	N (Y,N)	N (Y,N)	N (Y,N)

† The equals character cannot be specified.
†† DL is not a legal parameter in the TRMDEF command.
††† XK, XP, and X are not legal values for the IN parameter in the TRMDEF command.

TABLE F-1. TERMINAL DEFINITION PARAMETERS (Contd)

Terminal Type		HASP Protocol	200UT	CDC 214	CDC 711-10
Parameter	Mnemonic				
Terminal class	TC	9	10	11	12
Control character	CT	% (any) †	% (any) †	% (any) †	% (any) †
Backspace character	BS	N/A	N/A	N/A	N/A
Cancel character	CN	((any) †	((any) †	((any) †	((any) †
Abort output line character	AL	N/A	N/A	N/A	N/A
User break 1 (interruption character)	B1	: (any) †	: (any) †	: (any) †	: (any) †
User break 2 (termination character)	B2	) (any) †	) (any) †	) (any) †	) (any) †
Carriage return idle count	CI	N/A	N/A	N/A	N/A
Line feed idle count	LI	N/A	N/A	N/A	N/A
Page width	PW	80 (0-255)	80 (0-255)	80 (0-255)	80 (0-255)
Page length	PL	0 (0)	13 (0-255)	13 (0-255)	16 (0-255)
Page wait	PG	N/A	Y (Y,N)	Y (Y,N)	Y (Y,N)
Parity	PA	N/A	0 (0)	0 (0)	0 (0)
Special editing	SE	N/A	N/A	N/A	N/A
Transparent input mode delimiter	DL ††	N/A	N/A	N/A	X 03 (X 03)
Input device	IN †††	KB (KB)	KB (KB)	KB (KB,X)	KB (KB,XK)
Output device	OP	DI (DI)	DI (DI)	DI (DI)	DI (DI)
Echoplex mode	EP	N/A	N/A	N/A	N/A

† The equals character cannot be specified.
†† DL is not a legal parameter in the TRMDEF command.
††† XK, XP, and X are not legal values for the IN parameter in the TRMDEF command.

TABLE F-1. TERMINAL DEFINITION PARAMETERS (Contd)

Terminal Type				
Parameter	Mnemonic	CDC 714	CDC 731-12 CDC 732-12	CDC 734
Terminal class	TC	13	14	15
Control character	CT	% (any) †	% (any) †	% (any) †
Backspace character	BS	N/A	N/A	N/A
Cancel character	CN	((any) †	((any) †	((any) †
Abort output line character	AL	N/A	N/A	N/A
User break 1 (interruption character)	B1	: (any) †	: (any) †	: (any) †
User break 2 (termination character)	B2	) (any) †	) (any) †	) (any) †
Carriage return idle count	CI	N/A	N/A	N/A
Line feed idle count	LI	N/A	N/A	N/A
Page width	PW	80 (0-255)	80 (0-255)	80 (0-255)
Page length	PL	16 (0-255)	13 (0-255)	13 (0-255)
Page wait	PG	Y (Y,N)	Y (Y,N)	Y (Y,N)
Parity	PA	0 (0)	0 (0)	0 (0)
Special editing	SE	N/A	N/A	N/A
Transparent input mode delimiter	DL ††	X 03 (X 03)	N/A	N/A
Input device	IN †††	KB (KB,XK,X)	KB (KB)	KB (KB)
Output device	OP	DI (DI)	DI (DI)	DI (DI)
Echoplex mode	EP	N/A	N/A	N/A

† The equals character cannot be specified.
†† DL is not a legal parameter in the TRMDEF command.
††† XK, XP, and X are not legal values for the IN parameter in the TRMDEF command.

LINE FEED AND TRANSMISSION KEYS

Table G-1 shows the keys used by the supported terminal classes to advance the carriage or cursor to the beginning of the next line and/or transmit messages from the terminal. The terminal classes are described in appendix F. The keys listed in table G-1 are divided functionally into three types called carriage return, new line, and line feed.

TABLE G-1. TERMINAL KEY EQUIVALENCES

Terminal Class	Function		
	Carriage Return	New Line	Line Feed
1	RETURN	N/A	LINE FEED
2	RETURN	N/A	↓
3			
4	RETURN	N/A	ATTN
5	RETURN	N/A	NEW LINE
6	CR	N/A	LF
7	CARRIAGE RETURN†	N/A†	LINE FEED†
8	RETURN	N/A	LF
9	Varies† †	Varies† †	Varies† †
10	SEND	RETURN	N/A
11	SEND	RETURN	N/A
12	ETX	NEW LINE	N/A
13	ETX	NEW LINE	N/A
14	ETX	NEW LINE	N/A
15	SEND	NEW LINE	N/A

†If in block mode, the user should refer to terminal documentation for terminal key equivalences. Those listed are for character and line modes.

† †Terminals operating under HASP protocol use different keys for this purpose.

The functions each of the three types of keys provides for the terminal user and how IAF interprets each type are described in the following paragraphs.

Terminal user functions are:

Type of Key	Function
Carriage return	Terminates a message, advances the cursor or carriage to the beginning of the next line, and transmits the message. It also transmits any other messages which may be stored in the terminal's buffer.
New line	Terminates the message and advances the cursor or carriage, but does not transmit the message. Rather, it causes the message to be stored in the terminal's buffer until the carriage return function is used. Many terminals cannot activate the new line function and on other terminals the new line key does not activate the new line function. Refer to terminal documentation for information concerning the keys on the terminal.
Line feed	Terminates a physical line of input and advances the cursor or carriage to the beginning of the next line.

IAF interprets these functions as:

Type of Key	IAF Interpretation
Carriage return	Terminates a message.
New line	Terminates a message. Subsequent messages in the same transmission may not be accepted.
Line feed	Causes line transmission to IAF, which IAF interprets as a complete message. Because the results are unpredictable, the user is encouraged not to use this function.

DIFFERENCES BETWEEN TELEX AND IAF H

OVERVIEW AND INTRODUCTION

A number of differences exist between IAF and TELEX because of IAF's use of Network Products and the Network Access Method (NAM) for terminal communications. The differences are caused mainly by the movement of all specific terminal control to the CDC Network Products System. The TELEX replacement, IAF, addresses all interactive time-sharing terminals as virtual terminals. However, the TELEX ability to address the specifics of a terminal in what was called binary mode is still preserved. Under the Network Products System this capability is referred to as transparent mode. The feature of TELEX referred to as transparent mode has been renamed special editing mode.

The changes from TELEX to IAF primarily involve terminal operations. Great care has been exercised to minimize any changes that might affect user programs. Changes that might affect user programs are listed under Input/Output Data Handling Including Control Bytes and Additional Data Return from TSTATUS Macro in this appendix. The vast majority of user programs are not affected by running with IAF instead of TELEX.

NOTE

The changes affecting end users are described starting at Identifying Terminal to Network through Paper Tape in this appendix. The remaining paragraphs affect site operations only.

The greatest benefit of using IAF with NAM for terminal communications is that any terminal supported under the Network Products Interactive Virtual Terminal feature can be used for interactive time-sharing work on NOS. Specifically, this means that asynchronous terminals up to 9600 baud and synchronous terminals up to 9600 baud can be used on NOS as time-sharing terminals. Information on the types of terminals, line speeds, and communications protocols supported by network products is found in the Network Products literature (refer to the preface for a list of related publications). This appendix does not repeat the information given in the Network Products network, nor on how to operate such a network. Since this appendix discusses TELEX-to-IAF differences, it does not cover terminal operations when used in other than normal interactive use.

CHANGES AFFECTING END USERS

The changes that may affect end users are described in the following paragraphs.

IDENTIFYING TERMINAL TO NETWORK

There is no change when the terminal is of the same class as the default terminal class for the line on which the terminal is connected.

If the terminal is other than the default class, then under TELEX the terminal operator identified his terminal class by entering one of the following:

- ATTN key for correspondence code standard print terminals.
- A then ATTN for correspondence code APL print terminals.
- A for Memorex 1240 terminals with APL.
- B for block transmission ASCII code terminals.

Under IAF/Network Products, the user enters the following:

- SEND for mode 4A terminals.
- ETX for mode 4C terminals.
- CR for all other terminals. This causes the system to determine automatically the line speed of the terminal. When the line speed is recognized, the system issues two line feeds. The user enters) CR to cause automatic detection of the terminal character set or, for ASCII terminals only, CR alone to bypass character set detection. Two additional line feeds indicate the terminal character set has been recognized and the terminal identification procedure is complete.

The user can then enter a terminal class command (necessary only if the terminal class is different from the default). Information on the possible terminal classes is contained in the Network Products literature and in appendix F.

LOGIN PROCEDURE

Under TELEX, most terminals made use of only the interactive time-sharing capability. A few made use of both the time-sharing capability and TAF. A completely different set of terminals was used under Export/Import and these had only remote batch capability.

For the great majority of time-sharing terminals that use only the interactive time-sharing capability of NOS, the login procedure need not change at all. The following sequences show the differences.

- Login sequence for a network terminal:

  Line 1 - yy/mm/dd. hh.mm.ss. termnam

  Line 2 - system header line

  Line 3 - FAMILY: aaaaaaa (zero to seven alphanumeric characters)

  Line 4 - USER NAME: aaaaaaa (one to seven alphanumeric characters or *)

  Line 5 - PASSWORD:

  Line 6 - ******** (user overtypes one to seven alphanumeric characters)

  Line 7 - TERMINAL nnn, NAMIAF

- Login sequence for a TELEX terminal:

  Line 1 - yy/mm/dd. hh.mm.ss.

  Line 2 - system header line

  Line 3 - FAMILY: aaaaaaa (zero to seven alphanumeric characters)

  Line 4 - USER NUMBER: aaaaaaa (one to seven alphanumeric characters or *)

  Line 5 - PASSWORD.

  Line 6 - ******** (user overtypes one to seven alphanumeric characters)

  Line 7 - TERMINAL nn, TTY

The termnam field in line 1 of the network login sequence contains the network terminal name. This network terminal name is the name used in a network configuration file at the host to identify the port (for dial-up lines) or the terminal. The nnn in line 7 is the identifier a terminal operator needs to recover an interactive session with IAF after an interruption. The nn in line 7 of the TELEX session was the number a TELEX user needed to recover a TELEX interactive session.

The family name is always requested even if only one family exists.

The prompt USER NAME has been adopted in place of USER NUMBER, since the former is more meaningful.

As was true with TELEX, the login session for network terminals can be abbreviated by entering familyname, username, and password on one line in response to the FAMILY prompt.

Terminal operators who used both TELEX and TAF accessed TAF by logging into TELEX and then entering TAF via the TRAN command. Under the Network Products System, TAF is accessed directly from the network, not via TELEX or IAF. Therefore, TAF can be used when IAF is not available. For a network user who is allowed to access more than just IAF, the network provides an additional prompt line after the PASSWORD prompt.

Line 6B - termnam - APPLICATION: aaaaaaa (one to seven alphanumeric characters)

The user enters either IAF or TAF. Again, this entry can be added to the line of parameters entered in response to the FAMILY prompt; the user can enter familyname, username, password, and application in response to the FAMILY prompt. Similarly, the user can enter username, password, and application in response to the USER NAME prompt; and the user can enter password and application in response to the PASSWORD prompt.

The following new optional capabilities are being added to network products login capability.

- Automatic initial application selection. The terminal is required to connect to this application first; no application prompt is given.
- Default initial application selection. The user is validated for only one application; no application prompt is given.
- Automatic login. A terminal entering the system on a specific set of ports is given a default username and is automatically connected to a specific application. This feature is useful for connecting terminals on hardwired lines to TAF for transaction applications or for connecting time-sharing terminals on hardwired lines in a university computer lab to IAF.

NOTE

The IAF/Network Products do not check for an answerback code.

IAF RECOVERY PROCEDURES

When recovering a terminal session under TELEX, a terminal user normally entered the nn number displayed in line 7 of the login sequence. However, often if a user redialed in immediately it was not necessary to enter this number because the user would get the same port. If the terminal was on a hardwired line, the user could be assured the nn would not change. Under the Network Products System, the nnn of line 7 should be entered to recover a session; it will almost assuredly be different, whether on a dial-up or hardwired line.

TELEX AND IAF COMMAND DIFFERENCES

The following TELEX commands have been replaced in IAF/Network Products by the terminal definition parameters indicated (refer to appendix F). The functions performed by the TELEX commands are now a part of the specific terminal handling functions performed by Network Products for IAF (and for all other host network applications as well).

TELEX Command	Terminal Definition Parameters
BINARY	DL (specifies a transparent input mode delimiter)
	IN (specifies whether input is from keyboard or paper tape and whether it is normal or transparent)
PARITY	PA (specifies whether parity is zero, odd, even, or none)

TELEX Command	Terminal Definition Parameters
ROUT	CI (specifies number of rubouts)
TERM	TC (specifies terminal class)
FULL	EP (specifies echoplex mode)
HALF	

The STOP command has been replaced by a termination character (also called user break 2) described under Termination of Executing Program in section 1.

The TRAN command has been replaced by application selection during the login sequence.

The BYE command can work as it has under TELEX. Under IAF it has some additional formats, which are explained under IAF Logout and Network Logout in this appendix.

INPUT/OUTPUT DATA HANDLING INCLUDING CONTROL BYTES

The following paragraphs contain data relevant to input/output data handling.

Line Editing

Under TELEX, a user could backspace and re-enter input by using the backspace key (sometimes left arrow or underscore). With IAF, backspacing is done by using the logical BS character, which might be left arrow or underscore, or a character the user at the terminal chooses.

To be consistent with what now constitutes a logical line (with IAF/Network Products it can be multiple physical lines), there has been a change in the range that backspace can affect. Under IAF, a user can backspace only to the start of the physical line (which in most cases is the left margin of the line being entered).

To delete a logical line being entered, a TELEX user used the ESCAPE key. Under IAF/Network Products, the terminal operator uses the logical CN (cancel input line) character, which is either the default character or a character he chooses for use on his terminal.

Auto Mode

Under TELEX, auto mode could be terminated with the BREAK key, by backspacing completely through the line numbered prompt (and not starting the replacement line with a numeric), or by performing a line cancel (and not starting the replacement with a numeric). Under IAF, only the line cancel approach can be used.

In auto mode under TELEX, the user could backspace into the prompt and reenter part or all of the number to change the sequence number or to add a character in column 6. Under IAF, the user must perform a logical line cancel and then retype the new number or the same number if a character must be placed in column 6.

Output Data

Keeping Output Logical Lines Together

The IAF/Network Products user who is operating on the same asynchronous terminal used under TELEX will not experience a change. Even if IAF sends a logical line to the terminal in multiple network transmission blocks (refer to following paragraph), IAF places format effectors on the data so that it is formatted properly on the terminal.

Because synchronous terminals usually start a new line for each network transmission block received, it is important to know what can split a logical line from a program into separate network transmission blocks. If having output split (a new line starting in the middle) is a problem, then the programmer should avoid the following:

- Outputting logical lines over 225 ASCII characters long.
- Writing EOF/EOR before placing the entire logical line in the buffer.
- Making an input request before placing the entire logical line in the buffer.
- Making a WRITE request when the buffer is full and has no line terminators.

Line Folding

This is a new feature of IAF/Network Products that was not available with TELEX. TELEX overprinted in the rightmost position of a teletypewriter or any other terminal that did not automatically perform carriage return/line feed at right margin. For those terminals, the network performs automatic line folding of lines whose length equals or exceeds the stated page width of the terminal. A default page width is established for each terminal at the time it is connected to the network. This default is based on information found in the network's configuration files. This value may be altered by the user with the PW terminal definition parameter (appendix F).

Page Wait

This is a new feature of IAF/Network Products that was not available with TELEX. This feature is applicable only to display terminals. The network optionally provides the page wait feature to a terminal. When page waiting is enabled, output ceases whenever a specified number of lines has been sent to the terminal. This allows the user time to read the output or perform other activities.

The next page is transmitted when the user enters an input line. Any input line causes page turning, but the input is discarded. An interactive application is not aware of this feature. Two terminal definition parameters are involved: PG to enable or disable page wait and PL to specify number of physical lines on a page (appendix F).

Control Bytes

Because TAF does not use IAF for terminal communication, certain TAF-only control bytes (0010 - End of Transaction Message and 0012 - End of Marked Transaction Output) are discontinued.

The format of output on teletypewriters may not be exactly the same as on synchronous CRT devices because most synchronous CRTs perform a carriage return/line feed automatically at the end of a line, instead of under program control. Therefore, the control byte to prevent cursor movement after printing does not apply to most synchronous CRTs.

The 0005 control byte retains only two of the three functions it had under TELEX. It still causes input prompt suppression and causes the next input to be interpreted as 6/12-bit internal display codes. However, the function of special handling for input editing (backspace, input line cancel, and line feed) is now done when the terminal is placed in special editing mode, which is done with the SE terminal definition parameter (appendix F).

IAF LOGOUT AND NETWORK LOGOUT

The simple use of BYE or HELLO on IAF performs the same function as on TELEX. BYE causes the terminal to be logged out of both IAF and the network. HELLO causes the terminal to be logged out of IAF and transferred to the network. Login prompts begin with the assumption that a new user is at the terminal.

Entering BYE, application name (for example, BYE, TAF) causes the user to be transferred to the named application. Internally in NOS, the user is validated to ensure that he is allowed to access the named application.

ADDITIONAL DATA RETURN FROM TSTATUS MACRO

The user of this system macro finds the following changes in the response.

- The terminal type identification (returned in bits 59 through 18 of word 0) is NAMIAF for all network terminals.
- The transmission code (returned in bits 17 through 12 of word 1) is 3.
- A new field has been added in bits 43 through 36 of word 1 to contain the terminal class (appendix F).

PAPER TAPE

Because Network Products offer full virtual terminal appearances to IAF for terminal input and output, IAF processes paper tape input as it would keyboard input. A null input line from paper tape has the same effect as it does from the keyboard. In normal mode it invokes a status response, and in text mode it inserts a blank line into the primary file. Under TELEX, paper tape input ignored null input lines.

Paper tape input is initiated using the IN (input mode selection) terminal definition parameter (appendix F) instead of the former TELEX TAPE command.

Under TELEX input parity was not checked and, therefore, input parity and output parity could be different. Under IAF, input and output parity must match. This affects applications, such as numeric control, that attempt to punch paper tape in a different parity than the setting of the terminal.

CHANGES AFFECTING ONLY SITE OPERATIONS

The changes that affect only site operations are described in the following paragraphs.

MODVAL — ADDITIONAL VALIDATION INFORMATION

The validation file includes information used by the Network Validation Facility in determining whether a given user may be transferred to a requested application. This allows a site to control use of applications by users, much in the same way that it controls user capabilities through the access word. With Network Products, bits 47 through 24 of the access word are used to control application access.

A conversion aid is supplied as a MODVAL control statement option to avoid spurious generation of application validation (AP) directives from existing validation files. This problem occurs only when the existing access word has bits set in positions 47 through 24 (such as users with AW=ALL privileges). The control statement parameter SP causes MODVAL to ignore all application permission bits and enter an AP=NUL statement directive in the source file for each user record. Failure to use the SP parameter during conversion (or failure to perform the conversion) simply means that users with bits set in positions 47 through 24 of the access word could have access to applications they are not entitled to use.

NETWORK DESCRIPTION FILES — REQUIREMENTS

IAF does not require network description files although TELEX did. TAF interfacing with the network now requires a separate network description file.

IAF must know how many terminals it is expected to accept simultaneously. The number of terminals, formerly specified in a network description file, is now specified in a CMRDECK entry (refer to the CMRDECK section in the Installation Handbook).

DSD T DISPLAY

Minor changes have been made to this display to present more information. A new first column has been added indicating whether a terminal is a network terminal (NAM) or a stimulator terminal (MUX). The LINE column displays the application connection number (ACN) for network terminals rather than a line or port number. The word TELEX in the display header has been changed to TIMESHARING.

NOTE

The ACN cannot be used to identify a physical terminal or port number. An ACN is simply an internal identification of a connection between NAM and IAF which remains valid only for the life of that connection.

TAF/TS AND TAF/NAM

IAF does not interface with TAF/TS. TAF/NAM is an independent application which communicates directly with terminals.

CONSOLE OPERATOR'S IAF INITIALIZATION COMMAND

The command IAFffff† is used to initialize IAF, if this has not been done with the AUTO command. If the network software is running, IAF begins operation.

If NAM is not available, IAF issues the message WAITING FOR NETWORK to the B display and periodically attempts a network connection until either it is successful or the operator terminates it by entering 1.STOP.

TERMINAL FILE EST ASSIGNMENT

To provide compatibility with TELEX, all terminal input and output files are assigned to a dummy device, TT, defined as EST ordinal 75.

† The characters ffff are optional; if required, site personnel must supply the one to four alphanumeric characters to be used.

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