CD CONTROL DATA
CORPORATION

S A Mosberger

NETWORK PRODUCTS

INTERACTIVE FACILITY
VERSION 1
USER'S GUIDE

CDC® OPERATING SYSTEM:
   NOS 1

REVISION RECORD

REVISION	DESCRIPTION
A	Manual released. This manual reflects NOS 1.3 at PSR level 472.
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	interruption character, and termination character; additions to time and SRU limit messages; and TRMDEF
	command to change terminal characteristics. This edition obsoletes all previous editions.

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LIST OF EFFECTIVE PAGES

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PREFACE

This user's guide, describing the Interactive Facility (IAF) of the Network Operating System (NOS), is an introductory text. Its organization comprises a sequential presentation of topics that can be followed by a new user. Complex topics and those of limited or no use to the inexperienced user have either been omitted or simplified. Some features are only partially described at first; their complete explanation is delayed to the point in the text where the additional information will not be confusing or out of context.

AUDIENCE

This guide is oriented toward the beginning user of FORTRAN or BASIC. A knowledge of these languages is useful but not required in using this manual. It is assumed the user has no experience with IAF.

ORGANIZATION

Section 1 discusses the fundamental concepts of the operating system and the job. Sections 2, 3, and 4 comprise the main body of the text. Section 2 describes the procedures the user must follow to connect the terminal to the computer and to be identified as a valid user. Section 3 describes the basic techniques used to create and to run a program in FORTRAN or BASIC. Although this section is somewhat cursory, the user should be able to run programs and make corrections to them after completing this section. Section 4 describes how to save a program on a file and retrieve it at a later terminal session. This eliminates the need to reenter the program each time and allows the user to make improvements and corrections over a period of several terminal sessions.

Sections 5 and 6 provide commands and techniques that add scope and convenience to the user's abilities to manipulate files and interact with the operating system in general. Section 5 provides sufficient information for the user to use several additional commands that are of immediate usefulness. Section 6 gives brief descriptions of the remaining features and commands of IAF.

Appendix A is a glossary of terms used in this guide. A beginning user should refer to the glossary for descriptions of terms with which he is unfamiliar. Appendix B gives a brief summary of the characteristics of a terminal that a user can change and the commands used to change them. A beginning user seldom, if ever, needs to change the characteristics of his terminal.

The Network Products Interactive Facility Reference Manual (publication number 60455250) should be consulted for complete descriptions of all IAF and terminal definition commands, as well as for explanations of diagnostics. This manual should be used as the primary source of information once the information presented in this guide is mastered.
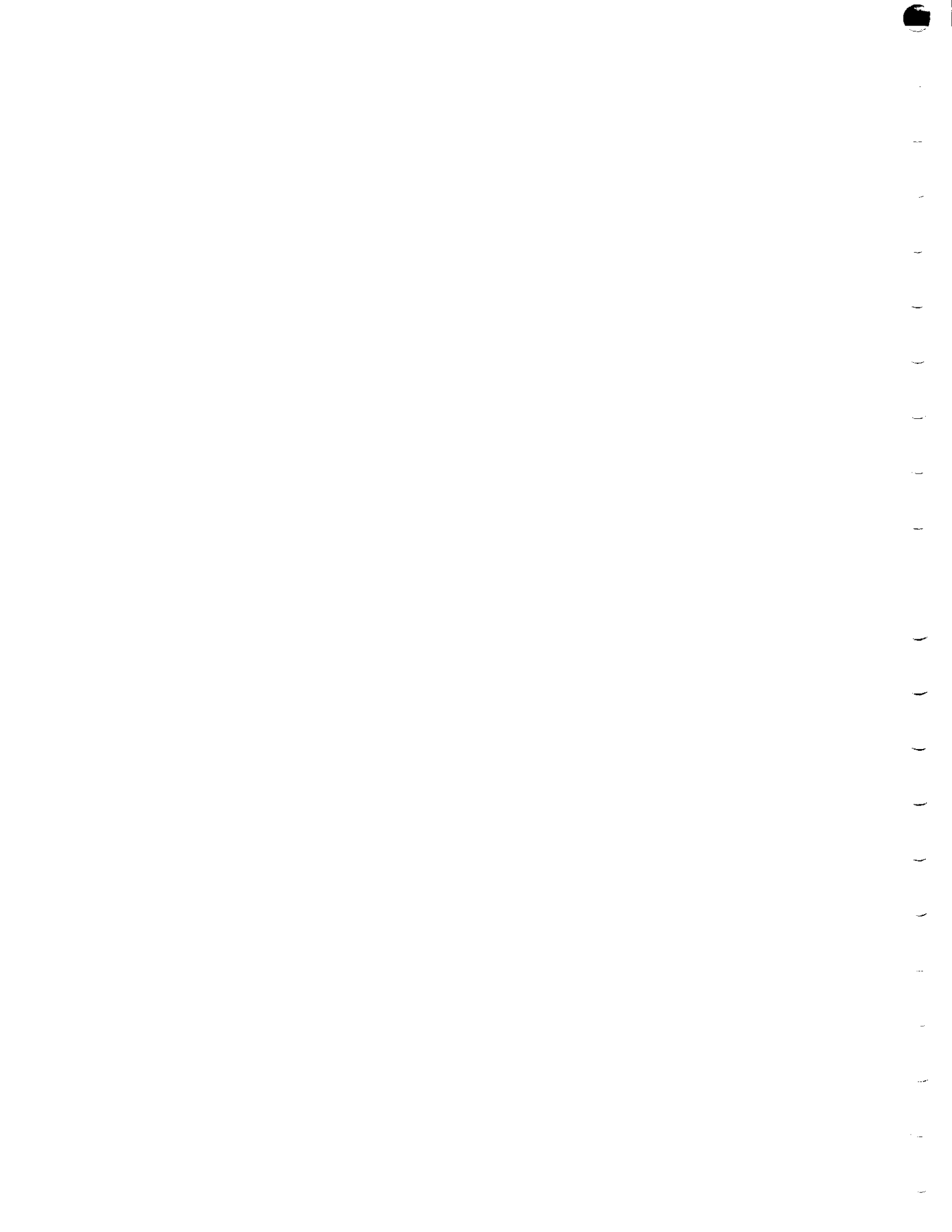
RELATED PUBLICATIONS

The following publications are referenced in the text and may be consulted for further information.

Control Data Publication	Publication Number
NOS Version 1 Reference Manual, Volume 1	60435400
FORTRAN Extended Version 4 Reference Manual	60497800
FORTRAN Version 5 Reference Manual	60481300
BASIC Version 3 Reference Manual	19983900
Text Editor Reference Manual	60436100
XEDIT Version 3 Reference Manual	60455730
Network Products Network Terminal User's Instant	60455270
APL Version 2 Reference Manual	60454000

DISCLAIMER

This product is intended for use only as described in this document. This manual describes a subset of the features and parameters documented in the IAF Reference Manual. Control Data cannot be responsible for the proper functioning of any features or parameters not documented in the IAF Reference Manual.

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APPENDIXES

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FIGURES

Whenever you are working at a time-sharing terminal, you will be interacting with a computer whose function is being directed by an operating system. To give you some perspective of the Interactive Facility (IAF) of the Network Operating System (NOS), the following descriptions are provided.

OPERATING SYSTEM AND JOBS

An operating system processes user jobs. The processing includes compiling and running users' programs; formatting data; calculating; retrieving, storing, and updating collections of information; and accumulating records of computer usage by individual users for accounting and billing purposes – all the activities associated with data processing. A user job is a unit of work organized by the user to accomplish specific data processing tasks. The operating system receives the user jobs either as batch jobs from a card reader at the local site, or from software modules which link a network of remote terminals to the operating system. IAF is one such module and allows terminal users to process jobs interactively at a terminal session.

In a batch job, you prepare control statements (typically on punched cards), which specify the data manipulations to be performed by the system. These statements are prepared before the system begins processing them. Your batch job may include programs and data that the system manipulates at the direction of the control statements, or the control statements may specify collections of information distinct from the job for the system to manipulate. Processing of your batch job ends normally when the last control statement is processed, or prematurely when the system cannot process a control statement (for example, a misspelled, and therefore indecipherable, control statement).

In an interactive session, you enter commands at a terminal to specify the actions you want IAF and the operating system to take. Each command you enter is processed immediately, and an indication of the results of the command is given at the terminal. This indication may range from confirming that your command was accepted to printing the results (output) of a program you just ran. A command you enter may call for processing of a program or a collection of data created earlier, possibly by another user, or you may enter the data or program via the terminal keyboard. The terminal session does not end if you enter an unintelligible command. Instead, IAF prints a message at your terminal informing you that it cannot understand what you typed and waits for you to try again.

IAF AND THE NETWORK

IAF allows you to process jobs interactively at a terminal session. However, before your job processing can begin, you and your terminal must become part of the communications network. For this to happen you must identify the terminal to the network and provide validation information so that the network recognizes you as a legitimate network user.

Identifying the terminal to the network might only involve dialing the correct phone number and connecting the terminal to the line. It might also mean pressing several keys on the terminal so the network can determine what kind of terminal you are using. When the network recognizes the terminal, it issues a message to the terminal which includes a request for validation information from you. While the network has not accepted you as a valid user at this point, it has accepted the terminal as legitimate.

After you have correctly identified yourself, the network recognizes the terminal as part of the network and you as a valid network user and allows you to choose one of the software modules (called applications) to access. When you select an application, another validation process takes place. When you choose IAF, the network checks to make sure you have the right to use IAF. When this procedure is complete, you are a validated user and can begin job processing.

This procedure is discussed in more detail in section 2. However, it may vary considerably from site to site. At some computer sites, it may only be necessary to press a key on the terminal and immediately begin IAF processing. At other sites, you need only identify yourself as a valid user and the network assigns you to IAF. In any case, whether simple or more complicated, you can think of initiating interactive processing as a two-part sequence; first, becoming part of the network; and second, choosing an application (IAF) to use.

In the same manner, terminating your interactive session can be considered a two-part sequence. First, you leave IAF control while remaining part of the network, and second, you leave the network. Both parts of this sequence are performed with one command. This sequence is described in detail in section 2.

TERMINAL SESSION

While NOS is a large and sophisticated system, you need only develop as much sophistication as your programming

tasks demand. Although your programming requirements may vary with time, a typical terminal session usually has the basic structure outlined in the following steps.

1. You physically connect your terminal to the computer and identify the terminal to the network.

2. You identify yourself to the network as a valid user.

3. You access IAF.

4. You enter a program (or retrieve a previously entered program) via the terminal keyboard, making any corrections you need before attempting to run the program.

5. You run the program, receiving output produced by it at the terminal or receiving diagnostic messages informing you of errors in the program.

6. If necessary, you make corrections or improvements to the program and return to step 5. If desired, you store the entire program text, as is, so that you may retrieve it at a later terminal session.

7. You inform IAF that you are finished, causing it and the network to break the connection to your terminal. This allows the system to use any resources which had been temporarily dedicated to your terminal's activity for other users' requirements.

This structure is not definitive. For example, you may store your incomplete program before you attempt to run it if you do not have sufficient time to enter all of it or if you wish to preserve a copy of it for safekeeping. Also, you may end the session any time that you have the opportunity to enter a command, not just after saving or running a program.

CONVENTIONS

Every line of text you enter at the terminal, whether it is a command or a line in your program, is ended with a message terminator. Depending on your terminal, this key may be the RETURN, CR, CARRIAGE RETURN, SEND, or ETX key. Since this is always true, it is not noted hereafter in the text unless the clarity of an explanation suffers. When the need for clarity demands it, a message terminator is denoted by the symbol ⓒⓡ. For example, if you read the following:

> When the system types RECOVER/SYSTEM, respond with FTNTS.

you should

> Type FTNTS
> Press ⓒⓡ

The following sections describe characters that you can enter to perform operations such as temporarily stopping output from an executing program or deleting a line you have entered incorrectly. These characters vary depending on the terminal you have. In the main text of this guide, the characters are given for the most common terminals: display terminals such as CDC® 713 terminals and most portable and printing terminals. Appendix B gives the default characters for all terminals.

For the terminals just mentioned, you will be told to use the control key. The control key on your terminal is labeled CTRL, CNTL, CNTRL, or similar characters. You press the control key and, while holding it down, press another key. For example, to stop an executing program, you press and hold the control key and press the T key. This combination of keys is indicated in this manual by the notation CTRL/T.

Examples given in the text employ the same convention used on most (but not all) terminals: characters entered by the user are shown in lowercase, and characters printed by the system are shown in uppercase. This will be true of all examples unless specified otherwise in a particular example. When the difference between the letter O and zero is not apparent from the typeface of the text (such as in examples of terminal output), the letter O is broken (Ø).

This section tells you how to begin and how to end a terminal session. First, the procedure you must follow to establish a physical connection between the terminal and the computer and identify the terminal to the network is described. This procedure is always the same; you or any user will follow the same steps each time the terminal is connected to the computer. Second, the login sequence is described. Login consists of identifying yourself to the network as a valid user and accessing the appropriate application, in this case IAF. You do this by responding to requests made by the network. The entries you make in response to these requests are, for the most part, unique to you as an individual user. Finally, the commands you enter to log out are given.

You cannot damage the computer or operating system by entering information incorrectly or pressing the wrong keys at the wrong time. If you make a mistake, the system sends you a message indicating that you have made an error and allows you to retry the entry. If you reach a point where you can no longer follow the procedures in this section, refer to the last part of this section, What to Do When Problems Occur.

PREPARATION

Before you begin to connect the terminal to the system and log in, you must have the following specific information.

About the terminal, you must know

- The characteristics of your terminal. The network groups terminals into terminal classes and defines a set of characteristics for each class. These characteristics include specifying which key you should use to backspace the carriage and which key you should use to interrupt a program in progress. Your site should give you a list of characteristics and the default values for your terminal class. Most terminals are either terminal class 1 or terminal class 2. Terminal class 1 includes most portable and printing terminals such as teletypewriters, and terminal class 2 includes display terminals such as CDC 713 terminals.

- The physical means by which the terminal is coupled to the computer (acoustic coupler, data set, or hardwired connections).

- The telephone number used to reach the computer (if yours is not a hardwired terminal).

- The locations of the duplex, parity, line speed, and line/local switches. If the terminal you use does not have one or more of these switches, ignore any further reference to them or their setting.

- The line speed (rate of transmission of information between the terminal and the computer) to be set on the line-speed switch. If more than one telephone number can be dialed to reach the computer, the use of different numbers may require that you set different line speeds on the terminal. You may also be given numbers of certain telephone lines through which the system can automatically detect the line speed. If this is the case, you can dial the same number each time you log in without being concerned with the speed of the terminal. The system recognizes which speed you are using.

To respond correctly to the requests that the network makes during login, you must know

- Your family name.

- Your user name.

- Your password.

- Your charge number and project number, if they are required at your site.

All of this information can be obtained from personnel at your site.

PHYSICAL CONNECTION AND TERMINAL IDENTIFICATION

The easiest way to connect and identify your terminal for the first time is to have someone familiar with your type of terminal go through the procedure with you. If this is not possible, perform the following procedures, using the information you gathered previously about your terminal. If the only information you have is the telephone number of the computer, try the procedure anyway. The operating system is designed to automatically recognize your terminal and several of its switch settings. As mentioned previously, you cannot harm the computer or operating system.

This procedure is divided into three parts: terminal preparation, dial-in, and terminal identification. If your terminal is hardwired, the dial-in section does not apply. Any step which contains a reference to a switch or feature that your terminal does not have can be ignored.

TERMINAL PREPARATION

You should prepare the terminal by setting the switches to enable the terminal to be connected to the network. You should also set switches to match values of terminal characteristics for the class of the terminal. The default

terminal characteristics are listed in appendix B. (The commands in that section are used to specify the terminal characteristics.) Use the following steps.

1. Set the power switch to the on position.

2. If the terminal has a duplex switch, set it to the HALF position. This is the normal setting for all terminal classes.

3. If the terminal has a parity switch, set it to the proper position for the terminal class of the terminal. EVEN is the normal setting for class 1 and 2 terminals.

4. If the terminal has a line-speed switch, set it to the position that matches the speed or speed range of the line you are calling. If you are not sure of the line speed, set the switch to any position (usually 10 to 30 characters per second); the system may automatically detect the line speed you are using.

5. Set the line/local switch to the line position. When this switch (sometimes called the mode switch) is set to the local position, the terminal displays keyboard entries without transmitting them.

DIAL-IN

The dial-in procedure connects the terminal to the computer through a data set or an acoustic coupler. Either of these may be built into the terminal or may be a separate unit. The procedures for each type of coupler are given separately. Follow the one which applies to your terminal.

Data Set

1. Pick up the telephone receiver.

2. Press the TALK button and listen for a dial tone. The light in the button comes on.

3. Dial the telephone number of the computer.

4. When you hear a high-pitched continuous tone, press the DATA button. The light in this button comes on, and the light in the TALK button goes out.

5. Replace the telephone receiver.

Connection has been made to the computer, and you are ready to identify the terminal to the network. Proceed to Terminal Identification.

Acoustic Coupler

1. If the acoustic coupler is not built into the terminal, turn the coupler's power switch to the on position.

2. Pick up the telephone receiver and listen for a dial tone.

3. Dial the telephone number of the computer.

4. When you hear a high-pitched continuous tone, place the receiver in the rubber cups of the acoustic coupler, ensuring that the telephone-cord end of the receiver is at the correct end, as marked on the coupler.

Connection has been made to the computer, and you are ready to identify the terminal to the network.

TERMINAL IDENTIFICATION

After completing the dial-in procedure and establishing a connection with the computer, you may have to identify the terminal to the network. If this is not required, the login sequence will start without it. But in some cases the network needs input from the terminal to correctly identify it.

If terminal identification is required, perform one of the following actions.

● Press SEND for mode 4A terminals (on these terminals, the SEND key takes the place of the carriage return).

● Press ETX for mode 4C terminals (on these terminals, the ETX key takes the place of the carriage return).

● Press ⓒⓡ for most terminals. (This entry is the most common.) If the telephone line you dialed is one that automatically recognizes terminal line speeds (which is the usual case), the system issues two line feeds when it has detected the line speed of your terminal. You then enter) ⓒⓡ (a right parenthesis followed by a carriage return) and the system proceeds with automatic detection of the character code of the terminal. For an ASCII terminal, you can enter ⓒⓡ alone and the character code is assumed to be ASCII. If you don't know your terminal's character code, enter) ⓒⓡ and the system will determine it for you.

The network identifies the terminal and sends a message to begin the login sequence.

LOGIN PROCEDURE

The login procedure identifies you as a valid user of the network and IAF. This procedure begins with the network printing three lines at the terminal. The first line usually consists of the date, time (a 24-hour clock is used: 1 p.m. is shown as 13.00.00., 2 p.m. as 14.00.00., and so on), and a network supplied terminal name which might appear as follows:

79/07/11. 14.56.09. L10T1

The second line is the header identifying the site to which you are connected. It may include the company name, the name and version of the operating system, and/or other information unique to your site. This line might appear as follows:

ACME DEVELOPMENT SYSTEM. NOS 1.

The third line is a request for the name of the family to which you were assigned.

FAMILY:

Enter the name you were given. For example, if you were approved for family AAA, enter this on the same line, followed by a carriage return. Letters of the alphabet can be entered in either uppercase or lowercase.

FAMILY: aaa

If yours is the default family for your system, enter only a carriage return.

FAMILY: ⓒⓡ

The network then requests your user name. The request appears as

USER NAME:

Enter the user name you were assigned on the same line followed by a carriage return. For example, if your user name is WX789YZ, the line is now

USER NAME: wx789yz

After you press the carriage return, the network responds with two lines.

PASSWORD
▮▮▮▮▮▮▮▮

The network produces the second line by overtyping a variety of characters (if possible, on your terminal) to obscure the password that you should now enter, followed by a carriage return. If a password is not required, enter only a carriage return.

If your family name, user name, and password are acceptable, the network either places you under control of IAF automatically or requests that you select IAF by issuing the following:

termnam – APPLICATION:

The termnam on this line is the same terminal name as that on the first line of the login sequence. You select IAF by entering IAF on the same line followed by a carriage return. This might appear as follows for terminal L10T1.

L10T1   – APPLICATION: iaf

If you are validated to use IAF, the network places your terminal under IAF control.

You can enter your family name, user name, password, and application name (separated by commas) on one line when

the family name request appears. For example, if your password is PASS12, the response to the request for your family name could appear as follows:

FAMILY: aaa,wx789yz,pass12,iaf

When this method is used, the network omits the intermediate prompts and places your terminal under IAF control.

When the terminal is placed under IAF control, IAF responds on the next line by identifying the terminal number. For example:

TERMINAL: 101, NAMIAF

This indicates that this is terminal number 101 of this installation's interactive facility. This number is not fixed; that is, the next time you log in on this terminal, IAF may issue a different terminal number.

⌐NOTE⌐

Always note the terminal number. You will need it if your terminal is unexpectedly disconnected from the computer.

The next line that IAF prints is either

RECOVER /SYSTEM:

or

RECOVER/ CHARGE:

Depending on the prompt, IAF is requesting you to enter an IAF command (following RECOVER/SYSTEM), the CHARGE command (following RECOVER/CHARGE), or the special command RECOVER. This command, discussed in section 5, is entered if you were previously logged in and unexpectedly disconnected.

If your user name does not require a charge number, RECOVER/SYSTEM is printed. At this point you can enter any valid IAF command. The login procedure is considered complete and you may skip the following discussion of charge number entry.

If, however, your user name requires a charge number, IAF prints RECOVER/CHARGE. Enter CHARGE followed by a comma and your charge and project numbers, separated by a comma, and a carriage return. If you were not furnished with a project number, omit the second comma and press carriage return after entering your charge number. For example, if your charge number is 5923 and your project number is PROJ1, your response is

RECOVER/ CHARGE: charge,5923,proj1

IAF then responds

READY.

and waits for you to enter an IAF command.

An alternate way of entering this information is to respond by typing only the word CHARGE, in which case IAF requests the charge number and the project number in the same manner that the network requested your password. If you use this method, your terminal has the following appearance.

```
RECOVER/ CHARGE: charge

CHARGE NUMBER:
? ▉▉▉▉▉▉▉▉▉▉
PROJECT NUMBER:
? ▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉
READY.
```

If you were not furnished with a project number, enter only a carriage return after the second row of blackouts is typed. After the charge number and (possibly) the project number have been entered over the blackouts, IAF prints READY, indicating that it is ready to accept an IAF command.

LOGOUT PROCEDURE

To terminate a terminal session, type one of the following commands.

GOODBYE

or

BYE

or

LOGOUT

These commands are identical and cause the terminal to be disconnected from the telephone line. They end the terminal session. After IAF and the network issue logout messages (described in the following), you should turn off the terminal power, and if you are connected via an acoustic coupler, replace the receiver on the telephone.

If another user is going to use the terminal immediately after you, you may end the terminal session without disconnecting the terminal by entering either of the following identical commands.

HELLO

or

LOGIN

Logout messages are issued and the network initiates another login sequence. The following example illustrates the logout procedure using HELLO.

```
hello

WX789YZ    LOG OFF    13.35.15.
WX789YZ    SRU        2.915 UNTS.


IAF      CONNECT TIME  0.32.17.
```

The last three lines are printed at the end of every terminal session. In the example, the user whose user name is WX789YZ logs out at 35 minutes after 1 p.m.; his terminal session used 2.915 system resource units (SRUs), a measure of computing activity used for accounting and billing purposes; and he was connected to IAF for 32 minutes and 17 seconds. Following these lines, the network displays the first three lines of the login sequence in anticipation of another user logging in.

WHAT TO DO WHEN PROBLEMS OCCUR

DURING DIAL-IN

If you have dialed the telephone number of the computer but do not receive a high-pitched continuous tone (that is, the telephone rings unanswered or you hear a busy signal), the computer may not be in operation or the maximum number of users may already be using that telephone number. Try alternate numbers if you have them. If you still do not receive a high-pitched continuous tone, either the computer is not operating at this time or all lines are busy; try again later.

DURING LOGIN

If you receive the message

IMPROPER LOGIN, TRY AGAIN.

you have entered the family name, user name, or password incorrectly. The system displays FAMILY again and you can retry the procedure. The system allows you four tries to identify yourself correctly, then issues the message

ILLEGAL USER.

and disconnects the terminal. If this happens, check with personnel at your site to make sure your family name, user name, and password are correct. It is possible they have not yet been entered onto the system and, therefore, the system cannot recognize you as a valid user.

If you receive the message

ILLEGAL APPLICATION, TRY AGAIN.

you have entered the application name, IAF, incorrectly or you are not allowed to use IAF. The system displays APPLICATION again and you can enter the name IAF. After four unsuccessful attempts to enter the application name, the system issues the message

APPLICATION RETRY LIMIT.

and disconnects the terminal.

If you receive the message

APPLICATION NOT PRESENT.

or

CONNECTION REJECTED.

IAF is not currently available or the maximum number of users are accessing IAF. You should log out and try again at a later time.

The message

TIMEOUT.

indicates you waited too long to respond to a request from the system, such as FAMILY or USER NAME. A typical time limit is two minutes. If this happens, the terminal is disconnected. You can log back in again but should know what responses are required of you and enter them within the required period of time after the request is issued by the system.

Any other messages you get during login are self-explanatory. If the system is closed to IAF use or particularly busy, you are usually asked to try again later.

You can receive the message

REPEAT..

any time you are entering information, not just during login. It indicates that the network is temporarily overloaded and could not accept your last entry. Reenter the information.

Whenever you receive an error message indicating you have entered illegal information (for example, ILLEGAL COMMAND), check your last entry to ensure that the command is spelled correctly and commas are included where required.

This section presents the information needed to enter a program at the terminal, to run it, and to make changes to the program if needed. Also discussed are techniques for interrupting program execution or program output and two commands that you can use to obtain information from the system about your terminal and the IAF commands available to you.

ENTERING PROGRAMS IN FORTRAN OR BASIC

Once the login procedure is complete, IAF commands can be entered. You begin by specifying which programming language you will use, FORTRAN or BASIC. If you will be entering a FORTRAN program, specify the FORTRAN compiler by entering FTNTS or FORTRAN.† If you will be entering a BASIC program, enter BASIC. IAF responds with the following:

        OLD, NEW, OR LIB FILE:

Enter NEW.

        OLD, NEW, OR LIB FILE: new

(Other responses may also be appropriate. They are discussed later in this section and in subsequent sections.) IAF responds by requesting the name that you wish to give the file which will contain the lines of your program.

        FILE NAME:

You may give the file any name you wish, subject to the following restrictions.

- The name must contain only the letters of the alphabet and/or the digits 0 through 9 and, for most purposes, should begin with a letter.

- The name must be one to seven characters long.

The following examples show what the terminal session might look like if you specified the FORTRAN Extended Version 4 compiler and chose the file name HEROFTN. The first example shows the terminal's appearance if charge numbers are required.

        79/07/11. 13.41.57. L10T1
        ACME DEVELOPMENT SYSTEM. NOS 1.
        FAMILY: aaa
        USER NAME: wx789yz
        PASSWORD
        ████████
        L10T1   - APPLICATION: iaf
        TERMINAL: 101, NAMIAF
        RECOVER/ CHARGE: charge,5923,proj1

        READY.
        ftnts
        OLD, NEW, OR LIB FILE: new
        FILE NAME: heroftn

        READY.

This second example shows the terminal's appearance on a system that does not require charge numbers.

        79/07/11. 13.41.57. L10T1
        ACME DEVELOPMENT SYSTEM. NOS 1.
        FAMILY: aaa
        USER NAME: wx789yz
        PASSWORD
        ████████
        L10T1   - APPLICATION: iaf
        TERMINAL: 101, NAMIAF
        RECOVER /SYSTEM: ftnts
        OLD, NEW, OR LIB FILE: new
        FILE NAME: heroftn

        READY.

The READY responses indicate that IAF is ready to accept another command.

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† Entering FTNTS selects the FORTRAN Extended Version 4 compiler. Entering FORTRAN selects the FORTRAN Version 5 compiler. In this guide, all FORTRAN examples use the FORTRAN Extended Version 4 compiler.

You are now ready to begin entering your program. Figures 3-1 and 3-2 illustrate this procedure. Enter the following command.

AUTO

This command causes IAF to generate a line number for each line of your program. IAF begins numbering with 00100 and increments this by 10 for each new line. IAF also follows each line number with one blank to separate it from the line that you enter after the blank. End each line that you enter with a carriage return, thereby causing IAF to begin a new line with the next line number. Continue entering lines in this manner until the entire program is entered.

When the line number following the last line of the program is printed, enter the cancel character to cancel the effect of the AUTO command. The cancel character varies depending on the terminal being used (default characters are given in table B-1). For terminal classes 1 and 2, the most commonly used classes, you hold down the control key and press the X key,[†] then enter a carriage return. The network responds by printing *DEL* on the next line and positioning the carriage to the beginning of a new line.

You may then enter an IAF command or make changes to your program, as described in Changing and Correcting Programs in Auto Mode.

Several items about entering lines in a FORTRAN program should be mentioned here. (If you are not using FORTRAN, you may skip this paragraph.) Line numbers are used only as reference numbers to facilitate making changes to your program; they are not statement numbers. A statement number need not be separated from the rest of the statement by one or more blanks; the convention of placing it in columns 1 through 5 need not be followed. A statement may begin anywhere after the system-generated blank separating it from the line number. Continuation of a FORTRAN statement is indicated by deleting the line number (by entering the cancel character followed by a carriage return) and reentering the line number, immediately following it with a + instead of a blank. Any other character except a digit entered in place of the blank indicates that the line is a comment.

Line numbers in a BASIC program are themselves used as statement numbers.

CHANGING AND CORRECTING PROGRAMS IN AUTO MODE

Three methods are available for changing or correcting the text of your program.

- Backspacing.
- Current line deletion.
- Line replacement/insertion.

BACKSPACING

If you discover an error while typing a line (before ending the line with a carriage return), the error can be corrected by backspacing[††] to the erroneous character, typing the correct character, and reentering the rest of the line from that point on.

For example, assume you wish to enter a line reading THETA=SIN(X) as line number 00180 but instead your line appears as:

00180 theta=sone(

When you discover your error, you can correct it by pressing the backspace key four times and entering IN(X) (CR) to finish the line. The correction now appears as follows (this appears on two lines for clarity):

00180 theta=sone(
                 in(x)

Since each depression of the backspace key deletes one previously entered character, you must reenter any characters that were backspaced over, even through they may be correct.

CURRENT LINE DELETION

You can delete the entire line on which you are working by entering the cancel character (that is, holding down the control key and pressing X), followed by a carriage return. The network responds by printing *DEL* on the next line and positioning the carriage to the beginning of a new line. A line number does not appear.

To correct the line, reenter the entire line, including the line number. You may omit leading zeros in the line number, but you must still enter a blank after the line number to separate it from the rest of the line (unless it is a comment or continuation line). Once you end the line by pressing the carriage return key, IAF resumes supplying line numbers automatically.

[†] The cancel character can be changed using a terminal definition command or the TRMDEF command, both described in appendix B. For the remainder of this manual, the cancel character is assumed to be the X character entered while you are pressing the control key. It will be written as CTRL/X.

[††] The backspace key may appear as BACK SPACE, ← (left arrow), _ (underline), or BS (CTRL/H). Consult the reference manual supplied with your terminal or your site personnel if you are unsure of which key to use.

```
new,heroftn  ←───────────────────────  Rather than enter the NEW command and wait for the FILE
                                        NAME: prompt, you can include the file name on the NEW
                                        command as shown here. The name of the new file is HEROFTN.

 READY.
auto  ←──────────────────────────────  IAF generates line numbers automatically following the AUTO
                                        command.
00100 program hero (input,output)       The program name and file name are not related.

00110 1 read*, a, b, c

00120 if (a .eq. 0.0) stop
                                        A mistyped plus sign (+) is corrected by backspacing to the error
00130 s = (a ; b                        and reentering the rest of the line. (The correction is actually
             + b + c) / 2.0             overtyped on the same line; it appears on a separate line in this
                                        example for clarity.)
00140 rdcl = s * (s-a) * (s-b) * (s-c)

00150 if (rdcl .lt. 0.0) go to 2

00160 deliberate error no. 1 ←────────  At this point the user enters the cancel character (that is, while
                                        pressing the control key, he enters X), followed by a carriage
*DEL*                                   return. The entire line is deleted.

00160 area = sqrt(rdcl) ←────────────   The entire line including line number is reentered correctly.
                                        Automatic line numbering resumes following a carriage return.
00170 print 101, a, b, c, area

00180 deliberate error no. 2

00190 ←──────────────────────────────   The cancel character (CTRL/X) is entered and the line number
                                        is deleted even though nothing has been entered in the line from
*DEL*                                   the keyboard.

00180 go to 1 ←──────────────────────   The line is replaced by reentering the entire line, including line
                                        number. Automatic line numbering resumes following a
00190 2 print 102, a, b, c              carriage return.

00200 go to 1
                                        The incorrect statement number is corrected by backspacing
00210 210 format                        and retyping. (The correction appears on a separate line for
      101 format(10h sides are, 3f9.4 / clarity.)

00220 ←──────────────────────────────   The cancel character is entered to delete the line number.

*DEL*
                                        Continuation of a statement must be indicated by a +
00220+        8h area is, 1pe11.4) ←──   immediately following the line number. To enter a character in
                                        this position, delete the line number and retype the entire line
00230 102 format(10h sides are, 3f9.4 / including line number and +.

00240

*DEL*

00240+       17 invalid triangle)

00250 end

00260 ←──────────────────────────────   Program entry is complete. The cancel character is entered to
                                        delete the line number. Any valid IAF command can be entered.
*DEL*
```

Figure 3-1. FORTRAN Program Entry (Sheet 1 of 2)

```
lnh  ◄──────────────────────────────  Causes the file to be listed for inspection.

00100 PROGRAM HERO (INPUT,OUTPUT)
00110 1 READ*, A, B, C
00120 IF (A .EQ. 0.0) STOP
00130 S = (A + B + C) / 2.0
00140 RDCL = S * (S-A) * (S-B) * (S-C)
00150 IF (RDCL .LT. 0.0) GO TO 2
00160 AREA = SQRT(RDCL)
00170 PRINT 101, A, B, C, AREA
00180 GO TO 1
00190 2 PRINT 102, A, B, C
00200 GO TO 1
00210 101 FORMAT(10H SIDES ARE, 3F9.4 /
00220+           8H AREA IS, 1PE11.4)
00230 102 FORMAT(10H SIDES ARE, 3F9.4 /
00240+           17 INVALID TRIANGLE)
00250 END

READY.
```

Figure 3-1. FORTRAN Program Entry (Sheet 2 of 2)

new,herobas ◄──────────────────────── The file name, HEROBAS, is included in the NEW command.

READY. ──────────────────────────── IAF generates line numbers automatically following the AUTO
auto ◄   command.

00100 input a, b, c

00110 if a = 0 then 300

00120 s = (a ; b ────────────────────── A mistyped plus sign (+) is corrected by backspacing to the error
         + b + c) / 2   and reentering the rest of the line. (The correction is actually
                                        overtyped on the same line; it appears on a separate line in this
                                        example for clarity.)

00130 r = s * (s-a) * (s-b) * (s-c)

00140 if r < 0 then 190

00150 deliberate error no. 1◄─────────── At this point the user enters the cancel character (that is, while
                                         pressing the control key, he enters X), followed by a carriage
DEL   return. The entire line is deleted.

00150 x = sqr(r)◄─────────────────────── The entire line including line number is reentered correctly.
                                         Automatic line numbering resumes following a carriage return.
00160 print using 270, a, b, c

00170 deliberate error no. 2

00180 ◄──────────────────────────────── The cancel character (CTRL/X) is entered and the line number
                                         is deleted even though nothing has been entered in the line from
DEL   the keyboard.

00170 print using 280, x ◄────────────── The line is replaced by reentering the entire line, including line
                                         number. Automatic line numbering resumes following a
00180 goto 100   carriage return.

00190 print using 270, a, b, c

00200 print using 290

00210 goto 100

00220 ◄──────────────────────────────── The cancel character is entered to delete the line number.

DEL
                                        The line numbering sequence is altered by entering the desired
00270 : sides are ###.#### ###.#### ###.#### line number, line contents, and a carriage return. Line
                                        numbering resumes using the line number you entered as the
                                        last valid line number.

Figure 3-2. BASIC Program Entry and Resequencing (Sheet 1 of 2)

```
00280 : area ia ◄─────────────────────── A typing error is corrected by backspacing and retyping. (The
        s #.####^^^^                       correction appears on a separate line for clarity.)

00290 invalid triangle

00300 end ◄──────────────────────────── Program entry is complete. The cancel character is entered to
                                          delete the line number. Any valid IAF command can be entered.
00310 ◄────────────────

*DEL*

lnh ◄───────────────────────────────── The file is listed for inspection.


00100 INPUT A,B,C
00110 IF A = 0 THEN 300
00120 S = (A + B + C) / 2
00130 R = S * (S-A) * (S-B) * (S-C)
00140 IF R < 0 THEN 190
00150 X = SQR(R)
00160 PRINT USING 270, A, B, C
00170 PRINT USING 280, X
00180 GOTO 100
00190 PRINT USING 270, A, B, C
00200 PRINT USING 290
00210 GOTO 100
00270 : SIDES ARE ###.#### ###.#### ###.####
00280 : AREA IS #.####^^^^
00290 : INVALID TRIANGLE
00300 END

READY.
reseq ◄───────────────────────────────── The RESEQ command resequences lines, changing BASIC line
                                          number references within the program automatically.

READY.
lnh

00100 INPUT A,B,C
00110 IF A = 0 THEN 00250
00120 S = (A + B + C) / 2
00130 R = S * (S-A) * (S-B) * (S-C)
00140 IF R < 0 THEN 00190
00150 X = SQR(R)
00160 PRINT USING 00220 , A, B, C
00170 PRINT USING 00230 , X
00180 GOTO 00100
00190 PRINT USING 00220 , A, B, C
00200 PRINT USING 00240
00210 GOTO 00100
00220 : SIDES ARE ###.#### ###.#### ###.####
00230 : AREA IS #.####^^^^
00240 : INVALID TRIANGLE
00250 END

READY.
```

Figure 3-2. BASIC Program Entry and Resequencing (Sheet 2 of 2)

LINE REPLACEMENT/INSERTION

If you discover an error in a line other than the one you are entering, or if you find that you have omitted a line, make note of it and finish entering your program. When you enter the cancel character followed by carriage return to delete the last (unused) line number, IAF waits for your next entry on the following line. To make corrections to your program, you should first cancel the effects of the AUTO command by entering any IAF command. For now, use the NORMAL command. IAF responds with READY.

```
normal
READY.
```

To replace a line that you have already entered, reenter the entire line, including its line number. To delete a line, type its line number only, followed by a carriage return. To insert a line, enter the entire new line, together with an appropriately chosen new line number. An example of line insertion can be found in figure 3-3. For example, to insert a line between lines 130 and 140, a line number in the range 131 through 139 should be chosen.

If you wish to insert a new line between lines with consecutive line numbers or before line 0, you must first resequence your program. Enter RESEQ. When IAF finishes resequencing your program, it responds with READY.

```
reseq
READY.
```

The first line of your program is now 00100 with succeeding lines numbered in increments of 10. If you are resequencing a program in BASIC, IAF changes references to line (statement) numbers within your program to indicate the new line numbers. (An example of resequencing a BASIC program can be found in figure 3-2.) In FORTRAN, only the line numbers are changed. To change or insert lines at this point, you should first list your program to find out its new line numbers and then make insertions according to the new line numbers, as described previously.

LISTING A PROGRAM

To review what you have entered with all editing and/or resequencing included, enter LIST. IAF responds by first printing a two-line header.

```
list

79/07/12.  08.18.40.
PROGRAM    HEROBAS
```

The first line of the header is the current date and time; the second line gives the name that you gave the file on which your program resides. IAF then prints your entire program with all changes included. When it finishes, it responds with READY, indicating that you may enter an IAF command or make further changes to your program, if necessary. An alternate form of the command, LNH (list no header), produces the same results but without the two-line header. The LIST and LNH commands are illustrated in figure 3-4.

RUNNING A PROGRAM

Once you have entered your program and made any necessary corrections to it, you can compile and execute it by entering RUN. IAF prints a two-line header like the one it prints for the LIST command.

```
run

79/07/12.  08.25.38.
PROGRAM    HEROFTN
```

An alternate form of the run command, RNH (run no header), suppresses the printing of the header. The RUN command is illustrated in figure 3-5.

If you receive the response ILLEGAL COMMAND, you have either mistyped the command or neglected to specify which compiler you are using. If the latter is the case, enter FTNTS or BASIC and reenter the RUN (or RNH) command.

If the system successfully compiles your program, it then begins executing the program. Any output your program produces is printed at your terminal. When a READ (in FORTRAN) or INPUT (in BASIC) statement requests input, IAF prints a question mark at the terminal. You should then enter the data your program requires, ending the line with a carriage return.

When your program completes, IAF prints RUN COMPLETE, followed by the number of SRUs used during its compilation and execution. If the system detects errors in your program, it prints appropriate diagnostic messages at your terminal.

Your program might also stop because it exceeds one of the default limits imposed upon it by the operating system. If you receive the message

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

your program has exceeded the default time limit. If you receive the message

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

your program has exceeded the default SRU limit. Follow the instructions given in the message you receive. You can allocate additional time by entering T or additional SRUs by entering S and thus continue execution of your program. (The increment is defined by your site and should be enough for your normal processing.) You can stop execution of your program by entering a carriage return alone.

```
normal
  READY.

182c
183c   transfer here
184c   if invalid triangle
185c
112c   enter 0,0,0 to end
111c
113c   execution
114c
1nh ◄─────────────────────────────────────

00100 PROGRAM HERO (INPUT,OUTPUT)
00110 1 READ*,A,B,C
111C ◄─────────────────────────────────────
112C   ENTER 0,0,0 TO END
113C   EXECUTION
114C
00120 IF (A .EQ. 0.0) STOP
00130 S = (A + B + C) / 2.0
00140 RDCL = S * (S-A) * (S-B) * (S-C)
00150 IF (RDCL .LT. 0.0) GO TO 2
00160 AREA = SQRT(RDCL)
00170 PRINT 101, A, B, C, AREA
00180 GO TO 1
182C
183C   TRANSFER HERE
184C   IF INVALID TRIANGLE
185C
00190 2 PRINT 102, A, B, C
00200 GO TO 1
00210 101 FORMAT(10H SIDES ARE, 3F9.4 /
00220+            8H AREA IS, 1PE11.4)
00230 102 FORMAT(10H SIDES ARE, 3F9.4 /
00240+           17H INVALID TRIANGLE)
00250 END

  READY.
```

Auto mode is cancelled; line numbering does not resume following a carriage return.

These lines are to be inserted in the FORTRAN program shown in figure 3-1. To enter additional lines in the program, the user must enter both line numbers and line contents from the keyboard. Lines may be entered in any order, with or without leading zeros in the line number.

Lines are automatically sorted by IAF according to line number and the entire program is listed.

A comment is indicated by a character other than a blank or a + immediately following the line number.

Figure 3-3. Inserting Lines into a Program

```
list

 79/07/12. 08.23.56.
PROGRAM   HEROFTN

00100 PROGRAM HERO (INPUT,OUTPUT)
00110 1 READ*,A,B,C
00120 IF (A .EQ. 0.0) STOP
00130 S = (A + B + C) / 2.0
00140 RDCL = S * (S-A) * (S-B) * (S-C)
00150 IF (RDCL .LT. 0.0) GO TO 2
00160 AREA = SQRT(RDCL)
00170 PRINT 101, A, B, C, AREA
00180 GO TO 1
00190 2 PRINT 102, A, B, C
00200 GO TO 1
00210 101 FORMAT(10H SIDES ARE, 3F9.4 /
00220+            8H AREA IS, 1PE11.4)
00230 102 FORMAT(10H SIDES ARE, 3F9.4 /
00240+           17H INVALID TRIANGLE)
00250 END

  READY.

1nh

00100 PROGRAM HERO (INPUT,OUTPUT)
00110 1 READ*,A,B,C
00120 IF (A .EQ. 0.0) STOP
          .
          .
          .
```

The LIST command produces a header. HEROFTN is the name of the file which contains the program, not the actual program name.

The LNH command does not produce a header.

Figure 3-4. Listing a Program

run

```
79/07/12. 08.24.41.
PROGRAM   HEROFTN

? 3,4,5
  SIDES ARE   3.0000    4.0000    5.0000
  AREA IS 6.0000E+00
? 2,1,5
  SIDES ARE   2.0000    1.0000    5.0000
  INVALID TRIANGLE
? 1.5197,1.5197,1.5197
  SIDES ARE   1.5197    1.5197    1.5197
  AREA IS 1.0000E+00
? 0,0,0

SRU      0.746 UNTS.

RUN COMPLETE.
```

The program prompts for input with a ? and accepts three values at a time, each trio describing a triangle by the length of its sides. The program then responds by repeating the input values (for verification) and displaying the triangle's area after calculating it with Hero's formula. Processing stops when three zeros are entered.

Figure 3-5. Running a Program

INTERRUPTING AND TERMINATING PROGRAM OUTPUT/EXECUTION

While your program is printing output at your terminal, you can interrupt its output or stop its execution with the following procedure.

1. Press the BREAK key (this may be labeled INT, INTRPT, or ATTN on some terminals); do not press the carriage return. Output is suspended.

2. If you wish to continue output immediately, press carriage return. Output continues from the point of suspension (if output was suspended in the middle of a line, that line is output again). If you wish to interrupt your program, perform step 3; if you wish to terminate your program, continue with step 4.

3. To interrupt output, enter the interruption character. Like the cancel character, the interruption character varies depending on the terminal in use (default characters are given in table B-1). For terminal classes 1 and 2, hold down the control key and press the P key, then enter a carriage return.† IAF prints the message *INTERRUPTED*. At this point you can do one of the following:

    a. Press P(CR). The current output is discarded but the program continues to run.

    b. Press (CR). Output continues; however, you may find that some output is lost.

    c. Proceed with the termination sequence in step 4.

4. To terminate output and stop the execution of the program, enter the termination character. This character also varies depending on the terminal (default characters are given in table B-1). For terminal classes 1 and 2, hold down the control key and press the T key, then enter a carriage return.†† IAF prints the message *TERMINATED* after which you may enter an IAF command.

If you are using a terminal which does not have a BREAK, INT, INRPT, ATTN, or equivalent key, you cannot interrupt or terminate output.

If your program is requesting input or is executing, but not currently producing output, you can stop its execution by entering the termination character (CTRL/T). This can also be entered to stop program execution when you are informed you have exceeded your time limit or SRU limit. IAF responds by printing *TERMINATED* after which you may enter an IAF command.

INFORMATIVE COMMANDS

Two commands, HELP and ENQUIRE, provide you with information about other IAF commands and about the status of your terminal.

HELP COMMAND

A descripton of each IAF command is stored by IAF. By entering HELP, you can obtain one or more of these descriptions. IAF asks you which ones you want. To stop listing descriptions, wait for a question mark and type END (CR) or use the procedure mentioned previously for interrupting/stopping a program.

Figure 3-6 shows the description for the command that selects the FORTRAN language, FTNTS.

---

†The interruption character can be changed using a terminal definition command or the TRMDEF command, both described in appendix B. For the remainder of this manual, the interruption character is assumed to be the P character entered while you are pressing the control key. It will be written as CTRL/P.
††The termination character can be changed using a terminal definition command or the TRMDEF command, both described in appendix B. For the remainder of this manual, the termination character is assumed to be the T key entered while you are pressing the control key. It will be written as CTRL/T.

```
help

  FOR MORE HELP TYPE YES, OTHERWISE ENTER COMMAND DESIRED.
  ? ftnts
  FTNTS
  FTNTS,NNNN.
              SELECTS   THE   FORTRAN   TIME   SHARING LANGUAGE SUBSYSTEM.   THE

              *NNNN* PARAMETER MAY  SPECIFY  ONE   ADDITIONAL   COMMAND.    IF

              *NNNN*  IS   NULL   AND NO PRIMARY FILE IS CURRENTLY SPECIFIED,

              THE SYSTEM RESPONDS -
                      OLD, NEW, OR LIB FILE -
              THE USER MUST THEN  SPECIFY FILE TYPE AND FILE NAME HE WISHES

              TO USE.   UNDER THIS SUBSYSTEM, THE *RUN* COMMAND WILL COMPILE

              AND EXECUTE THE INDICATED FILE.
              EXAMPLES -
                      FTNTS,OLD,A  -  BRINGS UP THE FTNTS SUBSYSTEM
                                       AND THE PERMANENT FILE A.
                      FTNTS,RUN   -  BRINGS UP THE FTNTS SUBSYSTEM AND
                                       COMPILES AND EXECUTES THE PRIMARY FILE.
                      FTNTS,ENQUIRE  -  BRINGS UP THE FTNTS SUBSYSTEM AND
                                       EXECUTES THE *ENQUIRE* COMMAND.
  ? end
    READY.
```

Figure 3-6. HELP Command Example

ENQUIRE COMMAND

To obtain information about your terminal, enter ENQUIRE. IAF responds with five lines of information.

The first line shows the terminal number, similar to the corresponding line printed at login.

The second line shows the programming language that is currently being used (for example, FTNTS or BASIC). If no language was selected, this line is SYSTEM: NULL.

The third line shows the name of the file containing your program.

The fourth line is one of the following:

    STATUS: IDLE

      or

STATUS: EXECUTE

    or

STATUS: WAIT

IDLE indicates that no program is currently running. EXECUTE indicates that your program is running. WAIT indicates that your job is waiting for some system resource to become available before it continues.

The fifth line shows the last message issued by the system if the job is currently active (status is EXECUTE or WAIT); no entry appears in this line if the job is not active (status is IDLE).

The response to an ENQUIRE command might appear as follows:

```
TERMINAL:    20, NAMIAF
SYSTEM:   FTNTS
FILE NAME: HEROFTN
STATUS:    IDLE
MESSAGE:
```

This section shows you how to save programs and data as permanent files that you can retrieve at later terminal sessions. Several conventions are used in figures in this section to illustrate the commands. Text appearing in the Terminal column is either an explanatory comment or a terminal command. Files are indicated by a combination of two symbols: the first (☐▷) indicates the file name and the second (☐) represents the file contents. If the symbol enclosing the file name is drawn with a heavy black line (☐▷), it indicates the primary file. These conventions are illustrated in figure 4-1.

FILES

A file is a collection of information referenced by a single name. As mentioned in section 3, a file name can be one to seven characters long, consist of letters of the alphabet and/or digits 0 through 9, and should begin with a letter. A file can contain any information you wish: typical examples are a program, input data to a program, and output resulting from a program's execution. A file can be permanent or temporary.

PERMANENT FILES

Permanent files are saved during a terminal session and can be retrieved at any time. Each permanent file that you create is identified by a name. In general, only the user who originally saves a file can retrieve, modify, or delete the permanent file. (Methods for granting permanent file access to users other than a file's creator are discussed in section 5.)

When you retrieve a permanent file, the operating system makes a copy of the file for use at the terminal. Any changes you make to the file occur only on the copy at the terminal; the actual permanent file is not changed. To save the changed version, you must issue a command to replace the permanent file with the copy of the file at your terminal. (A permanent file that you can access directly is described in the IAF Reference Manual.)

TEMPORARY FILES

A temporary file is created during a terminal session and lasts only as long as the session is in progress. It can be listed at the terminal or run as a program and is created in one of three ways.

● As a new, empty file into which information can be entered through the keyboard (created with the NEW command described in section 3).

● As a copy of a permanent file (created with the OLD or GET commands described in this section).

● As output from a program execution.

You can designate one file as the primary file. Once such a file exists, you can enter information into it directly with the AUTO command (described in section 3) or the TEXT command (described in this section). The primary file is the default file for many IAF operations. For example, if you enter LIST without specifying a file name, the primary file is listed. The primary file is also rewound to its beginning before every operation performed upon it. Typically, you enter your program into the primary file; you use one or more temporary files (as necessary) as auxiliary input or output from your program during its execution.
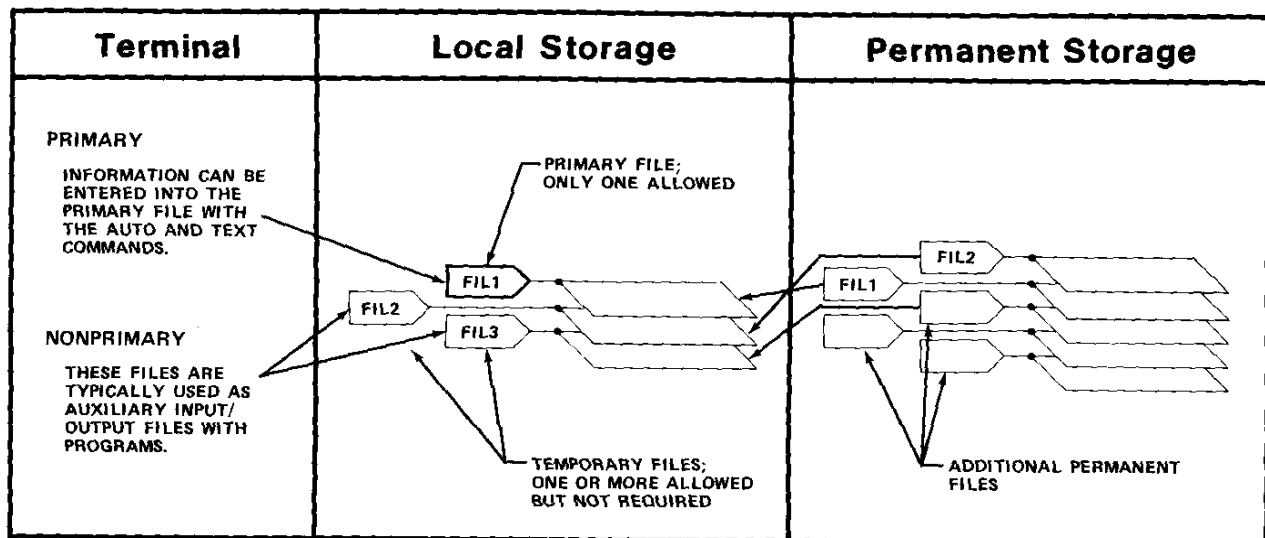

Figure 4-1. Primary and Temporary Files

CREATING A PRIMARY FILE

You have already been shown how to create a primary file in section 3 (Running a Program at the Terminal) by responding to requests from the system. To review that procedure, when you choose a programming language and have no existing primary file, the system responds

    OLD, NEW, OR LIB FILE:

You enter NEW to create an empty primary file. IAF asks for the name to be given to the primary file.

    FILE NAME:

You enter any valid file name. Remember this procedure works only if you are requesting a programming language and currently have no primary file.

To create an empty primary file at any time during a terminal session, regardless of whether you already have an existing primary file, enter the command

NEW

IAF requests the name to be given to the file and you respond with a valid file name. To eliminate this extra step, you can specify the file name with the command

    NEW,filename

If you already have a primary file, it is released when you request a new primary file. When a file is released, it is no longer available for use at your terminal. (If the primary file was a copy of a permanent file, only the temporary copy at the terminal is released; the file in permanent storage remains permanent.) All other temporary files are also released unless you include the ND (no drop) parameter on the NEW command.

    NEW,filename/ND

The NEW command is illustrated in figure 4-2. It is shown in an example in figure 4-3.

Terminal	Local Storage	Permanent Storage
1 NEW, FIL1 PREMARY FILE FIL1 IS CREATED. PERMANENT STORAGE IS UNAFFECTED.	FIL1	
2 AUTO • • • USER ENTERS INFORMATION INTO FILE FIL1. COPY IN PERMANENT STORAGE IS NOT CHANGED.	FIL1	NO CHANGE
3 LIST or LIST, F=FIL1 INFORMATION IS TRANSFERRED TO TERMINAL.	FIL1	NO CHANGE
4 SAVE or SAVE, FIL1 FILE IS COPIED TO PERMANENT STORAGE.	FIL1	FIL1
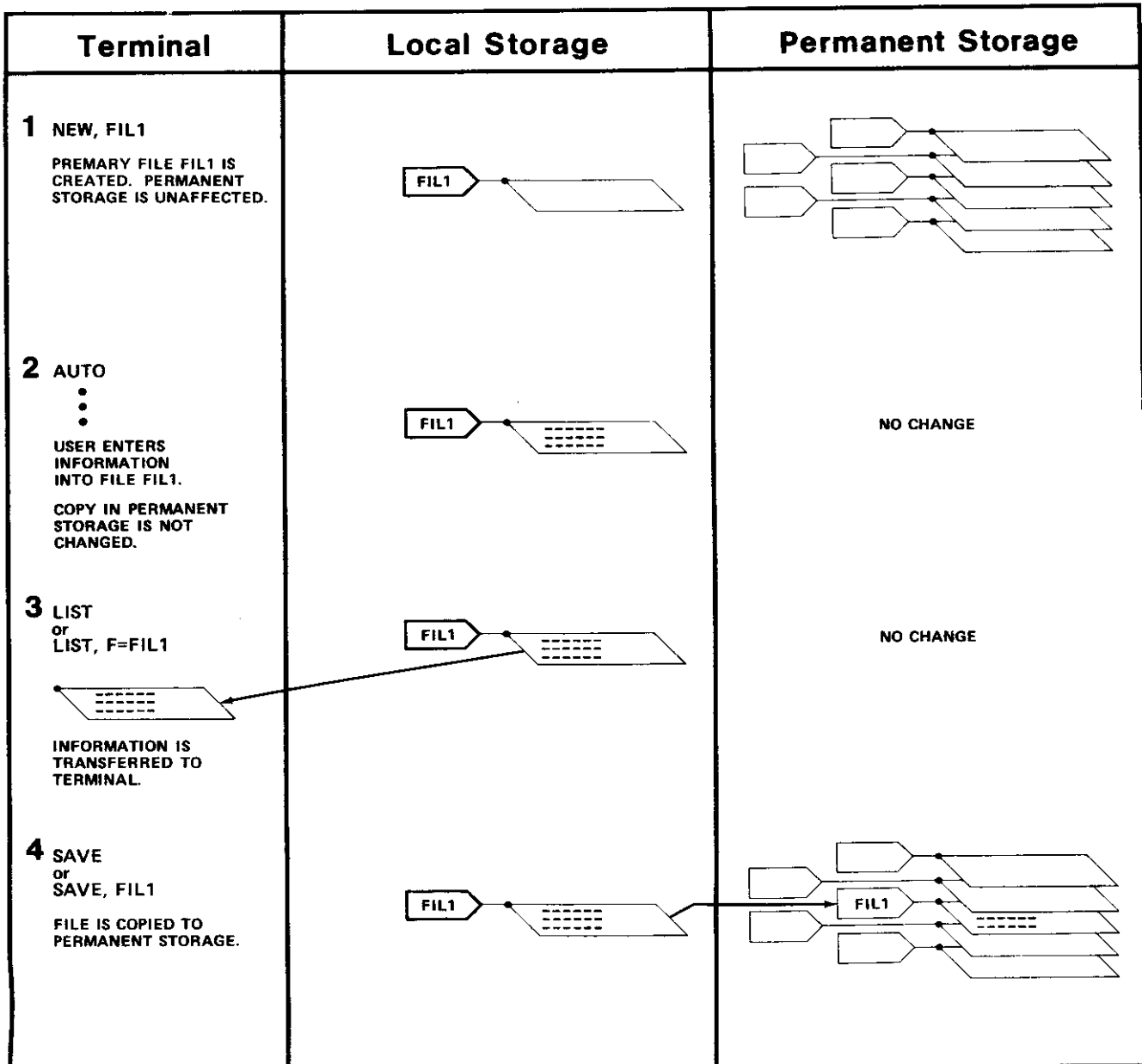
Figure 4-2. Creating and Saving a Primary File

```
ftnts
 READY.
 new,octfile  ◄─────────────────────────────────────┐
                                                      └──► An empty primary file named OCTFILE is
   READY.                                                 created.
   auto   ◄─────────────────────────────────┐
   00100 program octal (input,output)        └────► A FORTRAN program which converts a
   00110 read 100,j                                  decimal number to octal is entered.
   00120 100 format(i4)
   00130 print 200,j,j
   00140 200 format(2x,i4,9h decimal ,o10,6h octal)    The cancel character (CTRL/X) is entered.
   00150 stop
   00160 end
   00170 ◄─────────────────────────────────┘
   *DEL*                                           ── The program is run successfully. The user
   rnh  ◄───────────────────────────────────┐        responds to the question mark by entering the
                                                      number 8 which is converted and printed by
   ?    8                                             the program.
         8 DECIMAL 0000000010 OCTAL

   SRU      0.665 UNTS.                          ── OCTFILE is saved as a permanent file.

   RUN COMPLETE.
   save,octfile ◄─────────── Figure 4-3. Example Creating and Saving a Permanent File
```

Figure 4-3. Example Creating and Saving a Permanent File

You can make one of your other temporary files the primary file by entering

PRIMARY,filename

where filename is the name of the other file. (If filename is omitted, IAF requests the name.) The existing primary file, if any, is released; however, other files are not affected. If a file with the specified name does not exist, one is created as with the NEW command. The PRIMARY command is illustrated in figure 4-4.

ENTERING INFORMATION INTO THE PRIMARY FILE

You can enter information into the primary file using the AUTO command as described in section 3, or using the TEXT command. With the AUTO command, you enter numbered lines. With the TEXT command, you build a primary file consisting of unnumbered lines using the following procedure. Although this procedure could be used to enter numbered lines also, you would have to type the line numbers; IAF supplies line numbers only with the AUTO command. The information you enter with the TEXT command can be anything you wish (such as lines of a program); typically, it is used to create data files. To enter information into the primary file with the TEXT command, use the following procedure.

1. Enter TEXT

    IAF responds as follows:

        text
        ENTER TEXT MODE.

2. Enter as many lines as needed, ending each line with a carriage return. You can backspace over any mistakes you make and reenter the line from that point or you can delete an entire (uncompleted) line by pressing the cancel character (CTRL/X) followed by a carriage return. However, once a line has been entered, it cannot be changed

in text mode. It can be changed only by using Text Editor or XEDIT. Refer to the Text Editor Reference Manual or the XEDIT Reference Manual for further information.

3. When you are finished entering lines and the carriage is positioned at the beginning of a new line, press the interruption character (CTRL/P), the termination character (CTRL/T), or ETX, followed by a carriage return. IAF responds

        EXIT TEXT MODE.

4. Enter PACK

    Because of the technique that the system uses to store lines that you enter after TEXT, the PACK command must be entered to ensure that your file is formatted correctly.

    If you receive the message

        FILE NOT SORTED.
           TERMINATED

    in response to a command, you did not enter the PACK command. Enter PACK and then reenter your original command.

To add lines to the primary file, repeat the procedure. The new lines are appended to the end of the file.

When you are entering text into a primary file, it is often desirable to use uppercase and lowercase letters. Normally, the system converts lowercase letters to uppercase automatically. On most terminals (and in the examples in this guide), user input to files appears as lowercase letters but is converted to uppercase letters when listed. When you enter the command

    ASCII

the system accepts uppercase and lowercase letters as input to files without conversion. An example is shown in figure 4-5.

Terminal	Local Storage	Permanent Storage

1 ORIGINAL FILE STRUCTURE LOOKS LIKE THIS:

2 PRIMARY, FIL3

FIL1 IS DROPPED.
FIL2 IS NOT AFFECTED.

NO CHANGE
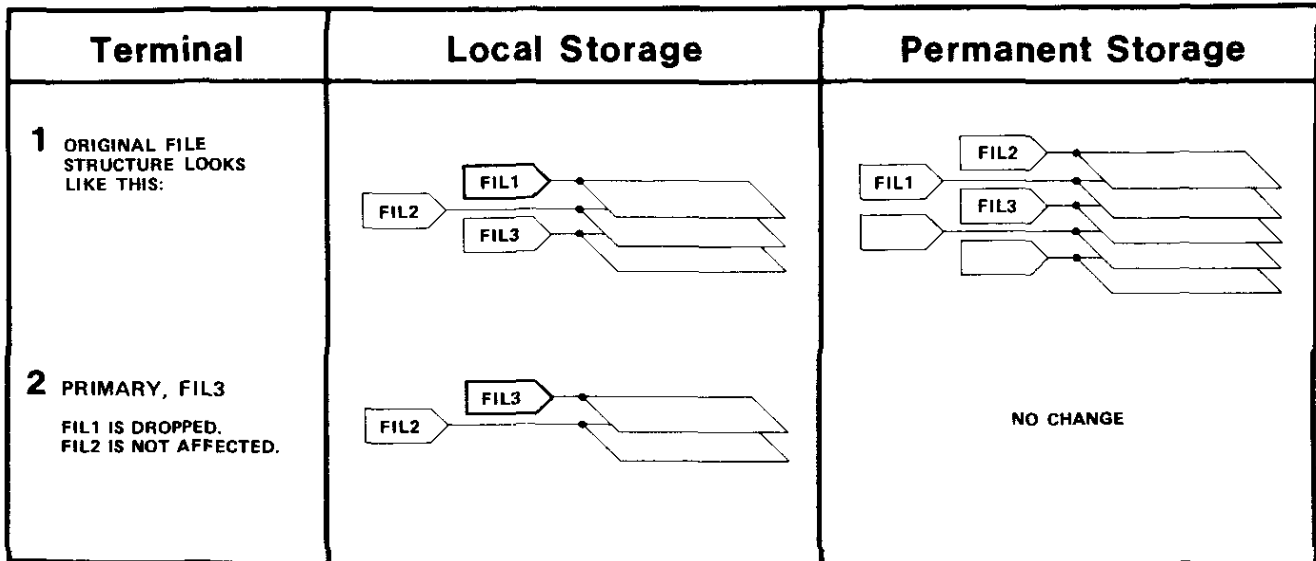
Figure 4-4. PRIMARY Command

To return to the normal mode of operation, enter

    NORMAL

and all lowercase letters are again converted to uppercase. You should not mix ASCII and NORMAL mode when entering data into a file. Lowercase letters entered under ASCII mode are translated differently if they are listed under NORMAL mode.

MAKING A FILE PERMANENT

To make a file permanent, enter

    SAVE,filename

To make the primary file permanent, you need enter only

    SAVE

When you save a file, the system makes a copy of it to put in permanent storage. The temporary copy of the file remains available for use at the terminal.

If a permanent file already exists with the name you specified (or implied, in the case of the primary file), the system takes no action except to issue the message

    filename ALREADY PERMANENT.

If you want to replace the file existing in permanent storage with your temporary copy, you use the REPLACE command (refer to Replacing a Permanent File).

The SAVE command is illustrated in figure 4-2. It is shown in an example in figure 4-3.
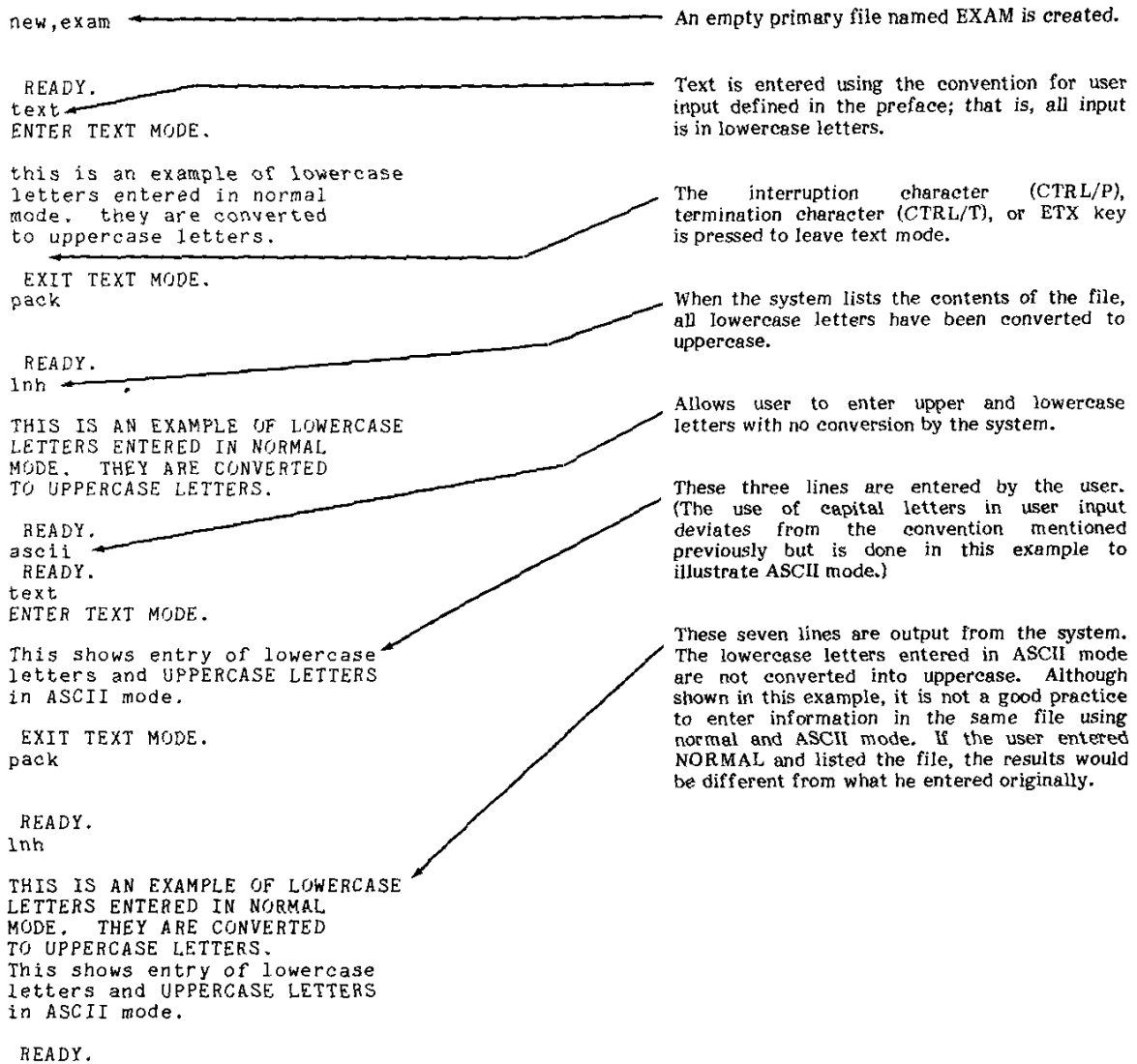
```
new,exam  ◄──────────────────────────────────  An empty primary file named EXAM is created.

 READY.  ──────────────────────────────────  Text is entered using the convention for user
text ◄                                        input defined in the preface; that is, all input
ENTER TEXT MODE.                              is in lowercase letters.

this is an example of lowercase
letters entered in normal                     The   interruption    character    (CTRL/P),
mode.  they are converted                     termination character (CTRL/T), or ETX key
to uppercase letters.                         is pressed to leave text mode.

 EXIT TEXT MODE.
pack                                          When the system lists the contents of the file,
                                              all lowercase letters have been converted to
                                              uppercase.
 READY.
lnh ◄                                         Allows user to enter upper and lowercase
                                              letters with no conversion by the system.
THIS IS AN EXAMPLE OF LOWERCASE
LETTERS ENTERED IN NORMAL
MODE.  THEY ARE CONVERTED
TO UPPERCASE LETTERS.                         These three lines are entered by the user.
                                              (The use of capital letters in user input
 READY.                                       deviates   from   the   convention   mentioned
ascii ◄                                       previously but is done in this example to
 READY.                                       illustrate ASCII mode.)
text
ENTER TEXT MODE.
                                              These seven lines are output from the system.
This shows entry of lowercase                 The lowercase letters entered in ASCII mode
letters and UPPERCASE LETTERS                 are not converted into uppercase. Although
in ASCII mode.                                shown in this example, it is not a good practice
                                              to enter information in the same file using
 EXIT TEXT MODE.                              normal and ASCII mode. If the user entered
pack                                          NORMAL and listed the file, the results would
                                              be different from what he entered originally.

 READY.
lnh

THIS IS AN EXAMPLE OF LOWERCASE
LETTERS ENTERED IN NORMAL
MODE.  THEY ARE CONVERTED
TO UPPERCASE LETTERS.
This shows entry of lowercase
letters and UPPERCASE LETTERS
in ASCII mode.

 READY.
```

Figure 4-5. Text Mode Example

RETRIEVING A PERMANENT FILE

PRIMARY FILE USE

To retrieve a copy of a permanent file and make it the primary file, enter

OLD,filename

where filename is the name under which it was stored originally. If filename is omitted, the system asks you for the name of the file.

If a primary file already exists, it is released. All other files are also released unless the ND (no drop) parameter is included.

OLD,filename/ND

If the system responds to the OLD command with the message

filename NOT FOUND

no permanent file exists with the specified name. Check your spelling of the file name. If you are unsure as to whether the file name is correct, enter

CATLIST

to list your permanent files (refer to Obtaining a List of Your Permanent Files). It is possible you saved the file under a slightly different name than you remember.

To print the contents of your primary file, enter

LIST or LNH

The OLD command is illustrated in figure 4-6. It is shown in an example in figure 4-7.

Terminal	Local Storage	Permanent Storage
1 OLD, FIL1 A COPY OF PERMENENT FILE FIL1 IS MADE.	FIL1	FIL1
2 LIST or LIST, F=FIL1 INFORMATION IS TRANSFERRED TO TERMINAL FOR INSPECTION.	FIL1	FIL1
3 USER MAKES CORRECTIONS TO COPY OF FIL1. NO CHANGE TO PERMANENT FILE.	FIL1	NO CHANGE
4 REPLACE or REPLACE, FIL1 FILE IS COPIED TO PERMANENT STORAGE. EXISTING FILE IS OVERWRITTEN.	FIL1	FIL1
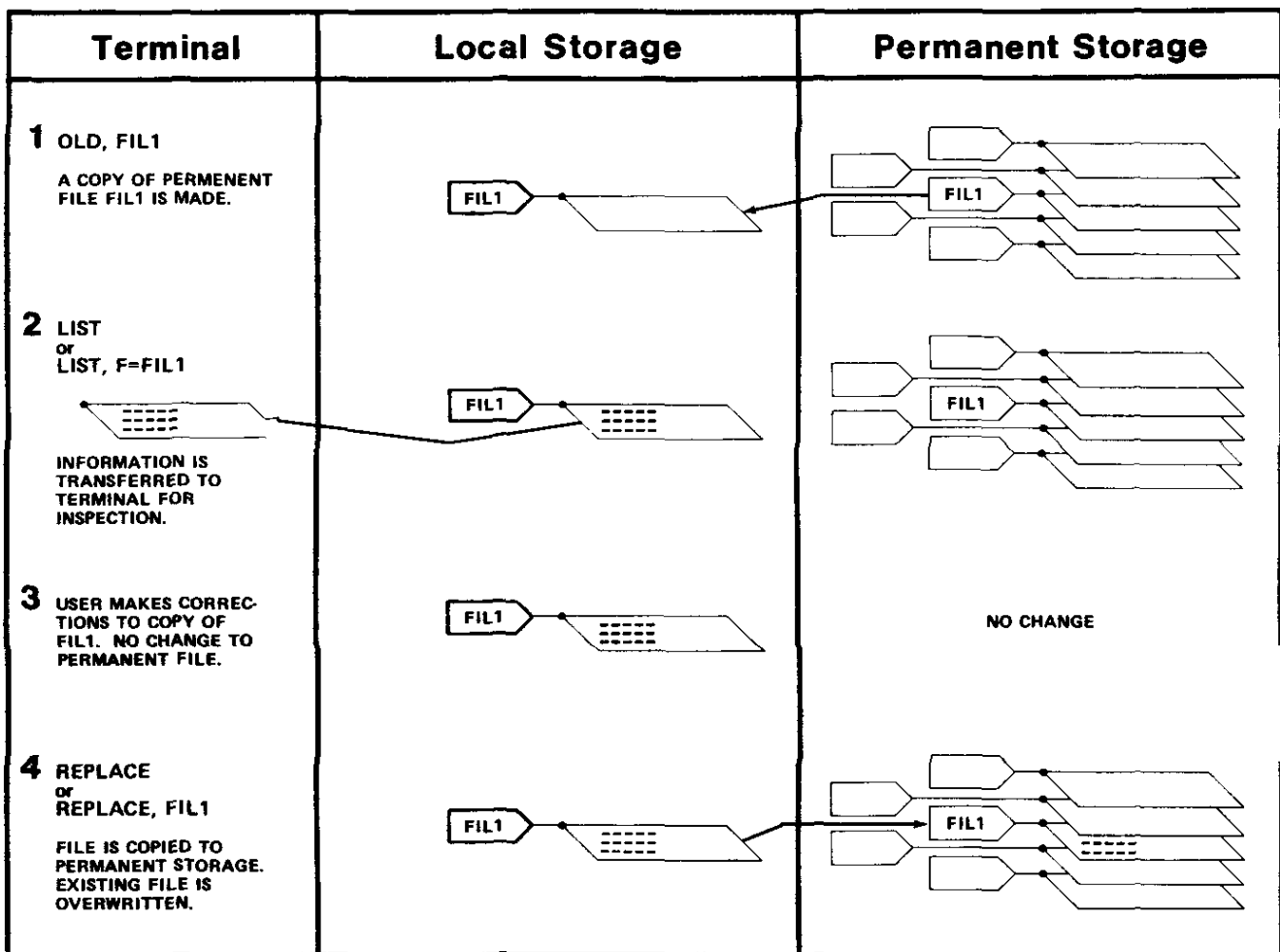
Figure 4-6. Retrieving and Replacing a Permanent File

```
old,octfile

  READY.
  lnh

  00100 PROGRAM OCTAL (INPUT,OUTPUT)
  00110 READ 100,J
  00120 100 FORMAT(I4)
  00130 PRINT 200,J,J
  00140 200 FORMAT(2X,I4,9H DECIMAL ,O10,6H OCTAL)
  00150 STOP
  00160 END

  READY.
  00103 print 50
  00105 50 format(23h enter a decimal number)
  00140 200 format(2x,20h the octal value of ,i4,4h is ,o10)
  rnh

  ENTER A DECIMAL NUMBER
  ?   16
    THE OCTAL VALUE OF   16 IS 0000000020

  SRU     0.664 UNTS.

  RUN COMPLETE.
  replace


  READY.
```

A copy of the permanent file OCTFILE (created in example 4-3) is retrieved and made the primary file.

The file is listed to see its current contents.

Modifications are made to the temporary copy of the program.

The program runs successfully with the changes that were just entered.

The contents of OCTFILE in permanent storage is replaced by the contents of the primary file which includes the modifications.

Figure 4-7. Retrieving and Replacing a Permanent File

NONPRIMARY FILE USE

To retrieve a copy of a permanent file for use as a file other than the primary file, enter

GET,filename

where filename is the name under which it was saved originally. Other files are not affected unless a temporary file exists with the same name as the permanent file being retrieved. In that case, the temporary file is replaced by a copy of the permanent file.

To print the contents of the file, enter

LIST,F=filename

The file name must be specified because it is not the primary file. Remember also that nonprimary files are not rewound before every operation like the primary file is. If you try to list a file and nothing is printed, the file may be positioned at its end. Enter

REWIND,filename

and try the LIST command again.

The effects of entering the GET and OLD commands are illustrated in figure 4-8.

Terminal	Local Storage	Permanent Storage
1 GET, FIL2 COPY FIL2.	FIL2	FIL1 FIL2 FIL3
2a OLD, FIL1 COPY FIL1 AS PRIMARY FILE. FIL2 IS RELEASED UNLESS "ND" IS USED.	FIL1	FIL1 FIL2 FIL3
2b IF FIL2 IS TO BE RETAINED, USER ENTERS: OLD, FIL1/ND GIVING INSTEAD:	FIL1 FIL2	FIL1 FIL2 FIL3
GET, FIL3 COPY FIL3.	FIL1 FIL2 FIL3	FIL1 FIL2 FIL3
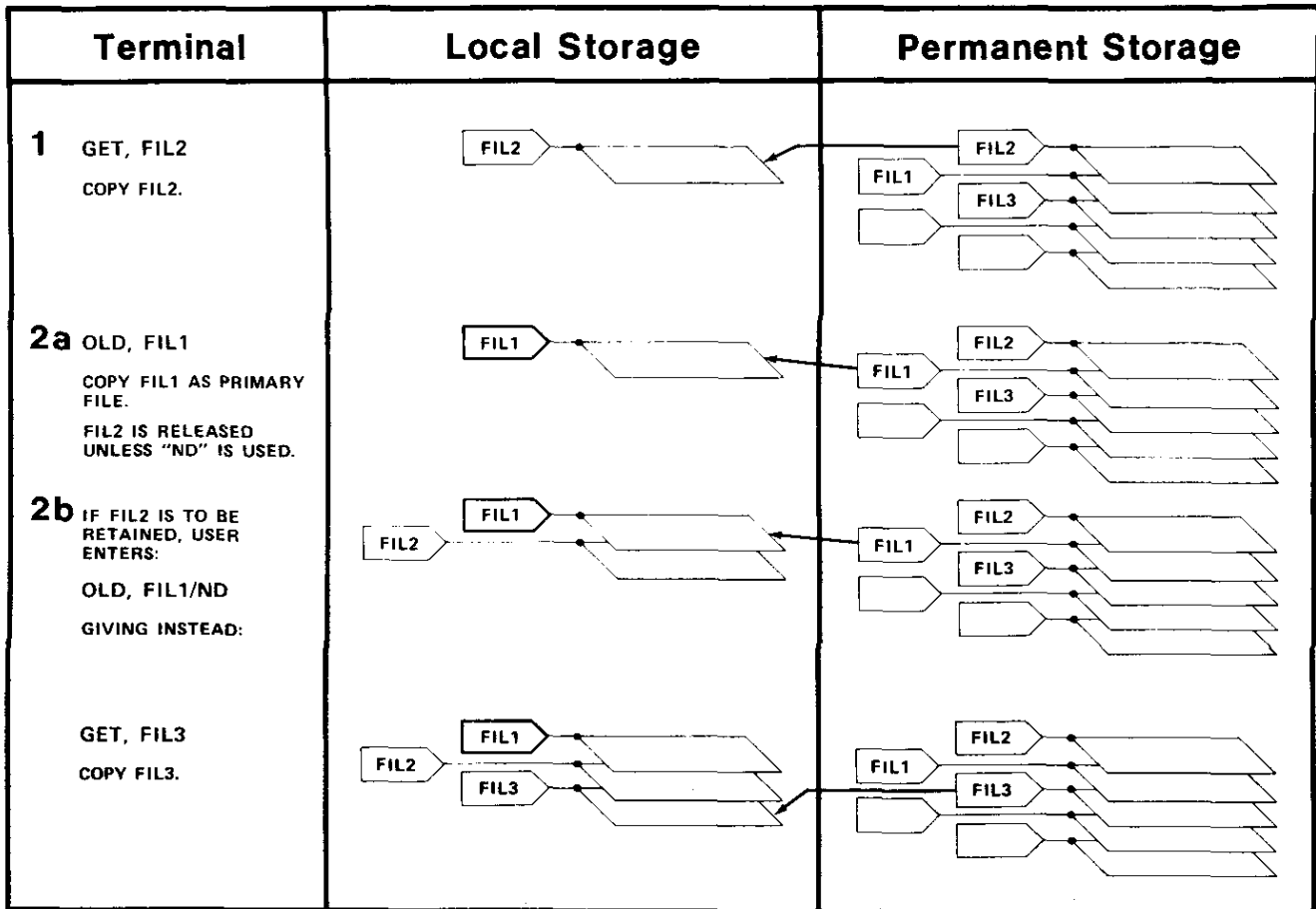
Figure 4-8. Retrieving Permanent Files

MODIFYING A PERMANENT FILE

In section 3 you were shown several ways to change and correct files (in that case, programs) which had been entered in auto mode (Changing and Correcting Programs in Auto Mode). The same methods are used to change permanent files which contain line numbers regardless of whether they were generated automatically in auto mode or entered by the user in text mode.

First you must make the file to be changed the primary file by entering

    OLD,filename

(if the file has not yet been retrieved from permanent storage), or

    PRIMARY,filename

(if the file has already been retrieved as a nonprimary temporary file).

To list the contents of the file, enter the LIST command. You can then make corrections in the following manner.

- To replace a line, enter its line number and the line the way it should appear.

- To delete a line, enter only its line number, followed by a carriage return.

- To insert a line, enter an appropriate line number and the new line. For example, to add a line between lines 110 and 120, a line number in the range 111 to 119 must be chosen. If you have to insert a line between lines with consecutive line numbers or before line 0, you can resequence the file by entering

    RESEQ

After resequencing, the first line of the file will be 00100 with succeeding lines numbered in increments of 10.

A nonprimary file can be changed by making it the primary file with the PRIMARY command, or using one of the editing facilities, Text Editor or XEDIT. (Refer to the Text Editor Reference Manual or XEDIT Reference Manual for further information.)

Changes are made to the primary file copy only; the original file in permanent storage is unchanged. To save the changed version, you must replace the existing permanent file (refer to Replacing a Permanent File) or, if you don't want to lose the original, save the copy using a new file name. Enter

SAVE,oldname=newname

If you entered SAVE alone, the system would try to save it using the primary file name which already designates a permanent file. You would receive the message

filename ALREADY PERMANENT

Examples of permanent file modifications are shown in figures 4-7 and 4-9.

REPLACING A PERMANENT FILE

To replace a file in permanent storage with a copy of a temporary file, enter

REPLACE,filename

where filename is the name of the existing permanent file and the temporary file. If filename is omitted, the primary file is replaced. If a permanent file with the specified name does not exist, REPLACE saves the file. The REPLACE command is illustrated in figure 4-6. It is shown in an example in figure 4-7.

REMOVING A PERMANENT FILE FROM THE SYSTEM

To remove a file from permanent storage, enter

PURGE,filename

If filename is omitted, the primary file is removed. This command has no effect on other files. If you retrieve a copy of a permanent file with the OLD or GET command and then delete the permanent file with the PURGE command, the temporary copy is still available at the terminal. If no permanent file with the specified name exists, IAF responds

filename NOT FOUND

REMOVING A FILE FROM THE JOB

When a file is no longer needed for use at the terminal, you can release it by entering

RETURN,filename

```
old,octfile                                              A copy of the permanent file OCTFILE is
                                                         retrieved and made the primary file. (This is
                                                         the file that was replaced in example 4-7.)
READY.
lnh                                                      The file is listed to see its current contents.
00100 PROGRAM OCTAL (INPUT,OUTPUT)
00103 PRINT 50
00105 50 FORMAT(23H ENTER A DECIMAL NUMBER)
00110 READ 100,J
00120 100 FORMAT(I4)                                     Modifications are made to the temporary copy
00130 PRINT 200,J,J                                      of the program.
00140 200 FORMAT(2X,20H THE OCTAL VALUE OF ,I4,4H IS ,O10)
00150 STOP
00160 END
                                                         The program runs successfully with the
READY.                                                   changes that were just made. (The number
00100 program hex (input,output)                         entered is converted to hexadecimal rather
00140 200 format(2x,26h the hexadecimal value of ,i4,4h is ,z10)  than octal.)
rnh
ENTER A DECIMAL NUMBER
?  16
    THE HEXADECIMAL VALUE OF   16 IS 0000000010          Because the user wants to keep copies of the
                                                         original program and the modified program, he
SRU    0.684 UNTS.                                       saves the modified program with a new file
                                                         name. OCTFILE and HEXFILE both exist as
RUN COMPLETE.                                            permanent files.
save,octfile=hexfile

READY.
```

Figure 4-9. Saving a File with Modifications and a New Name

The file is then no longer available at the terminal. If the file is a permanent file, it can be retrieved at a later time; if not permanent, its contents are lost.

To release all files, enter

CLEAR

OBTAINING A LIST OF YOUR PERMANENT FILES

You can obtain a list of the files you have made permanent by entering

CATLIST

The system responds as follows:

```
catlist

CATALOG OF WX789YZ          AAA        79/07/26. 08.29.18.

INDIRECT ACCESS FILE(S)

BASPROG   DATA    HEROBAS  HEROFTN  HEXFILE   OCTFILE

      6 INDIRECT ACCESS FILE(S),   TOTAL PRUS =        6.
```

The first line contains your user name, family name, the date, and the time. Then your permanent files are listed, followed by the total number of files and the total size of the files in physical record units (PRUs).

LISTING AND REWINDING FILES

The LIST and REWIND commands have been mentioned briefly in the preceding discussions; this description gives additional forms and information.

You have seen how the command LIST prints the contents of the primary file, and LIST,F=filename prints the contents of the specified nonprimary file. A third form of the command

LIST,linenum

lists the primary file beginning at the specified line number (or next largest if the specified number does not exist in the file).

IAF prints a two-line header giving the date, time, and file name before listing the file. An alternate command, LNH, performs the same functions as LIST but does not print the header. The formats of the LNH command are the same as those for the LIST command.

LNH
LNH,F=filename
LNH,linenum

The REWIND,filename command rewinds the specified file. This is necessary in some cases because certain operations performed on nonprimary files leave them positioned at their end-of-information. This may be the case if you attempt to perform an operation, such as listing a file, and receive no action (other than the READY response) or the message

EOI ENCOUNTERED.

Rewind the file and reenter the LIST command. To rewind all files, enter

REWIND,*

The commands and techniques described in this section provide you with greater file manipulation and system interaction capabilities. Among the topics described are:

- Renaming files.

- Granting alternate user access and accessing alternate users' files.

- Linking files to programs.

- Changing your password.

- Reestablishing connection to the computer.

RENAMING FILES

Two commands are available for renaming files; the first is used with temporary files, and the second is used with permanent files.

RENAME COMMAND

This command changes the name of a temporary file. It has no effect on any permanent files. If a temporary file with the new name already exists, it is released. The command format is

RENAME,newname=oldname

CHANGE COMMAND

This command changes the name of a permanent file. It has no effect on any other files. If a permanent file already exists with the new name, no action takes place, and IAF responds with the following message.

newname ALREADY PERMANENT

The command format is

CHANGE,newname=oldname

This command has several other uses described in the following paragraphs.

GRANTING ALTERNATE USER ACCESS AND ACCESSING ALTERNATE USERS' FILES

Unless you specifically grant permission to other users to access the permanent files which you create, only you have access to your permanent files. The following commands

and additional parameters (for use with the permanent file commands introduced in section 4) provide the capabilities for granting access permission to alternate users and for accessing the permanent files of other users for which you have been granted access permission.

PERMANENT FILE ATTRIBUTES

A permanent file is characterized by several attributes; so far, the only one which has been discussed is the permanent file name. Other attributes are important when alternate users are granted permission to use a permanent file. These attributes are:

- File password (PW).

- File category (CT).

- File usage mode (M).

The letters in parentheses are the parameters you use to specify the attributes with the appropriate permanent file commands. The methods you use to define or change these attributes and the ways in which they are used by an alternate user when he accesses permanent files are described following the descriptions of the attributes.

File Password

If you define a password for a permanent file, it must be specified by an alternate user when he references the file; the file password does not have to be specified by you when you access a file which you created. The file password can be any combination of one to seven digits and/or letters of the alphabet.

File Category

You can grant file access permission to alternate users on a user-by-user basis with the PERMIT command, or you may grant permission to all users (subject to their knowledge of your user name and the name and password of the file they wish to access). A file with the former type of permission has the private category type (abbreviated P); a file available to all users has the public category type (abbreviated PU).

File Usage Mode

When granting access to alternate users, you can specify whether or not the permanent file may be changed or deleted by another user. If the file usage mode is read

(abbreviated R), an alternate user may only access the file with the OLD or GET commands. If the file usage mode is write (abbreviated W), the alternate user may use the OLD, GET, REPLACE, or PURGE commands to access the file. The user who creates a permanent file is never restricted in the commands he can use to access the file. If a permanent file has the public category type, the usage mode you define is the same for any alternate user who accesses the file. If a permanent file has the private category type, you can define a different usage mode for each user to whom you give access permission.

DEFINING PERMANENT FILE ATTRIBUTES

When you initially save a file, you can define one or more permanent file attributes with an expanded form of the SAVE command. You enter

SAVE,filename/attribute$_1$=value$_1$,
attribute$_2$=value$_2$,...

The order in which you specify the attributes is not important. Furthermore, the system assumes a default value for any attribute not specified; private is assumed for the category type, write is assumed for the usage mode, and no password is associated with the file if you do not specify one. The value that you define for an attribute can be either the entire word (for example, M=WRITE) or its abbreviation (M=W). For example, if you wish to save a file named FIL3 as a permanent file available for use by all users, with file password of ABCD, and read usage mode permission, either of the following (equivalent) commands can be used.

SAVE,FIL3/PW=ABCD,M=READ,CT=PUBLIC
SAVE,FIL3/CT=PU,PW=ABCD,M=R

GRANTING ALTERNATE USER ACCESS TO INDIVIDUAL USERS

If the category type that you define is private (specified by CT=P, CT=PRIVATE, or by default when you omit CT), alternate user access must be explicitly granted for each alternate user with the PERMIT command. This command has the following format.

PERMIT,filename,username$_1$=m$_1$,
username$_2$=m$_2$,...

You can specify a different file usage mode (m$_i$, in preceding format) for each user to whom you grant access to the specified permanent file. For example, if you create a permanent file named FIL3 with the following command.

SAVE,FIL3

and wish to grant read access to user AB123CD and write access to user EF456GH, the following command accomplishes this.

PERMIT,FIL3,AB123CD=R,EF456GH=W

To rescind permission previously granted by a PERMIT command to a particular user, enter

PERMIT,filename,username=NULL

The user with the specified user name is no longer allowed to access the specified file.

ACCESSING PERMANENT FILES OF OTHER USERS

To access a permanent file created by another user (for which you have been granted access permission), you must specify the file name, the user name of the user who created the permanent file, and the file password if the other user defined one, as part of the permanent file command (OLD, GET, REPLACE, or PURGE if you have write permission and OLD or GET if you have read permission) as follows:

command,filename/UN=username,PW=file password

CHANGING PERMANENT FILE ATTRIBUTES

You can change the attributes of a permanent file which you create with the CHANGE command. You must specify the permanent file name and the new values for attributes as follows:

CHANGE,filename/attribute$_1$=value$_1$,
attribute$_2$=value$_2$,...

If an attribute is not specified with the CHANGE command, its value remains unchanged. If a file password is defined for the permanent file, but none is desired, specify PW=0.

This command was previously presented as the method for changing a permanent file name. You can change the name of the permanent file and its other attributes simultaneously with the following command format.

CHANGE,newname=oldname/attribute$_1$=value$_1$,
attribute$_2$=value$_2$,...

LINKING FILES TO PROGRAMS

Programs you write in FORTRAN or BASIC normally request input from the terminal keyboard by issuing a question mark as a prompt for input.

Similarly, any output that a program produces is normally printed at the terminal. However, by using the following methods, your program can read data from, or output data to, a file associated with your terminal. Figure 5-1 illustrates an example of linking a file to a FORTRAN program. Figure 5-2 is an example of the same procedure in BASIC.

```
100 program hero(input,output,data,tape3=data)
110 1 read (3,100) a,b,c
205 100 format(3f7.0)
lnh

100 PROGRAM HERO(INPUT,OUTPUT,DATA,TAPE3=DATA)
110 1 READ (3,100) A,B,C
00120 IF (A .EQ. 0.0) STOP
00130 S = (A + B + C) / 2.0
00140 RDCL = S * (S-A) * (S-B) * (S-C)
00150 IF (RDCL .LT. 0.0) GO TO 2
00160 AREA = SQRT(RDCL)
00170 PRINT 101, A, B, C, AREA
00180 GO TO 1
00190 2 PRINT 102, A, B, C
00200 GO TO 1
205 100 FORMAT(3F7.0)
00210 101 FORMAT(10H SIDES ARE, 3F9.4 /
00220+          8H AREA IS, 1PE11.4)
00230 102 FORMAT(10H SIDES ARE, 3F9.4 /
00240+          17H INVALID TRIANGLE)
00250 END

 READY.
 get,data


 READY.
 lnh,f=data

        3       4       5
        2       1       5
 1.5197 1.5197 1.5197
        0       0       0

 READY.
 rnh


SRU     0.868 UNTS.

 RUN COMPLETE.
 rewind,data


 READY.
 rnh

 SIDES ARE    3.0000    4.0000    5.0000
 AREA IS 6.0000E+00
 SIDES ARE    2.0000    1.0000    5.0000
 INVALID TRIANGLE
 SIDES ARE    1.5197    1.5197    1.5197
 AREA IS 1.0000E+00

SRU     0.925 UNTS.

 RUN COMPLETE.
```

New lines are added to the primary file to cause the program to read from a file named DATA.

Modified program.

A file named DATA was created earlier and is now retrieved and listed for inspection. It contains data for three triangles and a zero line to terminate execution. Note the use of the the F= on the LNH command since DATA is not the primary file.

This is included to show an error. The RNH command caused the program to be compiled and executed. The program ran correctly but no answers appeared. This is because the LNH,F=DATA command did not rewind the file after listing it. (LNH on a primary file does rewind the file.) Therefore, the program read what appeared to be an empty file.

DATA is rewound, and the program is executed again.

The program prints the expected results.

Figure 5-1. Linking a File to a Program (FORTRAN)

```
95 file #3 = "data"
100 input #3, a, b, c
lnh

95 FILE #3 = "DATA"
100 INPUT #3, A, B, C
00110 IF A = 0 THEN 00250
00120 S = (A + B + C) / 2
00130 R = S * (S-A) * (S-B) * (S-C)
00140 IF R < 0 THEN 00190
00150 X = SQR(R)
00160 PRINT USING 00220 , A, B, C
00170 PRINT USING 00230 , X
00180 GOTO 00100
00190 PRINT USING 00220 , A, B, C
00200 PRINT USING 00240
00210 GOTO 00100
00220 : SIDES ARE ###.#### ###.#### ###.####
00230 : AREA IS #.####^^^^
00240 : INVALID TRIANGLE
00250 END

 READY.
get,data


 READY.
lnh,f=data

     3       4       5
     2       1       5
1.5197 1.5197 1.5197
     0       0       0

 READY.
rnh

 END OF DATA ON FILE   AT   100
BASIC EXECUTION ERROR

 SRU      0.106 UNTS.

 RUN COMPLETE.
rewind,data


 READY.
rnh

 SIDES ARE    3.0000    4.0000    5.0000
 AREA IS 6.0000E+00
 SIDES ARE    2.0000    1.0000    5.0000
 INVALID TRIANGLE
 SIDES ARE    1.5197    1.5197    1.5197
 AREA IS 1.0000E+00

 SRU      0.135 UNTS.

 RUN COMPLETE.
```

New lines are added to the primary file to cause the program to read from a file named DATA.

Modified program.

A file named DATA was created earlier and is now retrieved and listed for inspection. It contains data for three triangles and a zero line to terminate execution. Note the use of the F= on the LNH command since DATA is not the primary file.

This is included to show an error. The RNH command caused the program to be compiled and executed. The program ran correctly but no answers appeared. This is because the LNH,F=DATA command did not rewind the file after listing it. (LNH on a primary file does rewind the file.) Therefore, the program read what appeared to be an empty file.

DATA is rewound and the program is executed again.

The program prints the expected results.

Figure 5-2. Linking a File to a Program (BASIC)

Names of files referenced in FORTRAN or BASIC programs must begin with a letter of the alphabet. The methods used under FORTRAN and BASIC are described separately; you may skip whichever method does not apply to you. The descriptions of these methods are not complete; complete descriptions can be found in the FORTRAN Extended Version 4 Reference Manual, FORTRAN Version 5 Reference Manual, or the BASIC Reference Manual.

READING AND WRITING DATA FILES IN FORTRAN

The first line of your FORTRAN main program should be a PROGRAM statement in which you specify any files you wish to reference within your program or its subroutines. The general form of the PROGRAM statement used to specify external files is

PROGRAM pname (INPUT,OUTPUT,filename$_1$,...,
filename$_m$,TAPEnn$_1$=filename$_1$,...,
TAPEnn$_m$=filename$_m$)

This is not an IAF command; it is the first line of the FORTRAN main program. The variable parts of the PROGRAM statement are as follows:

pname	Name that identifies the main program.
filename$_i$	Name of a file referenced within the program or its subroutines. The name of the file must begin with a letter of the alphabet and its maximum length is six characters when you link it to your program in this manner.
nn$_i$	Number ($1 \leq nn \leq 99$) used in READ and WRITE statements to identify the file upon which input or output is to take place. If nn$_i$ is a single digit, it should not be preceded by a zero (for example, TAPE7 but not TAPE07).

For example, to declare two files named NEW and OLD within a program named FIL3, the following PROGRAM statement is appropriate.

PROGRAM FIL3 (INPUT,OUTPUT,NEW,OLD,
TAPE3 = NEW, TAPE76 = OLD)

To perform input or output upon a file declared in the PROGRAM statement, you must specify the number you assigned to the file (nn$_i$, in the preceding statement) in the READ or WRITE statement as follows:

READ (nn,fmt)list

WRITE (nn,fmt)list

nn is the number that you assigned to the file in the PROGRAM statement; fmt is the statement number of the FORMAT for this READ or WRITE; and list specifies the FORTRAN variables to be read or written.

For example, to read from the file named OLD declared in the previous example of the PROGRAM statement, use a statement similar to the following:

READ(76,100)...

To write on file NEW, a typical WRITE statement appears similar to

WRITE(3,200)...

If a file named NEW does not exist when this statement is executed, one is created automatically.

READING AND WRITING DATA FILES IN BASIC

To read or write files in BASIC, the file names must be declared in the BASIC program with one or more FILE statements. The FILE statement associates a number with the file; this number is then used in subsequent INPUT and PRINT statements to perform operations upon the desired file. The general form of the FILE statement is

FILE #n$_1$="filename$_1$",...,#n$_m$="filename$_m$"

This is not an IAF command; it is part of the BASIC program. The variable parts of the FILE statement are as follows:

n$_i$	Number ($1 < n_i < 262143$) used in INPUT and PRINT statements to identify the file upon which input or output is to take place.
filename$_i$	Name of a file referenced within the program or its subroutines. The name of the file must begin with a letter of the alphabet and its maximum length is seven characters when you link it to your program in this manner.

For example, to declare two files named NEW and OLD within a program, either of the following is appropriate.

FILE #3 = "NEW", #76 = "OLD"

or

FILE #3 = "NEW"

FILE #76 = "OLD"

To perform input or output upon a file declared in a FILE statement, you must specify the number you assigned to the file (n$_i$) in the INPUT or PRINT statement as follows:

INPUT #n,list

PRINT #n,list

or

PRINT #n USING   list

n is the number that you assigned to the file in a FILE statement, list specifies BASIC variables to be read or written, and   is the line number of the IMAGE if the PRINT USING form is used.

For example, to read from the file named OLD declared in the previous example of the FILE statement, you would use a statement similar to the following:

INPUT #76,...

To write on file NEW, a typical PRINT statement is either of the following:

PRINT #3,...

or

PRINT #3 USING 180,...

If a file named NEW does not exist when either of these statements is executed, one is created automatically by the system.

CHANGING YOUR PASSWORD

The password you enter when you log in was originally assigned to you by your site. For greater security, you can change your password to one of your own choosing but, to do this, you must have special permission associated with your user name. If you are not sure whether you have this permission, you can try to change your password. If you are not allowed to do so, the system informs you and ignores your request; your password is not affected. To change your password, enter PASSWOR and the system responds as follows:

```
passwor

OLD PASSWORD:
? ████████
```

Enter your current password over the blackouts, followed by a carriage return. The system responds

```
NEW PASSWORD:
? ████████
```

The new password you enter over the blackouts can be any combination of digits and/or letters of the alphabet. The maximum length is seven characters. The minimum length can be set by the installation to be from zero to seven characters. The current default value is four.

You may enter both your old password and your new password (separated by a comma) at the same time when entering the PASSWOR command. For example, if your old password is PASS12 and the new password is PW100, you enter the following:

```
passwor,pass12,pw100
```

When this method is used, IAF omits the OLD PASSWORD and NEW PASSWORD lines and the lines of blackouts.

When IAF responds READY, your password has been changed and you may continue entering IAF commands.

REESTABLISHING CONNECTION TO COMPUTER

When your terminal is unexpectedly disconnected, as a result of either a mechanical failure or a system malfunction, you can reconnect to the computer by using the RECOVER command during the login procedure. You have 10 minutes from the time of disconnection or of system recovery to initiate the procedure. The recovery procedure is illustrated in figure 5-3.

To reconnect your terminal to the computer, complete the physical connection and login procedures to the point where IAF issues one of the following requests.

RECOVER/SYSTEM: or RECOVER/CHARGE:

On the same line, enter RECOVER, nnn ⒸⓇ. nnn is the terminal number that was indicated when you initially logged in.

If IAF responds RECOVERY IMPOSSIBLE, one of the following is true.

● No record was found of the specified user name being logged in on the given terminal number within the past 10 minutes.

● A system malfunction destroyed information necessary for IAF to recover your terminal.

If you receive this message, check the terminal number that you specified with the RECOVER command. If you find that it is incorrect, reenter the RECOVER command with the correct terminal number.

If recovery is successful, IAF responds as follows:

```
RECOVERY COMPLETE.
  LAST COMMAND     = cmdname
  JOB STATUS       = stat
  NEXT OPERATION   = nnnn
ENTER *CR* TO CONTINUE:
```

cmdname, stat, and nnnn can each be one of several responses.

cmdname   Name of last command processed before disconnection. If lines were being entered under AUTO or TEXT mode, the word SOURCE appears.

stat   One of the following job status messages.

IDLE

No activity.

EXECUTING

Your program is executing.

OUTPUT AVAILABLE

Output from an executing program is available.

OUTPUT LOST

Output from an executing program has been lost.

INPUT REQUESTED

An executing program is requesting input.

INPUT LOST

The last line of input was lost.

nnnn   One of the following next operation messages.

ENTER COMMAND

IAF is ready to process the next command.

RERUN OR CONTINUE

If significant output was lost or an unknown number of auto or text input lines were lost, you should rerun the program or list the primary file to establish how much of the file is intact.

ENTER DATA

An executing job is requesting input.

REENTER DATA

The executing program did not receive the last line of data you entered; reenter the last line of data.

CONTINUE

An executing job is ready to continue processing.

You may now enter a carriage return to continue. If the disconnection occurred while the terminal was printing output, the output normally resumes a few lines before the point at which the interruption took place. In some cases, a few lines of output may be lost when a telephone line is disconnected. If the telephone line is disconnected when you are entering lines under auto or text mode, you may lose the last few lines that you entered.

```
lnh

95 FILE #3 = "DATA"
100 INPUT #3, A, B, C
00110 IF A = 0 THEN 00250
00120 S = (~Y+
```

Interruption occurs at this point.

```
79/07/13.  08.20.21. L35T1
ACME DEVELOPMENT SYSTEM.  NOS 1.
FAMILY:  aaa,wx789yz,pw100
TERMINAL:     35, NAMIAF
RECOVER/ CHARGE: recover,5
```

Normal login sequence is followed up to RECOVER/CHARGE request.

IAF is directed to recover terminal 5. The terminal number has changed and is currently 35. If recovery were necessary a second time (after successfully recovering terminal 5), the new terminal number (35) is used.

```
RECOVERY COMPLETE.
    LAST COMMAND    = LNH
    JOB STATUS      = OUTPUT AVAILABLE
    NEXT OPERATION  = CONTINUE
ENTER *CR* TO CONTINUE:
95 FILE #3 = "DATA"
100 INPUT #3, A, B, C
00110 IF A = 0 THEN 00250
00120 S = (A + B + C) / 2
00130 R = S * (S-A) * (S-B) * (S-C)
00140 IF R < 0 THEN 00190
00150 X = SQR(R)
00160 PRINT USING 00220, A, B, C
00170 PRINT USING 00230, X
00180 GOTO 00100
00190 PRINT USING 00220, A, B, C
00200 PRINT USING 00240
00210 GOTO 00100
00220 : SIDES ARE ###.#### ###.#### ###.####
00230 : AREA IS #.####^^^^
00240 : INVALID TRIANGLE
00250 END

    READY.
```

Carriage return is entered at this point. Output resumes several lines before point of interruption in this example. This may not always be the case.

Figure 5-3. Terminal Recovery

This section describes methods that you can use to execute batch job control statements directly or indirectly from your terminal and briefly describes those IAF commands that are not otherwise mentioned in this guide.

CONTROL STATEMENT EXECUTION DURING AN IAF SESSION

The batch control statements available for execution during an IAF session through one of the following methods are described in the NOS Reference Manual, volume 1. Only the means by which you cause the system to execute batch job control statements are described here.

BATCH COMMAND

This command causes IAF to interpret any subsequent keyboard entry as a batch control statement. Entry of this command cancels the effects of the FORTRAN, FTNTS, or BASIC command; no compiler is in effect, and IAF indicates its readiness to accept an entry by printing a slash (/) instead of READY. Any IAF command can also be entered (except RUN or RNH, as there is no compiler in effect) in addition to batch control statements.

To cause the system to execute control statements entered at your terminal, type BATCH. IAF responds as follows:

```
batch
$RFL,0.
/
```

You can now enter control statements after the slash. Each line must be ended by a carriage return. Refer to the IAF Reference Manual for further information.

REMOTE JOB SUBMISSION

By creating a file containing batch job control statements and using the SUBMIT command, IAF causes the operating system to process the control statements in the file you specify as a batch job. The operating system processes the job as if it had originated as a card deck, with some minor differences. Among these differences is the disposition of any output that the job produces; you may specify where your output is to be printed either by including control statements that do this or by specifying an appropriate parameter when you enter the SUBMIT command. The format of the file containing the control statements, as well as additional information about remote job submission, can be found in the IAF Reference Manual.

REMAINING IAF COMMANDS

The following commands are described in full in the IAF Reference Manual. They provide additional capabilities in five areas.

- Manipulating permanent files.

- Selecting APL and text editing facilities.

- Selecting subsystems.

- Obtaining information about files, the terminal session, and the system resources that you can use.

- Changing the way that IAF transmits characters to your terminal and/or the way the system interprets characters it receives from your terminal.

Commands that do not fit into any of these areas are described in Miscellaneous Commands.

PERMANENT FILE COMMANDS

APPEND	Appends the contents of a temporary file to the end of a permanent file.
LIBRARY	Retrieves a copy of a permanent file stored under the special user number LIBRARY.
PACKNAM	Specifies an auxiliary device on which permanent files reside.
DEFINE	Creates a permanent file that can be accessed directly; no temporary copy is made.
ATTACH	Accesses a permanent file created by the DEFINE command.

SELECTING APL AND TEXT EDITING FACILITIES

APL	Selects APL (A Programming Language) interactive interpreter. Refer to the APL 2 Reference Manual before using this command.
EDIT	Selects Text Editor, a text file editing routine.
XEDIT	Selects XEDIT, a text file editing routine.

SUBSYSTEM SELECTION COMMANDS

ACCESS   Selects the access subsystem where a validated user can communicate with other interactive terminals.

EXECUTE   Selects the execute subsystem. The RUN command then causes the system to execute a binary file that has been previously compiled (as with FTNTS or BASIC).

NULL   Clears the subsystem currently in use.

INFORMATIVE COMMANDS

SUMMARY   Lists the amount of system resources used during the terminal session.

DAYFILE   Lists the system record of terminal activity since login.

LIMITS   Lists the amounts and kinds of system resources that you are authorized to use.

LENGTH   Lists information about a specified file.

STATUS   Same as ENQUIRE command.

CHARACTER TRANSMISSION/INTERPRETATION COMMANDS

CSET   Specifies the character set in which the system transmits characters to your terminal or interprets characters received from your terminal.

MISCELLANEOUS COMMANDS

BEGIN   Initiates processing of a CYBER Control Language (CCL) file of control statements as part of the IAF session.

BRIEF   Suppresses the printing of all full and partial header messages, such as those produced by the LIST and RUN commands.

CALL   Initiates processing of a file of control statements as part of the IAF session.

DEBUG   Activates, terminates, or resumes CYBER interactive debug mode.

SETTL   Specifies the time limit for subsequent commands.

SETASL   Specifies the SRU limit for the entire IAF session.

SETJSL   Specifies the SRU limit for subsequent commands.

TIMEOUT   Changes a no timeout terminal to standard timeout status whereby IAF automatically logs off the terminal after 10 minutes of inactivity.

NOSORT   Prevents automatic sorting of the primary file.

SORT   Reverses the effect of the NOSORT command or sorts a specified file by line numbers.

Acoustic Coupler

A device in which you place the telephone receiver to connect a terminal to a telephone line which is in turn connected to the computer. After dialing in to the computer, you place the telephone receiver in the rubber cups of the acoustic coupler, ensuring that the telephone-cord end of the receiver is at the correct end as marked on the coupler. An acoustic coupler is either built into the terminal (common on portable terminals) or a separate part (common on nonportable terminals). Contrast with data set.

Alphanumeric Characters

The letters of the alphabet (A through Z) and the digits (0 through 9).

Auto Mode

Mode of entering information into a primary file where the system automatically generates line numbers. This allows you to correct, insert, and delete lines easily because you can reference each line by its line number.

Catalog

A collection of information about the permanent files associated with a particular user name. Every user who saves permanent files has a permanent file catalog. Each time you create, modify, or purge a file, the system updates your catalog accordingly. You can list the names of your permanent files and other information about them using the CATLIST command.

Charge Number

A number which may be required at your installation for accounting and billing purposes. If it is required, the charge number is entered during the login procedure. It is given to you by personnel at your installation.

Control Character

A character or special key on the terminal keyboard that signals the entry of a network command. When the network recognizes the control character as the first entry of a line, it interprets the remainder of the line as a network command. The data is processed by the network rather than sent to IAF. The control character varies depending on the type of terminal you have; for terminal classes 1 and 2 (the most commonly used classes), the ESC or ESCAPE key is used to identify a network command.

Control Key

A terminal key labeled CTRL, CNTL, CNTRL, or similar characters. Many terminal classes require the control key to be pressed and held while another character is pressed for the cancel character, interruption character, or termination character.

Data Set

A device similar in appearance to a normal telephone that is used to connect a terminal to a telephone line which is in turn connected to the computer. After dialing into the computer, you press the DATA button on the front of the data set and replace the telephone receiver. The connection is made; the receiver does not have to be placed in a separate device. Contrast with acoustic coupler.

Default

A parameter value or name supplied by the system if the value or name is not supplied by the user. For example, if you enter LIST without specifying a file name, the primary file (the default) is listed.

Dial-In

Procedure during which you dial one of the telephone numbers supplied by personnel at your site and connect your terminal to the computer through the phone line using a data set or an acoustic coupler. The dial-in procedure is not necessary for a hardwired terminal.

Duplex

Mode of transmission on a communication line. A beginning user need be concerned about duplex mode only to the extent that the duplex switch on the terminal is set correctly for the line he is using. Although the switch is normally set to HALF, personnel at your site should tell you the correct setting for your terminal. If you enter data but nothing is printed, check the duplex switch on your terminal; it is probably set incorrectly.

End-of-Information

Marks the end of a file.

Family Name

Name of the permanent file device or set of devices on which all of your permanent files are stored. When you request a permanent file, the system looks for it on this family of devices. Usually a system has only one family of permanent file devices but it is possible to have alternate families in the system. You specify which family you are using when you log in. Your family name is given to you by personnel at your installation.

File

A collection of information referred to by a file name (one through seven alphanumeric characters). A file can be created at the terminal or retrieved from the permanent file system for use during a terminal session.

Hardwired Terminal

A terminal which is always connected to the computer. To begin a terminal session on a hardwired terminal, all you need to do is identify the terminal by pressing the proper key(s) and the login sequence begins (refer to Terminal Identification in section 2).

Line Speed

Rate of transmission of information between the terminal and the computer. It can be given in terms of characters per second or baud. (In general, baud rate is 10 times the character per second rate.) Your installation may restrict some terminals or phone lines to certain speeds; check with personnel at your site as to what line speeds can be used.

Line/Local Switch

Determines transmission of data. For normal IAF operations, the switch should be set to the line position. When set to the local position, entries are printed at the terminal but not transmitted to the system even though the terminal is still connected. This switch is also called the mode switch.

Login

Procedure during which you identify yourself to the system as a valid user. To identify yourself, enter certain responses to prompts from the system. These responses are given to you initially by personnel at your site and include family name, user name, password, and, if required, charge number and project number.

Logout

Procedure by which you end a terminal session. There are several commands which allow you to logout. Some disconnect the terminal completely; others end your terminal session but leave the terminal connected to allow another user to log back in.

Mode Switch

Refer to line/local switch.

Network

A system linking remote terminals to the operating system and applications.

Network Terminal

A terminal that communicates with the operating system through the network.

Operating System

Software that controls the execution of computer programs and provides scheduling, error detection, input/output control, accounting, compilation, storage assignment, and other related services.

Parity

Mode indicating a method of error detection. A beginning user need be concerned about parity mode only to the extent that the parity switch on his terminal is set correctly. Personnel at your site should tell you the correct setting for your terminal. Parity can be even, odd, or disabled. When used, a special bit (the parity bit) is set or cleared in the string of binary digits so that the sum of the digits set, including the parity bit, is always even or always odd. When data is read, the sum is checked and, if it doesn't agree with the parity setting (even or odd), the system knows the data is incorrect.

Password

A name or word entered during login to provide extra security for your user name. A unique password ensures that no one else can log into the system using your user name and access your files. Initially the password is given to you by installation personnel. Depending on the privileges assigned to your user name, you may be able to change your password. (You can find out the privileges associated with your user name using the LIMITS command described in the IAF Reference Manual.) You can also assign a password to a file when you save it. Any other user who wants to use your file must specify that password when he accesses the file. The file password has no connection with the login password.

Permanent File

A file which is created at the terminal and then saved so it can be retrieved at a later terminal session. When you retrieve the file, the system makes a copy of the file for use at the terminal. The original file remains unchanged even if you make changes on the copy at your terminal. If you want to save the copy of the file you have at your terminal instead of the original file, you enter the REPLACE command.

Primary File

The file on which IAF operations are performed if no other file name is specified. The primary file is designated with the NEW, OLD, or PRIMARY command. The primary file is automatically rewound to its beginning before every operation performed on it.

Project Number

A number which may be required at your installation for accounting and billing to a specific project. If it is required, the project number is entered during the login procedure. It is given to you by personnel at your installation.

Release

To release a file is to free its storage allocation for use by other users' jobs. A released file is no longer available for use at your terminal. The commands to specify a primary file (NEW and OLD) cause all temporary files to be released unless the ND (no drop) parameter is included in the command.

SRU

System resource unit. A unit of measurement of system usage printed following certain operations and when you

log off. The number of SRUs takes into account the central processor time, memory usage, and input/output activity. Each user has a limit on the number of SRUs he can accumulate. (This number can be found using the LIMITS command described in the IAF Reference Manual.) The limit set by your installation should be large enough for your needs, but if you ever reach your SRU limit, you will receive a message and instructions on how to reset it.

System

Refer to operating system.

System Resource Unit

Refer to SRU.

Terminal Class

Group of similar terminals which the network defines as having the same terminal characteristics (such as the page width or character used to backspace). Personnel at your site should tell you what class your terminal belongs to and what its characteristics are. These characteristics can be changed using the terminal definition commands or TRMDEF command but a beginning user should have no need to do so.

Temporary File

A file which is created at the terminal but disappears when you log out or specifically release the file. You can create a temporary file by entering information in a primary file, retrieving a permanent file (thus making a temporary copy at your terminal), or creating a file as output from a program.

Terminal Definition Command

A command used to change a characteristic of a terminal, such as its page width or the character used to backspace. A beginning user should have no need to change any of his terminal's characteristics.

Terminal Number

Number of the terminal you are using as given during the login procedure or following the ENQUIRE command. This number is not always the same; it can differ each time you log in even if you are using the same terminal. You should always note the terminal number; if your terminal is inadvertantly disconnected from the system, you may be able to recover your files at that point using the RECOVER command and terminal number.

Terminal Session

Period between the time you physically connect the terminal to the system in preparation for login to the time you log out.

Text Mode

Mode of entering information into a primary file without specifying line numbers. It is usually used to create data files. Although line numbers can be entered while in text mode, you must type them yourself. If a file does not contain line numbers, you can change lines only by using Text Editor or XEDIT, the editing facilities available under IAF.

User Name

Name assigned to you by personnel at your installation. Your user name has certain resources and privileges assigned to it. (You can find out the extent of your resources and privileges using the LIMITS command described in the IAF Reference Manual.) When you log in, you specify your user name to identify yourself to the system so it knows you are a valid user and what resources you are entitled to use. Your user name also represents a specific catalog in the permanent file system. All files you make permanent are associated with your user name and this catalog.
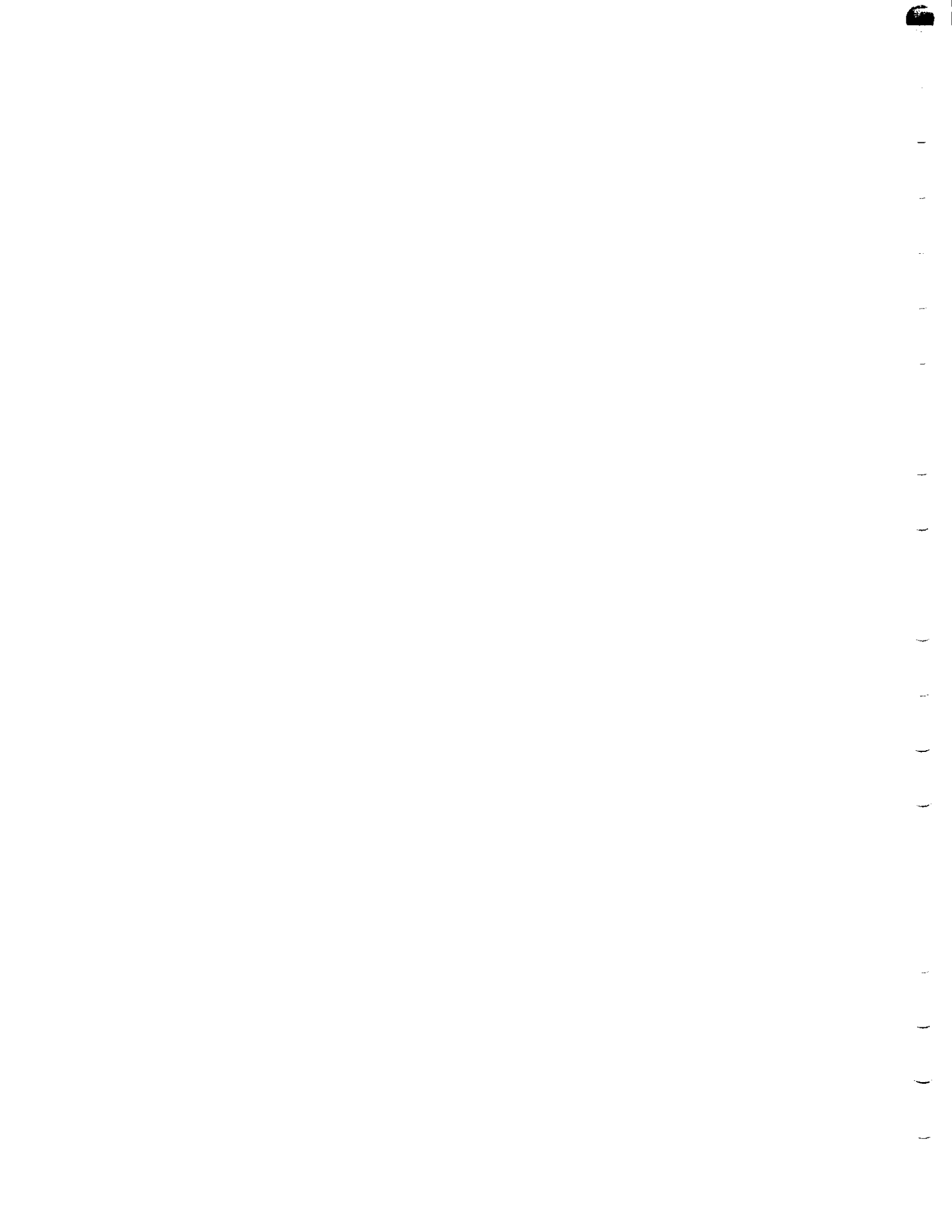
This appendix describes the characteristics of your terminal that you can change and the commands used to do so. You have already been introduced to three terminal characteristics: the cancel character, the interruption character, and the termination character. Other characteristics tell the network what type of terminal you have and how you wish the data entered and received at your terminal to be formatted and interpreted. Most of this information is not needed by the beginning user but is presented here so you will be aware of which characteristics you can change. Although all terminal characteristics are mentioned, they are described more thoroughly in the IAF Reference Manual, along with the released default values for each terminal class. The default values of most interest to the beginning user are given in table B-1.

There are two commands you can use to change the characteristics of your terminal:

- A terminal definition command.

- The TRMDEF command.

Parameters for both commands are entered in the same format.

    tc=value

where tc consists of two characters which specify the characteristic to be changed and value specifies the new value of the characteristic.

TERMINAL DEFINITION COMMAND

A terminal definition command is a command to the network rather than to IAF. As a network command it can be entered at any time, even during the login sequence before IAF is selected. The format of the command is

    control tc=value   (CR)

where control is a control character which must be entered to alert the system that a terminal definition comand is being entered.

The control character can be a single character, a special key on the terminal keyboard, or both. It varies depending on the type of terminal being used. For most portable and printing terminals, the control character is the ESC key; for display terminals such as the 713 terminal, it is the ESCAPE key. Only one terminal characteristic can be changed with each terminal definition command.

As an example, PW specifies the page width terminal characteristic, the number of characters that are output in one line at your terminal. If you have a portable terminal for which the control character is the ESC key, you can set the page width to 80 by pressing the ESC key, then entering

    PW=80 (CR)

The network responds by positioning the carriage to the beginning of the second line following. The network gives no other response if the command is legitimate.

If you make an error of any kind in entering a terminal definition command, the network responds with:

    ERR..

Examine the command you entered to determine what the error was and if necessary, refer to the IAF Reference Manual for specific information.

TRMDEF COMMAND

TRMDEF is an IAF command and therefore can be entered only when you are under IAF control. The format of the command is

    TRMDEF,tc_1=value_1,tc_2=value_2,...,
    tc_n=value_n

If the new value is a special character (that is, any nonalphanumeric character except the equal sign), it must be delimited by dollar signs (for example, $+$).

The preceding example to change page width would appear as follows using the TRMDEF command.

    TRMDEF,PW=80

Using TRMDEF, you can specify several changes, separated by commas, in one command. To set page width to 132 characters and increase the number of idle characters output following a carriage return (refer to CI parameter) to five, enter the command

    TRMDEF,PW=132,CI=5

If IAF finds any errors in the command, it issues a message and the terminal characteristics in effect before entry of the command remain in effect.

TERMINAL CHARACTERISTICS

The following paragraphs describe the characteristics of a terminal which you can change. The first six characteristics are those you are most likely to use. The remainder are seldom needed by beginning users. (For more information, refer to the IAF Reference Manual.) The two characters used to specify the characteristic to be changed are given in parentheses following each heading.

Terminal Type	Terminal Class	Control Character (CT)	Cancel Character (CN)	Interruption Character (B1)	Termination Character (B2)
M33, M35, M37, and M38 teletype-writers	1	ESC	CTRL/X	CTRL/P	CTRL/T
CDC 713-10	2	ESCAPE	CTRL/X	CTRL/P	CTRL/T
Reserved	3				
IBM 2741	4	ATTN %	ATTN (	ATTN :	ATTN)
M40	5	CTRL/P	CTRL/X	CTRL/F	CTRL/T
Hazeltine 2000	6	ESC	CTRL/X	CTRL/P	CTRL/T
CDC 751-1	7	ESC	CTRL/X	CTRL/P	CTRL/T
Tektronix 4000	8	ESC	CTRL/X	CTRL/P	CTRL/T
HASP Protocol	9	%	(	:	)
200UT	10	%	(	:	)
CDC 214	11	%	(	:	)
CDC 711-10	12	%	(	:	)
CDC 714	13	%	(	:	)
CDC 731-12 CDC 732-12	14	%	(	:	)
CDC 734	15	%	(	:	)

TERMINAL CLASS (TC)

When you connect your terminal to the network, the network assigns it to a terminal class. This assignment is made because of the telephone number you used to dial in, or because of the ability of the network to recognize your terminal. Associated with each terminal class is a set of values which can be changed with the remainder of these parameters. The default values are normally appropriate for the terminals of that class. However, in some cases your terminal may not be assigned to the correct terminal class. For example, your site may assume that all 10 through 30 character-per-second dial-up terminals which use the network are teletypewriters or portable terminals (terminal class 1) and configure the network in that manner. If you connect your 713 display terminal (terminal class 2) to the network, it assumes incorrectly that your terminal is a terminal class 1 terminal.

You could change your terminal class by entering a terminal definition command (the appropriate control character followed by TC=2) or, the TRMDEF command (TRMDEF,TC=2). Either command tells the network that your terminal is a terminal class 2 terminal.

Your site should provide you with the proper terminal class number and default characteristics for your terminal. If you are in doubt as to whether the network has assigned your terminal to the correct terminal class, enter the TC parameter with the value given to you by your site.

NOTE

Entering the TC parameter causes the remainder of the terminal characteristics to be set to their defaults for that terminal class. If you changed any characteristics prior to entering a command with the TC parameter, you must reenter those changes if you wish the values to remain the same.

CARRIAGE RETURN IDLE COUNT (CI)

The CI parameter specifies the number of idle characters to be output to your terminal after a carriage return. Idle characters after a carriage return are useful if your terminal has a print head which requires a significant amount of time to return to the beginning of a line. If the idle characters are not present, characters at the beginning of a line may be lost because data transmission continues while the print head is returning to the beginning of the line.

Any value from 0 to 99 or CA can be specified. If CI is set to CA, the default value for the terminal class is used; this is necessary only if you have changed the number of idle characters and wish to reset it to the original value.

Normally, the default value for each terminal class is sufficient. However, if you are using, for example, a display terminal (terminal class 2) with a printer attachment for hard copy output, you may have to use this command to allow enough time for the head on the printer attachment to return.

LINE FEED IDLE COUNT (LI)

The LI parameter allows you to specify the number of idle characters to be output to your terminal after a line feed. It may be desirable to use this parameter instead of or in conjunction with the CI parameter for some terminals.

Any value from 0 to 99 or CA can be specified. If LI is set to CA, the default value for the terminal class is used; this is necesary only if you have changed the number of idle characters and wish to reset it to the original value.

PAGE WIDTH (PW)

The PW parameter establishes the maximum number of characters that can be displayed on one output line. Any value from 0 to 255 can be selected; 0 selects infinite width. This parameter should be used to inform the network of the actual line length of your terminal. PW should be set to 0 or a value of 50 or more; commands longer than the value of PW are not interpreted correctly.

INPUT DEVICE (IN)

The IN parameter informs the network of the type of input it will receive from the terminal. The possible values are:

X	Input from current input device in transparent mode.
KB	Input from keyboard in character mode.
XK	Input from keyboard in transparent mode.
PT	Input from paper tape in character mode.
XP	Input from paper tape in transparent mode.

The TRMDEF command does not allow values of X, XK, or XP.

In transparent mode, characters are sent to IAF as 7- or 8-bit characters without translation into 6/12-bit internal display code characters as is normally done.

If your terminal has a paper tape reader and is set correctly, specifying paper tape input causes the tape reader to begin operation and read your tape.

OUTPUT DEVICE (OP)

The OP parameter informs the network of the type of output the terminal expects. The possible values are:

PR   Printer.

DI   Display.

PT   Paper tape.

Specifying PT causes paper tapes to be punched with the proper X-OFF characters included. PR or DI can be specified only to return from paper tape (PT) to the original output device type. PR cannot be specified for a display and DI cannot be specified for a printer.

CONTROL CHARACTER (CT)

The CT parameter allows you to change the control character used in terminal definition commands.

BACKSPACE CHARACTER (BS)

The BS parameter allows you to specify a substitute character to function as the backspace character.

CANCEL CHARACTER (CN)

The CN parameter allows you to specify a substitute character to function as the cancel character.

ABORT OUTPUT LINE CHARACTER (AL)

The AL parameter allows you to specify a substitute character to function as the abort output line character.

INTERRUPTION CHARACTER (B1)

The B1 parameter allows you to specify a substitute character to function as the interruption character.

TERMINATION CHARACTER (B2)

The B2 parameter allows you to specify a substitute character to function as the termination character.

PAGE LENGTH (PL)

The PL parameter allows you to specify the number of physical lines that can be displayed as one page. Any value from 0 to 255 can be specified; 0 selects infinite length. PL should be set to 0 or a value of 8 or more.

PAGE WAIT (PG)

The PG parameter allows you to specify whether output should stop at the end of each page. Possible values are:

Y   Output stops at page boundaries. A carriage return should be entered to continue output.

N   Output does not stop on page boundaries.

This parameter is valid only for display terminals.

PARITY SELECTION (PA)

The PA parameter allows you to inform the network of the type of parity that the terminal generates on input and expects on output. Possible values are:

E   Even parity.

O   Odd parity.

Z   Zero parity.

N   No parity.

SPECIAL EDITING (SE)

The SE parameter allows you to select special editing mode. In special editing mode, the cancel character, backspace character, and line feed character are sent to IAF as data. Possible values include:

N   Special editing is not in effect.

Y   Special editing is in effect.

TRANSPARENT INPUT MODE DELIMITER (DL)

The DL parameter allows you to specify transparent input mode delimiters. DL is not a valid parameter in the TRMDEF command. In a terminal definition command, any or all of the following can be specified.

Xcc   A delimiter character. cc is the terminal hexadecimal code for this character.

Cval   A character count, where val can be from 1 to 4095.

TO   Specifies a timeout of from 200 to 400 milliseconds.

ECHOPLEX MODE (EP)

The EP parameter informs the network whether the terminal expects character echoing from it. Possible values include:

Y   Character echoing is in effect.

N   No character echoing is in effect.

The FULL position on the FULL/HALF duplex switch of your terminal corresponds to character echoing. The HALF position corresponds to no character echoing.

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