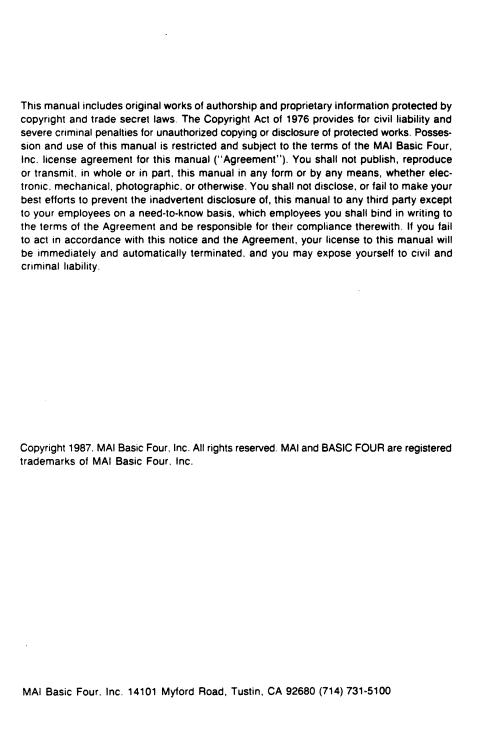
# MAI 2000 User Guide



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#### PREFACE

The MAI 2000 User Guide provides you with an introduction to the MAI 2000 and its operation. Basic information is provided about the system hardware and software. The presentation is primarily procedural, giving instructions for normal system operations, from starting the system in the morning to shutting it down in the evening. All the information and procedures you need to maintain the system are provided in this guide. The following topics are covered:

Section 1 - Introduction

Section 2 - System Startup and Shutdown

Section 3 - Using the BOSS/IX Operating System

Section 4 - Using Files

Section 5 - Text Editor

Section 6 - Printing

Section 7 - Daily Backup

Section 8 - Operator Maintenance

### SECTION 1

## INTRODUCTION

Your MAI 2000 system, together with the applications software you have purchased, has been designed to meet your business needs. The purpose of this guide is to introduce you to your MAI 2000 and to take you through some examples of basic system functions. Instructions for using your applications packages are provided under separate cover from your software vendor.

The information contained in this guide is covered in an expanded and more detailed form in the <u>BOSS/IX</u> <u>User Reference Manual</u>, M6211. This document covers procedures in their simplest forms, whereas the User Manual covers them in detail, including many advanced features.

The installation of your 2000 hardware and software is handled by your branch or dealer and service representative. If your system has not yet been installed, please contact them. The remainder of this guide assumes installation has been completed and the system is functioning properly.

## THE SYSTEM

Begin by looking at the equipment that has been set up. At the very least, you have a terminal, consisting of a keyboard and a screen, and a large (2' by 1.5') flat box. The terminal screen may be sitting on top of the box or beside the box. You probably also have one or more printers, extra terminals, and a Magnetic Cartridge Streamer (CS) drive or a Magnetic Reel Tape Streamer (TS).

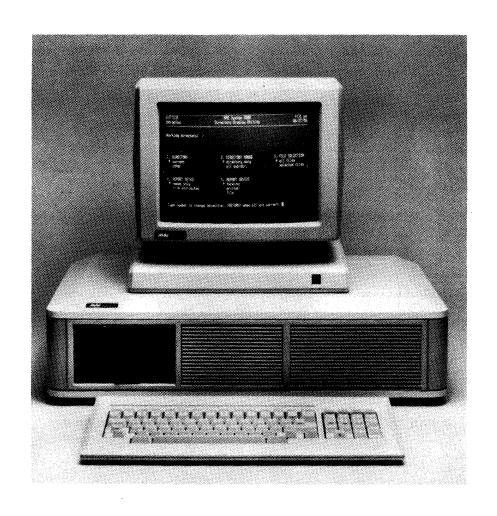


Figure 1-1. MAI 2000 Central Cabinet Assembly

The large box is called the Central Cabinet Assembly (CCA). The box may be on a desk, standing on end beside a desk, or even in another room. Wherever the box is, the terminals, printers, and CS or TS drive are connected to the CCA with cables.

For each terminal, printer or other peripheral, you should have received an operator's guide which explains in detail how to use it. Refer to these guides for information about the rest of your equipment.

#### RELATED PUBLICATIONS

- o BOSS/IX (7.3) User Reference Manual, M6211
- o BOSS/IX Technical Reference Manual, M6227
- o Business BASIC 86 Reference Manual, M6252
- o MAI 2000 Service Manual, M8079

### CONVENTIONS

Certain conventions have been adopted to help clarify the actions you are supposed to take while using the system. The following paragraphs describe these conventions.

# Prompts

Prompts are displayed indented and boldfaced on a separate line from the rest of the text. A prompt that is 2 lines long in the text may only take up 1 line on the terminal screen. This is due to page width restrictions.

This symbol is used as a generic command interpreter prompt:

**@**>

Actual command interpreter prompts are made up of the user's account name followed by the right angle bracket, ">".

# Pressing Keys

When a specific key on the terminal keyboard is referred to, the name of the key is capitalized and enclosed in angles. For example, we refer to the carriage return key as <RETURN>, and the A key is indicated as <A>.

If two or more keys must be pressed simultaneously, such as pressing <C> while holding down <CTRL>, the two keys are joined by a plus sign (+). For example:

<CTRL>+<C>

# Typing Text

When a character, number, or string of characters is to be typed, the information is displayed on a separate line. For example, type:

abcde

Usually, the text you type is followed by an instruction to press <RETURN>.

Note that BOSS/IX is "case-sensitive," meaning that it distinguishes lower-case letters from their upper-case equivalents. This is particularly important when entering file names, since a mistake in case will result in no file or the wrong file being found.

# NOTES

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#### SECTION 2

## SYSTEM STARTUP AND SHUTDOWN

In this section, we provide basic instructions for starting your MAI 2000. The procedures covered here include:

- o System Startup (Boot)
- o Entering Multi-user mode
- o System Shutdown
- o Alternate System Load

### SYSTEM STARTUP

The system startup routine begins with powering up the system, and then booting the BOSS/IX operating system.

# Power Up

On the back of the MAI 2000 CCA there is a two-position rocker switch that turns power to the CCA ON and OFF.

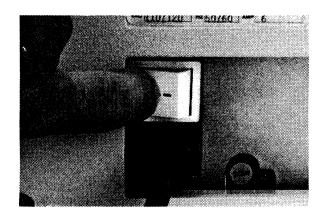


Figure 2-1. Power Switch

Press the side of the power switch marked 1 to turn power on to the system.

When power is turned on, the system begins a series of self-tests. While each test is being run, a message is displayed saying:

## Now testing XXXX ...

where XXXX is the part of the system being tested.

All of these tests must pass. If any fail, make a note of the failed test and contact your service representative.

When the self-tests are complete, the system immediately begins the boot procedure. There is no need for further action until you are prompted for the date and time. Refer to the boot procedure below for further instructions.

# Boot Prompt

If the system has been shut down and the power is still on, you may reboot the system. The system console displays the system boot prompt:

# Press 'RETURN' key to reboot ('^C'=alt-load, '^S'=self-testk

You have three options:

- 1. Press (RETURN) to boot the system.
- 2. Press (CTRL)+(C) to begin the alternate load procedure (described below).
- 3. Press (CTRL>+(S) to begin the system self-tests (described earlier) and then boot.

The alternate load procedure is described at the end of this section. The self-test messages were discussed earlier, under the heading "Power Up". The following topic describes the normal boot procedure.

# Booting BOSS/IX

The normal system boot routine begins immediately when you press (RETURN) at the boot prompt, or immediately after the system self-tests are done.

The following messages are displayed on the system console during the boot procedure:

Booting wd0

Loading /sys/bossix

Loading /etc/conf

Executing /sys/bossix,/etc/conf

During this time the operating system is being loaded into memory.

All other terminals remain inactive until the system has been booted and has entered multiuser mode (described later). If you don't know which terminal is the system console, turn on all the terminals before booting and look for the one displaying the boot messages.

Once the system boot is completed, a proprietary message is displayed, followed by the current system date and time. You are then asked to enter the current time and date:

Update clock: hhmmssxx mmddyy

If the time and date displayed are correct, press <RETURN>. If they are incorrect, enter the time in hour-minute-second-am/pm format, and the date in month-day-year format, then press <RETURN>.

The system may now ask for a password before the boot procedure is completed:

## Password:

If this prompt displays, you must enter the system administrator password. Type the password and press (RETURN). The password does not display as you enter it.

When you have entered the password, the screen displays:

# <single-user mode>

## ADMIN>

The prompt, ADMIN, is the system administrator prompt. (See note below.)

At this point, the system has been successfully started and is ready for use. It is in single-user mode, and only the system console is active.

NOTE: When the MAI 2000 leaves the factory, it has been configured to boot into single-user mode. However, your system may have been configured by your dealer to boot directly into multi-user mode.

# Multi-user Mode

When you have started the system and entered single-user mode, only the system console (tty0) is activated and ready for use. To activate additional terminals and printers, you must enter multi-user mode.

Any additional terminals and printers must already be connected to the CCA and the ports configured for them.

To enter multi-user mode, at the system administrator prompt, press:

⟨CTRL⟩+⟨D⟩

The system prompts:

single, multi or shutdown?

Type:

multi

and press (RETURN).

The system displays messages similar to these as it enters multi-user mode:

<multi-user mode>
Multi-user startup in progress.

Cleaning temporary directory '/tmp'...
Starting system 'update' and 'errlog'
processes...
Starting remote service manager...
Multi-user startup completed.

Wed Jun 10 1987 15:12:09

The following prompt displays on all configured terminals:

MAI 2000 (Terminal ttyN)-Press 'CTRL'+'C' or 'ESCAPE'...

The other terminals and printers are now available for use.

# Startup Problems

If the startup procedures described here fail to bring the system up, any of several things may have gone wrong. Many of the potential failures are described in Section 6 of the BOSS/IX User Reference Manual, M6211, "Problem Solving."

#### SYSTEM SHUTDOWN

Only the system administrator can shut down the system.

Shutdown is performed in two stages. From multi-user mode, the system is shutdown to single user mode. Then, from single user mode, the system can then be shutdown to the boot prompt.

#### CAUTION

You must follow the specified shutdown procedures before you turn off the power for the CCA. Otherwise, the filesystem could be damaged and you could lose data.

## Shutdown From Multi-user Mode

To shut down the system from multi-user mode, you must be logged on as the system administrator.

The shutdown command is used to shut down the system. The format of the shutdown command is:

shutdown {options} m {message}

where m is the number of minutes until the shutdown actually occurs and message is an optional message indicating the reason for the shut down.

If your system boots to single-user mode, it will shut down to single-user mode. If your system boots to multi-user mode, it will shut down to the reboot menu.

You can alter this process by using one of the available options. They are:

- -s shuts down to single user mode, even if your system boots to multi-user mode
- -r shuts down to the reboot menu, even on systems that boot to single user mode.

For example, to allow 2 minutes before shutting down for the night, type:

shutdown -r 2 For the night

and press (RETURN).

Every terminal screen displays:

# SYSTEM SHUTTING DOWN IN TWO MINUTES For the night

This message is repeated every minute, updating the remaining number of minutes until shutdown. When the specified number of minutes has expired, the screen displays:

# LAST WARNING - SYSTEM SHUTTING DOWN IN 15 SECONDS For the night

The number of seconds is counted down. When the time has expired, the system shuts down to the specified level.

If the system is shut down to single user mode, the screen displays:

<single user mode>

ADMIN>

The system is still functional, but only the system console is active.

NOTE: The shutdown process can be interrupted at any point up to the last moment. To interrupt the shutdown process, press <CTRL>+<C> at the terminal initiating the shutdown. This terminates the shutdown process, and multi-user activity can continue.

## Shutdown From Single User Mode

When the system is in single user mode, you may shut down the system to the reboot menu or power down.

At the system administrator prompt press:

<CTRL>+<D>.

The system prompts:

single, multi or shutdown?

Type:

shutdown

and press <RETURN>. The system shuts down and displays the reboot prompt:

System Shutdown Complete — Power Off or Reboot.

Press 'RETURN' key to reboot ('^C'= alt-load, '^S'=self-test)

It is now safe to turn off the system power, or you can reboot the system.

#### ALTERNATE SYSTEM LOAD

Option 2 of the boot prompt (CTRL>+(C)) performs an alternate system load. This is used for some special procedures when an alternate operating system is required, or when the root device must be different.

None of the procedures covered in this User Guide require an alternate load. Instructions for performing an alternate load are provided in any documentation that requires an alternate load procedure. Following is a general description of the procedure.

When you perform an alternate load, the system prompts you to enter the name of the device containing the operating system to be loaded:

## Boot device:

The default boot device is wd0, the first fixed disk drive. Press <RETURN> to select the default device. Other boot devices include cs, for the Magnetic Cartridge Streamer (CS) drive, ts, for the Magnetic Tape Streamer (TS) drive, and fd0 for floppy diskette.

Next you are prompted for the files containing the operating system and the system configuration information:

# System file:

The general format is:

/opersys/file,/config/file

consisting of two file names, including the directory path, separated by a comma.

The default operating system is /sys/bossix and the default configuration file is /etc/conf, both of which are on the boot partition of the first fixed disk. Press <RETURN> for the default files.

The operating system is generally not required, so you do not have to specify it. To specify the configuration file, type a comma followed by the file name and press (RETURN). For example, to boot the system rooting to the boot partition, type:

# ,/etc/boot.conf

The system then boots according to the operating system and configuration files specified.

In general, you cannot enter multi-user mode while booted with an alternate operating system or system configuration. Refer to the specific instructions included in the documentation for using the alternate load.

The shutdown procedure from an alternate load is usually the same as shutting down from single-user mode under a normal boot. Again, refer to the documentation for the particular procedure you are performing.

# NOTES

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#### SECTION 3

### USING THE BOSS/IX OPERATING SYSTEM

This section introduces the user interface to the MAI 2000, which consists of the BOSS/IX Menu System, Utilities and Commands.

The BOSS/IX operating system (the "O.S." for short) is the software that makes the MAI 2000 run. It performs functions such as maintaining the orderly distribution of memory, disk and tape access, file maintenance, and so on. It also includes the following system interfaces: a Menu System, Utility programs, a Command Language, and the Business BASIC programming language. Each of these four components is described in the following pages. BOSS/IX also includes a powerful file system, which is described in the next chapter.

This section is primarily procedural, beginning with procedures for logging on and off the system at a terminal. The overview of the Menu System and Utility programs provide the basis for accessing and using the procedures that make up the bulk of this User Guide.

Introductions to the Command Interpreter and BASIC are brief and are only included so you can access these operating modes when required. The Command Interpreter is discussed in detail in the <u>BOSS/IX User Reference Manual</u>, M6211, and BASIC is described in the <u>Business BASIC 86 Reference Manual</u>, M6262 (for BOSS/IX levels 7.3 and higher).

#### LOGGING ON TO THE SYSTEM

When the system has been started in multi-user mode, as described in the previous chapter, you need to log on to the system at a terminal before you can begin using it.

On the bottom of every terminal that is configured, the following prompt is displayed:

MAI 2000 (Terminal ttyN) - Press 'CTRL'+'C' or 'ESCAPE'...

where N is the number of the terminal.

To log on to the system at this terminal, press <ESCAPE> or <CTRL>+<C>.

The prompt line is cleared and the system displays:

### Account name:

Each user is assigned an account name by the system administrator.

Type your account name and press (RETURN). (The system administrator account name is admin.) If your account has been assigned a password, the system displays:

### Pagemord:

Type the password and press <RETURN>.

If you entered your account name and password properly, you are now logged on to the system.

Usually, the initial program for the system administrator is the Command Interpreter. In that case, the system administrator prompt is displayed:

#### ADMIN>

For other users, the login point is usually either an application program or the Initial Menu of the Menu System. NOTE: If you log on to an application, you might not be able to use the remaining procedures in this manual. All of your system access is controlled by the application. Refer to the special documentation provided by your software vendor.

If you log on to the Command Interpreter, you can access the Menu System by entering:

menu

at the prompt. The Initial Menu is displayed.

Although the Initial Menu may have been modified, a typical example is shown in Figure 3-1. This menu will be the starting point for the instructions in the remainder of this section.

EUT7.3A top MAI BASIC FOUR, INC.
Initial Menu

11:56 am 05/22/87

- 1. Utility programs
- 2. Command interpreter
- 3. BASIC
- 4. Log off

Type number of selection or desired menu name: <RETURN> for previous menu, <CTL-III> for logon menu, <CTL-IV> to abort

Figure 3-1. The Initial Menu

#### LOGGING OFF THE SYSTEM

When you have finished using the system, you need to log off the system to make the terminal available for another user.

If you log on to an application program, the application probably provides a log-off procedure different from the procedure described here. Refer to the documentation provided by your vendor for instructions.

The initial menu includes the option "Log off", shown as option number 4 in figure 3-1. At the Initial Menu, type the number of this option and press <RETURN>. This logs you off the system. (For instructions on moving around in the Menu System, refer to the following sections.)

If you log on to the command interpreter, you also have the option of logging off directly from the command interpreter. To log off, press (CTRL)+(D) at your prompt. (Notice that this exits to the process that invoked the command interpreter, e.g., if you last entered the command interpreter from the menu system, (CTRL)+(D) exits to the menu system.)

#### THE MENU SYSTEM

A sample Initial Menu is shown in Figure 3-1. Your system's Initial Menu may differ slightly, but the first three options are probably the same as shown here. Optional software packages may also be listed on the menu above the "Log off" option.

If you log on to an application program, you might not have access to the menu system. Refer to the application documentation to find out. The Initial Menu can be accessed from the command interpreter. At the @> prompt, type:

menu

and press <RETURN>.

## **Using Menus**

A menu is a numbered list of items, each describing a program or another menu. For example, the Utility programs option leads to another menu, while the Command interpreter option executes the command program.

At the bottom of the screen, there are two lines containing a prompt and a message:

Type number of selection or desired menu name: <RETURN> for previous menu, <CTL-III> for logon menu, <CTL-IV> to abort

The simplest use of the menu is to type the number of the desired item and press (RETURN). This calls the program or menu you selected.

The menu allows you to jump directly to another menu by typing the name of the menu followed by <RETURN>. To do that you must know the name of the menus. The names of the standard menus are listed in Section 4 of the BOSS/IX User Reference Manual, M6211. The initial menu name is "top". The other standard menus are used to access Utility programs. Additional menus may be defined to organize access to additional application menus.

At any menu, you can press (RETURN), without typing a selection number. The previous menu is displayed.

At any menu you can also press (CTL-III). This always returns you to the Initial Menu. You can also press (CTL-IV). This terminates the current process, in this case the series of menus you have accessed. If you log on directly to the currently displayed menu, (CTL-IV) logs you off of the system.

At any menu, you may press the  $\langle CTRL \rangle + \langle Z \rangle$ , or the  $\langle HELP \rangle$  key on the DT4310 terminal, to display a help message for that menu. The help text briefly explains each option.

With this introduction to the use of menus, we proceed to the first three options on the Initial Menu.

#### THE UTILITY PROGRAMS

The utility programs provide a simple, promptoriented method for performing many system maintenance functions. They allow you to instruct the O.S. to perform specific jobs, such as changing the date, copying and deleting files, printing the contents of files, and so on.

The utility programs on the MAI 2000 are linked by an extensive menu system. You can get to any utility you need simply by following the path to it through the menu system.

The Main Utility Menu is accessed by selecting option 1, "Utility programs," at the Initial Menu. The Main Utility Menu displays.

- 1. Directories
- 2. Files
- 3. Filesystem & disk
- 4. Printers
- 5. Save & restore
- 6. BASIC programs
- 7. Communications
- 8. System
- 9. Intersystem transfer

Type number of selection or desired menu name: <RETURN> for previous menu, <CTL-III> for logon menu, <CTL-IV> to abort

top

## Figure 3-2. Main Utility Menu

The Main Utility Menu lists nine options, seven of which are utility programs. (The Communications and Intersystem transfer options are included for convenience, but are optional programs not included with the base BOSS/IX system software.)

To become familiar with the utilities, take a look at the Directory Utilities. Select option 1, "Directories." The Directory Utilities Menu displays.

- 1. Display
- 2. Create
- 3. Change working directory

Type number of selection or desired menu name: <RETURN> for previous menu, <CTL-III> for logon menu, <CTL-IV> to abort

top ut.main

## Figure 3-3. Directory Utilities Menu

Notice that as you move from one menu to another, a list of menu names is displayed at the bottom of the screen.

The Directory Utilities Menu displays a list of the Directory Utility programs. Select option 1, "Display," to display the contents of a directory. (Directories are briefly explained in Section 4.) Figure 3-4 shows the initial prompt displayed by this utility.

EUT7.3A	MAI BASIC FOUR, INC.
ddisplay	Directory Display Utility

11:56 am 05/22/87

Working directory: /usr/xxxx

1. DIRECTORY

\* current

\* all files
other

selected files

FILE SELECTION
all files

\* names only
selected files

file attributes

4. REPORT DEVICE

\* terminal
printer
file

Type number to change selection, <RETURN> when all are correct:

## Figure 3-4. Directory Display Utility Prompt

The screen displays several multiple choice prompts, which allow you to select, in each category, one option from more than one choice.

The options are not explained fully here, but can be found in Section 4 of the <u>BOSS/IX User Reference</u>
<u>Manual</u>, M6211. Detailed descriptions of all kinds of prompts and menus are also included there.

Notice the "Working directory" line, near the top of the screen. This line shows your current working directory. The role of working directories is explained in Chapter 4.

The menu options indicate that:

- The contents of the current directory, the directory displayed as the working directory, are to be displayed.
- 2. All files in this directory and its subdirectories are to be displayed.

- 3. Only the file names will be displayed, excluding additional information about them.
- The contents of the directory are to be displayed on the terminal screen.

These are the default selections, and are indicated by an asterisk next to each option. Any of these options may be changed simply by pressing the number key for that list. For now, do not change the selections. Press <RETURN> to display the contents of your current working directory.

The names of any files in your working directory are displayed. If it is a new directory, it is probably empty. The following message is displayed at the bottom of the screen:

## Type (RETURN) to proceed:

Press <RETURN> to display more file names or, if there are no more, to end the utility. When there are no more files to display, the screen returns to the Directory Utilities Menu.

Go back into the utility and try it again. This time press the <1> key once to change the directory option to "other". Then press <RETURN>. The program asks you for the name of a directory:

# Type working directory, <RETURN> for no change:

Type:

/usr

and press <RETURN>. The contents of the /usr directory are displayed. Try some other options, just to gain experience. You may also wish to look at some other directories, such as /bin, and /util. You can exit the display at any time by pressing <CTRL>+<IV>.

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When you have finished, press (RETURN) at the Directory Utilities Menu, and again at the Main Utility Menu. This returns you to the Initial Menu.

More utilities are described in the following sections. Individual utilities are included in the sections that correspond to the tasks they perform. A full description of all the utilities can be found in the <u>BOSS/IX User Reference Manual</u>, M6211.

#### THE COMMAND LANGUAGE

Also included with the operating system is a Command Language. Like the utility programs, it allows you to instruct the O.S. to perform specific jobs, such as changing the date, copying and deleting files, and printing the contents of files. For a full description of the command language, refer to section 5 of the BOSS/IX User Reference Manual, M6211.

The Command Interpreter is a program that reads instructions written in the command language, and interprets them to the O.S. To access the command interpreter, select option 2, Command interpreter, at the Initial Menu.

The command interpreter prompt is usually made up of your operator name followed by ">". For example, a user named Dave would have the following prompt:

#### dave>

displayed at the left side of the screen. If you log on as the system administrator, your prompt is:

#### ADMIN>

To use a command, type the name of the command, plus any options or required information, and press <RETURN>. For example, to display your working directory, type:

pwd

(for "print working directory") and press (RETURN). Your working directory is whatever directory you last specified in the Display Directory utility, but we'll assume that it is back to your home directory. For example:

dave>pwd /usr

The directory shown is the same one that was displayed when you started looking at the Display Directory utility.

You can list the contents of this directory, just as you did with the utility, by typing:

ls

and pressing <RETURN>.

Again, as with the utility, you can display the contents of another directory, but there are two options.

First, you can change your working directory and list its contents. For example, to change your working directory to /bin, use the cd command. Type:

cd /bin

and press <RETURN>.

Now, if you type is and press (RETURN), the contents of this directory are displayed.

Second, you can display the contents of /bin, or any other directory, without changing your working directory first. To do this, type the command name, ls, followed by the name of the directory, /bin, separated by a space:

ls /bin

and press (RETURN).

This flexibility and many other features make the command language, in general, more powerful than the utility programs. However, the displays are usually less attractive and you have to remember the names of the commands and their formats.

Most of the commands, however, are contained in the /bin directory. To see the names of the available commands, simply list the contents of this directory, as you did earlier.

To learn the format of a command, type the name of the command, followed by -help, and press <RETURN>. Information about the command is displayed. For example, the following help is given for the ls command:

The full command set is described in the <u>BOSS/IX</u> <u>User Reference Manual</u>, M6211.

In the remainder of this guide, we emphasize using the utility programs, which were designed for ease of use. If you accessed the command interpreter from the Initial Menu, you can return to that menu by pressing:

<CTRL>+<D>

Otherwise type:

menu

and press <RETURN>.

## Comparison of the Command Language and Utilities

When the same function can be performed in either the command language or by a utility, the command language procedure is usually faster. However, if you do not know the correct command language sequence, using a utility program walks you through the procedure. Use the method you feel more comfortable with.

In addition, there are several functions that can be performed by using the command language, but not by using the utilities, and some that can be performed by using the utilities, but not by using the command language.

#### BUSINESS BASIC 86

The Business BASIC programming language is another way to interact with the system. In some instances, it can be used like the command language. For example, there are commands for setting the date and time, and for creating and deleting files. If you are familiar with other MAI Basic Four systems on which Business BASIC is the command language, you might want to start working with the system in BASIC while you become familiar with the new command language.

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More importantly, Business BASIC allows you to write your own application programs. Specific tasks that you need to perform repeatedly can often be performed more easily by writing a program to do it for you. For example, data input to files can be made painless by writing a small program that prompts you for the information and then writes it to the proper file.

Starting with BOSS/IX level 7.3, Business BASIC for the BOSS/IX systems conforms to the Business BASIC 86 standard. Business BASIC 86, including extensions for the BOSS/IX implementation, is fully described in the Business BASIC 86 Reference Manual, M6262.

To access BASIC, select option 3 at the Initial Menu. A message indicating the release level, followed by the word READY and the BASIC prompt, ">" is displayed at the left of the screen.

You can now write a BASIC program, immediately execute selected BASIC statements, or run a BASIC program, as explained in the Business BASIC documentation. For example, to execute a Business BASIC program named ACCOUNTING, type:

> RUN "ACCOUNTING"

and press (RETURN).

When you are finished with the BASIC interpreter, at the > prompt, type:

> quit

and press  $\langle \text{RETURN} \rangle$ . This returns you to the Initial Menu.

#### RUNNING APPLICATION PROGRAMS

Most application programs for the MAI 2000, as for all MAI Basic Four systems, are written in Business BASIC. Other applications may have been written in the C programming language, COBOL or Pascal.

Special instructions for running these programs are included in the documentation for the program. The following paragraphs describe the general method for running Business BASIC and C programs on the MAI 2000, the most common programs used on the system.

Your vendor may have set up your system so that the program executes immediately when you log on, or may have designed a menu to allow you to select one of several programs. In these cases, you do not need to use these procedures.

### Running a BASIC Program

To run a Business BASIC program, you must access the BASIC interpreter. Select option 3, BASIC, at the initial menu.

As described in the previous section, you execute a BASIC program by using the RUN directive followed by the program name enclosed in quotes:

#### > RUN "PROGNM"

The program name may include directories in a path name, as explained in the next chapter.

The program documentation may include some special instructions, such as specifying the program memory size before running the program:

- > START 64
- > RUN "PROGNM"

When there are any special requirements, the application documentation should make them clear.

## Running a C Program

Programs written in C are executed just like commands. Select option 2, Command interpreter, at the Initial Menu. When your prompt is displayed, type the name of the program and press <RETURN>.

The program name may include directories in a path name, as explained in the next chapter. Note that, unlike BASIC, there is no command or directive required other than the program name, and the program name is entered without quotation marks.

Again, there may be special instructions and options that must be included on the command line. These are described in the application documentation.

### NOTES

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#### SECTION 4

#### USING FILES

This section describes the BOSS/IX File System and explains how to use it to manage files. The section begins with a description of the file system, and concludes with procedural descriptions of the utilities used to maintain the file system.

#### THE FILE SYSTEM

A sophisticated file system allows you to group related files in a single "directory." This ability to group files reduces the number of file names you need to look through while searching for a specific file. It also lets you restrict user access to certain groups of files.

The MAI 2000 file system arranges files as a tree arranges its leaves: at the end of branches. Consequently the file system structure is referred to as a "tree" structure. It may also be referred to as a "hierarchical" structure.

Each branch of the tree corresponds to a directory. The branch then leads either to another directory or to a file.

At the base of the tree is a single super-directory, called the "root" directory. All directories and files in the file system can be reached by starting at the root directory and following a path through intermediate directories until the desired directory or file is reached.

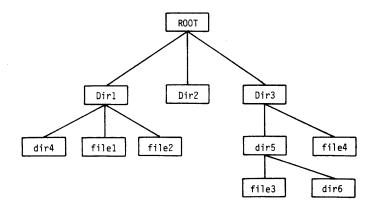


Figure 4-1. The File System Tree Structure

Files, like leaves, are always the end point of a branch; no more directories or files can grow from a file. There is no practical limitation to the number of branches that can originate at a single directory.

Files and directories all have their own names, but they are fully identified only by the complete "path" starting at the root and leading to the file or directory itself.

The root directory is always called "/" (slash). All succeeding directories and files are referred to by name.

The full path name is designated by the root directory, "/", followed by each intermediate directory name, separated by slashes, (e.g., /dir3/dir5/file3). The full path name cannot exceed 128 characters.

So the full path name of file3 is /dir3/dir5/file3. The first slash identifies the name as beginning at the root. The succeeding slashes serve as separators between directory and file names.

You do not always need to specify the full path name of a file or directory. You can create a "working directory." A working directory is the full path name of a directory.

To access a file or directory, you only need to specify the part of the path name that follows your working directory. For example, if your working directory is /dir3 and you want to access file3, you only need to specify dir5/file3. If your working directory is /dir3/dir5, you only need to specify file3.

A "home" working directory is assigned when you log onto the system. It can be changed by some of the utilities and certain commands in the command lanquage and Business BASIC.

The file specifications dir5/file3 and file3 in the examples above are called "partial path names", which specify file3 relative to your working directory. (They are also occasionally called "relative path names".) Notice that a partial path name does not begin with a "/". This indicates to the O.S. that a partial path name has been entered, and that your working directory is the prefix to the partial path name.

Several tools are available for maintaining directories, files, and working directories. They are available through utility programs, the command language, and Business BASIC.

Further explanation of the BOSS/IX file system is contained in the BOSS/IX User Reference Manual, M6211. In particular, a full description of how the BOSS/IX file system is organized into filesystems is contained there, but a brief description is required here.

### **Filesystems**

A filesystem is an independent structure made up of directories and files, that exists on a floppy diskette or a part of a fixed disk (a partition). A filesystem is used when the system is booted as the "root" filesystem.

Filesystems other than the root must be "mounted" to the root filesystem in order to access the files they contain. This is done by attaching the root directory of the independent filesystem to a directory in the root filesystem. Only a limited number of filesystems can be mounted at one time; this limit is set in the configuration file using the vconf command. Because of this, independent filesystems should be unmounted when they are not being accessed. This also helps to maintain data integrity, because unmounted filesystems are usually not affected by system crashes. The Mount and Unmount utility is described later in this section.

A floppy diskette must be formatted and have a filesystem built on it before it can be mounted for use as a filesystem device. The Format Diskette Utility, described later in this section, formats a floppy and builds the filesystem.

#### File Names

File and directory names may be no more than 20 characters long. The full path name of a file may be no more than 128 characters long, including all slashes, "/". The following characters have special meanings in BOSS/IX, so do not use them in naming files and directories:

Also avoid using blanks and control characters (characters used with the CTRL key).

Some file names may contain an extension. For example, in the file name uthelp.ind, the "ind" following the period is the file extension. A period marks an extension.

The O.S. is case sensitive, meaning that upper- and lower-case letters are handled as distinct characters. By convention, commands and most system file names are in lower-case, and BASIC program file names are in upper-case. You may use both cases in naming your files, but remember that when you try to access a file, the spelling, including the case, must match exactly. This includes BASIC program names, which are not automatically shifted to upper-case.

## File Access Rights

File and directory security is maintained by a system of file ownership and access rights. The file or directory is "owned" by the user who created it. Each file and directory also has two sets of "access rights." One set determines the read, write and execute rights of the file's owner, and the other set determines the access rights for all other users.

Access rights and ownership can be changed. The methods for changing them as well as a full description of their use, are described in the <u>BOSS/IX User</u> Reference Manual, M6211.

#### FILE SYSTEM MAINTENANCE UTILITIES

The following paragraphs describe the utilities required to perform the most common operations on the file system.

## Display Directory Contents

The Directory Display utility was briefly introduced in Section 3 as an example of a utility program. It allows you to generate a report of the contents of any directory.

 To access the Directory Display Utility, select option 1, "Directories," at the Main Utility Menu, and then select option 1, "Display," at the Directory Utilities Menu.

EUT7.3A	MAI BASIC FOUR, INC.	11:56 am
ddisplay	Directory Display Utility	05/22/87

Working directory: /usr/xxxx

1. DIRECTORY

\* current
other

2. FILE SELECTION

\* all files selected files REPORT DETAIL\* names only file attributes

4. REPORT DEVICE

\* terminal printer file

Type number to change selection, <RETURN> when all are correct:

Figure 4-2. Directory Display Utility Initial Prompt

# 2. Select the desired report characteristics from the multiple choice menu:

#### o DIRECTORY

Current - displays the contents of your working directory

Other - allows you to specify the directory to be displayed

#### o FILE SELECTION

All files - reports the entire directory, including subdirectory contents

Selected files - allows you to create a list of files to report

#### REPORT DETAIL

Names Only - reports file names only

File attributes - reports file type and size information

#### REPORT DEVICE

Terminal - displays the report on the terminal screen

Printer - prints the report on a printer you select

File - writes the report to a file you specify

Press <RETURN> when you have made your selections.

3. If you selected "other" as the directory to report, this prompt displays:

# Type working directory, <RETURN> for no change:

Type the name of the directory and press <RETURN>. (You can use the full or partial path name.)

4. If you chose "printer" as the report device, select the desired printer from the menu displayed and press <RETURN>.

### Printer devices

- 1. LP
- 2. PO
- 5. If you selected "file" as the report device, this prompt displays:

### Type report file name:

Type the name of file and press <RETURN>.

6. The report is produced. Progress is indicated by a row of dots at the bottom of the screen.

If the report is sent to a file or a printer, the utility ends once the report is generated.

7. If the report is sent to the terminal screen, this prompt is displayed at the bottom of the screen:

## Type <RETURN> to proceed:

Press <RETURN> to display the next page of the report. After the last page has been displayed, the utility ends.

## Create Directory

The Create Directory utility allows you to create a subdirectory in an existing directory. If the new directory path name contains directories that do not exist, they are created at the same time by the utility.

- To access the Create Directory Utility, select option 1, "Directories," at the Main Utility Menu. Select option 2, "Create," at the Directory Utilities Menu.
- 2. The program first asks you to enter the name of the working directory.

# Type name of working directory, <RETURN> for no change:

Type the name of the desired working directory and press <RETURN>, or simply press <RETURN> to keep your current working directory.

3. Type the full or partial path name of the directory to create and press (RETURN).

# Type name of directory to create, <RETURN> to end:

- 4. The utility creates the specified directory and repeats the prompt in step 3 for as many directories as you wish to create.
- 5. Press (RETURN) to end the utility.

## **Change Working Directory**

Working directories are convenient, because they allow you to use partial path names to specify files and directories.

The Change Working Directory Utility can be used to change the current working directory. Once you terminate the menu system by logging off or exiting to the command interpreter, the change is no longer in effect.

To access the Change Working Directory Utility, select option 1, "Directories," at the
Main Utility Menu, and select option 3,
"Change working directory," at the Directory
Utilities Menu.

# Type working directory, (RETURN) for no change:

Type the name of the working directory and press <RETURN>, or press <RETURN> alone to specify the current working directory.

The utility changes your working directory and ends.

## Copy Files

The Copy File Utility allows you to copy one or more files to a single destination directory. Source files are not affected. You can rename files as they are copied.

1. To access the Copy File Utility, select option 2, "Files," at the Main Utility Menu, and then select option 5, "Copy," at the File Utilities Menu.

\_\_\_\_\_\_

Working directory: /usr/xxxx

- 1. FILE SELECTION
  - \* single file selected files

- 2. DUPLICATES
- \* replace ask user

- 3. RENAME FILES
  - \* no yes

- 4. REPORT DEVICE
- \* terminal printer file

Type number to change selection, (RETURN) when all are correct:

## Figure 4-3. Copy File Utility Initial Prompt

2. Select the desired options from the multiple choice menu:

#### o FILE SELECTION

Single file - prompts you for the file name

Selected files - prompts you to build a list of files

#### o DUPLICATES

Replace - replaces a file in the destination directory that has the same name as the file being copied

Ask user - asks you whether to replace the file in the destination directory or skip the current file

#### o RENAME FILES

If yes, prompts you for the new name before each file is copied

#### o REPORT DEVICE

Terminal - displays the report on the terminal screen

Printer - prints the report on a printer you select

File - writes the report to a file you specify

Press <RETURN> when you have made your selections.

3. If you specified "printer" as the report device in step 2, select a printer from the displayed menu of printers and press (RETURN).

### Printer devices

- 1. LP
- 2. P0
- 4. If you specified "file" as the report device in step 2, this prompt displays:

## Type report file name:

Type the name of the file and press <RETURN>.

5. If you specified "single file" in step 2, this prompt asks for the file to copy:

## Type name of file to copy, <RETURN> to end:

Type the file name and press (RETURN). The name may be the full or partial path name.

6. If you specified "selected files" in step 2, this prompt begins the procedure for building a list of files to copy:

# Type a file or filelist name to add, <RETURN> when done:

Type the name of a file or filelist and press <RETURN>. (You may also use pattern matching characters to indicate multiple files.) The files are added to the list and the prompt repeats. Press <RETURN> when you have finished adding names.

The menu that appears next contains options for modifying the list. Press (RETURN) to continue.

Please refer to Section 4 of the <u>BOSS/IX User</u> Reference Manual, M6211, for a full description of the file selection procedure.

7. Type destination directory, <RETURN> for working directory:

Type the full or partial path name of the destination directory and press <RETURN>.

8. If you set the Rename Files option to yes, this prompt displays for each file before it is copied:

# Type the new file name, <RETURN> for no change:

Type the new file name (with no directory path) and press <RETURN>. Press <RETURN> to copy the file with its current name.

9. If you specified "ask user" under Duplicate Files in step 2, this prompt is displayed every time a file already exists in the destination directory with the same name as the file being copied

# File "file.name" already exists. Replace it? (yes/no):

To replace the file, press <Y> and press <RETURN>. To skip the file, press <N> and press <RETURN>.

When all files have been copied, the utility ends.

#### Delete File

The Delete File Utility allows you to delete one or more specified files and directories.

1. To access the Delete File Utility, select option 2, "Files," at the Main Utility Menu, and then select option 2, "Delete," at the File Utilities Menu.

EUT7.3A	MAI BASIC FOUR, INC.	11:56 am
fdelete	Delete File Utility	05/22/87

Working directory: /usr/xxxx

1. FILE SELECTION 2. VERIFY 3. REPORT DETAIL \* current \* no \* don't delete other yes delete

4. REPORT DEVICE

\* terminal printer file

Type number to change selection, <RETURN> when all are correct:

## Figure 4-4. Delete File Utility Initial Prompt

Select the desired options from the multiple choice menu:

#### o FILE SELECTION

Single file - prompts you for the file name

Selected files - prompts you to build a list of files

#### o VERIFY

If yes, prompts you for each file to verify that it is to be deleted

#### DIRECTORY CONTENTS

Don't delete - does not delete a directory or its files if the directory contains files or subdirectories.

Delete - deletes specified directories and their contents.

#### o REPORT DEVICE

Terminal - displays the report on the terminal screen

Printer - prints the report on a printer you select

File - writes the report to a file you specify

Press <RETURN> when your selections are made.

3. If you specified "printer" as the report device in step 2, select a printer from the displayed menu of printers and press (RETURN).

### Printer devices

- 1. LP
- 2. PO
- 4. If you specified "file" as the report device in step 2, this prompts displays:

## Type report file name:

Type the name of the file and press <RETURN>.

5. If you specified "single file" in step 2, this prompt asks for the file or directory to delete:

# Type file or directory name, <RETURN> to end:

Type the file name and press (RETURN). The name may be the full or partial path name.

6. If you specified "selected files" in step 2, this prompt begins the procedure for building a list of files to delete:

# Type a file or filelist name to add, <RETURN> when done:

Type the name of a file or filelist and press <RETURN>. (You may also use pattern matching characters to indicate multiple files.) The files are added to the list and the prompt repeats. Press <RETURN> when you have finished adding names.

The menu that appears next contains options for modifying the list. Press <RETURN> to continue.

Please refer to Section 4 of the <u>BOSS/IX User</u> <u>Reference Manual</u>, M6211 for a full description of the file selection procedure. 7. If you set the Verify option to "yes", this prompt is displayed for each file before it is deleted:

## Delete file "/dir/file.name"? (yes/no):

To delete the file, press <Y> and press <RETURN>. To keep the file, press <N> and press <RETURN>.

When all files have been deleted, the utility ends.

## Display File Information

The File Information Utility produces a report of certain file information. The information includes the file name, file type, size data, access parameters, date last modified, and the number of names. The number of names is usually one; multiple names are generally used for special system functions.

1. To access the File Information Utility, select option 2, "Files," at the Main Utility Menu, and select option 3, "Display information," at the File Utilities Menu.

EUT7.3A MAI BASIC FOUR, INC. 11:56 am finfo File Information Utility 05/22/87

Working directory: /usr/xxxx

1. DIRECTORY
2. FILE SELECTION
3. REPORT DEVICE
4 current
5 terminal
6 printer
7 file

Type number to change selection, <RETURN> when all are correct:

# Figure 4-5. File Information Utility Initial Prompt

- 2. Select the desired options from the multiple choice menu:
  - o DIRECTORY

Current - uses the current working directory for specifying files

Other - changes the working directory before specifying files

o FILE SELECTION

Single file - prompts you for the file name

Selected files - prompts you to build a list of files

#### o REPORT DEVICE

Terminal - displays the report on the terminal screen

Printer - prints the report on a printer you select

File - writes the report to a file you specify

Press <RETURN> when you have made your selections.

3. If you selected "other" for the directory in step 2, this prompt is displayed.

Type working directory, <RETURN> for no change:

Type the full or partial path name of the new working directory and press <RETURN>.

4. If you specified "printer" as the report device in step 2, select a printer from the displayed menu of printers and press <RETURN>.

Printer devices

- 1. LP
- 2. PO

## 5. Type report file name:

If you specified "file" as the report device in step 2, type the name of the file and press (RETURN).

6. If you specified "single file" in step 2, this prompt asks for the file to report:

### Type file name, <RETURN> to end:

Type the file name and press <RETURN>. The name may be the full or partial path name.

7. If you specified "selected files" in step 2, this prompt begins the procedure for building a list of files to report:

# Type a file or filelist name to add, <RETURN> when done:

Type the name of a file or filelist and press <RETURN>. (You may also use pattern matching characters to indicate multiple files.) The files are added to the list and the prompt repeats. Press <RETURN> when you have finished adding names.

The menu that appears next contains options for modifying the list. Press  $\langle \text{RETURN} \rangle$  to continue.

Please refer to Section 4 of the <u>BOSS/IX User</u> Reference Manual, M6211 for a full description of the file selection procedure.

8. If you specified "terminal" as the report device in step 2, the file information is displayed for one file at a time. This prompt is displayed at the bottom of the screen.

## Type <RETURN> to proceed:

Press (RETURN) to display the next file.

The program ends after the last specified file is displayed.

## Mount & Unmount Filesystem Utility

The Mount and Unmount utility allows you to attach an independent filesystem to the root filesystem, and to detach it again. Filesystems must be mounted in order for the system to access the files they contain. Since only a limited number of filesystems can be mounted at one time, they should be unmounted when access to their files is no longer needed.

### Mount

 To access the Mount and Unmount Utility, select option 3, "Filesystem & disk," at the Main Utility Menu. Then select option 1, "Mount & unmount," at the Filesystem & Disk Utilities Menu.

EUT7.3A MAI BASIC FOUR, INC. 11:56 am smount Mount & Unmount Filesystem Utility 05/22/87

- Mount a filesystem
- 2. Unmount a filesystem
- 3. Display mounted filesystems

Type number of selection, (RETURN) to end:

# Figure 4-6. Mount and Unmount Utility Function Menu

When the utility displays the utility functions menu, select option 1, "Mount a filesystem."

## 3. Type directory name, (RETURN) to end:

Type the path name of the mount point directory (usually "/mnt") and press <RETURN>. Any directory may be used as the mount point, but only empty directories are recommended, because a mounted directory prevents access to contents of the directory upon which it has been mounted.

4. These are the filesystem devices

1. boot 5. fdl 9. wd0

2. bswap 6. flop 10. wdl

3. fd 7. floppy 4. fd0 8. root

Type number of selection, (RETURN) to end:

Select the filesystem device to mount.

5. Filesystem "/dev/device" is mounted on 
"/directory"

## Type (RETURN) to proceed:

Press (RETURN) to acknowledge the message.

6. The program repeats the "type directory name" prompt. Repeat the procedure for another filesystem device, or press (RETURN) to end the utility.

## Unmount

- To access the Mount and Unmount utility, select option 3, "Filesystem & disk," at the Main Utility Menu, and then select option 1, "Mount & unmount," at the Filesystem & Disk Utilities Menu.
- When the utility displays the utility functions menu, select option 2, "Unmount a filesystem."

## Type directory name, (RETURN) to end:

Type the path name of the directory to unmount and press <RETURN>.

4. The program unmounts the filesystem. When the filesystem has been unmounted, the program displays:

## "/directory/name" unmounted Type <RETURN> to proceed:

Press <RETURN> to acknowledge the message.

5. The program displays the "type directory name" prompt. Repeat the procedure for another filesystem, or press <RETURN> to end the utility.

When these utilities end, the Mount & Unmount Filesystem Utility menu displays again.

## Format Diskette Utility

The Format Diskette Utility prepares a diskette to receive files. First the diskette is formatted, and then an empty filesystem is created on the diskette.

- 1. To access the Format Diskette utility, select option 3, "Filesystem & disk," at the Main Utility Menu, then select option 2, "Format diskette," at the Filesystem & Disk Utilities Menu.
- 3. The system prompts:

## Verify the format (yes/no):

Type:

yes

and press (RETURN).

4. The utility formats the diskette and checks for bad blocks. When it is finished, the utility displays this message:

Format complete with no errors. Remove the diskette. Then type (RETURN) to proceed:

If any bad blocks were found, the numbers are displayed. Press (RETURN) to end the procedure.

5. The prompt shown in figure 4-7 is repeated. Press (CTL-IV) to end the utility, or repeat the procedure starting at step 2. When the utility has ended, the Filesystem & Disk Utilities Menu is displayed.

## NOTES

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#### SECTION 5

#### TEXT EDITOR

BOSS/IX includes a sophisticated text editor (VED), which can be used to create and modify files of type "string". (Refer to the BOSS/IX User Reference Manual, M6211, for a description of file types). These string files can be printed using the Submit Print Job utility, using the procedure described in Section 5 of the BOSS/IX User Reference Manual, M6211.

This section contains a full description of VED. First, the basic commands and operations are described, which will get you started using the editor. Following this is a description of some more advanced features. A complete description of all VED commands is given at the end of the section.

#### BASIC TEXT EDITING

The following paragraphs describe the basic operations used for text editing, including starting the text editor program, moving the cursor, inserting and deleting text, and exiting the editor.

# Accessing the Text Editor

The text editor is an executable program file, called ved that can only be executed when you are in the command interpreter.

When the command interpreter prompt is displayed, access the editor by typing ved followed by the name of the file you want to edit. If the file does not already exist, it is created. For example, to edit the new file called test, type:

#### @> ved test

and press (RETURN). A file called test is created in your working directory. You can create it in another directory by specifying the path name.

The terminal screen clears, a header (also called the information line) displays, and the cursor is placed in the top left-hand corner of the screen. For the present, we are only interested in the file name.

If you edit an existing file, the first 23 lines of the file are displayed.

# Entering and Editing Text

You are now ready to enter text into the file. Note that the text editor operates in "insert mode," meaning that text is inserted at the current cursor position. If any text follows the cursor, it is pushed to the right as you enter text.

As text reaches the right margin, the editor moves it to the left margin of the next line. This text "wrapping" is done on a character-by-character basis. If a word is split, you can force the whole word to the next line by positioning the cursor at the beginning of the word and pressing <RETURN>.

If the line wraps around to the next line on the screen, a backslash (\) is placed at the right margin. The text editor treats both lines on the screen as a single line of text. If you insert a carriage return, the lines are treated as separate lines.

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#### Cursor Movement.

VED is a full-screen text editor, which allows you to edit any text displayed on the screen. To edit text on another part of the screen, you have to move the cursor to that point. The four basic cursor movements are: forward, backward, up and down.

To move the cursor forward one character, press:

<CTRL>+<F>

The cursor moves forward, leaving all text intact. If the cursor is at the right margin, moving it forward places it at the left margin on the next line.

To move the cursor back one character, press:

<CTRL>+<H>

or press the <BACK SPACE> key. If the cursor is at the left margin, moving back a character moves the cursor to the last character on the previous line.

To move the cursor up one line, press:

<CTRL>+<P>

NOTE: If the cursor is located on a line that is wrapped around on two or more lines on the screen (marked by the backslash), VED treats those wrapped lines as a single line. <CTRL>+<P> moves the cursor up several lines on the screen, but it is really only moving up one line of text.

To move the cursor down one line, press:

<CTRL>+<N>

Again, if the line is wrapped around on several screen lines, the cursor moves several screen lines to the new position.

If the text is larger than one screen, VED adjusts the text when the cursor moves to the second line from the top or bottom of the screen. The text of the file scrolls so you can edit the entire file.

These commands will move the cursor to any position in the file. Additional commands which move the cursor more quickly are described below.

The cursor movements do not allow moves to a position before the first character position in the file, or past the last character position entered in the file. The program sounds a beep if you try to move the cursor past these limits.

#### Character Deletion

Since the editor operates in insert mode, you cannot simply write over an unwanted piece of text. Instead, you must insert and delete text as separate operations. (Refer to the topic "Text Editing Modes" for information on "overstrike" mode.)

To delete a character, place the cursor on top of the character and press:

<CTRL>+<D>

This deletes the character, and moves the text that follows it one space to the left.

A carriage return can be deleted by moving the cursor to the end of the line and using the delete command.

# Exiting the Editor

When you are finished editing the file, exit the editor by pressing:

<CTRL>+<C>

The following prompt displays at the top left of the screen:

### QUITTING. PUT EDITS?(Y/N)

If you want to save the file with the changes you made during the session, press  $\langle Y \rangle$ . Your edits are then written to the file.

If you do not want to save your edits, press  $\langle N \rangle$ . The edits are abandoned and the file is left unchanged.

You may abort the exit command by pressing <ESCAPE> or <RETURN>. This returns you to your previous position in the file.

#### ADVANCED TEXT EDITING FEATURES

VED includes a large number of advanced editing features. The following topics describe many of these and illustrate their uses.

The general categories include:

- o Command Sequences
- o Text Editing Modes
- o Rapid Cursor Movement
- o Cut and Paste Operations
- o Text Search
- o Number Arguments
- o Block Operations

## Command Sequences

There are three standard command sequences used by VED: Control Sequences (or control characters), Escape Sequences, and ALT Sequences.

Control Sequences were used in the previous section to describe simple cursor moves, text deletion, and exiting the text editor. Control Sequences are executed by pressing a key while holding down the <CTRL> key, (e.g., <CTRL>+<F>).

An Escape Sequence is executed by pressing the <ESC> key and then executing a Control Sequence. An Escape Sequence usually produces a slightly modified action of the same type as the Control Sequence that follows the <ESC>. For example, <ESC> <CTRL>+<F> moves the cursor forward one word, rather than one character.

An ALT Sequence is a special Control Sequence, <CTRL>+<1>, followed by another Control Sequence or an Escape sequence. An ALT Sequence is written as ALT followed by the Control or Escape Sequence, (e.g., ALT <CTRL>+<F> or ALT <ESC> <CTRL>+<F>). The ALT sequence places a text marker before executing the Control or Escape Sequence. This marker can then be used for a quick return to the location of the marker or to define the beginning of a block of text for a block operation.

# Text Editing Modes

As stated in the topic "Character Deletion", VED operates in INSERT mode. In this mode, text that you type is inserted at the cursor position and any existing text following the cursor position is shifted to the right.

VED allows two other operating modes: Overstrike mode and Visible mode.

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When VED is in overstrike mode, text is entered at the cursor position. Any character at the cursor position is replaced with the newly entered character. The exception to this is the end of file character, which is shifted to the right.

When VED is in Visible mode, text is entered in insert mode. The difference is that VED displays a graphic representation of tabs, carriage returns, and the end of the file. Tabs appear as a combination of dots and a colon (:). The dots represent each blank space between tab stops, and the colon represents an actual tab stop. A dollar sign (\$) represents a carriage return. A right angle bracket (>) represents the end of file.

## Changing Modes

To change the editing mode, type:

<ESC> <CTRL>+<M>

The following prompt displays at the top of the screen:

Mode?(ORV)

Type:

O for Overstrike mode, V for Visible mode, or R to Reset to the default, insert mode.

# Rapid Cursor Movement

There are a number of commands that can be used to move the cursor more quickly than the character or line movements described in the previous topic. For these movements, the following definitions are used:

- o A WORD begins at the first non-space character following a space or carriage return.
- o A PARACRAPH begins at the first non-blank line following a blank line.
- o A LINE is the text from the first character following a carriage return (or the beginning of the file) to the next carriage return (or the end of the file).
- o A MARKER is placed by an ALT sequence.

The following commands cause rapid cursor movements.

## Forward Moves

The following commands move the cursor forward in a file:

<esc> <ctrl>+<b></b></ctrl></esc>	moves cursor to end of file
<ctrl>+<e></e></ctrl>	moves cursor to end of line
<esc> <ctrl>+<e></e></ctrl></esc>	moves cursor to end of paragraph
<ctrl>+<f></f></ctrl>	moves cursor one character to the right
<esc> <ctrl>+<f></f></ctrl></esc>	moves cursor one word to the right
<ctrl>+<n></n></ctrl>	moves cursor down one line
<esc> <ctrl>+<n></n></ctrl></esc>	moves cursor to next paragraph

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## Backward Moves

⟨CTRL⟩+⟨A⟩	moves cursor to beginning of line
<esc> <ctrl>+<a></a></ctrl></esc>	moves cursor to beginning of paragraph
<ctrl>+<b></b></ctrl>	moves cursor to beginning of file
⟨CTRL⟩+⟨H⟩	moves cursor back one character
<esc> <ctrl>+<h></h></ctrl></esc>	moves cursor back one word
⟨CTRL⟩+⟨P⟩	moves cursor up one line
<esc> <ctrl>+<p></p></ctrl></esc>	moves cursor up one paragraph

## Moving By Line Numbers

The <CTRL>+<B> and <ESC> <CTRL>+<B> can be used with number arguments to move a specified number of lines from the beginning or end of the file, respectively. Number Arguments are discussed in more detail later in this section.

The following commands can be used to determine line numbers in the file:

<CTRL>+<@> lines from beginning of file to

cursor

<ESC> <CTRL>+<@> lines from cursor to end of

file

ALT (CTRL)+(0) lines from beginning of file to

marker

ALT (ESC) (CTRL)+(0) lines from marker to end of

file

## Cut and Paste Operations

VED uses buffers and block selection for cut and paste operations. For example, to move text from one place to another, first "cut it out" and place it in a buffer, then move the cursor to the new location for the text, and "paste" the contents of the buffer back into the text.

## Buffers

VED allows you to use several different buffers, but only one buffer is active at a time. You give each buffer a name the first time you use it.

At the beginning of each VED session, the active buffer is called default, and is indicated by the word \:default on the top line on the screen. Any text you cut out goes into the active buffer. That buffer remains active until you change to another buffer.

To change buffers use the (CTRL)+(\) command. VED displays the prompt:

#### Take Buffer:

on the information line. Type the name of the desired buffer (a new name for a new buffer) and press (RETURN). The buffer name is displayed on the information line and this buffer becomes the active buffer.

For example, if you name a buffer hold, \:hold is displayed on the information line. This buffer is now active and all "cuts" will be put into it.

## **Buffer Files**

Each buffer has a name. VED creates a file for each buffer in the /tmp directory. You can list your defined buffers by executing the <CTRL>+<X> command sequence followed by the BOSS/IX command:

ls /tmp

The buffer name is ved.name.pid, where name is the name you assigned the buffer, and pid is the process identification number of the ved process. If there are several pid's listed, you can identify yours by executing the BOSS/IX ps command, (again using <CTRL>+<X> and finding the ved entry).

## Cutting

There are several commands used to cut text to the active buffer. These commands append the cut text to the current buffer.

NOTE: These commands cut text from the current cursor position to the end of the word, line, or paragraph.

⟨CTRL⟩+⟨J⟩ cuts character to buffer

<ESC> <CTRL>+<J> cuts word to buffer

⟨CTRL⟩+⟨T⟩ cuts line to buffer

<ESC> <CTRL>+<T> cuts paragraph to buffer

All the above cut commands allow number arguments which determine the number of characters, words, lines and paragraphs that are cut. (Number arguments are discussed later in this section.)

# **Pasting**

To paste the contents of the current buffer, move the cursor to the desired location and press:

A copy of the text is inserted at the cursor posi-

The text remains in the buffer after pasting, so the paste operation may be repeated as often as necessary until the buffer is cleared.

Number arguments may also be used with this command.

## Clear Buffer

A buffer must be cleared before you can replace its contents.

To paste text and clear the current buffer, press:

To clear the current buffer without pasting its contents, press:

### Text Searching

VED allows you to search for a text string. The search begins at the current cursor position and can proceed in either a forward or backward direction.

When you issue a search command, you must supply the search string at the top of the screen. You can specify a word, part of a word, a number, tabs, etc. Pattern matching is allowed. The string must be entered exactly, because pattern matching is case sensitive, distinguishing between upper- and lower-case letters.

If VED cannot find the string, or if there are no more occurrences of the string, a beep is sounded and the cursor does not move.

The string can consists of several words, but all the words in the string must be on the same line.

If you want to find every occurrence of a text string, start at one end of the file or the other. After using the appropriate search command (to search forward if the cursor is at the beginning of the file, or to search backward if the cursor is at the end of the file), you can repeat the search command until you've found every occurrence.

## Search Commands

<ctrl>+<r></r></ctrl>	searches forward
ALT <ctrl>+<r></r></ctrl>	searches forward and selects text, placing a marker at the beginning of the text and the cursor at the end of it.
<esc> <ctrl>+<r></r></ctrl></esc>	searches backward
<ctrl>+<r> <ctrl>+<r></r></ctrl></r></ctrl>	searches forward for specified text. Pressing <ctrl>+<r> again prompts you for replacement text. Enter text and press <return> to ex- ecute the replace.</return></r></ctrl>
<esc> <ctrl>+<r></r></ctrl></esc>	searches backward and replaces text.
ALT <esc> <ctrl>+<r></r></ctrl></esc>	searches backward and selects text, placing a marker at the beginning of the text and the cursor at the end of it.
<ctrl>+<z></z></ctrl>	repeats last search
ALT (CTRL>+(Z)	repeats last search and selects text
<esc> <ctrl>+<z></z></ctrl></esc>	reverses direction and con-

tinues search

and selects text

ALT <ESC> <CTRL>+<Z> reverses direction, searches

## Pattern Matching

You can use the BOSS/IX pattern matching characters to help search for text strings in VED. For a detailed discussion of pattern matching, see Section 5 of the BOSS/IX User Reference Manual, M6211.

Note that VED searches for occurrences of the pattern, without regard for what precedes and follows the pattern in the text. In this way, the search is carried out as if the search string was preceded and followed by asterisks, \*string\*. Only the specified string is considered.

Some pattern-matching characters indicate the position in a text. For example, the caret (^) matches the beginning of a line, and the dollar sign (\$) matches the end of a line. These can be used with a search string to indicate that the string must occur at the beginning or end of a line.

For example, to find the word "either" at the end of the line, use either\$ as your search string. To find the same string at the beginning of a line, use ^either.

The backslash (\) can be used to specify special characters, such as pattern matching characters, when that character is being searched for. The backslash causes VED to ignore any special meaning of the next character. In this way, ved can distinguish between the string ^C and an occurrence of C at the beginning of the line. Type \^C as the search string when you want to find ^C, and ^C when you want to find C at the beginning of the line.

Table 5-1 summarizes the pattern matching characters.

# Table 5-1. Pattern Matching Characters

Symbol	Pattern Matching Function
*	Matches any number of characters in this position (e.g., "*z" matches "abz", "abcdz", etc.)
?	Matches any single character in this position (e.g., "a?b" matches "axb", "acb", etc., but not "axxb" or "axcb").
#	Matches any number of occurrences of the character following the pound sign (e.g., "a#zb" matches "azb", "azzzb", etc.)
!	Allows alternative matching patterns (e.g., "ab!ac!de" matches "ab" and "ac" and "de").
[c-d]	Specifies a range of characters (e.g., "a[c-h]b" matches "acb", "adb", "aeb",, "ahb", but not "abb" or "aib"). The range is determined by ASCII order.
[^xxx]	When followed by a pattern (xxx) and enclosed in brackets, the caret means "not". Selects anything that does not match the pattern following the caret (e.g., "a[^b]c" matches "aac", "acc", "a=c", etc., but not "abc").

## Table 5-1. Pattern Matching Characters (Cont'd)

- ^ Matches the beginning of a line. It may be followed by a string to find it at the beginning of a line (e.g., "^s" matches "s" only when it is the first character on a line).
- \$ Matches the end of a line. It may be preceded by a string.
- Specifies that a pattern matching character or an unprintable character is to be matched.

## Number Arguments

VED allows commands and other key strokes to be used with a number argument.

In most cases, the number argument determines the number of times the next command or key stroke is repeated. For example, if the number argument is set to 10, the <CTRL>+<D> command will delete 10 characters.

In other cases, the number argument modifies the operation of the command. For example, <CTRL>+<B>, which usually moves the cursor to the beginning of the file, when used with a number argument moves the cursor the specified number of lines from the beginning of the file.

Not all VED commands accept a number argument. (Refer to the topic called "VED Commands" to find out which commands accept number arguments and how they operate with a number argument.)

On the information line, #:XXXXX indicates the current number of repetitions, and usually shows #:1, the default value. This line changes when the number argument is changed.

There are two ways to change this to a larger number for the next command or key stroke. The number can be specified directly, or it can be incremented using the multiplier function.

# Specifying Number Argument Directly

The number argument is specified directly by pressing the <ESC> key and typing the number of repetitions you want, followed by pressing <RETURN>. The number line is updated indicating the number specified.

For example, if you specify 25, the number argument on the information line looks like this:

#:25

While entering the number, you can use the <BACK SPACE> and <DEL> keys to correct the entry before you press <RETURN>.

## The Multiplier Function

The Multiplier Function also lets you specify a number argument. It is executed by pressing <CTRL>+<U>. Each time this sequence is pressed, the current number argument is increased by multiplying the current value by the multiplier value.

The default multiplier value is 4, so the values increase in the order: 1, 4, 16, 64, 256, etc.

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You can change the multiplier value with the Escape Sequence (ESC) (CTRL)+(U). A prompt displays on the left of the information line:

#### Mult =

Type the new multiplier value and press <RETURN>.

Now when you press  $\langle CTRL \rangle + \langle U \rangle$ , the number argument will be a multiple of the new number. For example, if you chose 5 as the multiplier, each  $\langle CTRL \rangle + \langle U \rangle$  would be a multiple of 5: 5, 25, 125, 625, and so on.

Note that the multiplier begins operating on whatever the current number argument is. If the number is set to some value other than one, the sequence will differ from those shown above.

The multiplier value remains set until you change it, or until you exit VED.

## Canceling a Number Argument

Once the number argument has been specified, you can cancel it by pressing the <ESC> key twice. Make sure you cancel it; otherwise, your next key stroke will be repeated the indicated number of times.

# **Block Operations**

ALT Sequences perform operations using a text marker. In an earlier section, the marker was used for rapid cursor moves, moving to the marked text. The marker can also be used to define a block of text.

A selected block of text is the text between the marker and the cursor. The selected text is available for use in block operations, such as block moves or deletions.

The marker can be placed alone, without executing another command, by this sequence:

<CTRL>+<1> <RETURN>

NOTE: The word ALT represents the Command Sequence <CTRL>+<]>.

Other commands involve placing the mark at the cursor position and then moving the cursor to some other position in the text.

Once the marker is placed, another ALT command can be used to perform an action on the marked text. For example,

ALT <CTRL>+<K>

deletes (kills) the selected text.

The following ALT Sequences perform operations on the selected block of text.

ALT	<return></return>	places a marker at current cursor position
ALT	<ctrl>+<k></k></ctrl>	deletes selected text
ALT	⟨CTRL⟩+⟨R⟩	searches forward from marker and selects string
ALT	<esc> <ctrl>+<r></r></ctrl></esc>	searches backward from marker and selects string
ALT	⟨CTRL⟩+⟨T⟩	moves selected text to current buffer
ALT	<ctrl>+<v></v></ctrl>	replaces selected text with current buffer contents
ALT	<ctrl>+<w></w></ctrl>	writes selected text to specified file
		On the information line, the "Sel to:" prompt displays.  Type a file name, using the

full or partial path name, and

press (RETURN).

#### VED COMMANDS

The rest of this section describes all of the VED commands. ALT commands are not described separately, but the effect of using the ALT sequence with each command is described.

The commands are arranged in seven functional groups:

- o Cursor movement
- Text addition and deletion
- o Cut and paste
- o Search and replace
- o Exiting and putting
- o Numbers
- o Command execution
- o Miscellaneous

Within groups, the commands are listed alphabetically. The purpose of the command and the command itself appear on the left, with further explanation on the right.

#### Cursor Movement

Beginning	<u>of</u>
line	

Moves cursor to beginning of line.

<CTRL>+<A>

A number argument moves the cursor the specified number of characters from the beginning of the line.

Beginning of paragraph

Moves cursor to beginning of paragraph.

<ESC> <CTRL>+<A>

A number argument moves cursor moves the specified number of words from the beginning of the paragraph.

ALT places a marker before moving the cursor.

Beginning of file

Moves cursor to beginning of file.

<CTRL>+<B>

A number argument moves the cursor the specified number of lines from the beginning of the file.

ALT places the marker before moving the cursor.

End of file

Moves cursor to end of file.

<ESC> <CTRL>+<B>

A number argument moves the cursor the specified number of lines from the end of the file.

End of line

Moves cursor to end of line.

<CTRL>+<E>

A number argument moves the cursor the specified number of characters from the end of the

current line.

ALT places the marker before

moving the cursor.

End of Paragraph Moves cursor to end of

paragraph.

<ESC> <CTRL>+<E>

A number argument moves the cursor the specified number of words from the end of the current paragraph.

ALT places the marker before moving the cursor.

One Character Right Moves cursor one character to

the right.

<CTRL>+<F>

A number argument moves the cursor the specified number of characters to the right.

One Word Right

Moves cursor one word to the right.

<ESC> <CTRL>+<F>

A number argument moves the cursor the specified number of words right.

ALT places the marker before moving the cursor.

One Character Left Moves cursor one character to the left.

<CTRL>+<H>

A number argument moves the cursor the specified number of characters to the left.

ALT places the marker before moving the cursor.

One Word Left

Moves cursor one word to the left.

<ESC> <CTRL>+<H>

A number argument moves the cursor the specified number of words left.

ALT places the marker before moving the cursor.

One Line Down

Moves cursor down one line.

<CTRL>+<N>

A number argument moves the cursor down the specified number of lines.

One Paragraph Moves cursor down one paragraph.

<ESC> <CTRL>+<N> A number argument moves

ESC> <CTRL>+<N> A number argument moves the cursor down the specified num-

ber of paragraphs.

ALT places the marker before

moving the cursor.

Up One Line Moves cursor up one line.

<CTRL>+<P> A number argument moves the

cursor up the specified number

of lines.

ALT places the marker before

moving the cursor.

Up One Paragraph Moves cursor up one paragraph.

<ESC> <CTRL>+<P> A number argument moves the

cursor up the specified number

of paragraphs.

ALT places the marker before

moving the cursor.

<u>To Marker</u> Moves cursor to marker.

ALT <CTRL>+<J>

Switch with Switches the cursor and the

Marker marker.

ALT <ESC> <CTRL>+<J>

## Text Insertion and Deletion

<CTRL>+<D>

Delete Character Deletes a character.

A number argument deletes the

	specified number of characters, starting at the cursor position and deleting to the right.
Delete Word <esc> <ctrl>+<d></d></ctrl></esc>	Deletes a word (i.e., all the characters from the cursor position to, but not including, the first character of the next word).
	A number argument deletes the specified number of words to the right of the cursor.
One Tab Right <ctrl>+<i></i></ctrl>	Moves line of text, beginning at cursor position one tab stop to the right.
	Deletes character at cursor position if overstrike mode is on.
	A number argument moves the text the specified number of TAB stops.
	ALT places the marker at the cursor position before placing the TAB character.

Delete Line

<CTRL>+<K>

Deletes a line (i.e., all text from the cursor position through the next carriage

return).

A number argument deletes the specified number of lines.

Delete Paragraph

<ESC> <CTRL>+<K>

Deletes a paragraph (i.e., all text from the cursor position through the end of the paragraph).

A number argument deletes the specified number of paragraphs.

<u>Delete Selected</u> Text

ALT <CTRL>+<K>

Deletes selected text (i.e., all text between the last marker that was placed and the current cursor position.

Insert Carriage Return and Move

<CTRL>+<M>

Inserts a carriage return character at the current cursor position, either inserting the character or replacing the current character, depending on the editing mode. The cursor moves to the beginning of the next line.

A number argument inserts the specified number of carriage returns.

Insert Carriage Return  (CTRL>+<0>	Inserts a carriage return immediately following the cursor position. The cursor remains in its original position.
	A number argument inserts the specified number of carriage returns.
	ALT places the marker at the beginning of the new line produced.
Delete Character Left <ctrl>+<del></del></ctrl>	Erases the character to the left of the cursor. (This is the same as using the <del> key alone.)</del>
	A number argument erases the specified number of characters to the left.
Delete Word Left	Erases the word to the left of the cursor.
<esc> <ctrl>+<del></del></ctrl></esc>	A number argument erases the specified number of words.
Restore Last Deletion	Restores the last text that was deleted.
<ctrl>+&lt;_&gt;</ctrl>	
<pre>Place Mark  <ctrl>+&lt; &gt; <return></return></ctrl></pre>	Puts a marker at the current cursor position.
Delete Mark	Erases the marker from the file.

ALT <CTRL>+<\_>

#### Cut and Paste

<u>Merge File</u>

Merges another file at the current cursor position.

<CTRL>+<G>

On the information line, the "Get from:" prompt displays. Type a file name, using the full or partial path name, and press <RETURN>.

<u>Cut Character</u> <u>To Buffer</u> Removes the character at the cursor position and puts it in the current buffer. The character is appended to the current buffer contents.

<**CTRL>+**<**J>** 

A number argument cuts the specified number of characters to the current buffer.

<u>Cut Word to</u> <u>Buffer</u> Removes a word starting at the current cursor position and puts it in the current buffer. The word is appended to the current buffer contents.

<ESC> <CTRL>+<J>

A number argument cuts the specified number of words to the buffer.

Cut Line to Buffer <ctrl>+<t></t></ctrl>	Removes a line starting at the cursor position, and puts it in the current buffer.  A number argument cuts the specified number of lines to the buffer.
	ALT cuts the selected text to the buffer.
Cut Paragraph to Buffer <esc> <ctrl>+<t></t></ctrl></esc>	Removes the paragraph starting at the cursor position and puts it in the current buffer.  A number argument cuts the specified number of paragraphs
Copy Buffer To	to the buffer.  Copies the contents of the
Text  CTRL>+(V)	current buffer into the file at the current cursor position. The buffer retains a copy of the text.
	A number argument writes the specified number of copies to the text.
Copy Buffer to Text and Clear <esc> <ctrl>+<v></v></ctrl></esc>	Same as the above, but clears the buffer after copying the text.
Replace Text with Buffer	Replaces the selected text with the contents of the current

buffer.

ALT <CTRL>+<V>

Replace Text with Buffer and Clear

ALT (ESC) (CTRL)+(V) buffer.

Replaces the selected text with the contents of the current buffer, and then clears the buffer.

Change Buffer

<CTRL>+<\>

Changes the current buffer. Specify the new buffer at the "Take Buffer:" prompt.

<u>Clear Buffer</u>

clears the text out of the current buffer.

<ESC> <CTRL>+<\>

# Search and Replace

# Search Forward

<CTRL>+<R>

Searches forward in a file for the specified text string, starting at the cursor position. Specify the search string at the "+Search:" prompt.

A number argument searches for the  $n^{\text{th}}$  occurrence of the search string.

ALT places the marker at the beginning of the string when found.

## Search Backward

<ESC> <CTRL>+<R>

Searches backward in a file for the specified text string, starting at the cursor position. Specify the search string at the "-Search:" prompt.

A number argument searches for the n<sup>th</sup> occurrence of the search string.

ALT places the marker at the beginning of the string when found.

## Repeat Search

<CTRL>+<Z>

Repeats last search command, finding the next occurrence of the search string.

A number argument searches for the n<sup>th</sup> occurrence of the search string.

ALT places the marker at the beginning of the search string when found.

# Reverse Direction and Search

Repeats the last search, but in the opposite direction.

<ESC> <CTRL>+<Z>

A number argument searches for the n<sup>th</sup> occurrence of the search string.

ALT places the marker at the beginning of the search string when found.

## Saving Text and Exiting

### Exit Editor

<CTRL>+<C>

Ends the editing session. The "QUITTING, PUT EDITS? (Y/N)" prompt displays on the information line. Press <Y> to save the changes made during this editing session. Press <N> to abandon the edits.

## Backup File

<ESC> <CTRL>+<C>

Saves the edits made during the current editing session and returns to current editing session. The "BACKUP(Y/N?)" prompt displays. Press <Y> to back up the file. Press <N> to return to editing without backing up the file. Press <RETURN> to cancel the command.

## Change File

<ESC> <CTRL>+<G>

Exits the current file and enters another file. The "Change to:" prompt displays, asking for the file to edit. Type the name of the file and press <RETURN>.

The "CHANGING. PUT EDITS?(Y/N)" prompt then displays. Press <Y> to save the edits before changing files. Press <N> to abandon the edits.

# Copy Text to File

<CTRL>+<W>

Writes a copy of the file you are editing to a specified file. The "Write to:" prompt displays, asking for the destination file. Type a file name and press <RETURN>.

If the file exists, its contents are overwritten. If the file does not exist, it is created.

# Copy Buffer to File

<ESC> <CTRL>+<W>

Writes the contents of the current buffer to a specified file. The "\ to file:" prompt displays, asking for the destination file. Type the file name and press (RETURN). If the file exists, its contents are overwritten. If the file does not exist, it is created. The buffer contents remain intact.

# Copy Selected Text to File

ALT <CTRL>+<W>

Writes a copy of the selected text to a specified file. The "Sel to:" prompt displays, asking for the destination file. Type the file name and press (RETURN). If the file exists, its contents are overwritten. If not, it is created.

## Suspend Session

<CTRL>+<Y>

Suspends the current editing session process. The "SUSPENDING. PUT EDITS? (Y/N)" prompt displays. Press <Y> to save your edits before suspending. Press <N> to abandon the edits.

The process then suspends and exits to the command interpreter. The process ID is displayed before the command interpreter prompt. You can use the resume command to return to editing.

#### Numbers

## Multiples

<CTRL>+<U>

Multiplies the current number argument by the multiplier. The default multiplier is 4. Each time you press this sequence, the number argument changes to the next multiple of 4 (e.g., 1, 4, 16, 64, ...).

# Change Multiplier

<ESC> <CTRL>+<U>

Changes the multiplier. The default multiplier is 4. To change the multiplier value, type the number when the "Mult=" prompt is displayed and press <RETURN>.

#### BOSS/IX Command Execution

#### Execute Command

<CTRL>+<X>

Execute a BOSS/IX command without terminating the editing session. Control temporarily returns to the command interpreter while the command is executed, then returns to the editor.

When the "Execute:" prompt displays, type the command line and press <RETURN>. The "EXECUTING. PUT EDITS? (Y/N)" prompt displays. Press <Y> to update the file before exiting the command. Press <N> to execute the file without updating the file.

# Execute Buffer Contents

If the current buffer contains a BOSS/IX command line, this sequence executes it.

<ESC> <CTRL>+<X>

When the "EXECUTING. PUT EDITS? (Y/N)" prompt displays, press <Y> to update the file before executing the command. Press <N> to execute the command without updating the file.

Execute Selected
Text

ALT <CTRL>+<X>

If the selected text is a BOSS/IX command line, this command executes it.

When the "EXECUTING. PUT EDITS? (Y/N)" prompt displays, press <Y> to update the file before executing the command. Press <N> to execute the command without updating the file.

#### Miscellaneous

## Help Text

<ESC> <CTRL>+<Y>

Calls the VED help text. When the "HELP?(Y/N)" prompt displays, press <Y> to call the help text. Press <N> to return to editing without displaying help.

Viewing the help text is just like any editing session. When you are finished, press <CTRL>+<C> and press <N>. You are then returned to your file.

## Center Text

<CTRL>+<L>

Adjusts the text displayed on the terminal screen so that the cursor position is on the sixth line from the top.

## Refresh Screen

<ESC> <CTRL>+<L>

Redisplays the current screen of text. This may be necessary if a message has been sent to your terminal and has overwritten some of the text.

# Freeze Display

<CTRL>+<S>

Freezes text and cursor movements on the screen. It does this by sending an X-OFF signal to the system. Unfreeze the screen with the <CTRL>+<Q> command.

# Change Mode

<ESC> <CTRL>+<M>

Changes the editor mode. The "Mode?(ORV)" prompt displays. Press V for visible mode, O for overstrike mode, or R to reset back to default (insert) mode.

# Unfreeze Display

<CTRL>+<Q>

Unfreezes the screen that was frozen by the <CTRL>+<S> sequence.

# Lines From Beginning

<CTRL>+<@>
or
<CTRL>+<SPACE>

Both sequences indicate the number of lines between the beginning of the file and the cursor position. The number is displayed on the information line.

ALT gives the number of lines from the beginning to the marker.

### Lines From End

<ESC> <CTRL>+<@>
or

<ESC> <CTRL>+<SPACE>

Both sequences indicate how many lines exist between the cursor position and the end of the file. The number is displayed on the information line.

ALT gives the number of lines from the marker to the end of file.

## <u>Quote Unprintable</u> Characters

<CTRL>+<^>

Quotes the next character so that it is taken literally. This is only used if you are including unprintable characters, such as control characters, in a file.

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Type the number of the item to change. Items 4, 5 and 7 (lines per inch, pitch and hand sheet feed) rotate through the options each time the number is entered. The remaining options prompt for the value. Enter the value and press (RETURN).

When all values are correct, press (RETURN) to save the parameters.

#### Delete Form Definition

This option deletes a specified form definition.

## 1. Type a form name, (RETURN) to end

Type the name of the form to delete and press <RETURN>. The form "stanrd" cannot be deleted.

## 2. Delete this form definition? (yes/no):

The parameters for the specified form are displayed and you are prompted to verify that it is to be deleted. Press  $\langle Y \rangle$  to delete the form, press  $\langle N \rangle$  to keep it.

# Report Form Definitions

This option creates a report of all form definitions.

## Report Device Menu

This menu lets you display the report on the terminal screen, write it to a file or output it to a printer.

If you choose "printer", you will be asked to select the printer from a menu of printers. If you select "file", you will be asked to specify the file name.

## End of report. Type (RETURN) to continue:

When the report is finished, this prompt displays. If output is to a terminal screen, this prompt is displayed at the bottom of the last page of the report. Press <RETURN> to acknowledge the prompt and return to the options menu.

#### Notes

The Printer Parameters Utility modifies these files:

- o /etc/defaults
- o /etc/class
- o /etc/forms

These files can be modified using the text editor, ved. If the system defaults definition or the stanrd form definition are missing, you must create them using the text editor.

#### SECTION 6

#### PRINTING

Printing is accomplished on the MAI 2000 by submitting files to the print spooler. The spooler maintains a print queue of files, and manages the printing of files on system printers.

More than just a print queue, the spooler prints the files submitted according to a number of criteria, including priority, print form, date and time, etc.

Most of the files that you print are submitted by application programs. The file may be created by the program just prior to printing, so that the file does not exist in a form to be submitted directly to the spooler apart from the application.

For example, this would be true in the case of a report of customers and outstanding orders. The program would search the data base, generate the report and print it. The Submit Print Job Utility (described below) cannot be used to submit this sort of a print job.

The only files that can be submitted directly for printing using the Submit Print Job Utility are String type files containing text. These files are created by the text editor (VED), utility programs that output a report to a file, and a few other methods. Application programs may also write directly printable files. The utility rejects incorrect files.

Print Classes and Forms and the utilities that create them are described in the <u>BOSS/IX User</u>

<u>Reference Manual</u>, M6211. Print classes are sets of predefined print job parameters. Print forms define a form format, including such information as linesper-inch, characters-per-inch, form length and vertical tabs.

The Submit Print Job Utility prompts you for a class and lets you specify of a form. Unless you know the specific class and form you need, simply press <RETURN> at these prompts to accept the default class and form.

#### Submit Print Job

The Submit Print Job Utility allows you to print a string file. The system must be in multi-user mode to use this utility.

String files, shown as file type "str" by the directory display utility, include files created with the text editor and certain system data files.

EUT7.3A	MAI BASIC FOUR, INC.	11:56 am
psubmit	Submit Print Job Utility	05/22/87

Working directory: /usr/xxxx

Type working directory, <RETURN> for no change:

Figure 6-1. Submit Print Job Utility
Initial Prompt

 To access the Submit Print Job utility, select option 4, "Printers," at the Main Utility Menu, and then select option 1, "Submit print job," at the Printer Utilities Menu.

# Type working directory, (RETURN) for no change:

If you want to change your working directory, type the full or partial name of the new directory and press <RETURN>. Press <RETURN> alone to keep your current working directory.

# 3. Type class name, <RETURN> to continue:

If you are using a pre-defined print class, type the name of the class and press <RETURN>. Otherwise, press <RETURN> to accept the default class. (Refer to Section 3 of the BOSS/IX User Reference Manual, M6211 for a discussion of print job classes.)

# 4. Type printer name, <RETURN> for default:

The utility displays a list of print job parameters (see figure 6-2) and the above prompt. Type the name of a printer (e.g., lp, p1, etc.) and press <RETURN>, or press <RETURN> alone for the default printer.

# 5. Type file name:

Type the full or partial path name of the file to print and press  $\langle \text{RETURN} \rangle$ .

Change any of the displayed print job parameters as necessary. The parameters are described in the <u>BOSS/IX User Reference Manual</u>, M6211.

11:56 am

Working directory: /

Class name: test

1. Printer:

Hold priority:

12. Wait mode: 13. Raw mode:

2. File:

3. Alias:

4. Priority: 5. Form: 6. Copies: 7. From page: 8. To page:

14. High bit: 15. PDF name: 16. Trans. tbl: 9. Requeue: 17. Form feed: 10. Delete: 18. Date to print: 19. Time to print: 11. Notify:

Type printer name, <RETURN> for default:

## Figure 6-2. Print Job Parameter Display

- 7. Press (RETURN) to submit the job with the displayed defaults.
- 8. The utility displays the print job number and prompts:

# Type (RETURN) to proceed:

Press <RETURN> to acknowledge the prompt and end the utility.

## Maintain Print Queue

The Maintain Print Queue Utility allows you to check the operation of the print queue for any system printer. The utility can also modify print jobs already in the queue and stop a job that is presently printing.

- To access the Maintain Print Queue Utility, 1. select option 4, "Printers," at the Main Utility Menu, and then select option 2, "Maintain print queue," at the Printer Utilities Menu.
- 2. Type printer name, (RETURN) for default printer.

Type the name of the printer to report or modify and press (RETURN). The printer name is two characters, (e.g., lp, p0, l1). The default printer is usually lp.

The printer status and print queue are displayed for that printer.

EUT7.3 pqueue		MAI BASIC FOUR, INC. Maintain Print Queue Utility							11:56 am 05/22/87	
PRINT	ER	HOLD PRI	STATUS	CUR	RENT	TOTAL JOBS	CURF PAGE		CURRENT COPY	
lp		2	offline		0	5		1	1	
JOB P	RΙ	FILE	STA	TUS	USER	FORM	CURR COPY	MODE	FROM PAGE	TO PAGE
0	5	/vdirect	ory/gzq/pro			onst.h n stann	 d 1		1	9999
1	5	/vdirecte	ory/gzq/pro	gram	s/c/i		_		1	9999
2	5	/vdirect	ory/gzq/pro	gram	<b>s</b> /c/p:		_		1	9999
3	5	/vdirecte	ory/gzq/edu	ı/mac	ro		_			
4	5	/etc/_qt	emps/lpr0.5	50		n stann n stann			1	9999

Type number of job to process, (RETURN) to update status:

Figure 6-3. Printer Status and Queue Display

# 3. Type number of job to process, (RETURN) to update status:

To modify a print job, type the job number (in the left-hand column) and press (RETURN).

To end the utility, press (CTL-IV).

# 4. The job is printing. Do you want to stop it? (yes/no):

This prompt displays if the job you chose to modify is printing. The job must be stopped before it can be modified.

To stop the job and proceed with the modifications, press <Y> and press <RETURN>.

If you press <N>, the previous prompt repeats and the job continues printing.

# 5. Type number of job action, <RETURN> to end:

The print job parameters of the job specified at step 4 are displayed along with the following menu of job actions:

## JOB ACTION

- 1. Kill
- 2. Stop
- 3. Modify
- 4. Restart

Each job action is defined as follows:

Kill removes the job from the print

queue

Stop prevents the job from being

printed

Modify allows you to change print job

parameters

Restart starts a job that had been

stopped

Select the desired job action.

The Modify option lets you change the print job parameters. These parameters are described in the BOSS/IX User Reference Manual, M6211.

# 6. Do you want to kill this job? (yes/no):

If you choose to kill the job, (i.e., remove it from the queue), this prompt is displayed. Verify the action by pressing <Y> and pressing <RETURN>. To keep the job in the queue, press <N> and press <RETURN>.

7. Press (RETURN) at the job action prompt to end the utility.

### Change Print Form

The Change Print Form Utility notifies the spooler that the form change required for a print job has been made. The utility can only be used when a queue is in a form change state, as shown by the Maintain Print Queue, the Printer Status Utilities or a message on the terminal screen.

 To access the Change Print Form Utility, select option 4, "Printers," at the Main Utility Menu, and then select option 3, "Change print form," at the Printer Utilities Menu.

## 2. Type printer name whose form was changed, <RETURN> for default:

The screen display contains a list of all printers and their current status. The printer on which the form was changed should show "formchange" under STATUS. Type the name of the printer and press <RETURN>.

If the printer you entered is not waiting for a form change, an error message displays.

# 3. Do you want to align the form? (yes/no):

To print an alignment pattern, press (Y) and press (RETURN). The pattern is printed and the prompt repeats. Make any necessary adjustments and print the pattern again.

When the alignment is correct, press  $\langle N \rangle$  and press  $\langle RETURN \rangle$ .

When the form has been changed and aligned, the utility displays a message saying that printing is being resumed. Press (RETURN) to acknowledge the message. The program ends.

#### **Printer Status**

The Printer Status Utility displays a list of all printers and their current status. Use the display to identify printer problems such as the need to add paper or to change form.

- 1. To access the Printer Status Utility, select option 4, "Printers," at the Main Utility Menu, then select option 4, "Printer status," at the Printer Utilities Menu.
- Type (RETURN) to continue, (CTL-II) to update status:

The screen display indicates the status of all system and slave printers.

Press (CTL-II) to update the display.

Press (RETURN) to end the utility.

#### Printer Parameters

The Printer Parameters Utility maintains definitions for print control defaults, print classes and forms. The three functions are selected from a menu displayed when the utility is first accessed. The definitions are used by the print spooler to specify parameter values for print jobs.

The three functions that make up this utility are divided into create, modify, delete and report subfunctions. All users are allowed to use the report functions, but only the system administrator can create, modify or delete definitions.

### **Prompts**

The prompts differ for each of the utility functions.

To enter this Utility, select option 4 at the Main Utility Menu and select option 5 at the Printer Utilities Menu.

## Maintain Print Control Defaults Function

This function creates, modifies, deletes and reports print default definitions. These defaults are defined for users, printers and the system. The defaults for the system are provided with the system software. Defaults for users and printers can be defined in addition to the system defaults.

The print control fields are:

NAME printer or user name

PRI the default priority (0 - 9)

FORM NAME the default form name

COPY the default number of copies

DEL deletes spooled file after printing

REQUEUE requeues file after printing

NOTIFY notifies user after printing

SPOOL spools the file

DESPOOL delays printing spooled file until

WAIT entire file is received.

RAW disables all mnemonic processing and

character translation

HIGH BIT inverts most significant bit as data

is sent to printer

One default definition, "system", is required for this function to operate.

## Create/Modify Defaults Definition

These functions create and modify print job default definitions. They function identically except for the first prompt.

 Type operator or printer name, <RETURN> to end:

Type the name of the operator or printer for which the name is being created/modified. If an existing default definition name is entered for the create function, or a non-existent name is entered for the modify function, a verification prompt allows you to switch functions and continue with the procedure.

2. Type number of item to change, (RETURN) when all are correct.

The current default parameters for the user or printer are displayed. Default parameters are provided for new definitions. Select the number of the parameter to change.

- For the Name, Priority, Form name, and Copies fields (options 1 through 4), the cursor moves to the first character of the field. Type the new value and press <RETURN>.
- 4. The Delete, Requeue, Notify, Spooling, Despool wait, Raw Mode and High Bit ON fields (options 5 through 11) rotate between the values yes, no and empty. Enter the number of the parameter you want to change to the next value. The empty value allows the value to be determined by a definition lower in priority.
- 5. When all values are correct, press <RETURN> to return to the menu.

#### Delete Defaults Definition

This option deletes the default definition for a user or printer.

### Type operator or printer name, <RETURN> to end:

Type the name of the default entry to delete and press (RETURN). The "system" default definition cannot be deleted.

# 2. Do you want to delete this default definition? (yes/no):

The parameters for the specified operator or printer are displayed and you are prompted to verify that it is to be deleted. Press <Y> to delete the displayed definition.

# Report Defaults Definition

This option reports the defaults definitions for all users and printers.

#### Maintain Class Definitions Function

This function maintains print class parameter definitions. The parameters are the same as the print control defaults, except that the class name is not tied to a user or printer.

## Create/Modify Class Definition

These functions create and modify print class definitions. They operate identically except for the first prompt.

## Type class name, (RETURN) to end:

Type the name of the class definition to be created/modified. If an existing class definition name is entered for the create function, or a non-existent name is entered for the modify function, a verification prompt allows you to switch functions and continue with the procedure.

## Type number of item to change, (RETURN) when all are correct.

The current class definition parameters for the specified class are displayed. Default parameters are provided for new definitions. Select the number of the parameter to change.

- 3. For the Class name, Priority, Form name, and Copies fields (options 1 through 4), the cursor moves to the first character of the field. Type the new value and press (RETURN).
- 4. The Delete, Requeue, Notify, Spooling, Despool wait, Raw Mode and High Bit ON fields (options 5 through 11) rotate between the values yes, no and empty. Enter the number of the parameter to switch to the next value. The empty value allows the value to be determined by a definition lower in priority.
- 5. When all values are correct, press <RETURN> to return to the menu.

#### Delete Class Definition

This option deletes a print class definition.

### Type class name, (RETURN) to end:

Type the name of the class definition to delete and press (RETURN).

# Do you want to delete this class definition? (yes/no)

The parameters for the specified class definition are displayed and you are prompted to verify that it is to be deleted. Press <Y> to delete the displayed definition.

## Report Class Definition

This option reports all class definitions.

#### Maintain Form Definition Function

This function maintains printer form definitions. Form definitions contain information such as form length and width, number of lines per inch, number of characters per inch, special translation tables, and other information that determines how files are printed.

The function opens with a menu allowing the user to create, modify, delete and report form definitions.

One form definition, "stanrd", is supplied with the BOSS/IX operating system, and is required for this function.

# Create/Modify Form Definitions

These sub-functions operate identically, except for the first prompt.

## 1. Type a form name, (RETURN) to end:

Type the name of the form to create or modify and press <RETURN>. If an existing form name is entered for the create function, or a non-existent form name is entered for the modify function, a verification prompt displays, allowing you to change operations.

## Form Definition Parameters Menu

The current definition parameters for the specified form are displayed in a menu. Parameters for a new form definition are supplied from the "stanrd" form, and need to be changed for the new form.

## The parameters are:

- o Form name as specified
- o Length lines, 1 to 255
- o Width characters, 1 to 255
- Lines per inch 6, 8 or empty
- o Pitch 10, 12, 16 or empty
- o Translation table 2-character name
- Hand sheet feed yes, no or empty
- o Initial Form Feed number of form feeds to be sent before printing starts
- o Slew 2-8 maximum varies for printers
- Printers name of printers to use the form,
   or \* for all printers

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#### SECTION 7

#### DAILY BACKUP

In this section, we describe simple procedures for making a backup copy of the files on your MAI 2000.

You can backup your files to 1/4-inch CS cartridges, 1/2-inch TS reels, or floppy diskettes. Utilities are provided to perform backup and restore for all types.

This section begins with a discussion of backup, including a strategy to help maintain a current backup of your important data files.

Procedures are given for backing up and restoring files from tape using the Save and Restore Utilities. The backup procedure allows you to initialize a cartridge so you don't need to run the Label a Tape Utility.

#### INTRODUCTION TO BACKUP

The information stored in your computer files is critical to your business. It is also vulnerable to damage and loss, due to system failures or external damage to the system.

The single most important reason for backing up your files is to increase the security of your data. If files on your system become damaged, you will only lose the data added to the system since your last backup. A regular backup schedule can minimize the amount of loss.

When you back up files, you copy each file on the fixed disk onto a removable storage medium. This can be either a CS cartridge or a TS reel. These copies are then stored in a safe and secure location.

Some guidelines to follow in selecting a storage location are:

- Select a storage area away from the system, so that physical damage to the system (e.g., fires, water damage, etc.) does not affect the storage area as well.
- o Store the backups away from magnetic fields, such as those generated by telephone bells and certain kinds of electrical equipment.
- o If the data is of a sensitive nature, such as employee records, choose a storage area that is secure from unauthorized access.
- You may want to keep a backup "off site", at a facility away from the system site or use an archival storage service.

If your system incurs damage, the backup copies of your files can be restored once the system damage has been repaired. This way, loss of data is limited to the data entered since the last restorable backup.

# Which Files to Back Up

You should have a backup copy of all your files, including all program files, system files, and the operating system.

In some cases, such as the operating system programs, the original distribution (installation) tapes are adequate for a backup. Other files, such as operator information and system configuration files, change infrequently and only need to be backed up occasionally.

Your data files, on the other hand, probably change on a daily basis, and should be backed up more frequently.

## System Files

The following system files contain system configuration and setup information that is not contained in the operating system distribution files. They should be backed up when your system has been set up and after changes have been made.

```
/etc/bfsdsk /etc/plotters
/etc/class /etc/ports
/etc/defaults /etc/printers
/etc/forms /etc/terminals
/etc/passwd
```

Also back up all the files in the following directories:

```
/etc/ptrxlt
/etc/ptrtbl
```

Many of the devices defined in the "/dev" directory are specific to your installation, and should also be backed up. Back up:

/dev/\*

to capture all of these devices and the standard devices.

Your standard configuration file must also be backed up. It is on the boot filesystem. Mount the boot filesystem to the /mnt directory , and backup the file:

/mnt/etc/conf

If your system has local area network, the stations are defined in the /sta directory. Back up:

/sta/\*

## A Backup Routine

You should work with your dealer and software supplier to determine the best backup routine for your needs. As a starting point, however, MBF recommends an alternating method of redundant backups.

Redundant backups are kept by maintaining two or more backup tapes (or sets of tapes) and using them on a rotating basis to update the backup copies of files. For example, if you back up your files on a daily basis, you might use 1 tape (or set of tapes) on Mondays and Wednesdays, a 2nd tape(s) on Tuesdays and Thursdays, and a 3rd tape(s) on Fridays.

This way you always have at least two recent backup copies of your files, one that is 1 day old, and another that's 2 days old. The third is at most a week old. If your system becomes damaged, you do not have to depend on a single backup to recover your data. (Even tapes can fail.)

On the other hand, by rotating a set of tapes, you don't have to buy and store a new set of tapes each time you perform a backup. This saves both money and storage space.

# File Specification

The Save and Restore Utilities described below allow you to specify files and lists of files. The standard file specification procedure is described fully in section 4 of the <u>BOSS/IX User Reference Manual</u>, M6211, but a few points are covered here.

## Individual Files

The prompts allow you to specify files individually. For example, to backup the file /etc/passwd, simply type its name at the prompt:

/etc/passwd

## Groups of Files

Groups of files can be specified using pattern matching characters. This works best when the group of files can be identified by a similar sequence of characters in their names. For example, a set of payroll files might all have the same file name extension, .pyrl.

The most common pattern matching characters are the asterisk (\*) and the question mark (?). The asterisk can be used to match any sequence of characters. The question mark can match any single occurrence of any character.

# Directories

The default setting in the file selection process calls for "recursive" file selection. This means that, given the name of a directory, the procedure will select the directory itself, all of the files in the directory, all subdirectories, and all files in the subdirectories.

This default setting can be changed using the "change environment" option in the utilities. This option is described fully in the <u>BOSS/IX User</u> Reference Manual, M6211.

### **Filelists**

The prompt also allows you to specify a filelist. A file list is a file that contains a list of file names. Create a filelist that contains the names of the files that you typically want to back up at one time. For example, enter the names of the data files that you want to back up on a daily basis in a filelist. The filelist can then be entered at the prompt, instead of each individual file name.

The name of a filelist always ends with ".f", (e.g., daily.f might be the name of your daily backup filelist). Filelists are usually kept in the /util/fl directory.

You can create a filelist by using the file selection process included in the save and restore utilities, or by using the Filelist Maintenance Utility described in the <u>BOSS/IX User Reference Manual</u>, M6211.

## Image Backup

Rather than backup individual files, you can make a "disk image" backup of a filesystem. This is available only through the command language, using the "tsave" command with the "-filesystem" option. Refer to section 5 of the <u>BOSS/IX User Reference Manual</u>, M6211, for details.

The filesystem being backed up must not be mounted at the time. This means that in order to perform an image backup of the root filesystem, you must perform an alternate load, rooting to the boot filesystem, before executing the command.

#### CAUTION

If you have retired bad blocks, do not use a "tsave -filesystem" or a "trestore -filesystem" command to backup the filesystem.

## Backup User Logon Account

It is a good idea to have a user logon account named "backup", or some other convenient account name. This account allows a user to temporarily have system administrator access to all files for the purpose of backup only. That way, a user who does not usually have administrator access can still back up the system.

When you log on as the backup user, the Save to Diskette Utility or Save to Magnetic Tape Utility is executed immediately. Follow the directions given below for running the utility.

When the utility has completed, you are logged off the system.

Some suggested parameters for the backup user(s) are as follows.

## Diskette Backup User:

Operator name: dbackup

ID number: -1
Home directory: /

Initial program: /util/dsave

# Tape Backup User:

Operator name: tbackup

ID number: -2 Home directory: /

Initial program: /util/tsave

Use the Operator Information Utility, described in Section 8, to create one or both of these accounts. Note that the operator name can be any unique name. The ID number must be a <u>negative</u> number to grant the user full access to all files.

#### BACKUP AND RESTORE PROCEDURES

For both the save and restore procedures, you should be logged on as the system administrator. It is not necessary for the system to be in single user mode, but only 1 user should be logged on to the system.

## Save to Magnetic Tape Utility

The following procedure creates backup copies of your files on CS cartridge or TS reel.

1. To access the Save to Magnetic Tape Utility, select option 5, "Save & restore," at the Main Utility Menu, and then select 1, "Save to Tape" at the Save and Restore Utilities menu.

EUT7.3A	MAI BASIC FOUR, INC.	11:56 am
tsave	Save to Magnetic Tape Utility	05/22/87

- 1. TAPE DEVICE \* 1/4 inch cartridge 1/2 inch reel-to-reel
- VERIFY \* no yes

- 2. ERROR HANDLING
- \* log and continue log and ask user no error log
- 4. REPORT DEVICE
  - \* terminal printer file no report

Type number to change selection, (RETURN) when all are correct:

## Figure 7-1. Save to Magnetic Tape Initial Prompt

# Make selections at the multiple choice menu as desired:

## TAPE DEVICE

1/4 inch cartridge - CS cartridge

1/2-inch reel-to-reel - TS reel.

### ERROR HANDLING

log and continue - writes errors generated during the Save to a log file and displays them at the end of the Save report

log and ask user - reports errors to the terminal screen and prompts the user for the appropriate action to take. These errors are also written to the log file and displayed at the end of the Save report.

no error log - does not write errors to the log file but reports the errors to the terminal screen and prompts the user for the appropriate action to take.

#### o VERIFY

no - does not verify that the Saved files match their counterparts on disk

yes - verifies that the Saved files match their counterparts on disk. Following the Save operation, each file in the save set is compared to its original on disk as a verification that the save set is good.

## REPORT DEVICE

terminal - displays the report on the terminal screen

printer - prints the report on a printer
you select

file - writes the report file to a file you specify

Press <RETURN> when you have made your selections.

3. You are then prompted for a file or filelist name to add:

# Type a file or filelist name to add, <RETURN> when done:

Type a file or filelist name and press <RETURN>. Pattern matching characters can be used to specify groups of files.

- 4. Press <RETURN> again when you have finished specifying file names.
- 5. The "Edit list of names" menu displays. Press <RETURN> if your files are correct; otherwise, make the necessary changes.
- 6. You are then prompted to mount a tape.

If you are using the CS cartridge, make sure the cartridge "write protect" notch is turned away from the "SAFE" label. Insert the cartridge into the drive and lock it. Then press <RETURN>.

If you are using a TS reel tape, make sure the "write ring" is in place on the reel. Insert the reel into the drive and press the LOAD button. (Refer to the operator's manual for details.) Press <RETURN> when the drive is READY.

7. The tape label is displayed and you are asked to verify:

# Is this the correct tape? (yes/no):

Press <Y> if the tape is correct and press <RETURN>; otherwise press <N>, followed by <RETURN>.

8. If the tape was used previously for a backup, the prompt asks:

Do you want to append to this tape? (yes/no):

Appending adds the new backup to the tape following any previous backup. Type:

no

to overwrite the previous backup and press <RETURN>. If you want to append the backup, type:

yes

and press (RETURN).

9. If the tape is not labeled, a set of label parameters is supplied and you are prompted:

WARNING: Labeling the tape will destroy the current data. Type number of item to change, <RETURN> to label tape: Press (RETURN) to label the tape with the displayed parameters. When the tape has been labeled, press (RETURN) again to proceed. The files are then saved.

10. The report of files saved displays. Press <RETURN> as many times as required to display the list. The program ends. If you logged on as the backup operator, you are logged off.

# Restore from Magnetic Tape Utility

The Restore from Magnetic Tape Utility restores all or some of the files saved in a save set of cartridges or tape reels. (Filesystem image backups cannot be restored by this utility.)

1. To access the Restore from Mag Tape Utility, select option 5, "Save & restore," at the Main Utility Menu, and then select option 2, "Restore from Tape," at the Save and Restore Utilities menu.

EUT7.3A MAI BASIC FOUR, INC. 11:56 am trestore Restore from Magnetic Tape Utility 05/22/87 11:56 am

- 1. TAPE DEVICE

- 3. DUPLICATES
- \* replace skip ask user
- 4. ERROR HANDLING 5. VERIFY

  \* log and continue \* no
  log and ask user yes 6. REPORT DEVICE \* terminal printer file no error log no report

Type number to change selection, (RETURN) when all are correct:

Figure 7-2. Restore from Magnetic Tape Initial Promot

# 2. Make selections at the multiple choice menu:

#### o TAPE DEVICE

1/4 inch cartridge - CS cartridge

1/2-inch reel-to-reel - TS reel.

#### o FILE SELECTION

all files - restores all files in a save set

selected files - restores only the files you select. The utility prompts for the filename to be restored.

## o DUPLICATES

replace - if the file to be restored already exists on the disk, replaces the old file with the new version of the file

skip - skips (i.e., does not restore) a file that already exists

ask user - prompts user to determine whether file should be replaced or skipped

#### ERROR HANDLING

log and continue - writes errors generated during the Save to a log file and displays them at the end of the Save report

log and ask user - reports errors to the terminal screen and prompts the user for the appropriate action to take. These errors are also written to the log file and displayed at the end of the Save report.

no error log - does not write errors to the log file but reports the errors to the terminal screen and prompts the user for the appropriate action to take.

### o VERIFY

no - does not verify that the Saved files match their counterparts on disk

yes - verifies that the Saved files match their counterparts on disk. Following the Save operation, each file in the save set is compared to its original on disk as a verification that the save set is good.

#### REPORT DEVICE

terminal - displays the report on the terminal screen

printer - prints the report on a printer
you select

file - writes the report file to a file you specify

no report - does not generate a report

3. Mount the tape.

If you are using a CS cartridge, insert the cartridge into the drive and lock it. Press <RETURN>.

If you are using a TS reel, insert the reel into the drive and press the LOAD button (refer to the operator's manual for details). When the drive is READY, press <RETURN>.

- 4. The tape label is displayed and you are asked to verify that it is the correct tape. If the tape is correct, Press (Y) and press (RETURN); otherwise, press (N) and press (RETURN).
- 5. The system prompts you for the name of the save set to restore. If the save set is the only save set or the first save set on the tape, press (RETURN). If it is an appended save set, type the name and press (RETURN).
- 6. If you specified "selected files," the system prompts you to build a list of files to restore. You may enter individual file names, use pattern matching characters, or filelists.
- 7. If the save set is split between two or more cartridges or reels, you are prompted to mount the next tape as required. Repeat this process as necessary until all specified files have been restored.

When all the files have been restored, the utility ends.

# Backup and Restore with TSAVE Command

Backup to 1/2-inch TS reels and 1/4-inch CS cartridges can also be accomplished using the tsave command.

NOTE: This topic describes the procedure for saving to and restoring from TS reel; however, by substituting CS for TS in the "dev=" option of the commands, the CS cartridge may be used as well. The procedure is identical.

There is no interactive file selection process provided by the command, as there is for the utility. File lists may still be used, or files may be specified individually.

The most useful option is the "-recursive" flag. This option lets you specify the directory containing the files you want to back up. The procedure then backups the directory, all files in the directory, all subdirectories and all files in the subdirectories. So, using the "-recursive" flag and specifying the root directory "/" backs up all files in the currently active filesystem(s).

TS reels (and CS cartridges) must be labeled prior to executing the save command.

All of these procedures must be executed from the command interpreter. When the commands have been completed, you can return to the Initial Menu by entering:

## @>menu

To have access to all files for backup and restore, you must be logged on as the system administrator.

## Label a Tape

- To access the command interpreter, select option 2 at the Initial Menu, "Command Interpreter." If you log on as the system administrator, you begin in the command interpreter.
- Mount the tape reel to be labeled. Refer to your tape drive operator's guide for full instructions.
- 3. At the command prompt, enter:

# @>tlabel dev=device name set=xxx id=yyy ser=zzz

One or more of the options, set=, id= or ser= must be specified in order for the tape to be labeled. The values specified can be any string of up to eight characters.

The tape is then erased and labeled. When the labeling is complete, the new label is displayed and the command interpreter prompt is displayed.

# Backup to TS Reels

- Log on as the system administrator. Only the system administrator has full access to all files. (If you are backing up only your own files, you can log on as yourself and access the command interpreter.)
- Mount a LABELED tape reel in the TS drive.

Refer to the <u>Basic Four Model 4402 Streamer</u>
<u>Tape Drive Operator's Guide</u>, M5125, for full instructions on using the drive.

3. Execute the tsave command specifying the device to save to, either /dev/cs or /dev/ts, and the save set name and using one of the methods for specifying files. The format of the tsave command is:

# @>tsave dev=device {options} {file(s)}

The options to use are:

name=save set name - each save set on a tape has a name. It can be up to 64 characters in length (with no spaces). When a name is not given, a default name operatorname\_MM/DD\_hh:mm is assigned.

list=filelist - specifies a filelist of files to back up.

-recursive - when a directory is encountered in the list of files to back up, all sub-files in the directory are also placed in the save set recursively.

files - a listing of all files you want saved.

-verbose - displays each file name as it is saved

Pattern matching characters are allowed. An asterisk (\*) matches any sequence of characters. A question mark (?) matches any single character.

(Refer to the <u>BOSS/IX User Reference</u> <u>Manual</u>, M6211, for a full description of pattern matching characters available.)

## Examples:

A. @>tsave dev=ts name=sysfiles -recursive /dev /etc

Saves all files in the /dev and /etc directories.

B. @>tsave dev=ts name=wholething
-recursive /

Saves all files in the filesystem.

C. @>tsave dev=ts name= daily list=daydata.f

Saves all files listed in the filelist daydata.f, a filelist of data file names that are modified on a daily basis.

D. @>tsave dev=ts name=accounting
/acntg/\*.acntg

Saves all files in the "/acntg" directory with the filename extension ".acntg".

- 4. If the space on tape required to back up the specified files exceeds the available space, the backup pauses when the space is exhausted. You are prompted to unmount the current tape and mount another. When the next tape has been mounted, press (RETURN) to continue with the backup.
- 5. When all files have been backed up, the program ends and the command interpreter prompt is displayed. Unmount the tape reel and store it in a secure place.

## Restore from TS Reels

- Log on as the system administrator. File ownership is subject to change if a user other than the system administrator restores files.
- Mount the tape reel containing the file(s) to restore. If the save set is split between more than one tape, mount the first tape of the save set.
- Execute the trestore command specifying the device to restore from, either /dev/cs or /dev/ts, the save set and files as necessary.

# @>trestore dev=device {options} {file(s)}

The options to use are:

name=save set name - each save set on a tape has a name. It can be up to 64 characters in length (with no spaces). When a name is not given, a default name of operatorname MM/DD hh:mm is assigned.

list=filelist - specifies a filelist of files to back up.

-recursive - when a directory is encountered in the list of files to back up, all sub files in the directory are also placed in the save set recursively.

files - a list of files to be restored. Pattern matching files can be used.

-verbose - displays each filename as it is saved

The most common file specification is a single file, or a directory with the -recursive option.

4. If the file(s) are not found, the program displays the following message and ends:

## file not found

If the backup is on more than one tape, the file may be on another tape. Mount the next tape in the save set and repeat the command.

5. When the specified files have been restored, the program ends and the command interpreter prompt displays.

# Save to Floppy Diskette Utility

The following procedure creates backup copies of your files on a set of floppy diskettes.

Floppies must be formatted prior to running the backup utility. Prepare a sufficient number before continuing with this procedure.

NOTE: Files saved using this utility can only be restored using the "Restore from Diskette" utility. The backup floppies cannot be mounted and used as filesystem devices.

 To access the Save to Diskette Utility, select option 5, "Save & restore," at the Main Utility Menu, and then select option 6, "Save to diskette."

EUT7.3A	MAI BASIC FOUR, INC.	11:56 am
dsave	Save to Diskette Utility	05/22/87

1. REPORT DEVICE
\* terminal

terminal printer file 2. WRITE VERIFY

no \* yes

Type number to change selection, <RETURN> when all are correct:

Figure 7-3. Save to Diskette Initial Prompt

 Make selections from the multiple choice menu. Press (RETURN) when you have made your choices.

#### REPORT DEVICE

terminal - displays the report on the terminal screen

printer - prints the report on a printer
you select

file - writes the report file to a file
you specify

## WRITE VERIFY

no - does not verify the data that is written to disk

yes - verifies the data that is written to disk. The utility re-reads the information that was written to diskette and verifies that it is the same as the original. (Note that this slows down the process considerably.)

3. You are prompted for a file or filelist name to add:

> Type a file or filelist name to add, <RETURN> when done:

Type a file or filelist name and press <RETURN>. Pattern matching characters can be used to specify groups of files. To back up the whole filesystem, enter "/\*".

4. Press <RETURN> again when you have finished specifying file names.

- 5. The "Edit list of names" menu displays. Press <RETURN> if the files are correct; otherwise, select the appropriate option to make the necessary changes.
- 6. The program builds a list of all files to be saved, and then asks for a save set name:

Type save set name:

Type a name to identify the save set and then press  $\langle \text{RETURN} \rangle$ .

7. The save set label is displayed and you are prompted to insert the first diskette:

Insert diskette number 1, (RETURN) to proceed:

Insert a diskette and press (RETURN).

8. This message is displayed:

All data on the diskette will be lost! Proceed?(yes/no):

Press <Y> and press <RETURN>.

- 9. The utility begins saving files to diskette. When a diskette becomes full, you are prompted for the next diskette. Follow the prompts until all files have been saved.
- 10. When all specified files have been saved, the utility displays the names of the files. At the bottom of each page you are prompted:

# Type <RETURN> to proceed:

Press <RETURN> for the next page, or to end the program when the last page is displayed. The Save and Restore Utility Menu displays.

# Restore from Floppy Diskette Utility

The following procedure restores files which have been backed up on floppy diskettes. Only files restored using the Save to Diskette Utility can be restored by this method.

The procedure allows you to restore all the files or selected files.

 To access the Restore from Diskette Utility, select option 5, "Save & restore," at the Main Utility Menu, and then select option 7, "Restore from diskette."

EUT7.3A drestore MAI BASIC FOUR, INC.
Restore from Diskette Utility

11:56 am 05/22/87

- 1. FILE SELECTION

  \* all files
  selected files
- 2. DUPLICATES

  \* replace
  skip
  ask user

- 3. CONTIGUOUS yes
  - \* no

- 4. REPORT DEVICE
- \* terminal printer file

Type number to change selection, (RETURN) when all are correct:

Figure 7-4. Restore from Diskette Initial Prompt

2. Make selections from the multiple choice menu. Press (RETURN) when you have finished.

#### o FILE SELECTION

all files - restores all files in a save set

selected files - restores only the files you select. The utility prompts for the filename to be restored.

#### o DUPLICATES

replace - if the file to be restored already exists on disk, replaces the old file with the new version of the file

skip - skips (i.e., does not restore) a
file that already exists

ask user - prompts user to determine whether file should be replaced or skipped

### CONTIGUOUS

yes - creates all restored files as contiquous files

no - does not make restored files contiguous

#### REPORT DEVICE

terminal - displays the report on the terminal screen

printer - prints the report on a printer
you select

file - writes the report file to a file you specify

3. If you chose to restore all files, insert the first diskette in the save set to be restored.

If you are restoring selected files, insert the LAST diskette in the save set.

Insert the indicated diskette and press <RETURN>.

4. The save set label is displayed, and you are asked to verify that it is correct:

Is this the correct save set? (yes/no):

To restore from this save set, type:

yes

and press <RETURN>. If this is not the correct save set, type:

no

and press (RETURN). Return to step 3.

If you are restoring all files, the program begins restoring files from the first diskette. Go to step 7.

5. If you are restoring only selected files, you are now asked for the files to restore:

Type a file or filelist name to add, <RETURN> when done:

Type a file or filelist name and press <RETURN>. Pattern matching characters can be used to specify groups of files.

When you have finished specifying files, press (RETURN).

- 6. When the "Edit list of names" menu is displayed, press (RETURN) if the files are correct. Otherwise, select an option to make the necessary changes.
- 7. You are now prompted for a diskette:

# Insert diskette number n, (RETURN) to proceed:

Insert the indicated diskette and press <RETURN>.

This prompt is repeated for as many diskettes as required to restore the specified files. For all files, all the diskettes should be inserted in sequence. For selected files, only those diskettes containing the selected files are required.

8. When all requested files have been restored, a report of restored files is generated. Press (RETURN) as prompted to display the report and end the utility.

## NOTES

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## SECTION 8

## OPERATOR MAINTENANCE

This section describes the procedure for adding or deleting an operator from the system. Before a person can use the MAI 2000, he or she must be given logon access to the system. The Operator Information Utility is used to define an operator's logon access.

NOTE: You must be logged on as the system administrator in order to make changes using the Operator Information Utility. A user other than the system administrator can only display his/her own operator information.

The procedures given here apply only to the system administrator. Only the Add an Operator and Delete an Operator options are covered. Refer to the <u>BOSS/IX User Reference Manual</u>, M6211 for instructions on the remaining options.

# Add an Operator

 To access the Operator Information utility, select option 8, "System," at the Main Utility Menu, and then select option 4, "Operator Information," at the System Utilities Menu.

If you are in the command interpreter, type:

oprinfo

and press <RETURN>.

The program displays the "Maintain operator information file" menu. Select option 1, "Add an operator."

## Maintain operator information file

- 1. Add an operator
- 2. Modify an operator
- 3. Delete an operator
- 4. Change password
- 5. Operator report

Type number of selection, <RETURN> to end:

# Figure 8-1. Maintain Operator Information File Menu

# 3. Type operator name, (RETURN) to end:

Type in the name that the new operator will use to log onto the system, and then press <RETURN>. The name can be up to 20 characters long.

4. The utility now displays the operator information with defaults for all fields, and prompts you for the item to change. Press <RETURN> to define this operator with the default parameters.

Usually, there is no need to change the default operator parameters. If you do need to change them, refer to Section 4 of the BOSS/IX User Reference Manual, M6211 for a full description of the legal parameter values.

5. You are then asked to enter a password for the operator:

# Type password:

The password is optional but is recommended for security reasons. Type a string, 0 to 8 characters long, and press (RETURN). The password does not display on the screen as it is entered.

6. You are then asked to repeat the password, to verify that you entered it correctly:

# Type password again:

Type the password again just as you did before and press (RETURN). The program adds the operator and the "Maintain operator information file" menu displays again.

# Delete an Operator

- To access the Operator Information Utility, select option 8, "System," at the Main Utility Menu, and then select option 4, "Operator Information," at the System Utilities Menu.
- The program displays the "Maintain operator information file" menu. Select option 3, "Delete an operator."
- 3. Type operator name, <RETURN> to end:

Type the logon name of the operator to be deleted and press <RETURN>. The name must be entered exactly.

# 4. Do you want to delete this operator? (yes/no):

The operator parameters are displayed to verify that the correct operator name has been entered.

To delete the operator, press <Y> and press <RETURN>. The operator is deleted and the utility returns to the functions menu.

To keep the operator, press <N> and press <RETURN>. The operator name prompt repeats.

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