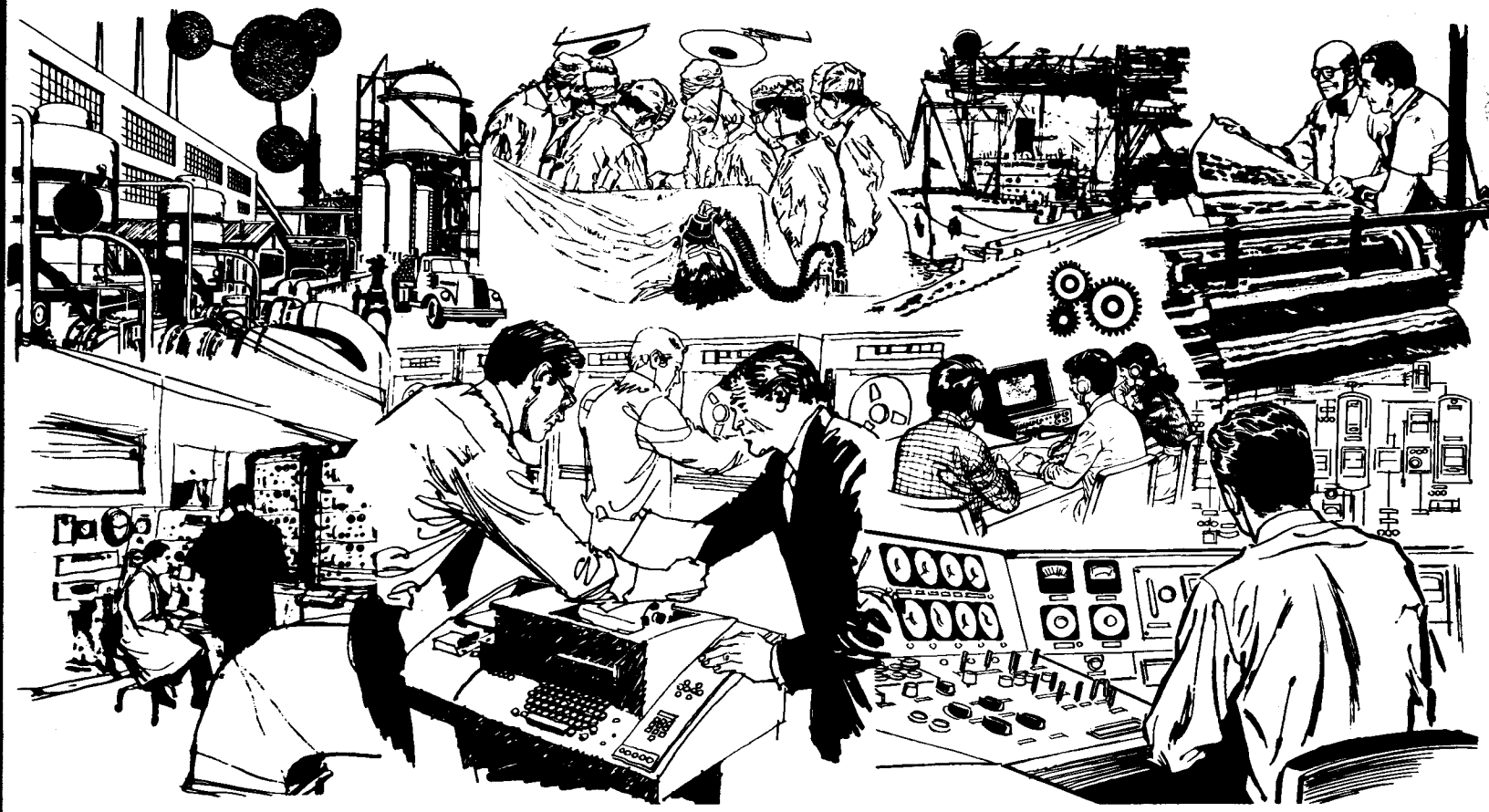
BEM — OS/3

Basic Editor Monitor

User Reference



SPERRY UNIVAC

UA-0139 Rev. 4

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Printed in U.S.A.

PREFACE

This reference manual describes the Basic Editor Monitor (BEM) system, which operates under the SPERRY UNIVAC OS/3 Operating System. It is designed to allow the conversational use of applications such as EDT (Interactive Editor) and BASIC (Beginner's All-purpose Symbolic Instruction Code).

Sections 2, 3, and 4 of this manual are aimed at separate audiences. The organization of this manual is as follows:

Section 1 — System Description — provides the reader with a general description of the features of the BEM system.

Section 2 — Terminal User Guide — introduces the user to the terminal procedure and concepts of the BEM system. Commands used to gain entry to the monitor and to invoke the application program are also explained.

Section 3 — Operator Guide — contains information required by the 90/30 console operator such as key-ins and responses by error messages.

Section 4 — Installation Guide — is intended for the system administrator. It includes details on how to configure the system as well as ways to efficiently utilize the available resources.

Appendix A — Console Error Messages — documents all run-time error messages.

Appendix B — System Error Messages — documents all system error messages.

This manual is one in a series pertaining to BEM. The others are:

BEM: EDT — OS/3 Interactive Editor, User Reference UA-0141
BEM: BASIC — OS/3, User Reference UA-0140
BEM:RSP — OS/3 Remote Spoolout Processor, User Reference UA-0243

Also available are summary cards:

BEM — OS/3, Operator Command UA-0189
BEM:BASIC — OS/3, Instruction Summary UA-0191
BEM:EDT — OS/3, Instruction Summary UA-0190
BEM:RSP — OS/3, Instruction Summary UA-0244

CONTENTS

1 SYSTEM DESCRIPTION

1.1 INTRODUCTION

This manual describes the BEM (Basic Editor Monitor) system, its features and its capabilities. The function of BEM is to provide support features required by interactive application programs. By using BEM, a terminal user can accomplish tasks which previously could only be done by a slow batch process, or could not be done at all. The interactive approach used throughout BEM allows the user to initiate a function from the terminal, and learn immediately if it has been performed successfully. Any error correction necessary may also be attempted from the terminal.

BEM may be used to accomplish simple functions such as printing or punching elements from library files, obtaining a directory listing of a library, initiating batch jobs, or executing interactive application programs. It is in this last function where the power of BEM may be seen. Three programs currently available with BEM are EDT, BASIC, and RSP.

EDT is an interactive editor. With the editor, a user may create program source statements or text online, as well as modify existing library elements. Functions of this editor include the ability to print, delete, change, insert, modify, and sequence statements on the basis of their line number, or the contents of the statement itself. For detailed information about EDT consult *BEM:EDT — OS/3 Interactive Editor, User Reference* UA-0141.

Another interactive program available with BEM is BASIC (Beginner's All-purpose Symbolic Instruction Code). This compiler allows the user to create and run programs written in the BASIC language. Existing programs may also be run. All input to BASIC is through the terminal allowing users to write interactive BASIC programs. Disk files may be used as a storage medium so that useful programs may be retained for later use. For detailed information about BASIC, consult *BEM:BASIC — OS/3, User Reference* UA-0140.

The third program available is RSP (Remote Spoolout Processor). This system permits the interactive user to examine the spooled output of OS/3 batch programs. Printed or punched output of any batch job may be displayed at the UNISCOPE terminal without modifying the batch job. Card input files may also be created by RSP. For detailed information about RSP, consult *BEM: RSP — OS/3 Remote Spoolout Processor, User Reference* UA-0243.

The BEM system is capable of supporting several terminals simultaneously, while each terminal still has access to all of the capabilities of BEM.

An optional feature of BEM allows users to submit card batches for background processing. These batches may be entered from the card readers at main or remote sites, or from the terminal. Background processing can occur simultaneously with normal interactive processing.

Three groups will come in contact with the BEM system: the terminal user, the computer operator, and the system administrator. This manual presents information needed by each of these groups.

2 TERMINAL USER GUIDE

This section is directed to the BEM system terminal user. It explains the general capabilities of the system and the conventions used throughout the system. For the new user there are sections describing the use and operation of various terminals, which are supported by BEM.

BEM is an interactive system as opposed to a batch or demand type system. Each statement entered at the terminal is processed immediately, and any errors detected are returned to the terminal user. The user relies entirely upon the terminal as a means of communication with the computer, thus eliminating the need for punched cards or printed output.

When an error is detected, a short message describing the error is displayed on the terminal. The message is usually self-explanatory; however, should the user require additional information, a HELP facility is built into the system. This additional information gives a list of possible causes and corrections.

The basic unit of work in BEM is a task. In order to be assigned a task, the user must log on to the system. Once logged on, the user proceeds by entering a line of input. This input is passed to BEM, which processes it and returns one or more lines of output to the terminal.

When initially logged on, the user will be interacting with the monitor directly. BEM may be requested to do several things at this point:

- Status information may be requested.
- Help may be obtained.
- Messages or questions may be sent to the computer operator.
- A program may be executed.
- Produce hardcopy or punched card output.
- Display the elements in a library file, or the names of files on a disk.
- Delete an element from a library file.
- Display pertinent information about the OS/3 environment.
- Allocate and scratch disk files.
- Submit BEM background tasks.
- Recover recently deleted elements.

Once a program has been initiated all user type-ins are processed by the program itself, and not BEM. When the user has finished with a program, he may issue a command to return control to BEM. This command is unique to each program. For example, a HALT command is used within EDT and a BYE command is used for BASIC. Once BEM has regained control, the user may enter any monitor command as if he had just logged on, or he may resume execution of the program that had just been terminated.

All users on the system share an area of memory and the disk work space. Each user is assigned sections of memory and disk space as needed from the shared area. This assignment and deallocation procedure is done within BEM without the user's knowledge. Occasionally, there may be more users requesting space than there is space available. Under these circumstances, the user will be informed that a particular resource is unavailable, and will be asked to wait a few moments and reenter any last input.

Certain sites may elect to place a limit on the amount of time a terminal will be left waiting for input. The system administrator may designate that a terminal left logged on waiting for input for some period of time, be logged off automatically. The terminal user should be aware that leaving a terminal idle for an extended period of time, such as an hour, may result in the terminal being logged off and all workspaces discarded. When the time limit expires, BEM will warn the user and allow 30 seconds for some input. If nothing is transmitted within 30 seconds, the terminal will be logged off.

2.1 TERMINAL PROCEDURES

The BEM system will support several different types of remote terminals. This section describes the methods of operating these terminals.

In general, the following procedures must be learned:

- How to transmit input to the system
- How to interrupt a command in progress

2.1.1 UNISCOPE Terminals

The UNISCOPE keyboard layout is shown in Figure 2-1. The top row contains several special function keys the user should be aware of. The SOE key (start-of-entry) when depressed, displays the ▷ character which identifies the starting point for a message. The message text should be entered immediately following the ▷ character. The complete message may be entered and corrected on the screen before transmitting it to the computer. Once satisfied that the text is correct, the TRANSMIT key is used to actually send the input to the computer.

While BEM is processing the input, the UNISCOPE keyboard will be locked out. When BEM has finished, it will move the cursor (⌐) to a new line of the screen, and present a start-of-entry character. Unless the user alters the screen format, there will always be an SOE character automatically positioned before the message.

One additional feature of the UNISCOPE is the MESSAGE WAITING key. This key is used by BEM to interrupt the current function. When depressed BEM will suspend the program in execution and return to monitor mode. Interrupts and monitor mode will be discussed in detail in a later section.

The maximum length of an input line is 128 characters; however, some interactive programs will truncate at 80 characters (i.e., BASIC program source is limited to 80 columns).

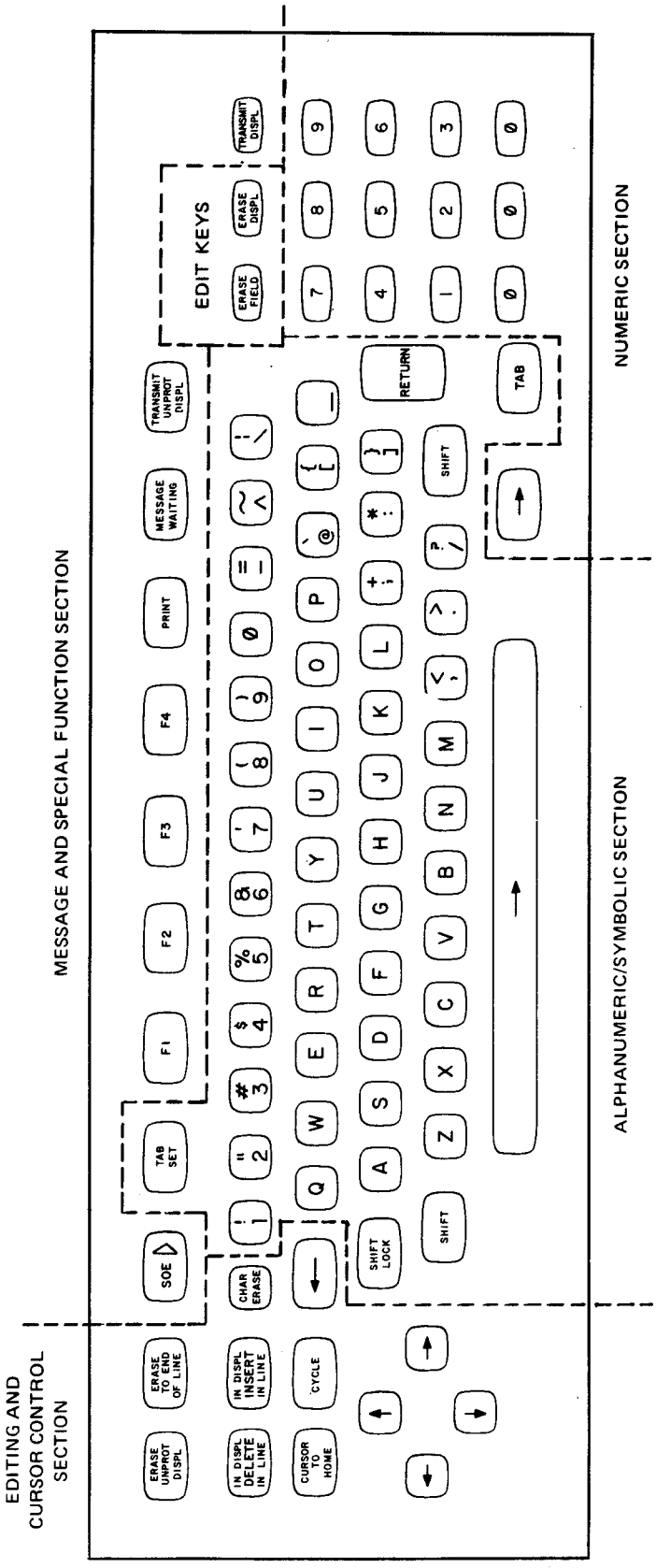

Figure 2-1 UNISCOPE 100 Keyboard

2.1.1.1 UTS 400 TERMINAL

The description of the UNISCOPE terminal also pertains to the UTS 400 terminal. Its keyboard is shown in Figure 2-2. When the UTS 400 is used, the PROTECT-FCC switch must be set to PROTECT. In addition, the user must issue the BEM command /SCREEN UTS400 immediately after logging on. This sets the UTS 400 transmit mode for correct BEM operation and informs BEM that the user is using a UTS 400 terminal.

2.1.2 DCT 500 and Other Hardcopy Terminals

The keyboard layout for the DCT 500 and other similar terminals is shown in Figure 2-3. When operating this terminal, each time a key is struck the character is sent immediately to the computer. This differs somewhat from the operation of the UNISCOPE, since the user may change an input line several times, but the computer does not get the text until the UNISCOPE TRANSMIT key is depressed.

A list of all terminal switches and their normal settings is shown in Table 2-1. These switches should be set up correctly before attempting to communicate with BEM.

The green CLEAR TO SEND indicator on the keyboard is lit when BEM is ready to accept input. If it is not lit, the user should wait, or depress the PROCEED key to clear the terminal.

If an error is discovered as the input statement is entered, the backspace key may be used to erase characters until the character in error is reached. The user may then retype the statement correctly from that point in the line.

Example:

/LGGON←←←←OGON

will be interpreted as

/LOGON

To signal the end of an input line, an "end of text" message must be sent to the computer. This is accomplished by striking the CTL key and the letter C simultaneously.

The DCT 500 user may request BEM to interrupt the current program in execution by using the INTERRUPT or BREAK keys. Interruption of programs is discussed in a later section.

BEM supports hardcopy terminals such as Teletype[1] identically to the DCT 500 terminal; however, the location of certain keys on the keyboard may be different.

[1] Trademark of Teletype Corporation

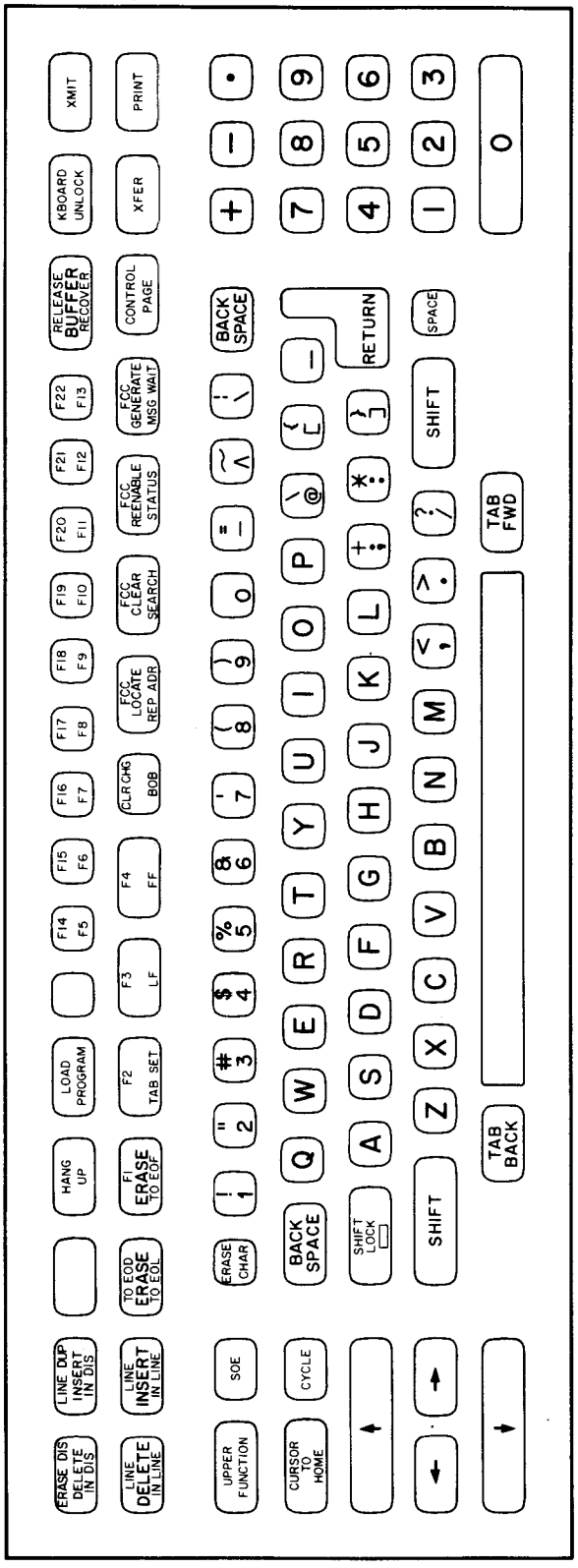

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Figure 2-2 UTS 400 Keyboard

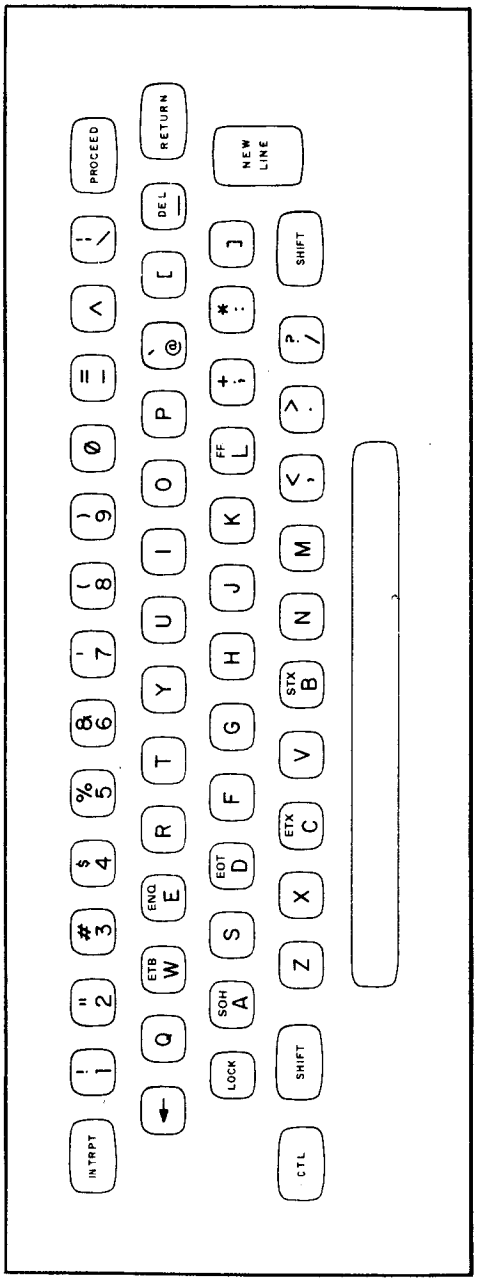


Figure 2-3 DCT 500 Terminal Keyboard

Table 2-1 Terminal Switches

Key	Function	Position
MASTER/SLAVE	Communicates with another terminal.	MASTER
XMIT/OFF/RECMON	Selects print monitor option.	XMIT
BAUD RATE	Determines maximum device speed.	Site selected, usually 300 baud
ON/OFF LINE	Logically disconnects the terminal from the computer.	ON LINE
KEYBOARD	Selects the keyboard as an input device.	ON
PRINTER	Selects the printer as an output device.	ON
READER	Selects the paper tape reader as an input device.	OFF
PUNCH	Selects the paper tape punch as an output device.	OFF
FULL/HALF DUPLEX	Determines 2-way simultaneous or 2-way alternate transmission.	HALF
UPPERCASE	Selects all uppercase character set.	ON

2.1.3 DCT 1000 Terminals

The keyboard of a DCT 1000 is similar to that of the DCT 500 except that a TRANSMIT and a CLEAR key have been substituted for the PROCEED and INTERRUPT keys. The DCT 1000 is also a buffered terminal, which allows the user to correct each line of input before it is sent to the computer. The backspace key (←) will erase the last character typed, and the CLEAR key will erase everything which may have been entered to allow the user to reenter a line.

Once an input line has been formatted, the TRANSMIT key may be used to send it to the computer. This same key will also be used to interrupt a program which is in execution. Interruption of programs will be discussed in a later section.

Before attempting to use the DCT 1000 with BEM, the keyboard switches should be set up as shown:

Switch	Position
AUTO/MANUAL	AUTO
MONITOR	ON
RUN/STOP	Push to "RUN" position after other switches have been set.
ON/OFF LINE	ON LINE
KEYBOARD	ON
PRINTER	OFF
READER (paper tape)	OFF
PUNCH (paper tape)	OFF
CARD-READER	OFF
CARD-PUNCH	OFF

2.2 TERMINAL COMMANDS

This section of the manual explains the various commands acceptable to BEM with their functions.

2.2.1 Initiating a Session

The BEM system provides several application programs for use at the remote terminal. In order to use these programs, the user must first have his terminal logged on to the system. This procedure informs BEM that there is a new user terminal to service, and allows it to obtain and initialize any work areas which may be required by the terminal user.

To log on to the system the following command is used:

/LOGON *userid* [,*account*] [,*password*]

The user-id is a one-to four-character name that is used by the computer operator to identify the user of a particular terminal. The keyword portion of the command must be entered exactly as shown.

The account number is a one- to four-character identifier used for billing purposes. Its use is optional at each site. The password is a one- to four-character identifier used to restrict access to a particular user-id and account combination. It is never printed or displayed.

The system administrator defines the user-id account password combinations for a site, and may elect to have certain accounts under which any user may log on and other accounts for which only certain users may log on. A password may be placed on any of these accounts, and if defined by the administrator, it must be entered in the LOGON command.

It is possible that the same user, when logging on under two different accounts, may need to know a different password for each account. Also, a second user, logging on under the same two accounts but with a different user-id may need to know two entirely different passwords.

Associated with each unique set consisting of a user-id, account number, and password are possible restrictions and default file-parameters which are used during a BEM session. A given user on some account may be restricted from:

- Accessing files on the system pack.
- Writing to files on the system pack.
- Writing to any files on any pack.
- Accessing any files other than the file specified by the system administrator.
- Accessing any files at all.
- Using certain programs or facilities of the BEM system.

The administrator may also designate one file as a default file for a particular user-id/account/password combination. If no filename is stated in a command which requires a file-access, BEM will use the file designated by the administrator. If no default file has been designated, the user will be required to supply one.

When a certain function or file access is restricted due to the user's account definitions, BEM will display an error message stating that the operation was not permitted for the account. Only the system administrator may remove the restriction.

If the LOGON command has been entered correctly, BEM will initialize a task to handle the new terminal. As part of the initialization process BEM may display a status bulletin that has been established by the system administrator. Finally, when BEM is ready for input it will display a slash (/) to prompt the user to enter a command.

Whenever the monitor is in control, it will display the slash to identify that the next input will be processed by the monitor itself, and not an application program. The applications programs use a different character to request user input.

Two error messages are possible if the user enters an incorrect LOGON command. If the user-id, account, or password contains more than four characters, the user-id is omitted or extra parameters entered the following message is displayed:

```
INVALID FORMAT FOR LOGON COMMAND
```

If the user-id, account, and password combination is undefined, the following message is displayed:

```
INVALID ID, ACCOUNT, PASSWORD FOR LOGON
```

When either of the preceding errors is displayed or if the LOGON statement is not recognized BEM will display the message:

```
PLEASE LOGON/
```

The user may then reenter the command. It is also possible that BEM is currently unable to service another user. In this case, a message will be displayed asking the user to wait.

Another possible BEM response is:

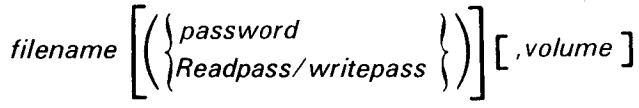
TERMINAL ALREADY LOGGED ON, PROCEED

This indicates that the last user of the terminal did not logoff the system when the task was finished, and an additional LOGON command is not needed. The terminal is usable in this condition, however it may be logged on with the wrong user-id and account.

Once logged on, the terminal is in what is called "monitor mode." That is, commands are processed by the monitor itself (BEM) and not an application program. Once a program has been executed, all input is processed by it instead of the monitor. By using the interrupt feature, the user may switch between monitor mode and the application program as desired.

There are several commands that may be entered in monitor mode. These are explained in the following sections with examples.

Throughout this manual and all other manuals in the BEM series, there is a need to specify parameters which identify the file or element a command will use. These will be referred to from this point on as *file-parameters*, and have the following format:



where

filename — Name of an OS/3 disk file as identified in the Volume Table of Contents (VTOC).

password — Password required to access the file. A correct password is required if the file is listed in the OS/3 catalog with one. If the file is being used in a read function (such as FSTATUS), the read password should be specified; if used in an output function (DELETE, COMMENT, etc.), the write password is used. If the file has two passwords, they may both be specified (e.g., read pass/write pass).

volume — OS/3 disk pack name on which the file resides. If the file has been cataloged with a volume name, then the user may omit this field and use the name stored in the catalog. The volume name must refer to a disk which is mounted and allocated to the BEM job.

Certain functions use the file-parameters as defined, others require specification of an element name and also an element type. When these additional fields are required they will be shown in the command. In general, they are as follows:

element, file-parameters, type

or, showing the full file-parameters:

element, [*filename* [(*password*)]] , [*volume*] [,*type*]

If the user has logged on under an account which has a default filename, then the file-parameters may be omitted for a reference to that file. Thus an element can be referenced, if no type is needed, as:

element

or as:

element, , ,type

when the type is specified.

2.2.2 HELP Query

No matter how careful the user is, occasionally a statement will be entered that will result in an error. Most error messages displayed by BEM are short, and most are self-evident. If the error is unclear, or the cause is unknown, there is a monitor command to request additional explanation. The format of this command is:

/HELP

BEM will then display more information about the error which just occurred. It is important to query BEM as soon as possible, since the desired explanation is lost if a new error is generated prior to issuing the HELP command.

Example:

```
(IN)    /LOAD
(OUT)   SYSTEM COMMAND NOT RECOGNIZED
(IN)    /HELP
(OUT)   ALL SYSTEM COMMANDS MUST BE PRECEDED BY A
(OUT)   SLASH. VALID COMMANDS ARE:
(OUT)   LOGOFF, STATUS, EXEC, HELP, TYPE, RESUME, DISPLAY
(OUT)   FSTATUS, PRINT, PUNCH, PAUSE, DELETE, RUN, SCREEN, INTR
(OUT)   /
```

In this example, an illegal command was entered. This resulted in an error message which the user wished clarified. BEM displayed four lines of additional information followed by a slash to indicate that it is ready for input.

If the user requests help when there has not been an error, or after all of the additional information available has been displayed, BEM will ignore the request and present a slash again to solicit the next command.

2.2.3 Sending Messages to the Computer Operator

At times, users may need to communicate with the computer operators to inform them of specific requirements or to have questions answered. The TYPE command instructs BEM to display a message on the computer console.

Format:

/TYPE *message*

The message may be up to 60 characters in length and will be displayed on the operator's console immediately. The user task is not held up waiting for a reply, and other functions may be performed.

The computer operator may also send messages to the terminal. These messages do not arrive immediately, but are held by BEM until there is some other output for the terminal, then it will be displayed along with the normal output. In this way, a message will not disturb anything the user may be entering at the time. All such messages are identified by the prefix CONS- which identifies the source as the operator's console.

Examples:

```
/TYPE IS DISK PACK SRCE01 MOUNTED?
CONS-YES, DISK SRCE01 IS AVAILABLE
```

When a user must have an answer from the terminal operator, he may use the PAUSE command. This command displays a message on the computer console and waits for an operator reply:

/PAUSE *message*

With this command the message will remain on the operator's console until the operator answers it. However, the user will not get control back at his terminal until the operator answers the message.

Example:

```
/PAUSE    MOUNT TAPE 'ABC 123' AND RUN JOB 'READTP'
CONS — JOB READTP IS EXECUTING
```

2.2.4 BEM and System Status

2.2.4.1 STATUS COMMAND

The STATUS command gives information about BEM usage. During operation, the terminal user may request BEM to display certain status information about the system. This information takes three forms:

- information about the computer resources available to BEM
- list of terminal users of the BEM system
- information about the user's terminal only

Any status command may be issued at any time while the terminal is in monitor mode.

Information concerning available memory, disk space, and the number of terminals allowable may be obtained using the RESOURCE status command:

/STATUS RESOURCE

This will display three lines of output.

Example:

TASKS	TERMS	MEMORY			SCRATCH	
		MAX	AVAIL	FREE	AVAIL	FREE
4	3	40960	16384	12288	20	15

where

TASKS — Maximum number of terminals allowed on the system at one time. This value has been set by the system administrator at four terminals.

TERMS — Number of terminals presently using the system. Three terminals are shown as being in use in the example.

MAX MEMORY — Total amount of memory used by the entire BEM system. This figure is normally needed only by the system administrator. A 40K memory partition is shown in the example.

AVAILABLE MEMORY — Amount of memory to be shared by the terminal users on the system. All or part of this memory may be used as needed. The system administrator has elected to make 16K available.

FREE MEMORY — Amount of memory pool not being used. In the example, 12K out of a total of 16K is not in use.

AVAILABLE DISKSPACE — Similar to the available memory space category, but shows how much disk space the system administrator has elected to make available.

FREE DISKSPACE — Amount of available disk space currently not in use. The example shows 15 out of a total of 20 units of disk space are unused.

As described earlier in this section, all users of the system obtain disk and memory storage from a common pool. Depending on system loading, it may happen that the storage pools become exhausted. In that case, BEM will inform users affected that it was unable to acquire a certain resource, and ask them to wait. At this point the user may wish to see the system status via the above command, and periodically reissue the command until enough space becomes available.

The second status command may be used to list all users of the system.

Format:

/STATUS TERM

which will display a table similar to the following:

TERMINAL	COMMAND	PROGRAM	SCRATCH SPACE	USER
T110	EXECUT	BASIC	001	BETA
T230	STATUS		000	COMP
T210	HELP	EDT	002	BEM

where

TERMINAL — Internal name of the terminal used by BEM. The numbers in the name are the line-id, terminal-id, and terminal-type.

COMMAND — Last system command issued by user.

PROGRAM — Last program executed by user.

SCRATCH SPACE — Number of units of disk space the user has acquired.

USER — Logon-id of the terminal user.

The third STATUS option will display the user's id, terminal number, logon time, and current date and wall-clock time.

Format:

/STATUS

which will display two lines:

TERMINAL	USR	LOGON	DATE	CUR-TIME
E001	PROC	09:07	78/02/17	09:08:20

2.2.4.2 DISPLAY COMMAND

The DISPLAY command gives information about OS/3 system usage. This command takes two forms:

- information about batch jobs
- list of disk volumes currently mounted

Information about batch jobs may be obtained using the JOBS display option:

/DISPLAY JOBS

Examples:

JOB NAME	SIZE	TIME	STEP	EXEC	JOB NO.
BEM	044986	13.2	01	BEM000	0002
ASMTEXT	131072	25.8	02	ASM000	0015
UNUSED MEMORY	004096				

where

JOB NAME	The name of each batch job currently executing.
SIZE	Amount of memory allocated to that job including program load area and job prologue in decimal.
TIME	Current elapsed CPU time for all steps of the job in seconds.
STEP	Step number currently executing.
EXEC	Name of current load module.
JOB NO.	Unique job number assigned by spooling.

The unused memory entry shows total free memory at the time of the display. Memory allocated to the supervisor, symbionts, and ICAM is not explicitly shown by the display.

A list of disk volumes on the OS/3 system may be obtained with the VOLUMES option:

/DISPLAY VOLUMES

Example:

```
*OS3REL     USER01      *BEMPAK
```

This example shows three disk packs mounted. The two that are accessible to the BEM user are marked with an asterisk (*).

2.2.5 Program Execution

Once the user has logged on to the system, various application programs may be invoked. The EXECUTE command is used to begin a program:

/EXEC *program-name*

This command may be entered at any time during a session to load or reload programs. Each time a program begins, the previous, if any, is lost. Any disk or memory storage which the old program may have been using is deallocated, and any storage the new program may need is then acquired.

If the user has interrupted a program to get back to monitor mode, care should be taken not to execute a new program unless the user is prepared to lose access to the interrupted program.

Programs which may be executed are selected by the system administrator, and may include the following:

/EXEC EDT
/EXEC BASIC
/EXEC RSP

2.2.6 File Status Command

To obtain a directory listing an OS/3 library file at the terminal, the FSTATUS command may be used. This command will display the names of each source proc, object, or load module, and the type of each module.

Format:

/FSTATUS *file-parameters* [LONG]

where

file-parameters Describe the file which is to be listed.

LONG The alternate format of the command is to be used to display the comment and creation date and time for each module.

This command will produce output similar to:

P-SUPEQU	**P-EOJ**	**S-SRCMOD**	**S-COPYMOD**
S-COBOLPRG	**P-CLOSE**	**L-LOAD**	**O-LOADMOD**

To obtain a directory listing of the default file for an account (if one exists), enter the command without any operands.

The LONG format of the FSTATUS command produces output similar to:

```
P-SUPEQU      SUPERVISOR EQUATES      02/05/78   12:15
P-EOJ         END OF JOB PROC         01/31/77   02:59
S-SRCMOD      COBOL PROGRAM           07/14/77   14:20
S-COPYMOD     COBOL COPY MODULE       07/14/77   14:35
S-COBOLPRG                            07/14/77   15:05
P-CLOSE       CLOSE THE FILE          01/28/77   22:06
O-LOAD        PROGRAM TO SAVE FILE    09/15/78   08:15
L-LOADMOD     PROGRAM TO SAVE FILE    09/15/78   08:17
```

If the LONG format is used with the default file, a single comma must precede LONG:

```
/FSTAT , LONG
```

2.2.7 Print and Punch Commands

These two commands may be used to produce a printed listing of a module, or a punched card deck. The PRINT command will list a module on the system printer. A heading, identifying the user, and line numbers are also produced. The PUNCH command will punch the named module on the system punch. Identifier cards are punched preceding and following each deck to give the user's task information.

Format:

/PRINT *element, file-parameters*[,*type*]
/PUNCH *element, file-parameters*[,*type*]

where

element — Name of the module to be printed or punched.

file-parameters — Describe the OS/3 library file which contains the element.

type — Element-type of the module. An "S" denotes source, a "P" denotes proc. If this is omitted, source is assumed.

To PRINT or PUNCH from a default file, enter the command with only the element name and type. For example:

```
/PRINT LISTIT,,,P
```

2.2.8 DELETE Command

This command may be used to delete an element from a library file. Any macro, proc, source, object, or load element or group header may be deleted. In order to delete elements, the account parameters for the task must permit writing to the selected file.

Format:

/DELETE *element, file-parameters* [,*type*]

where

element — Name of the module to be deleted.

file-parameters — Description of the OS/3 library file which contains the element.

type — Element type of the module:

S	Source
P	Proc
M	Macro
O	Object
L	Load
G	Group header

If this is omitted, source is assumed.

NOTE: Type G specifies that only group headers (BOG and EOG markers) be deleted, not the entire group.

To delete elements from a default file, enter only the element name and type. For example:

/DELETE SRCEPROG

2.2.9 Interrupting and Resuming Programs

The interruption facility in BEM allows the user to switch between program execution and monitor mode as required. The simplest time to switch to monitor mode is when the program is expecting an input command from the terminal. All processors within BEM contain a command that switches the terminal back to monitor mode, but retains all information about the program currently in use.

Examples:

PROCESSOR	TERMINATION COMMAND	INTERRUPTION COMMAND
EDT	@HALT	@SYSTEM
BASIC	BYE	SYSTEM
RSP	END	BREAK

Once in monitor mode the user may execute any command as needed and then return to the program via the RESUME monitor command:

/RESUME

It is important to remember that executing a new program while in monitor mode will remove any former program.

The interruption facility may also be used while a program is processing. This may be useful if the user has issued a command that requires considerable time to process, or if a user wishes to suspend or cancel a command which was just entered. While a program is processing, it normally does not expect any input from the terminal. Should the user send input to BEM while a function is in progress, this input will be interpreted by BEM as a request for interruption. When BEM receives this unexpected input it will display the question:

INTERRUPTED:(C)ONT,(D)ISCOUNT,OR(S)YSTEM?▷

At this point the user has three options. A response of C will allow the current program to continue to process.

The response of D will discontinue the current function and return control to the user ready to accept a new command.

The last response of S will interrupt the program, and allow the user to enter monitor commands. The /RESUME command may be used when the user is ready to reenter the interrupted program. The /INTR command may be used to interrupt the current function. Its use is equivalent to specifying the DISCONTINUE option.

The recommended procedure for interrupting a program in progress is to use the MESSAGE WAITING key on the UNISCOPE terminal and the BREAK key on a hardcopy terminal; however, any input from the terminal when a program is active will cause BEM to interrupt it.

2.2.10 RUN Command

This command enables a terminal user to schedule a batch job without operator intervention. The job will not be run until all needed resources (memory, disk packs, etc.) are available. If a job name is specified, the job will be executed from the system Job Control library (YJCS). If the job name is omitted, the job control is assumed to be in the system Spool file.

Format:

/RUN [*jobname*]

Example:

```
/RUN     LISTIT
/RU
```

When a job is scheduled via BEM, the user will not be notified of its actual initiation or termination. The DISPLAY JOBS command may be used at the terminal to monitor the execution of a batch job.

2.2.11 SCREEN Command

The SCREEN command is used to inform the BEM system of certain UNISCOPE characteristics or options which the user wishes to utilize.

Format:

/SCREEN [*dimension*] [,COP / ,NOCOP] [,ROLL / ,NOROLL] [,UTS400]

where

dimension	Size of the UNISCOPE screen — height × width (e.g., 16×64, 24×80 For a hard copy device, the width is ignored, but the height will control the number of lines printed at a time.
COP	Indicates that all messages output by BEM are to be logged on the COP printer.
NOCOP	Messages are no longer to be logged.
ROLL	All messages displayed by BEM will be displayed at the bottom of the UNISCOPE and the screen will be scrolled up.
NOROLL	UNISCOPE screen will no longer be scrolled.
UTS400	Indicates to BEM that this is a UTS 400 terminal and sets the UTS control page for correct RSP operation.

The COP option should not be used unless the device is actually present and configured, or control will not be returned to the terminal. If such a problem occurs, the user should clear the terminal, and issue a SCREEN NOCOP command to restore operation.

The UTS 400 option should be entered immediately after LOGON but need not be entered again for the remainder of the session. The COP option provides the ability to obtain selected hard copy listings at the terminal. It is not intended to produce a hard copy log of all terminal transactions. Consequently, not all BEM commands will produce meaningful COP listings. To get a hard copy of an FSTATUS or DISPLAY, for instance, the user should format the screen and use the UNISCOPE PRINT button.

The ROLL option truncates all output to a single UNISCOPE line and thus should not be used when longer lines need to be displayed. Two lines are always left at the bottom of the screen, however, for data entry.

2.2.12 VTOC Command

The VTOC command may be used to display the names of the files on a disk volume. The name of each file on the disk will be shown, along with the number of cylinders allocated to the file, the file type, and extent count. If the file is a library file (file type = SAT), additional information is displayed showing the remaining free space in each partition of the file. This command may be issued to any disk allocated to the BEM system, provided the account parameters permit access to it.

Format:

/VTOC *volume-name*

Example:

/VTOC PACK22

would produce output similar to the following sample:

FILENAME	CYL.	EXTENTS	TYPE	DIRECTORY/	DATA/	B-LOAD
SAMFILE	010	01	SAM			
RANDFILE	002	01	D.A.			
LIBFILE	050	05	SAT	124/	4021/	4
VERYLONGFILENAME						
	010	02	SAT	0/	0/	0

2.2.13 Disk Space Management Commands

These commands allow the user to create and erase files dynamically under BEM. As with most other BEM commands, their use may be restricted by the system administrator for certain accounts.

2.2.13.1 ALLOCATE

This command will allocate a new disk file on a specified volume. The file may be any OS/3 file type. It it is a SAT file, it may be initialized as an OS/3 library file.

Format:

/ALLOCATE *type, file-parameters* [,INIT = {YES / NO}] [, SIZE = *n*] [,INC = *n*]

where

type — Indicates the type of file to be allocated:
- ST — SAT (possibly a library file)
- IR — IRAM
- IS — ISAM
- DA — Direct access
- SQ — Sequential
- NI — Non-indexed

file-parameters	Valid OS/3 file description of a file which does not exist on the volume. The volume stated in the parameter list specifies where the file will be placed.
INIT	YES — Causes the SAT file to be initialized as an OS/3 library file. This is the default value for a SAT file.
	NO — The file is not initialized. This is the default value for non-SAT files.
SIZE	Initial allocation SIZE in cylinders. Default value is ten cylinders.
INC	The SIZE in cylinders of any extents added when the file is extended. Default is one cylinder.

Any DA, SQ, or NI files allocated may be processed by BASIC. Any initialized SAT file may be processed as a library file by any BEM module.

2.2.13.2 SCRATCH

This command will scratch any file except system files. If the file is catalogued, its catalog entry will not be removed. The user should be careful when using this command, as once a file has been scratched, its contents are inaccessible.

Format:

/SCRATCH *file-parameters*

where

file-parameters	Description of the file to be scratched. This may not be a Y file.

2.2.14 ENTER Command

This command enters an OS/3 library file element to be executed in BEM background mode. This function is only available if it is configured by the system administrator. Tasks entered in background are executed by BEM exactly as from interactive terminals except that output is produced on the high speed printer.

Format:

/ENTER *element,file-parameters*[,*type*]

where

element	Name of the module to be entered.

file-parameters Description of the OS/3 library file which contains the element.

type Element-type for the module. An "S" denotes source, a "P" denotes proc. If this is omitted, source is assumed.

The ENTER facility allows users to submit an OS/3 library element containing commands and data just as they would be entered at the terminal. This element may contain one or more LOGON-LOGOFF sequences, and each task (LOGON-LOGOFF pair) may perform any functions which would be valid at the terminal. The first statement of an entered deck must be a LOGON command, and there should not be any cards between the LOGOFF and LOGON commands when several tasks are stacked in a single enter deck.

Decks submitted via the enter function are queued in the OS/3 spool file, along with background decks submitted through the card reader. These decks are then processed in a first-come first-served manner concurrently with interactive processing. The number of tasks available to process these decks is defined by the system administrator; more than one background task may be active at a time.

Output from entered tasks is routed to the main site printers and each task's output is identified with the user-id from the LOGON statement. Invalid LOGON statements in a deck cause BEM to begin rejecting cards until a valid LOGON is found, or the end of the deck is reached. Rejected cards are printed on a separate listing.

Each time an input is expected during a background session, BEM attempts to read the next card. This card could be either a command or a line of data. It is processed just as if it had been entered from a terminal. If an error is encountered during the processing of a command, the error message is printed and processing continues with the next card; the session is not aborted. The only condition which will cause a background session to be aborted is the exhaustion of all input. This is usually due to a missing or misinterpreted LOGOFF statement, and results in the task being logged off.

Certain conditions which normally arise at a terminal have been modified for background tasks. These are:

1. CONTINUE queries. Normally, BEM outputs one screen of lines and suspends output until the user answers the CONTINUE query. This has been eliminated for background tasks and all output is displayed in its entirety.

2. OVERWRITE queries are eliminated for background tasks. If a module to be written already exists, it is deleted and a new one written automatically.

3. OUT OF MEMORY conditions for background tasks are considered errors and a "NO" response is assumed.

4. Batch tasks are treated as hard copy terminals; thus RSP is not available.

2.2.15 COMMENT Command

This command permits the user to enter comments in the comment field associated with an OS/3 library element. The element is located, and then the 30-character comment specified in the command is applied.

Format:

/COMMENT *element,file-parameters* [,type] *comment*

where

element — Name of the OS/3 librarian format element to be commented.

file-parameters — Specifies the location of the file containing the element.

type — Specifies the element type. A P denotes proc or macro; an S or blank, source; an O, object; an L, load.

comment — 30-character string to be used as a comment. It must be separated from the file-parameters by exactly one space. Any additional spaces are considered part of the comment.

2.2.16 BULLETIN Command

This special purpose command allows the system administrator to read, display, and change (using the WRITE keyword) the LOGON bulletin. The READ and WRITE options are restricted to privileged users only, while DISPLAY can be used by any user.

Format:

/BULLETIN { READ / DISPLAY / WRITE }

where

/BULLETIN READ — Deletes the entire contents of the user's workspace and then reads the current log-on bulletin into the workspace. This command should be issued while in EDT or RSP as a SYSTEM command to avoid losing the workspace again on entry into EDT or RSP.

NOTE: This is equivalent to @DROP — all procs are lost.

/BULLETIN DISPLAY — Displays the current log-on bulletin to the terminal. This option can be invoked by any user.

/BULLETIN WRITE — Overwrites the existing log-on bulletin with the contents of the user's workspace.

If the entire new bulletin will not fit in the maximum space reserved for log-on bulletins, only as much as will fit is written and an error will be displayed. The user can find out how much was accepted via the BULLETIN DISPLAY function. It is allowable to write a new bulletin which is larger than the existing one, provided the maximum bulletin space limit is not exceeded. This command should be issued from EDT or RSP via a SYSTEM command.

2.2.17 RECOVER Command

This command allows the terminal user to recover OS/3 librarian elements which were unintentionally deleted. It is only effective for elements which have been deleted recently and have not been entirely removed from the file via a PAC librarian statement. It must be used carefully to ensure that the correct element is "undeleted" (there may be several to choose from).

Format:

/RECOVER *element,file-parameters* [, *type*]

where

element — Name of the deleted modules to be recovered.

file-parameters — Location of the file containing the elements to be recovered.

type — Element type which is to be used to rebuild directory entries for the deleted element.

Once invoked, this command will begin by listing each deleted element which could possibly have the same element type specified in the command. For example, if the user attempts to recover a source module named TEST, and the file contains both source and load deleted modules, only the source modules will be shown:

```
/RECOVER     TEST,MYFILE,MYPACK,S

1. TEST    OS/3    TEST PROGRAM    01/30/78    12:48
2. TEST    OS/3    TEST PROGRAM    01/30/78    14:02
3.*TEST    OS/3    TEST PROGRAM    01/30/78    15:25

SELECT NUMBER AND NEW NAME ▷
```

Each element with the name and type indicated will be displayed, with a sequence number for identification purposes. The comment field, date, and time of creation will also be shown. If an undeleted element currently exists, it too will be shown and flagged with an asterisk.

After displaying the list, the user will be asked to select an element (by number), and the name under which the recovered element is to be written. The name selected by the user must not be a name which already exists. As long as this rule is followed, the user may rename any of the modules listed including the active one; thus RECOVER may be used to rename modules too.

Continuing with this example, if the user wished to retain the active TEST element, but also recover deleted element 2, the response

▷2,TEST2

could be entered to recover copy 2 of TEST and rename it to TEST2. BEM will insure another module of the same name does not already exist and generate appropriate error messages.

If, on the other hand, the user did not want the active copy of TEST (#3), but wished to restore copy two, he could rename the active copy and restore copy two via:

▷3,DUMMY
▷2,TEST

and later go back and delete element DUMMY from the file.

Each time the user renames a module, BEM will list the elements with new numbers to avoid confusion. To end the RECOVER command, type STOP.

2.2.18 Command Abbreviations

All BEM commands may be abbreviated if the user desires. When abbreviating a command, the user must include enough of the command word to make it unique.

For example,

/P

is confusing — it could be either /PRINT, /PUNCH, or /PAUSE, so in this case this abbreviation should not be used. Other valid abbreviations are:

Command	Abbreviations
HELP	H,HE,HEL,HELP
TYPE	T,TY,TYP,TYPE
EXEC	E,EX,EXE,EXEC
FSTATUS	F,FS,FST,FSTA,FSTAT,FSTATU,FSTATUS

(Continued)

Command	Abbreviations
PRINT	PR,PRI,PRIN,PRINT
PUNCH	PU,PUN,PUNC,PUNCH
LOGOFF	L,LO,LOG.LOGO,LOGOF,LOGOFF
STATUS	S,ST,STA,STAT,STATU,STATUS
TERM	T,TE,TER,TERM
RESOURCE	R,RE,RES,RESO,RESOU,RESOUR,RESOURC,RESOURCE
RESUME	R,RE,RES,RESU,RESUM,RESUME
PAUSE	PA,PAU,PAUS,PAUSE
DELETE	D,DE,DEL,DELE,DELET,DELETE
DISPLAY	DI,DIS,DISP,DISPL,DISPLA,DISPLAY
JOBS	J,JO,JOB,JOBS
VOLUMES	V,VO,VOL,VOLU,VOLUM,VOLUME,VOLUMES
RUN	RU,RUN
SCREEN	SC,SCR,SCRE,SCREE,SCREEN
COP	C,CO,COP
NOCOP	NOC,NOCO,NOCOP
ROLL	R,RO,ROL,ROLL
NOROLL	NOR,NORO,NOROL,NOROLL
INTR	I,IN,INT,INTR
VTOC	V,VT,VTO,VTOC
ENTER	EN,ENT,ENTE,ENTER
ALLOCATE	A,AL,ALL,ALLO,ALLOC,ALLOCA,ALLOCAT,ALLOCATE
SCRATCH	SCRA,SCRAT,SCRATC,SCRATCH
UTS400	U,UT,UTS,U400,UT400,UTS400
COMMENT	C,CO,COM,COMM,COMME,COMMEN,COMMENT
RECOVER	REC,RECO,RECOV,RECOVE,RECOVER
BULLETIN	B,BU,BUL,BULL,BULLE,BULLET,BULLETI,BULLETIN
READ	R,RE,REA,READ
WRITE	W,WR,WRI,WRIT,WRITE

2.3 BATCH SUBMISSION

An optional feature available at some sites is the capability for entering card decks of BEM sessions for background execution. This feature permits access to the system when a terminal is not available.

To use the batch capability, the user need only keypunch the session from LOGON to LOGOFF, and submit it to BEM via the computer operator. The deck will be queued and executed on a first-come first-served basis.

Output from batch tasks is routed to the main site printers, and each task's output is identified with the user-id from the LOGON statement.

Batch decks are processed in a manner similar to the decks submitted via the ENTER facility. For additional details on how these decks are processed, and how errors are handled, see the description of the ENTER command (2.2.14).

The mechanics of submitting a deck to BEM is explained in 3.1.10.

3 OPERATOR GUIDE

This section of the manual is intended for the person who will be operating the OS/3 console while BEM is running. It contains descriptions of the commands which may be entered through the console, as well as suggested error recovery responses and procedures.

The OS/3 computer operator is responsible for several functions during a BEM session. Users at remote terminals have the ability to send messages to the operator. These messages may be questions about the system, requests for certain facilities, or information about a problem that a particular user may be having. BEM allows the operator to respond to user messages on an individual or group basis. The specific command to do this is explained in a later section.

Both hardware and software error messages may appear on the console. These errors may be a result of some hardware malfunction, or a notification by ICAM that certain communications facilities are not operating correctly. In either case, a correct response is mandatory if the system is to remain operational.

Various commands are available in BEM to allow the operator to monitor and alter the status of the system. The operator may close the system to new users, reopen it at a later time, cancel specific users as the need arises, and list active terminals and available resources on the console.

Optionally available at some sites is the capability to allow the console operator to log on to BEM via the console and use it as a terminal. If configured, this feature permits the console operator to take full advantage of the features of BEM.

3.1 CONSOLE COMMANDS

All commands entered at the console are issued via unsolicited key-ins; that is, the operator must precede the command with the correct key-in number for the job slot used. This key-in prefix is established by finding the job slot number for BEM and appending a zero. For example, if BEM were running as job 5, the prefix would be 50, and if it were running as job 1, the prefix would be 10. A complete sample key-in is shown for BEM running as job 2:

```
20 STTUS
```

Invalid key-ins result in immediate notification via the following error message:

```
V121 INVALID KEYIN
```

and the input is ignored.

It should be noted here that heavy use of the BEM console interface may degrade terminal response times.

3.1.1 Terminal Identifiers

The terminal-identifier is used so often by BEM in its commands that a statement about its construction is in order.

All terminal identifiers are four characters long. The first character specifies the type of task:

T — Interactive terminal
C — System console
B — Batch tasks
E — Enter file

The next three digits form a sequential number for noninteractive tasks.

Examples:

BO12	Batch task
EO21	Enter file
C000	OS/3 console

Otherwise, for interactive tasks, the following description holds.

The second character specifies the hardware communications line to which the terminal is attached, and the third character gives the logical terminal number on a specific line. The last character is always zero.

The terminal-id is computed by BEM at logon time and may be determined by the operator using the STATUS command explained later in this section.

Examples:

T110	line = 1, terminal = 1
T320	line = 3, terminal = 2
T310	line = 3, terminal = 1

3.1.2 STATUS Command

This key-in causes BEM to list information about each terminal currently using the BEM system. The task name, user-id, amount of disk scratch space, and amount of memory assigned to each task is displayed. After each task is listed, two final lines will be displayed, one showing the system space used, and the last showing the amount of free space left.

This command is useful when monitoring system usage, to locate a specific user's terminal, and to verify that a single terminal is not monopolizing the system resources.

Example:

Input: 20 STATUS

Output:

V120	TERM	USER	DISC	MEMORY
V120	T110	ACCT	00001	00000
V120	T220	PAYR	00002	01024
V120	T210	MAIN	00000	04096
V120	SYSTEM		00002	08192
V120	FREE		00137	16384

A prefix of 20 was used in this case to select job 2, followed by the command keyword STATUS. BEM responds with six lines of output, each line prefixed with the identifier V120. The first line identifies the columns of information which will follow. Each line describes one terminal. The first terminal has a terminal-id of T110 and a user-id of ACCT. It has acquired one unit of disk space and no memory. Two other terminals were also on the system at the time the preceding display was taken. The system has acquired 2 cylinders of space and 8192 bytes of storage for loaded programs. The final line shows 137 free cylinders and 16,384 bytes of unused memory.

3.1.3 CLOSE Command

The BEM system may be closed temporarily to new users via the CLOSE command. The function of this command is to disallow any new users, but any existing users are not affected. Should users log off while the system is closed, they will not be allowed back on. This command may prove useful if the system is to be brought down for some reason since no additional users will be allowed even if old users log off.

Format:

20 CLOSE

where

20	Is the key-in prefix, it depends upon the job slot assigned.
CLOSE	Instructs BEM to ignore any log-on requests.

If the system is to be closed temporarily, the operator may counteract the close function using the OPEN command described in the next section.

3.1.4 OPEN Command

The function of this command is to reopen the system in the event it has been closed or shut down. All restrictions imposed by the CLOSE command are removed. If this command is entered while system use has not been restricted (not closed), the command is ignored.

Format:

20 OPEN

where

20	Is the key-in prefix; it depends upon the job slot assigned.
OPEN	Instructs BEM to remove any log-on restrictions in effect.

The CLOSE and OPEN commands may be used as often as required.

3.1.5 CANCEL Command

This is a dual-purpose command. It may be used to remove a single user from the system, or all users from the system. The command format for both forms is similar, as can be seen from the following descriptions.

To remove a specific user, the selective CANCEL command is used. With this command, the operator must supply the exact terminal identifier of the user to be severed. This terminal-id may be found from a STATUS command, and then used as the operand of the CANCEL. The user task specified will be removed from the system as soon as the user's last function has been completed.

Example:

```
Input:   20 STATUS

Output:  V120        TERM      USER    DISC     MEMORY
         V120        T110      ACCT    00001    01024
         V120        T220      PAYR    00015    20480
         V120        SYSTEM              00001    08192
         V120        FREE                         00000

Input:   20 CANCEL   T220

Input:   20 STATUS

Output:  V120        TERM      USER    DISC     MEMORY
         V120        T110      ACCT    0001     01024
         V120        SYSTEM              00001    08192
         V120        FREE                         20480
```

The above operator-BEM interaction is a typical application of the CANCEL command. The first status command shows two users; however, the second user,

terminal T220, has acquired all available memory, thus making it impossible for any new users to log on. A CANCEL command is issued to remove the user, which results in 20,480 bytes of memory being returned to the storage pool.

Format:

20 CANCEL *terminal-id*

where

20	Identifies the key-in as intended for job 2.
CANCEL	Command keyword requesting BEM to remove a user.
terminal-id	Terminal name of the user to be removed.

An alternate form of the CANCEL command is also available. This form removes all active users of the system. It does not take effect immediately, but removes each user's task after any function in progress has completed. The alternate form of this command is:

20 CANCEL ALL

3.1.6 Terminating BEM

There are two commands which may be used to terminate the BEM job. The EOJ command will terminate BEM immediately, regardless of the number of users still logged on. The SHUTDOWN command will close the system to new users and terminate BEM as soon as all users are logged off. As long as there is one user logged on, the SHUTDOWN procedure can be halted by entering the OPEN command. It is recommended that SHUTDOWN be used as the normal means of terminating BEM and that EOJ only be used when users will not or cannot log off.

Format:

20 EOJ
20 SHUTDOWN

where

20	Identifies the key-in as directed toward job 2.
EOJ	Command keyword
SHUTDOWN	Command keyword

3.1.7 Console Communications

BEM provides a method for two-way communication between the operator's console and remote terminals.

Any message from a terminal to the console will be prefixed with the BEM message identifier VI12, followed by the terminal-id of the user who issued the message.

Example:

```
VI12    T110    PLEASE RUN JOB "PRINTRUN"
```

This message came from terminal T110. The operator may respond to such messages from the console by entering the response, preceded by the terminal identifier, as in:

```
20    T110    YOUR JOB IS SCHEDULED — 12:05
```

This will send a response to terminal T110. When sending messages from the console, the operator should be aware that BEM will only queue one message, so sufficient time should be allowed for the message to be received.

Console commands are not restricted to only one terminal at a time, but can broadcast messages to all terminals on a specific line or all terminals on the entire system. This is done by using a zero instead of the terminal or line identifier. If the third digit of the message prefix (the terminal-id) is set to zero, all terminals on the given line will receive the message. If the second digit of the message prefix (the line-id) is set to zero, all terminals on all lines will receive the message. These examples should help to clarify this.

Example 1:

```
20    T230    YOUR OUTPUT IS READY
```

The message "YOUR OUTPUT IS READY" will be sent to terminal T230.

Example 2:

```
20    T300    THIS LINE HAS BEEN CAUSING ERRORS
```

All terminals on line three will receive the message informing the users that the communications line may be malfunctioning.

Example 3:

```
20    T000    THE SYSTEM WILL SHUTDOWN IN 5 MIN.
```

All users currently on the system will be informed that BEM will terminate in five minutes.

NOTE: The operator may only send messages to interactive tasks, i.e., those with terminal identifiers beginning with T.

The terminal user may also send the operator a message which requires a response. These messages appear with a question mark:

```
22?VI12  T120     HOW LONG WILL THE SYSTEM BE UP?
```

The operator can reply directly to this question by typing a message as a response:

```
22 UNTIL 5:00.
```

In this case, a terminal identifier is not needed and the message is sent only to the terminal which issued the question.

The OS/3 operator should answer this type of message promptly, because the terminal user will not be able to use his terminal until the operator replies.

3.1.8 Line Setup Command

Normally, BEM can recover from most line errors automatically, and no operator intervention is required. Should the operator manually set a line down through ICAM, BEM will lose control of it and must be informed again when the operator manually sets the line up. The following command is used in this instance to restore a line to operation:

20 SETUP *n*

where

20	Is the key-in prefix.
SETUP	Informs BEM that a line is to be set up, and placed on its poll list.
n	Is the line number.

NOTE: This command may only be used in the case where a line is set down via ICAM's console interface. If it is used in any other condition it will cause a system halt.

3.1.9 Abnormal Termination of BEM

In the unlikely event there should be a need to cancel or dump BEM, perhaps due to hardware errors, a problem with the SYSGEN, or user error, the DUMP command should be used.

Format:

```
20     DUMP
```

where

20	Identifies the key-in as directed toward job 2.
DUMP	Command keyword.

This method of terminating BEM will produce a translated dump when the BEM JPROC is used. After obtaining the dump, your Sperry Univac representative should be consulted.

3.1.10 Initiation of BATCH Tasks

An optional feature of BEM allows users to submit card decks for background processing by BEM. In this environment, the operator is usually responsible for entering these decks for processing. The exact method for doing this is selected by the system administrator and falls into two categories: live reader and spooled files.

When the live reader technique is used, one card reader is hard assigned via job control and is always expecting input. The operator need only place the batch decks in the reader and depress the RUN switch. BEM will read decks and process them until the cards are exhausted, at which time the reader will revert to a STOP state and will wait for additional decks. When the operator has additional decks to process, they should be placed in the reader and the RUN switch depressed. BEM will continue processing.

To eliminate the STOP state and its associated error message, the operator may optionally place a /* card after the last deck in the reader. When this card is read BEM will stop reading cards and the batch processor will go into an idle state. The card reader will be idle, but still assigned to BEM. To restart the batch processor, the operator should place the new decks in the reader and enter the BATCH console command to BEM.

The administrator may also choose to use spooled input for batches. Note that even though a system may be generated for input spooling, the live reader technique may be used without complications. To submit spooled batches to BEM, a // DATA card must be placed before the batch and a // FIN card after the deck. DATA cards are constructed using either the LBL or the job name and LFD from the reader file and is defined by the system administrator. Inclusion of DATA and FIN cards is normally the responsibility of the operator.

To submit spooled batches, the operator places the batch in the reader and spools them in via an IN command. Once spooled, BEM may be informed that there are batches to process via the BATCH console command.

Output from batch tasks may either be directly printed on the printer or spooled. In a spooling environment, the operator should periodically call in a burst mode output writer to print batch task output; otherwise a substantial amount of printout may accumulate. BEM automatically breakpoints its output. Each task's output is separated by a page header of dollar signs, which may be used to determine where printouts should be separated.

Format:

20 BATCH *n*

where

20	Identifies job 2.
BATCH	Is the command keyword.
n	Is the batch task to be activated. This corresponds to BTCHRDRn and will be defined by the system administrator for each batch processor reader file.

3.1.11 Using the Console as a BEM Terminal

The operator can use the OS/3 console as a BEM terminal by issuing this command. Once logged on, any BEM commands may be entered when solicited by BEM. This feature does not preclude the use of other unsolicited keyins.

The operator should enter commands as quickly as possible, since leaving the console open for an extended period of time may cause system response degradation. This open period applies from the time the MESSAGE WAITING key is depressed until TRANSMIT is depressed.

Format:

20 LOGON *logon-parameters*

where

20	Identifies job slot 2.
LOGON	Is the command keyword.
logon-parameters	Are the user-id, account, and password, as described in 2.2.1.

3.2 RUNNING THE BEM JOB

The BEM system runs as a single job under OS/3. Normally, a card deck or filed job will be established for BEM and the operator need only issue the run commands.

During initialization, an ICAM must be loaded prior to loading BEM. It is most efficient if BEM occupies the highest memory partition in the system, and ICAM the lowest, as this will not lead to fragmentation of available memory. Correct loading may be insured if ICAM is loaded first, with no jobs running, and then BEM is run.

Upon initialization, BEM will verify the parameter cards used and the allotment of resources. If some element is incorrect, an error message will result and the job will terminate. Specific messages are explained in Appendix A.

During the session, error messages may also result from ICAM or hardware malfunctions. In the case of hardware errors, a retry should always be attempted. Should this fail, the unrecoverable (U) option should be used. This will allow BEM to continue and perhaps correct the situation, and inform the terminal user of its progress. The cancel option (C) should never be used.

An error from ICAM usually requires that some action be taken before a response is made. Several possible error conditions exist:

1. A terminal has timed out and has been set down by ICAM. The operator should attempt to reset the terminal, and if the condition is correctable, respond to ICAM to have the terminal set up. If the terminal cannot be restored, the operator should cancel the user task which may be assigned to the terminal.

2. A line has been set down or disconnected. In this case the operator should attempt to restore the line to operation, and inform ICAM that the line is operational by first setting the line up, and then (if the line is dialup) issuing a connect request to ICAM.

```
Output:   MC#51 03 CA 04 LNE1 TRMI SOFTWARE TIMEOUT LINE DOWN
          At this point the operator restores the line.
Output:   MC#90 LINE LNE1, MARKED UP, USER 03
Output*:  MC#03 DIAL 123 4567 ON PORT 04 (ANS #03 LN LNE1 UR 03)
Input*:   00 C1 CN L,LNE1,03
Output*:  MC#90 LINE LNE1, MARKED UPLI
```

In both instances, if the abnormal condition can be corrected, BEM will not log off the users of the downed terminal or line. If the problem cannot be corrected, the operator may wish to cancel the affected users.

All ICAM key-ins have the general form:

00 C*n cc F, name,uu*

where

00	Identifies the key-in to a symbiont.
C*n*	Supplied by the user. Your ICAM symbiont number (C1, for example) is used here.
cc	Command to ICAM (UP,DO,CN,etc.).

* Indicates these are not used on a direct connect line.

F	Facility to be modified (L-line, T-terminal, P-port).
name	Name of the facility (LNE1, for example).
uu	User's job number.

4 INSTALLATION GUIDE

4.1 INTRODUCTION

This section of the manual is intended for the person who will be responsible for installing and maintaining the BEM system. It is recommended that BEM be installed first using a minimum configuration as described in Section 4.3. After gaining experience with BEM at the terminal, the section on Features and Optimization will seem more clear.

In maintaining the system, there are several areas where the installer has freedom to change or select the operating environment. Such areas are:

- ICAM configuration
- Memory size
- Maximum number of user tasks
- Disk storage pool size
- Priority structure
- OS/3 catalog
- Log-on bulletin
- User files for program storage
- Amount of resident BEM code
- Type of RSP access to the Spool file
- Number of batch slots
- Accounting and security configurations

4.2 INTERNAL ORGANIZATION

BEM is classified as a communications user job. It runs under an ICAM in a fixed memory partition. Through ICAM, BEM is able to communicate with remote terminals. Most functions are performed by BEM itself or its application programs; however, some functions are relayed to the OS/3 Operating System for execution.

ICAM allows for four levels of support for communication programs. BEM requires the Direct Data Interface (DDI). The interface is simple to generate, and allows BEM to control all polling and queuing functions. This also results in a considerable size reduction for ICAM. ICAM's input and output buffers are resident in BEM. It is up to the installer to inform BEM of how many input buffers to establish, and how many output buffers to make available. The number of input buffers is always fixed by the number of communications lines in the network. The number of output buffers available is entirely up to the installer. It may vary from one buffer to as many as desired.

Application programs used with BEM (e.g., EDT, BASIC, and RSP) may be resident or automatically loaded as required. Applications which are resident will be loaded at initialization time and will be placed at the top of the BEM memory partition.

Nonresident programs will be loaded to satisfy EXECUTE commands issued from user terminals, and will be unloaded as soon as no terminals are using them. When nonresident programs are executed there must be sufficient free memory to contain the application programs, or an error will be displayed at the terminal.

These load options apply to transient programs (e.g., FSTATUS, DELETE, and SCREEN) as well. Since these are much smaller and require much less time to execute than the application programs, they are usually made nonresident. However, if it is expected that certain transients will receive heavy usage, they too may be configured as resident. It is recommended that the LOGOFF transient always be made resident if accounting is being used.

Whether resident or not, BEM application programs are completely reentrant to allow their use by multiple terminals. With each terminal on the system, there is associated one subtask. This task executes the command code and communicates with the main task for any terminal I/O required. The main task is responsible for polling and subtask initialization at log-on time. The tasking structure within BEM is shown in Figure 4-1.

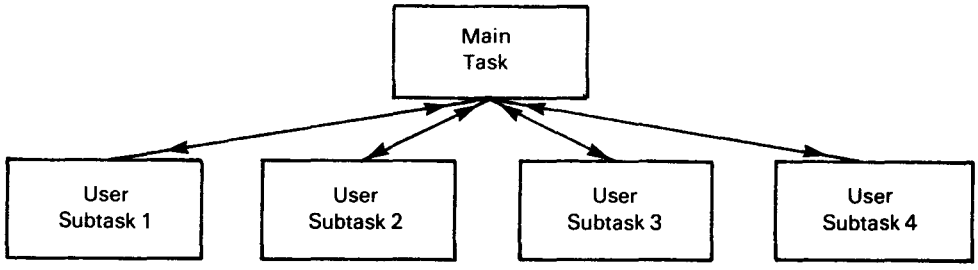


Figure 4-1 Subtask Structure — Four Users

Along with the tasking structure, there is a priority structure to maintain response time in the event of compute bound programs. An example of this is BASIC. During execution of a BASIC program, the user may have a program "bug" that results in a compute loop. BEM changes the priority of the user task such that interactive users will not be affected. Three priority levels are used. The main task runs at the highest priority within the job, interactive tasks run at a normal priority, and compute bound programs run at lowest priority. (See Figure 4-2.)

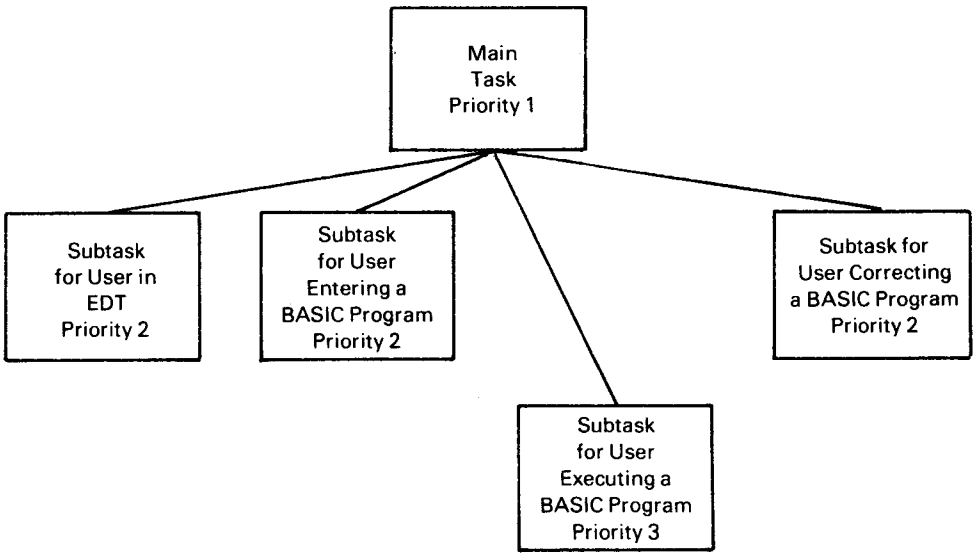


Figure 4-2 Priority Structure — Four Users

Since all application programs are reentrant, each task must have a work area in memory for data storage and buffers. These areas are acquired from a storage pool set up at initialization time. The installer prepares the BEM job deck specifying some amount of memory to be allocated to the job partition. BEM loads itself and all resident application programs, and then determines how much free memory has been left. This free memory is then formatted for use as the storage pool. Section 4.6 shows various sizes for programs, work areas, buffers, etc. One of the areas of prime concern to the installer will be memory size. This determines how many terminals will be allowed, and in the case of BASIC, how large a program may be executed. Figure 4-3 shows an example of the memory layout.

A situation similar to the memory pool exists for disk space. Most programs require disk work space in some form or other. EDT uses the space for storing the text as it is processed. BASIC stores the source and object program statements on disk until they are called in for execution. During initialization, BEM locates all disk work space, which has been assigned by the installer, and formats it for later use. As the user at the terminal proceeds with a program, that program may request space, a cylinder at a time. The terminal user is normally unaware of this process unless the disk space pool has been exhausted, in which case, an error message is displayed. The user has the option to wait for another user to log off or leave a program which returns more space to the pool. The terminal user may also elect to wait until later.

It is the responsibility of the installer to insure enough disk space so that this saturation condition is rare.

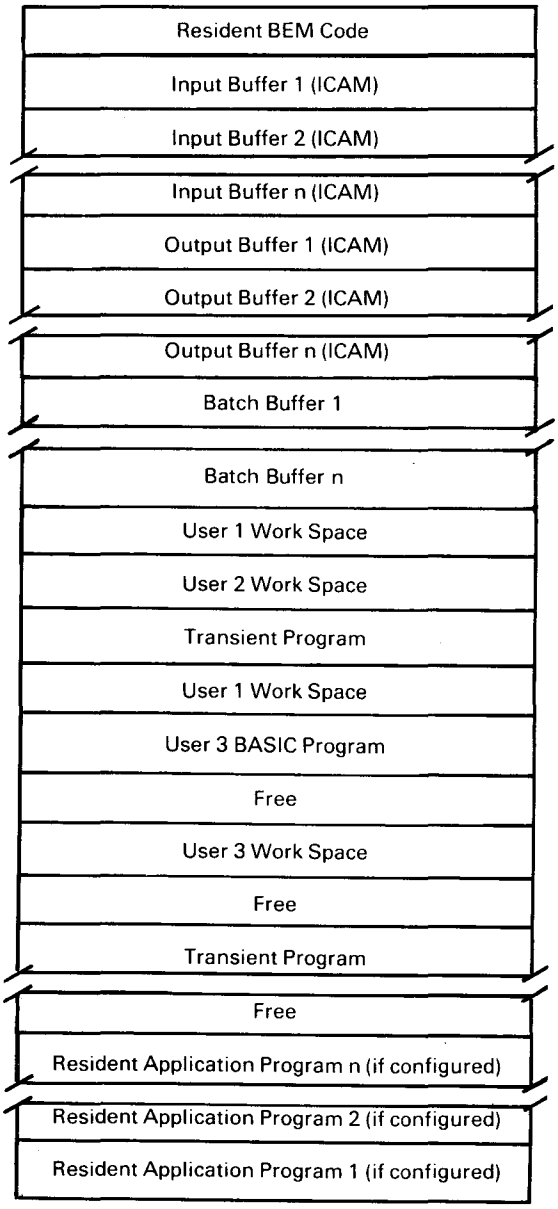


Figure 4-3 Typical Memory Layout — Four Users

Many application programs interact with library files for permanent storage of programs and text. The command used to locate a library file will always contain a specification called "File Parameters." These parameters include the element name, the library and the disk pack name, and an optional password. BEM supports the OS/3 catalog if the installer has selected this option. Under OS/3, a file may be cataloged, and the catalog entry may include a password. It may also include the name of the disk on which the file resides. With the catalog option selected, BEM verifies all file accesses through the catalog, checks to be sure a correct password has been supplied, if required, and will take the disk pack name from the catalog if it has not been explicitly specified.

As described above, BEM has the ability to locate a file, given its name and the disk pack on which it resides. Before actually going to the library, the allocation of the disk drive is checked. If the drive is available to BEM, the operation proceeds, but if the drive was not allocated at initialization time, the user is denied access to it. The installer must be aware of this situation — for a user to access a pack, the disk drive on which it resides must be allocated to BEM. This allocation is done via job control, and should allocate the drive, not a specific pack. If the disk drive itself is allocated, packs may be mounted and dismounted as needed. If, on the other hand, a pack is allocated, another disk pack may not be exchanged during the session.

In addition to supporting interactive terminals, BEM can process batch card decks in a background mode. BEM can also support the operator's console as a remote terminal if configured. Configuring batch support involves defining an input card file and an output print file. Each batch processor configured requires one reader and one printer, and their associated buffers. To configure the operator's console as a possible terminal, only the buffer space need be reserved. All of the options are processed at initialization time and any additional memory which may be required for buffers is allocated at that time and remains used for the entire BEM session.

Accounting and security definitions are specified by the system administrator as part of the BEM job control. This information sets the restrictions which will be placed on certain users' use of BEM facilities and disk files. It also defines how users will be billed for their use of the system. The accounting/security information is stated by the administrator in a simplified format. This information is then read at initialization time, compressed and encoded, and made ready for access during the BEM session.

The preceding paragraphs describe several operations which are performed during initialization. These operations are done to initialize components of the system, or to prepare information one time at initialization, to be used many times later during the run. The sequence of operations is:

1. Task initialization.
2. Determine if catalog is active and note its location.
3. Set up ICAM buffers.
4. Locate and format disk scratch space.
5. Allocate BATCH buffers, if batch is present.
6. Process accounting records and write to disk.
7. Set up free storage pool in memory.
8. Load resident programs.
9. Request ICAM network.
10. Roll message file to disk.
11. Load resident portions and open system.

4.3 MINIMUM EXECUTION JOB CONTROL STREAM

This section describes the minimum set of job control statements necessary to begin the BEM job. It is not intended that this be the permanent configuration, only that it is a means of bringing up the system quickly.

This job control stream will need to be tailored slightly to the specific site's situation, but serves as a guideline in creating the job.

Job control for BEM selects or specifies 12 parameters for various options:

1. Memory size
2. Number of tasks (maximum number of terminals)
3. Catalog selection and location
4. Disk work space location
5. Library pack locations
6. Relative priority to other jobs in the system
7. Number of input and output buffers
8. ICAM network name
9. Log-on bulletin contents (if any)
10. Output peripherals available (printer, punch)
11. No accounting or security options
12. No batch support

The minimum configuration job control stream described in this section sets the following defaults, in order to obtain a general job which will run on most systems:

```
                        (1)  (2)
//  JOB  BEM,,A000,,3
//  OPTION  JOBDUMP          (10)
//  DVC  20     //  LFD PRNTR
(3) //  DVC  RES     //  LBL $Y$CAT     //  LFD  *$Y$CAT
(4) //  WORK1
(5) //  EXEC  BEM,,1 (6)
//  PARAM  1 , 1   (7)
//  PARAM  NET1 (8)
/$
    B.E.M. TEST SYSTEM ACTIVE (9)
/*
/&
//  FIN
```

The job control to establish these parameters is:

(1) Memory size is 40K bytes
(2) Three tasks, which will support two terminals
(3) Catalog will be on the system pack (usual location) and will be read-only
(4) One standard unit of scratch space (8000 records) located on the RES device
(5) No library packs other than the system packs
(6) Higher relative priority than batch jobs
(7) One input and one output buffer (only one communications line)
(8) ICAM network named NET1
(9) Simple log-on bulletin
(10) One output printer for hardcopy listings.

The identifying numbers in this example relate back to the parameter specification list shown.

The installer will also need to generate an ICAM. The generation should have a network name of NET1 (specification 8), one communication line (specification 7), and one or more terminals. It should be noted that only two terminals will be allowed to log on at the same time, since only three tasks have been established (specification 3). The ICAM generation procedure is given in 4.4.

This example is by no means a required configuration; indeed, it may need to be modified for a user's environment. If this is the case, the individual descriptions included in 4.5 may be helpful.

4.4 ICAM GENERATION

The BEM system runs as a communications user job and requires the services provided by ICAM (Integrated Communications Access Method). Of the four user interfaces available, the DDI interface has been used, as it offers the greatest flexibility to the communications program (BEM). The generation procedure is straightforward and does not require the user to specify facilities such as queues, buffers, or disk files. An outline of the generation parameters is given in this section; the installer will need to determine his configuration and make the necessary adjustments and replacements.

BEM's use of the DDI interface does not preclude the concurrent use of the other interfaces by other jobs, such as IMS 90.

Only a small subset of the many ICAM configuration parameters will be needed at the DDI level. Each parameter is explained in this section as it applies to BEM.

4.4.1 CCA

This macro initiates the communications control area in ICAM. The four-character identifier used in the label field will become the network identifier for BEM. The specification NET1 is recommended; however, any four-character label is acceptable. This same name must be included in a PARAM card in the BEM job. Three keyword parameters required for this call are:

TYPE CCAID FEATURES

The TYPE parameter must be coded exactly as:

LABEL	OPERATION	OPERAND
NET1	CCA	TYPE=(DDI,2), . . .

The CCAID is a listing parameter left entirely up to the user. The FEATURES keyword allows the user to select general facilities. "BASIC" device handlers should not be used. The recommended specification is:

NET1	CCA	TYPE=(DDI,2),CCAID=NET1,FEATURES=(OPCOM)

4.4.2 BUFFERS

This generates both buffers and Activity Request Packets (ARP). No buffers are needed at the DDI level, but ARPs must be specified. The number of ARPs required by ICAM (modified for BEM) is:

4 + 4* (lines) + 1* (terms)

The base number of four is required by BEM. Add to this four per each communications line, plus one per each terminal. Thus, for three lines with a total of six terminals, the call line is:

```
        | BUFFERS | ,,,ARP=22
```

4.4.3 LNETBL

This parameter identifies the four-character name of the last communications line in your configuration. It is recommended (but not required) that each communication line be labeled LNE1 for the first line, LNE2 for the second line, etc. If, for example, your configuration contained three communications lines, the line-table call would look like:

```
        | LNETBL | LNE3
```

4.4.4 LINE

One LINE macro call should be included for each communications line in the system. The label field should contain the line name, as described before, and recommended keyword parameters are:

DEVICE	TERMS	TYPE	RECONECT
[CALL]	[DIALER]	[ID]	

The following keywords should not be used:

QUEUES	LBL	MPPS
PRCS	STATS	

Allowable DEVICE specifications are:

DCT500 in TTY mode
DCT1000 in interactive mode (may be mixed with UNISCOPE terminals)
UNISCOPE 100
UNISCOPE 200
UNISCOPE general class

The TERMS keyword specifies the number of terminals on this line. There will then be this number of TERM macro calls under the LINE statement.

The TYPE keyword specifies hardware information such as line speed, line type, and line protocol. Options include:

Line speed
Automatic vs. manual dialing (AUTO)
When a dial-up line is to be connected (CONNECT)
Full-or half-duplex line discipline (FULL)
Private or public line (SWCH)
Synchronous or asynchronous line (SYNC)
Attended or unattended answering (UNAT)

The RECONECT keyword should be used for dial-up lines to automatically re-establish the line adapter after a user hangs up, and eliminates the delays and inconvenience of having the console operator manually reset the line.

The CALL keyword supplies a phone number to be used by the automatic dialer for switched communications lines. This keyword is optional.

The DIALER keyword specifies the hardware port number of the automatic dialer. This keyword is optional.

The ID keyword is used with unattended answering of switched communications lines, and supplies the port number of the line. This keyword is optional.

```
LNE1    LINE    DEVICE=(UNISCOPE), TYPE=(2400, SYNC),    X
                TERMS=3,ID=4
```

4.4.5 TERMTB

This macro call must follow each LINE macro, and states the name of the last terminal for that line. Terminals may be named in a similar manner to that used for lines. The first terminal is named TRM1, the second TRM2, etc. These names must be unique within an ICAM generation.

If the configuration had two communications lines each with three terminals, the generation sequence would be:

```
        LNETBL  LNE2

LNE1    LINE    . . .
        TERMTB  TRM3
TRM1    TERM    . . .
TRM2    TERM    . . .
TRM3    TERM    . . .
LNE2    LINE    . . .
        TERMTB  TRM6
TRM4    TERM    . . .
TRM5    TERM    . . .
TRM6    TERM    . . .
```

4.4.6 TERM

One TERM macro call should be included for each remote terminal on the system. The TERM specifications for a terminal on a given line are placed immediately following the TERMTB call for that line. The label field should contain the four-character terminal name as explained under TERMTB. Allowable keywords to be used with this call are:

FEATURES ADDR PINTV AUX

Allowable FEATURES for a terminal are DCT500 compatible terminals, DCT1000, and all formats of UNISCOPE terminals.

The ADDR specification must be included for any pollable terminal.

UNISCOPE terminals also require the specification of a poll interval. A value of 10 is suggested.

If a DCT1000 is used on a multiplexer with UNISCOPE terminals, it should have a different RID than the terminals so that it will be in a separate poll group.

For best performance all UNISCOPE terminals on a line should be in the same poll group (i.e., have the same RID).

If a COP printer is to be used for hard copy listings, it must be generated as AUX1 and should be strapped to space on DC3 characters (hex 13).

4.4.7 ENDCCA

This macro signals the end of the Control Area (CCA). It must be coded exactly as shown:

ENDCCA	

4.4.8 MCP Area

The final step in configuring an ICAM is to complete the MCP area. This consists of three special (non-macro) calls. The first is:

MCP	MCPNAME=C*n*	

The user selects a symbiont number C1 to C9 and assigns it via the preceding card. This will be the number entered at the console to invoke ICAM. If ICAM is to be placed somewhere other than the system disk, the call

	MCPVOL=*pack-id*	

is used. Finally, each Communications Adapter Channel (CACH) must be assigned a network and line:

	CACH=*(port,network,line)*	

One card per CACH is used

where

port	Is the hardware port number 4 through 20.
network	Is the name of the network controlling this line. This will be NET1 if the example has been followed.
line	Is the sequential line number within the stated network. The first line is 1, second 2, etc.

Surrounding these generation cards are placed the SG$PARAM identifiers:

```
COMMCT
        Generation parameters go here.
END
```

A complete ICAM generation example is shown in Figure 4-4. For complete details on ICAM, the user is referred to the current version of the *ICAM User Guide* UP-8194.

```
COMMCT
NET1    CCA       TYPE=(DDI,2),FEATURES=(OPCOM),                X
                  CCAID=NET1
        BUFFERS   ,,,ARP=10
        LNETBL    LNE1
LNE1    LINE      DEVICE=(U100),                                X
                  TYPE=(2400,POLL,,,,SYNC),                     X
                  TERMS=2,ID=4
        TERMTB    TRM2
TRM1    TERM      ADDR=(23,56),FEATURES=(U100,1024),            X
                  PINTV=1
TRM2    TERM      ADDR=(23,57),FEATURES=(U100,1024),            X
                  PINTV=1,AUX1=(COP,74)
        ENDCCA
        MCP       MCPNAME=C9
                  MCPVOL=OS3RES
                  CACH=(04,NET1,01)
END
//FIN
```

Figure 4-4 Sample ICAM Generation for One-line, Two-line Terminals

4.5 FEATURES AND OPTIMIZATION

This section deals in detail with each of the major functional areas within BEM in detail. Means of optimizing the system and improving the efficiency of a given configuration are also covered. Section 4.2 described the major sections within BEM; this section will attempt to explain the means of specification for those areas, and the expected results.

4.5.1 Disk Files

Two types of disk files are of concern to the BEM system: scratch files and library files. Most processors within BEM require some amount of scratch space. This space is provided by temporary work file cards such as:

```
//    WORK1
```

Normally, OS/3 places these files either on the resident device (RES) or the run library device (RUN). In a multiprocessing environment, these disks usually have great activity, and thus will provide slow response time and only a few accesses per second. This slow access time will degrade response time greatly. It is therefore suggested that work space be placed on a disk which otherwise would have few accesses by other jobs. It is also recommended that the space be spread over several such disks, if possible. This spread factor will decrease the number of times the disk boom must be moved. Co-channeling will also speed response by allowing the access of two disks simultaneously. It should be noted that if all scratch space is placed on one disk, any benefits of co-channeling may be lost.

The amount of scratch space is also a factor. BEM uses disk space in blocks containing 512 bytes each. During initialization, this space is formatted, if necessary, for nonsectored disks. All disk space used by BEM processors is acquired a cylinder at a time. The table below shows the capacity of a cylinder of space on various disk drives:

Disk Type	Approximate Number of Records per Cylinder
8415R	240
8411	300
8415F	360
8416/18	840
8414	1200
8430	1824

In addition to user scratch space, BEM requires one cylinder of space for its own use. All cylinder total computations should be increased by one for this reason.

The installer should determine the amount of disk space required, and the number of disk volumes across which scratch space may be spread, and proceed as follows:

1. All disk work space is allocated using //WORK*n* cards. Up to ten of these may be used beginning with //WORK 1, //WORK2, etc., up to //WORK 10, if needed.

2. A work area may be placed on a specific disk using the VOL=volume operand: `// WORK1 VOL=PACK05.`

3. A specific amount of space may be requested on a given disk using the BLK=number operand: `// WORK1 BLK=1600`

4. If only one disk is to be used to contain the scratch space, only the //WORK1 card should be used.

5. If space is to be spread over several volumes, the installer should begin by allocating a two-cylinder extent on each volume, then determining how much additional space will be needed, and spreading this space evenly across all of the disks with additional //WORK*n* cards.

6. Only full cylinders are used. Partial allocations of tracks are ignored.

As an example of this procedure, if three disks were available:

PACK01	8414
PACK02	8416
PACK03	8416

and a total of 20 cylinders of space were required, the allocation could be:

```
//  WORK1 VOL=PACK01 , BLK=1600
//  WORK2 VOL=PACK02 , BLK=1120
//  WORK3 VOL=PACK03 , BLK=1120
//  WORK4 VOL=PACK01 , BLK=4000
//  WORK5 VOL=PACK02 , BLK=2800
//  WORK6 VOL=PACK03 , BLK=2240
```

Space will be proportioned as follows:

PACK01	2 cylinders + 5 cylinders
PACK02	2 cylinders + 5 cylinders
PACK03	2 cylinders + 4 cylinders

4.5.2 Library Files

OS/3 SAT library files may also be accessed by BEM for permanent storage. All SAT files are accessed on an element basis. The terminal user always supplies the element name with the command. The user may also be required to supply the filename, password, and disk-volume name. The procedure followed by BEM is:

1. Verify the command format.

2. Use the accounting information (if present for the user) to fill in the filename if it has been omitted.

3. If the installer has selected the use of the file catalog, check to see if the file has a password, and if the user has given the correct password. If illegal, notify the user.

4. If the installer has selected the use of the file catalog, check to see if the user has specified the disk-volume name. If not, use the volume name stated in the catalog.

5. Verify that this access is permitted for the user's account. Possible violations are:

   - User may not access any files.
   - User may not access any files on the system pack.
   - User may not access any file other than his default file.
   - User may not write to any files.
   - User may not write to any files on the system pack.

6. Verify that the element, file name, and disk volume are all present.

7. Test to see if the file is in use. If so, cause the user's task to wait, or else proceed.

All library files must have been initialized by the librarian prior to attempting to use BEM with them. Initialization consists of opening the file and adding at least one element with the librarian. This element may even be a dummy element from cards.

Should an error occur while writing a library element, the directory and VTOC will not be updated, and the file will be left in the same condition it had been in before the command.

4.5.3 OS/3 File Catalog

The previous section of this manual described the function of the file catalog. This section will explain how to implement its use and how to catalog files.

Using the catalog is a two-step process. First, the file desired must be entered into the catalog using a simple job control stream. The OS/3 system will then note such information as the file name, disk-volume name, disk type, and the passwords, if stated.

After a file has been cataloged, BEM can use the catalog to obtain additional information about that file, and obtain parameters for "File-parameters," which the terminal user has left blank.

The process of placing file information in the catalog is done with a simple job stream; BEM will not catalog files for you:

```
// JOB CATALOG
// DVC 60      // VOL your-pack
// LBL your library [ ( readpass/writepass )]
// LFD your lfd
// CAT your lfd
/&
// FIN
```

The user must supply the disk-volume name (*your-pack*) the disk-file name (*your library*), an optional password set enclosed in parenthesis (*readpass* and *writepass*) and some lfd (*your lfd*).

The installer must choose whether or not to use the catalog within BEM. If it is used, the procedure outlined in Section 4.5.2 will be followed, and all passwords will be verified. If the catalog option is not selected, no passwords will be validated, and the terminal user will be required to supply all necessary file information; no information will be looked up in the catalog. To select the catalog option, the following Job Control card is placed in the job stream:

```
// DVC RES // LBL $Y$CAT // LFD *$Y$CAT
```

The identifier RES states that the catalog resides on the system disk. An asterisk has been used to designate the catalog as "read-only" by BEM. It is suggested that the asterisk be used to avoid conflicts with other jobs. If the card is deleted, the catalog will not be searched. For more details, consult *OS/3 Job Control, User Reference* UP-8065.

4.5.4 Log-on Bulletin

At the option of the installer, a log-on bulletin may be displayed at the user's terminal when it is logged onto the system. This bulletin is a message built by the installer, and is fixed as long as BEM is running. Each time any user logs on, this message will be displayed on the terminal. The content of this bulletin is entirely up to the installer, it may contain system status information, restrictions, operation hours, etc.

The text of the bulletin is punched on cards. Columns 1 to 48 may be used in each card, and up to 50 cards may be used. These cards are placed in the BEM job stream as data cards. They should be surrounded by a /$ and a /* card, and placed after the PARAM cards in the deck. An example of a bulletin deck is shown below:

```
// JOB BEM
      .
      .
      .
// PARAM . . .

/$

* * * * * * * * * * * * * * * * *
*  BEM WILL BE UP FROM 8:00 to 12:00 TODAY      *
*  AND AGAIN FROM 1:00 to 5:00 THIS AFTERNOON   *
* * * * * * * * * * * * * * * * *

/*
/&
// FIN
```

The log-on bulletin is optional and need not be included in the BEM job deck.

4.5.5 Subtask Assignment

The BEM system uses tasking to obtain user independence. Each terminal user is assigned a task when it is logged onto the system; it is this task that services all requests for that particular user. In addition to these user tasks, the system requires one task to communicate with ICAM. Thus, the installer must provide one task for the system, plus one additional task each, for the console or as many terminals or batch runs as may be on the system at one time. This is how the installer may limit the number of terminals which may be on the system concurrently. There may be many more terminals generated into the system than there are free tasks assigned. Should all free tasks be in use (all tasks which were specified are active), then any additional users attempting to log on will be notified, and asked to wait.

As an example, assume a system has 10 terminals but only five are to be allowed on the system at one time. In this case, you would need one task plus one additional task for each of the five terminals, or a total of six. This parameter is placed on the JOB card as the fifth positional parameter:

```
// JOB BEM,,,,6
```

If two batch processors have been configured, then the example should be increased from six to eight. It must be remembered that idle tasks are not dedicated to a particular type of session, so if seven terminals logged on to the system, all eight tasks would be in use (the system task is the eighth task). In this example, no batch processors could be initiated due to lack of tasks, and any batch decks would remain queued until an idle task becomes available.

4.5.6 Priority Assignments

The OS/3 priority feature may be used to assign a higher or lower relative priority to BEM when run in a multiprogramming environment. During OS/3 system generation, the number of priority slots are established. To allow BEM to function efficiently, this number must be at least three, and preferably greater than three.

Each priority slot in the supervisor has a number; the lower the number, the higher that task's priority. If two tasks attempt to use the processor, the task with a higher priority will gain control first, then the lower priority task will get control.

The installer must assign BEM a priority number in the job stream. BEM uses this number as a basis for internal priority assignments. The ICAM task runs at the job-assigned priority, normal user subtasks run at one less than the job priority, and the compute-bound BASIC program runs at a priority two less than that of the job.

For BEM to adjust its internal priorities correctly, it must have available at least two priority slots below its own. Thus if the OS/3 Supervisor contained six priority slots, then BEM may be run at priority 1, 2, 3, or 4, but not 5 or 6. Notice that the installer would also be able to take advantage of the flexibility of using slots 1 through 4 to adjust the priority of BEM as a whole, relative to other jobs in the system.

The priority assignment is placed as the third positional parameter on the EXEC card:

```
// EXEC BEM,,3
```

4.5.7 Parameter Cards

4.5.7.1 ICAM PARAMETER CARDS

Two PARAM cards are required in the BEM job stream to match BEM to the ICAM configuration. Both cards must be coded exactly as shown.

The first card is used to specify the number of communications lines, the number of output buffers, and the timeout limit for idle, logged-on terminals. The number of communications lines is determined directly from the ICAM generation by counting the "LINE" macro calls within the network. This number is placed as the first number on the card.

The number of output buffers is determined by the installer. It may be a minimum of one, and the maximum number of usable buffers is equal to the number of tasks you have assigned. Any additional buffers will only take up space, as they will never be used. The installer should select a quantity of buffers between one and this maximum, and place this number as the second parameter on the card. You may wish to vary this parameter over several runs, and attempt to determine how this affects response time. A normal starting point for this parameter is one buffer per line or less.

The third parameter specifies the maximum time allowed for a response, before the user is logged off. This value is specified in seconds. The maximum and default value is 32,767 seconds (which is over 9 hours). If the time elapses without an input, a warning message is displayed. If the user does not respond to the warning within 30 seconds, he is logged off.

Format:

```
//    PARAM lines,buffer[,timeout]
```

Examples:

```
//    PARAM 3,3
//    PARAM 2,3,3600
```

The first example indicates a configuration with 3 communications lines and 3 output buffers. No input timeout is specified so a 32,767 second timeout is assumed, which for most purposes is the same as no timeout at all. The second example shows two lines and three buffers. A timeout of 3600 seconds (1 hour) has been selected. This limit applies only to input responses by the terminal user; it does not limit the amount of time a terminal can be left active while performing some processing task.

The second parameter card must contain the network name, as it was entered in the label field of the CCA macro call and an optional parameter to allow the use of the console as a terminal.

```
//    PARAM network[, CONS]
```

Examples:

```
//    PARAM NET1
//    PARAM BEMN, CONS
```

The first example shows a network name of NET1, and will not allow the console to log on as a user terminal. The second example shows a network of BEMN, and will allow the console operator to use BEM. In the second example, the administrator should consider allocating an additional task to service the console, if it will receive heavy usage.

These two types of ICAM parameter cards, in order, are placed immediately following the EXEC card for BEM.

4.5.7.2 LOAD PARAMETER CARD

This optional parameter card indicates to BEM which modules are to be resident and which are to be loaded only as needed. It is recommended that modules which are expected to get heavy use are made resident, and those that are lightly used are made transient.

The standard option (STD) will make the application programs (EDT, RSP, and BASIC) resident and the other functions transient.

The MAX option will make all functions resident.

If the LOAD param card is omitted, all functions will be transients. Note that all modules are reentrant and only a single copy will be loaded, regardless of the number of concurrent users.

The options available are:

EDT — EDITOR will be resident.
RSP — RSP will be resident.
BAS — BASIC will be resident.
STD — The three preceding applications will be resident.
$FS — FSTATUS command
$PR — PRINT command
$PU — PUNCH command
$RU — RUN command
$DE — DELETE and COMMENT commands
$DI — DISPLAY command
$SC — SCREEN command
$VT — VTOC command

$AL — ALLOCATE and SCRATCH commands
$EN — ENTER function
$LG — Logoff function (should always be resident if accounting is used)
$LO — Logon function
$ST — STATUS command
$BU — BULLETIN command
$RE — RECOVER command
MAX — All programs are to be resident.

Examples:

```
//    PARAM LOAD=(MAX)
//    PARAM LOAD=(STD,$FS,$LG)
```

Parentheses are required, even if a single option is specified.

These options give the installer great flexibility in configuring a system In a system where memory size is critical no param card is used (nothing is resident), thus components such as EDT and RSP may overlay each other when the other one is not in use. In systems where more memory is available, all functions may be made resident to reduce loading time.

Load time may also be reduced by employing the block loader. All BEM modules, except the main module (load name BEM), may be made block load modules by use of the librarian. The main modules are only loaded once during initialization and thus nothing would be gained by block loading it. The structure of the main module prohibits the use of the block loader, and it must not be used.

The logoff module is responsible for writing out BEM usage statistics for each terminal when it logs off. If accounting information is being used for billing purposes, the LOGOFF ($LG) module should be made resident to ensure that memory is available to write the accounting information. When a user logs off, if there is insufficient memory to load the logoff module (since it was not made resident), accounting information will not be written out, but the user will still be logged off.

4.5.7.3 RSP PARAMETER CARD

This optional parameter card indicates the type of access which is to be provided by RSP to the Spool file subfiles. This card is not meaningful unless RSP is included in the configuration. Subfile access is also restricted by system generation options. For example, the JCS and remote batch subfiles cannot be accessed unless remote spooling is included in the system configuration.

The RSP param card can be used to prohibit read access and write access. If omitted, access is permitted to all configured subfiles. The NR option specifies no read access; NW, no write.

The queues which may be specified are:

LOG — Log
PRI — Print subfile
PUN — Punch subfile
RDR — Input reader subfile
JCS — Job control subfile
RPR — Remote batch print subfile
RPU — Remote batch punch subfile
ALL — All subfiles

Examples:

1. // PARAM NR=(LOG,RDR),NW=(PRI,RPR,RPU,LOG)

2. // PARAM NR=(LOG,RDR,PUN,RPU,RPR,JCS)
   // PARAM NW=(ALL)

4.5.8 Transient Functions

Several functions of BEM are transient in nature. They do not reside in the OS/3 transient file, but are called in from the BEM load library as needed and loaded as if they were a new "phase" of BEM. The memory requirement of these functions is usually very small, so BEM acquires space for them as needed from the memory pool.

When the function completes, the memory is released back to the pool. The entire process is executed by BEM without the terminal user knowing it, when one of these functions is involved.

Two sections of memory are required to invoke a transient. The first section is for the reentrant code which comprises the transient itself. There will never be more than one copy of the code for a transient in memory at any given time. The second section of memory required to execute a transient is for local storage for buffer areas, etc. There will be one such section for each user of the transient.

The functions which are normally nonresident, the phase names associated with them, and the memory segment requirements are shown in Table 4-1.

The transient code sizes given are rounded to 256-byte multiples. When transients are made resident at initialization time, these sizes are smaller because it is only necessary to round to a double word boundary. It is thus advantageous to make resident those modules which will get very heavy usage at a site.

The installer should be aware of these modules when determining the memory pool size, and should make an additional amount of storage available.

Table 4-1 Nonresident Functions

Monitor Function	Phase Invoked	Code Size	Local Storage (1/user)
/ALLOCATE	BEM$AL	1536	1024
/BULLETIN	BEM$BU	768	512
/COMMENT	BEM$DE	768	256
/DELETE	BEM$DE	768	256
/DISPLAY	BEM$DI	768	256
/ENTER	BEM$EN	768	768
/FSTATUS	BEM$FS	768	256
/LOGOFF	BEM$LG	512	0
/LOGON	BEM$LO	768	0
/PRINT	BEM$PR	1024	512
/PUNCH	BEM$PU	768	512
/RECOVER	BEM$RE	1280	512
/RUN	BEM$RU	256	256
/SCRATCH	BEM$AL	1536	1024
/SCREEN	BEM$SC	512	256
/STATUS	BEM$ST	768	0
/VTOC	BEM$VT	1280	512

4.5.9 Library Disk Assignments

The installer may wish to make one or more disk drives available for use as library drives of users of the BEM system. As explained in a previous section, disk drives and not disk packs should be assigned to BEM. This allows the operator to change disk packs while BEM is running. Furthermore, BEM will not allow terminal users to access libraries on disks which are not allocated to BEM.

Any disk packs which have been used for work space are automatically allocated to BEM, and may be used for libraries. These packs may not be dismounted. It is suggested that, if possible, library files not be placed on the work packs, as this may generate considerable boom movement.

One means of allocating a pack to BEM is by placing a card similar to the one shown in the job control stream for each library drive:

```
// DVC 50 * // VOL PACK02(NOV) // LFD A
```

The Library File Descripter (LFD) in this case is "A". Any name, however, may be used; it is not referenced.

If a particular library is to be excluded from use by the general terminal user, the installer should consider the use of a password.

If NOV is specified, the volume will be nonsharable, and thus not accessible to batch jobs while BEM is running.

4.5.9.1 OPEN FILE TABLE ENTRIES

BEM accesses files using SAT by building FCBs in memory for any files accessed. Each time a file is opened, an "Open File Table Entry" in the preamble is used and released when the file is closed. Normally, an average user's job control will provide sufficient table entries for BEM. If an entry cannot be obtained, BEM will inform the user

WAITING FOR OPEN FILE TABLE ENTRY

and wait until another file access completes. The user can choose not to wait by interrupting BEM (message-waiting).

If this condition occurs frequently, as could happen when BASIC programs access several files at once, the installer can add extra table entries by including "dummy" file definitions such as:

```
//  DVC 50  //  VOL PACK02  //  LFD DUMMY1
//  DVC 50  //  VOL PACK02  //  LFD DUMMY2
```

Each LFD will reserve an additional open file table entry. The names themselves do not matter, as they are not referenced.

4.5.9.2 LIBRARY FILE LFD ENTRIES

In any file parameter used throughout BEM, an LFD may be substituted for the label and volume names. If this feature is to be used, a complete DVC, VOL, LBL, LFD sequence must be included in BEM. Files for which no LFD is included in the JCL may still be referenced by specifying label and volume names. If any file on a pack is defined in this manner, it is not necessary to allocate the pack as described previously in the paragraph entitled "Library Disk Assignments."

This feature allows frequently referenced files to be referenced by an abbreviated name (the LFD), rather than the full label and volume. In particular, the default LFDs for systems files may be referenced (YJCS, YLOD, YMAC, YSRC).

4.5.10 Configuring BATCH and ENTER Usage

An optional feature of BEM permits terminal users and users at the main site to submit batch decks for processing in a background mode.

Batch decks submitted by terminal users are stored by the user in OS/3 Library files. When the terminal user indicates to BEM that a batch deck is to be submitted for processing, BEM copies the deck to the Spool file as an input deck and invokes a batch processor.

Batch decks submitted at the main site can be either input spooled by the operator, or a hard-assigned reader can be dedicated to BEM, overriding spooling entirely.

The system administrator must decide how many batch processors to configure, and which, if any, will be hard assigned. A batch processor is configured by including a reader and a printer device assignment for each processor. The LFDs for these are BTCHRDRn and BTCHPRTn, and must be paired. Up to nine of the pairs may be included. Each reader and printer must have a unique device number, and the assignments for the printers must not be the same as that used for the /PRINT function (LFD PRNTR).

Both spooled and nonspooled devices may be configured in any combination. However, input spooling must be system generated and at least one spooled reader file must be defined if ENTER is to be available, since it uses the Spool file to hold and queue batch decks. Notice that printers, as well as readers may be hard assigned to override spooling. The sample job control which follows configures two batch processors; the first uses a hard-assigned reader and printer, and the second makes full use of spooling for the ENTER function. A spooled printer has also been made available for the /PRINT function.

```
//  DVC  30,001  //  LFD  BTCHRDR1
//  DVC  22,002  //  LFD  BTCHPRT1
//  DVC  31      //  LFD  BTCHRDR2
//  DVC  21      //  LFD  BTCHPRT2
//  DVC  20      //  LFD  PRNTR
```

As described earlier in this manual (4.5.5), each user session requires one task. This applies both to interactive, terminal-oriented sessions and to batch sessions. When several batch processors are configured, the system administrator should consider increasing the task limit for the BEM job.

4.5.11 BEM Security and Accounting

The use of LOGON ids serves two functions: access to the system is restricted to specific users who can have limited functions, and statistics are generated showing BEM usage for different users.

4.5.11.1 SECURITY

The system administrator specifies the use of security features in BEM by defining a series of account definition cards to the BEM job control. These records are verified and encoded by BEM and stored in an internally maintained accounting file, which lasts for the duration of the job.

Each time a user logs on, BEM uses the user-id, account number (if specified), and password (if specified) to search the accounting file for a matching accounting record. For a match to occur, the account number and password must match exactly. If the administrator has defined a record with both an account and a password, then the user must enter both of these correctly to match that record. If a record has been defined with only a password and no account number, then the user must leave the account field blank on his LOGON, but must still enter the correct password. The same holds true for an omitted password. The user-id is

treated in a slightly different manner. If an accounting record contains a user-id (in addition to the account-password combination), then the user must LOGON with that user-id to match the record. However, if no user-id is specified for a particular record, then any user-id will match as long as the account and password match. If a particular logon combination matches more than one record, then the last matching record is used for the user. When a matching accounting record is found, the information contained in it will pertain to the user's entire BEM session. An example may clarify this. Suppose the accounting records in Table 4-2 have been defined; they will be numbered for reference purposes.

Table 4-2 Sample Accounting File

Record Number	User-id	Account Number	Password	Privileges
1	AL	0745	HIGH	—
2		1257	LOW	—
3	BEN	1257	LOW	—
4	BEN	1257	PSWD	—
5	AL	1335		—
6	ED	XTRA		—
7	DAVE		10△△	—

Using the several LOGON statements with this file, the results would be as follows:

/LOGON BEN,1257,PSWD — The only matching record for this user would be record 4. Any additional information on this record would apply for the duration of the session.

/LOGON BEN,1257,LOW — This logon matches records 2 or 3 and as previously stated the last matching record is used, record 3.

/LOGON BILL,1257,LOW — This logon only matches record 2 since record 3 only applies to user-id BEN. Record 2 allows any user-id to be used with 1257,LOW but the administrator has chosen to include a special record (3) for user-id BEN to give BEN different privileges from all other users of 1257,LOW.

/LOGON AL,0745,LOW — This logon is not permitted, as it does not match any existing records.

/LOGON AL,745,HIGH — This logon is not permitted, and points out that all three fields are treated as character strings, not numbers; 745 does not match 0745. If 0745 would have been entered, record 1 would have been selected.

/LOGON ED,XTRA	This logon matches record 6, and illustrates no password protection. If a password were entered in the LOGON command it would have been rejected.
/LOGON DAVE,,10	This logon matches record 7, and illustrates an omitted account number. It also shows that fields shorter than 4 characters should be left justified in the accounting record.
/LOGON DAVE,,1075	This logon will not be accepted.
/LOGON ,ABCD,EFGH	A logon without a user-id will never be accepted, regardless of the contents of the accounting file.

From this discussion, it should be clear that a completely blank accounting record will allow any user to log on with just a user-id. This can be put to use in certain instances to give some users certain privileges, while allowing all other users very limited access to the system.

Associated with each accounting record is a default file name, which enables the user to specify only an element name when accessing the default file. The use of the default file is not mandatory, but simplifies BEM usage for an inexperienced user who does not need to be aware of the OS/3 file structure. However, the user is not necessarily restricted to the default file and may override it by specifying a filename explicitly.

In addition to the default file, there are a number of other options concerning library files. The user may be restricted to access only his default file; he may be prohibited from writing any file; and his access to files on the RES pack may be restricted or prohibited.

The functions available with an account can be further restricted by specification of those BEM modules which may be used. For example, one group of users can be restricted to using only BASIC, PRINT, and FSTATUS commands while another group can be allowed to use any module except RUN, while still another group can be permitted to make full use of the system.

4.5.11.2 ACCOUNTING

All accounting information for a user is written to the OS/3 accounting file when the user logs off. BEM accounting information is written to the OS/3 log file along with system accounting information. It may be accessed by the OS/3 DUMPLOG and JOBLOG programs and is also printed with the BEM log file when BEM terminates.

When a user logs off, three accounting records are written as shown in Figure 4-5.

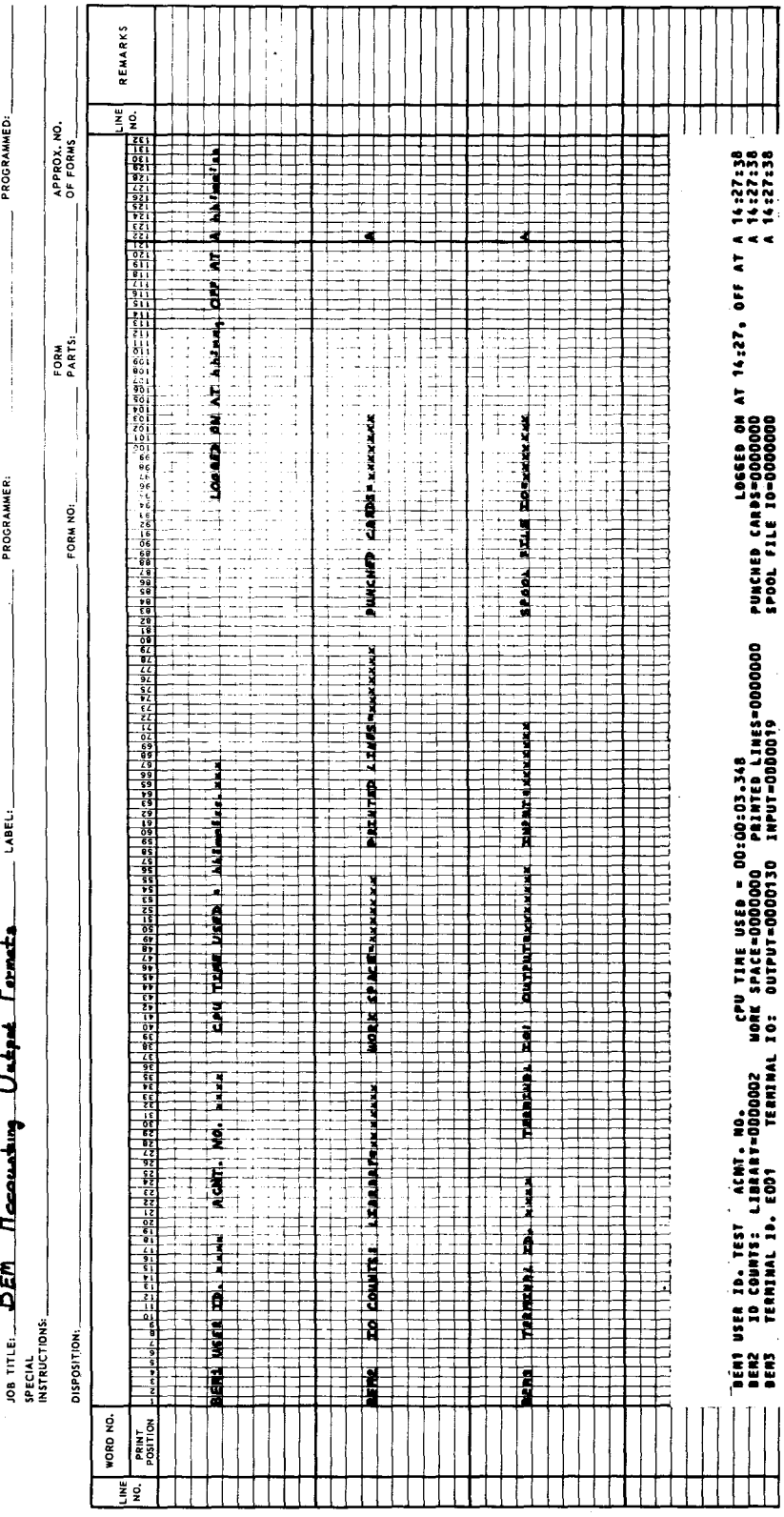


Figure 4-5 Accounting Records

The fields contain the following information:

USER-ID	The 4-character user id specified at LOGON time.
ACNT. NO.	The 4-character account number specified at LOGON time.
CPU-TIME USED	Total CPU time, in seconds, accumulated by this task. It does not include time spent by the BEM main task on behalf of this job. The time used is broken down into hours, minutes, seconds, and milliseconds.
LOGGED ON AT	Wall clock time in hours and minutes.
LOGGED OFF AT	Wall clock time in hours, minutes, and seconds when the logoff occurred.
LIBRARY	Total number of I/O operations (EXCPs) issued while accessing the OS/3 Library file.
WORK SPACE	Total number of I/O operations (EXCPs) issued while accessing the BEM disk work space.
PRINTED LINES	Total number of lines printed with the /PRINT command.
PUNCHED CARDS	Total number of cards punched by the /PUNCH command.
TERMINAL ID	The 4-character identifier showing the terminal used, batch task sequence number, or enter task sequence number.
TERMINAL IO	Total number of input and output messages issued to ICAM on behalf of this terminal. For background tasks, this represents the number of cards read, and the number of lines printed.
SPOOL FILE IO	Total number of I/O operations (EXCPs) issued to the Spool file by RSP.

These three records will always be written consecutively when a user logs off. However, the LOGOFF processor is a transient and it is possible that it could not be loaded by BEM. If it cannot be loaded, no accounting information is written for the user and there is no indication to the user or to the administrator that an error

occurred. This situation can be avoided by making the LOGOFF module (BEM$LG) resident. If, however, it is desirable to suppress accounting information, the logoff module can be removed from the BEM load library. The only effect that this will have is to eliminate the BEM accounting records from the accounting-log file. Also, a specific account number can specify that LOGOFF is not to be loaded by specifying INHIBIT = (. . . , $LG , . . .). The effect of this will be to suppress accounting information for this account-id only.

4.5.11.3 CONFIGURING THE ACCOUNTING FILE

Accounting information is specified as the second data set in the BEM job. If no bulletin is being used the /$-/* pair for the first data set must still be present. Information on the accounting cards specify user-ids, account numbers, and passwords needed to log on. For each id a number of restrictions are possible. These are described later. For each id there may be 1 or 2 cards. If no accounting is desired, the entire second data set can be omitted, in which case any user is allowed to log on and will be permitted to use any function of BEM.

Each accounting record is defined by one or two cards in the data set. The first card defines the user-id/account number/password combination for which this record will apply, the types of file accesses permitted, the name of the default file if used, and states whether a second card is needed to complete this record. Card two, if selected, defines which programs and functions of BEM will be permitted. This can be specified in either of two ways: a list of functions to be permitted, or a list of functions to be disallowed.

Card 1 has the following format:

Columns	Contents
1-4	User-id; if blank any user-id is permitted at logon time.
5-8	Account number; if blank, an account number may not be specified at logon time.
9-12	Password; if omitted may not be specified at logon time.
13	Privileged flag: Y indicates this is to be a privileged user. Provided for future use. A blank indicates nonprivileged.
14	Default file flag: Y indicates that the user may only reference the default file. A default file should be specified. A blank indicates any file may be accessed.
15	Read-only flag: Y indicates that the user may only read files; no writes are permitted. A blank indicates writes are permitted.
16	System file flag: R states user may only read system files. N states user has no access to system files. System files are any files on the RES pack. A blank allows the user to access the system pack.
17	Inhibit flag: If nonblank, a second accounting card must be included to specify those programs which may be used.

(Continued)

Columns	Contents
20-80	Default file parameters. Format is *filename (rdpass/wrpass),volume.* If included, user need only specify element name to reference the default file.

NOTE: The default file flag and read-only flag override the system file flag. For example, read-only=Y and system=R is redundant; read-only=Y is sufficient.

The second card begins with one of two keywords:

ALLOW = (list)	Allow only these modules to be used.
INHIBIT = (list)	Do not allow these modules to be used.

where

(list)	Consists of 3-character identifiers separated by commas as given in the LOAD card (4.5.7.2). Either ALLOW or INHIBIT may be used to specify restrictions.

Examples:

```
ALLOW = (BAS,$FS,$ST,$LG)
INHIBIT = ($RU,$AL)
```

If no accounting information is included, any user-id is permitted and full access to the system is allowed for all users.

4.5.12 Spooling Buffers

Spooling buffers are allocated automatically by the system; however, when RSP is used extensively, additional buffers may be desired. These buffers are allocated in the preamble to the BEM job. The specification of number and size of these buffers is the ninth positional parameter on the job card. This parameter has the form NXM where N is the number of buffers and M is the size in multiples of 256 bytes; thus the default of 2×2 allocates two buffers of 512 bytes each. It is recommended that additional buffers be allocated when multiple users will be accessing the spool file at the same time and that larger buffers be used when large print files are being accessed. Buffers may also be dedicated to a specific printer or punch. Doing so will aid RSP indirectly by reducing contention for the shared buffers.

Example:

```
//    JOB    BEM,,10000,,5,,,,4×4
```

NOTE: The memory allocated for these buffers is not included in the partition size specified on the job card. However, the memory allocated is dedicated to the BEM job.

4.5.13 Memory Assignment

Many references throughout this manual have been made to the memory storage pool. This section deals with its construction. When configuring BEM, the installer must make a determination of how much memory will be made available. It is this determination that will limit the number of users (if the task limit is not a factor), the size of BASIC programs in execution, the number of programs in execution, the number of "transient" monitor functions which may be utilized, etc.

Section 4.6 gives specific memory sizes for all components of the BEM system, including user areas. The installer should consult that guide when determining a partition size. He should also be prepared to decrease or enlarge this size once the system has been in operation and a realistic size determination can be made.

In systems containing only EDT or RSP it will be very easy to fix on a memory partition. The installer need only determine how many users to allow on the system at once, and fill in the guide. Very little tuning will be necessary.

Systems containing BASIC will prove somewhat more difficult to configure. Storage for BASIC programs is not required until the program is called into execution. At this time the object code, constants, and variables are mapped into memory. This memory is acquired from the storage pool, and released at program termination. Student BASIC programs will not generally require a large amount of storage, and the recommended sizes in the Memory Configurator Guide will be fairly accurate. Production BASIC programs may be somewhat large, and may tend to run for a longer period of time. In this case, the installer may need to allow additional space.

The installer should also be aware of the "transient" functions. These load into free areas in the storage pool and are released within a relatively short period of time. Thus some storage, but not a great deal should be allowed, and the installer should expect to have only one or two (if that many) such transients in memory at any time.

If the storage pool becomes exhausted, the appropriate user will be notified, and will normally be asked to retry the input after waiting a few moments. By waiting, another user may release some storage, which may be acquired by the first user. Should a condition arise where the storage pool is exhausted frequently, a larger job partition should be considered.

4.5.14 Job Control Stream

The previous sections have described elements of the job stream necessary to select certain features. This section explains the job stream in its entirety. The elements of the deck are shown in Table 4-3:

Table 4-3 Job Stream Deck Elements

Element	Features Affected
1 JOB card	Memory size Task limit Spooling buffers

(*Continued*)

Figure 4-3 Job Stream Deck Elements (*Contd*)

	Element	Features Affected
2	Device card for the PRNTR	Hardcopy listings
3	Device card for the PUNCH	Punched card output
4	Device card for the catalog	Catalog search
5	WORK cards	Disk storage pool assignments
6	Device cards for library disks	Permanent library storage
7	EXEC card	Priority assignment
8	PARAM cards	Number of communications lines
		Number of output buffers
		Maximum response time
		Network identifier
		Console usage
		Resident BEM modules
		RSP accessible spool subfiles
9	Embedded data set 1	Log-on bulletin
10	Embedded data set 2	Accounting information
11	Device cards for reader and printer	Batch/enter availability

A sample job control for a fully configured system is shown. The numbers at the left reference the elements in Table 4-3.

```
1    // JOB BEM,, 10000, ,5
     // OPTION JOBDUMP
2    // DVC 20      //  LFD PRNTR
3    // DVC 40      //  LFD PUNCH
4    // DVC RES     //  LBL $Y$CAT     //  LFD *$Y$CAT
5    // WORK1 VOL=PACK01, BLK=4000
5    // WORK2 VOL=PACK02, BLK=4000
6    // DVC 51      //  VOL PACK03     //  LFD A
6    // DVC 52      //  VOL PACK04     //  LFD B
6    // DVC 53      //  VOL PACK05     //  LFD C
     // DVC 21      //  LFD BTCHPRT1
     // DVC 30      //  LFD BTCHRDR1
     // DVC 53      //  VOL PACK05
     // LBL LOADLIB     //  LFD LOAD
7    // EXEC BEM,,LOAD, 2
8    // PARAM 5, 4, 3600
8    // PARAM NET1, CONS
8    // PARAM LOAD=(STD)
8    // PARAM NW=(LOG),NR=(LOG,RDR)
9    /$
9         SAMPLE BULLETIN FOR A FULLY
9         CONFIGURED BEM SYSTEM
9    /*
10   /$
10        ACCT     DEFLTFILE, PACK22
10 ADMI  SYST   Y
10   /*
     /&
     // FIN
```

The two JCL cards for the printer (PRNTR) and punch (PUNCH) are required by the /PRINT and /PUNCH functions. Since these cards assign devices for the duration of the BEM session, it is suggested that spooling be considered; however, it is in no way required. If either of these cards are omitted, the /PRINT or /PUNCH function will be disabled.

4.6 MEMORY CONFIGURATOR GUIDE

The various modules that go into making up the BEM system are presented here. Memory sizes are given to aid the installer in obtaining the most efficient use of memory for a given configuration.

- Required Sizes

  BEM, the monitor and common software — 16K bytes

  EDT, the editor, if configured — 7K _____

  RSP, the spool processor, if configured — 6K _____

  BASIC, the language system, if configured — 36K _____

- Communications Buffers

  Line buffer, for input. One buffer per line is required, each buffer is 184 bytes. _____

  Output buffer. Each buffer is 196 bytes, at least one is required. _____

- Batch Table Entries

  One for console, if specified, and one for each batch task allowed. Each entry is 116 bytes. _____

- Transient Functions

  These functions and their memory sizes are shown in Table 4-1. Normally only a few are ever in memory at any given time (unless they are resident), so enough storage to load several should be allocated. _____

- User Work Areas

  General packet. One per active user. Each requires 512 bytes of memory. _____

  I/O buffers. One per active user of EDT, BASIC, or RSP. Each requires 1K of memory. _____

- Program Work Areas*

  EDT work area. One per active user of EDT. Each requires 512 bytes of memory. _____

  EDT global variable area. One 512-byte area per active EDT user who is using EDT variables. _____

* These areas overlay each other; if a user of EDT switches to BASIC, the same 512-byte area is used.

BASIC work area. One per active user of BASIC. Each requires 1280 bytes of memory. _____

RSP work area. One per active user of RSP. Each requires 768 bytes of memory. _____

- BASIC Program Area

  Object code. Size varies with program. Student programs require roughly 2-4K each. Standard software packages may be larger. One area per program in execution. _____

  Total _____

These sizes are exclusive of the OS/3 Operating System, ICAM and the job preamble. The following example shows a sample configuration:

Example:

BEM:EDT, four users, two lines, one batch processor, all transient functions.

BEM		14,336 bytes
EDT		6144
Input line buffers	2×184	368
Output buffers	2×196	392
Batch processor	116	116
BEM transients	2048	2048
General packet	4×512	2048
I/O buffers	4×1024	4096
EDT work area	4×512	2048
BASIC work area	NOT USED	
Object code area	NOT USED	
	TOTAL	31,596 bytes

4.7 RUN COMMAND — REMOTE JOB INITIATION

One of the features of BEM allows terminal users to request that batch jobs be scheduled. Since this function allows terminal users to place jobs on the same queue that is being used for batch jobs run from the main site, the function may not be desirable at some sites. To eliminate the /RUN command, the BEM administrator need only delete the BEM$RU load module from the BEM load library.

At a site which uses the /RUN command heavily, consideration should be given to how the YJCS file and the JCS queue of the Spool file should be used. RUN will allow jobs to be scheduled from either file, but if only the YJCS file is used, it will soon become overloaded with extra "single use" job control. The solution to a problem like this is the JCS queue of the Spool file. Permanent and commonly used jobs may be kept in the YJCS file, while special single use jobs may be placed in the JCS queue and run as needed.

Jobs can be created and placed in the YJCS file via EDT or RSP, and jobs can be placed in the JCS queue of the Spool file by RSP.

4.8 SPOOLING GENERATION AND RSP

Sites which include RSP as one of the BEM subsystems in their configuration should be aware of the impact that spooling generation has on the RSP user. The level of spooling support is specified at system generation time and allows the installer to generate either 3, 4, or all 7 spool queues (subfiles). The following table summarizes the relevant spooling generation parameters and how they affect RSP.

Spooling Option	Spool Subfiles Accessible Under RSP
SPOOLING = OUTPUT	PRINT, PUNCH, LOG
SPOOLING = INPUT	PRINT, PUNCH, LOG, READER
SPOOLING = REMOTE	PRINT, PUNCH, LOG, READER, JCS, RBPPR, RBPPU

Thus, if users are to put job control into the JCS subfile for use with the /RUN command, SPOOLING = REMOTE should be specified.

4.9 SAMPLE JPROC

If your installation requires using BEM with several different disks at various times, the following Job Control Procedure may prove to be time-saving. The calling procedure is:

```
// JOB      BEM, ,xxxx, ,y

// BEM      [disklist]   [, WORK1= {RES / vol}] [, WORK2= {RUN / vol}]

         [, LOAD= {(BEMLOAD,BEMPAK) / (lbl,vol)}] [, NAME= {BEM / name}]

         [,ICAM= {(NET1, 1) / (network,lines)}]

// FIN
```

where

disklist — List of disks to be used with BEM.

Example: // BEM PACK01,PACK02

WORK1 — Specification for the location of the first work file. This defaults to the RES device.

Example: // BEM WORK1=PACK03

WORK2 — Specification for the location of the second work file. This defaults to the RUN device.

Example: // BEM WORK2=PACK04

LOAD — Location where BEM is to be loaded from. Normally, this defaults to a file named BEMLOAD on a disk named BEMPAK.

Example: // BEM LOAD=(LOADLIB,DISK01)

NAME — Load module name to be loaded. This defaults to BEM.

Example: // BEM NAME=BEMEDT

ICAM — Name of the network, and the number of communication lines. It defaults to NET1 with one line.

Example: // BEM ICAM=(BEMN,3)

It is recommended that this JPROC be modified by the user so that the default file names are appropriate for the installation.

APPENDIX A CONSOLE ERROR MESSAGES

A.1 INITIALIZATION MESSAGES

VI01 ICAM PARAM CARD IS MISSING/INVALID

One of the two PARAM cards specifying either the network name or buffer quantity is missing. The first PARAM card must contain the buffer specification and the second card, the network name. See the section of this manual concerning the job stream for additional information.

VI02 ERROR IN REQUESTING OR OPENING A LINE

The ICAM to be used with BEM was not valid. Either no ICAM was loaded prior to initializing BEM, or ICAM was not generated correctly. Consult the section of this manual dealing with ICAM generation, and the current ICAM User Reference manual.

VI03 MESSAGE INDEX COULD NOT BE LOADED TO DISC

During initialization, BEM writes the complete message index to disk. This error message indicates that it could not be done successfully. Possible causes could be the lack of any disk scratch space assignments in the job, or a hardware error during initialization. Check the job stream and rerun. ICAM will need to be reloaded.

VI04 ERROR IN PRE-FORMATTING DISC SCRATCH SPACE

In attempting to format the scratch space on disk, an I/O error was encountered. Retry the job, or investigate for possible hardware malfunction.

VI05 NETWORKxxxxCOULD NOT BE LOADED

The network listed in the message could not be loaded due to an ICAM error. Be sure that an ICAM has been loaded, and that the network PARAM card contains the same identifier as was used to generate ICAM.

VI06 PROGRAM CHECK HAS OCCURRED WITHIN INIT

The most common cause of this error is that insufficient memory was allocated on the BEM job card. Another cause is that an ICAM was not present when BEM attempted to request the communications network. An ICAM generation with errors could also cause this message. If the ICAM is correct, this message indicates a software problem within BEM. Submit all relevant data (dumps, ICAM-gen, job control, configuration) to your local Sperry Univac representative.

VI07 BEM SYSTEM READY (VER x.x)

This indicates a successful completion to BEM initialization. The system is ready for use.

VI08 EXTENDED INSTRUCTION SET NOT PRESENT

BEM requires the extended instruction set feature of the 90/30 (2K COS). Verify that the correct COS is loaded and rerun.

VI11 RSP OR LOAD PARAM CARD INVALID

BEM has detected an error in the RSP or LOAD param card due to an invalid option or a format error. See Section 4.5.7.2 or 4.5.7.3 for the correct formats for these cards.

VI13 ERROR IN ACCOUNT RECORD xxxxxxxxxxxx, LOAD CONTINUES

The format of an accounting card is in error. The first 12 characters of the card in error are displayed in the message. This error is normally caused by an invalid default file format, an illegal INHIBIT or ALLOW card, or an extra INHIBIT or ALLOW card.

VI14 NO DISK SPACE ALLOCATED TO BEM (// WORK)

The //WORK cards which allocate work space for BEM are not present in the job stream, or do not allocate sufficient space for BEM to create a disk work space pool. Add //WORK cards.

VI15 INSUFFICIENT MEMORY FOR RESIDENT PROGRAMS

The memory partition size stated on the JOB card does not allow enough memory to load the programs stated on the LOAD parameter card. Either increase the amount of memory on the JOB card, or decrease the number of resident programs.

VI16 BAD PUB — BTCHPRT/BTCHRDR IGNORED

One of the batch processor printers has been assigned to the same printer as was used for the /PRINT function (LFD PRNTR). This would lead to unpredictable results, so the batch processor for the illegal printer is ignored. This error will also occur if the BTCHRDR LFD is omitted when the corresponding BTCHPRT LFD was included.

A.2 RUN TIME MESSAGES

VI10 OUTPUT BAD L=x, T=y

An output error has occurred when sending data to a terminal. The message is discarded and operation continues. If the error persists, cancel the affected user and investigate the hardware problem. The line (x) and terminal (y) are displayed in the message text.

VI12 Tnnn *text*

This is a message sent for the terminal identified by Tnnn. It does not represent any error conditions within the system. If a reply is required, the reply text will be displayed at the user's terminal.

VI20 *status text*

This is one of several lines of system status information displayed as a response to a STATUS request.

VI21 INVALID KEYIN

The last key-in to BEM was not accepted. Correct the format and resubmit the request.

VI22 LOGON/BATCH INVALID OR UNAVAIL

The console operator has entered a BATCH or LOGON command with an incorrect format, or the system does not have BATCH or LOGON configured.

APPENDIX B SYSTEM ERROR MESSAGES

Error messages appropriate for an interactive environment are short and self-explanatory. For additional information about an error message, the user is directed to the HELP command. The messages are categorized on a functional basis and are listed in the following table. Possible causes of each error and suggested procedures to follow in response to the error are also included. The designation to the right of the message identifies the BEM component which identified the error.

A SUBSTATEMENT OCCURRED BEFORE AN END *BASIC*

Subprograms must occur after the main program. This means that they must be placed immediately after the END statement, or after another subprogram's SUBEND statement.

ACCESS TO PROGRAM NOT PERMITTED FOR USER ID *BEM*

The account currently in use does not permit its users to execute the selected function or program. Use another account, or contact the system administrator to change the account's restriction.

ACCESS TO QUEUE TYPE NOT PERMITTED *RSP*

Access to the queue type (PRINT, PUNCH, READER, LOG, JCS, RBPPU, RBPPR) is not permitted for one of two reasons. The OS/3 Supervisor has not been generated to include the appropriate level of support for the queue, or the BEM job control includes parameters to restrict access to that queue. Consult the system administrator to have the access type changed.

ACCESS TO SYSRES FILES NOT PERMITTED *LIBRARY*

The account currently in use does not permit its users to access files on the OS/3 system pack. Use another account or contact the system administrator to change the account's restriction.

ACTIVE SUBROUTINES EXCEED 16 LEVELS *BASIC*

A maximum of 16 levels of subprogram calls may be issued. Investigate for a possible program loop, or a recursive subprogram call.

ALLOCATE FORMAT ERROR *BEM*

The ALLOCATE command has been entered incorrectly. The format of this command is:

/ALLOCATE *type,file,vol,*[SIZE=*n*][,INC=*n*] [,INIT={YES / NO}]

ARGUMENT TOO LARGE FOR EXP(X) FUNCTION *BASIC*

A value has been used with the exponential function which will produce a result greater than the largest number that the 90/30 is capable of handling. The maximum permissible value for the EXP argument is approximately 174.6.

ARRAY SUBSCRIPT OUT OF RANGE *BASIC*

An array subscript, which is out of the range specified by the dimension statement has been detected. The subscript is either less than zero, or greater than the upper limit in the dimension statement. If no dimension statement has been used, the upper limit is 10.

ATTEMPTED TO RESET FILE BEYOND EOF OR NEGATIVE *BASIC*

The RESET statement may not reposition the file past the end of the file pointer. The record number specified must be positive.

ATTEMPT TO TEST END OR MORE ON RANDOM FILE *BASIC*

The IF-END or IF-MORE formats may only be used against TERMINAL format files. Check the file type referenced by this statement.

BAD FORMAT — TRY AGAIN *RSP*

The user has transmitted something other than the preformatted parameter table. This may also be the result of using RSP with a UNISCOPE without the protected fields hardware option.

BASIC EDITING COMMAND UNRECOGNIZABLE *BASIC*

Either an invalid command has been entered, or a BASIC statement has been entered without a valid line number. Valid commands are:

OLD	NEW	SAVE
RUN	PRINT	HELP
BYE	DELETE	LIST
SYSTEM	RUNOLD	

BASIC FILE NOT OPEN OR NO DATA STATEMENTS *BASIC*

The channel number referenced by the flagged statement has not been opened by a FILE statement. Check the channel-setter for a valid file, or issue a FILE statement for the channel to be used. This error can also result when READ statements are issued and no DATA statements are present.

BASIC SOURCE LINES OUT OF ORDER *BASIC*

The lines of source in a BASIC program read in by a RUNOLD or CHAIN statement are not in order by line number. This is mandatory. Do an OLD against the program and then SAVE it.

BEM POINTERS DO NOT AGREE WITH WORKSPACE *WORKSPACE*

The workspace access routines have detected a problem with the in-core and disk pointers. This could have been caused by a previous I/O error, or a modification of the disk by an external source. If the error persists, the user may be forced to halt the current program and reexecute it.

BULLETIN LOCKED — RETRY LATER *BEM*

The bulletin cannot be updated because another user is currently accessing it. Wait until the other user finishes and retry the command. The system administrator should discourage the updating of the bulletin by multiple users.

CHAIN ERROR — INVALID NAME OR PASSING BAD FILE *BASIC*

There are two possible causes for this error. The Library element specified in the CHAIN statement does not exist, or one of the channel numbers of files to be passed to the next program segment is invalid.

CHANGE ERROR *BASIC*

The CHANGE operation specified by the flagged statement is not valid. Possible causes of this error are an invalid vector or vector size, invalid BIT expression, or invalid string result, or invalid value encountered during conversion.

CHANNEL NUMBER INVALID IN FILE STATEMENT *BASIC*

The channel-setter used in the FILE statement results in a channel number which is not in the range 1 to 4095. Channel zero cannot be defined by a FILE statement.

COMMAND CANNOT BE USED AT THIS TIME *BEM*

A PRINT, PUNCH, DELETE, or FSTATUS command was issued while an active program had been interrupted. The active program was accessing a file at the time of interruption. Allow the interrupted command to complete (RESUME) and then retry the command.

COMMAND KEYWORD OMITTED *EDT*

An operand has been entered for which there is no command function. For example, the file parameters have been used without the specification READ or WRITE.

COMMAND TERMINATED *EDT*

The EDT command which was active when the user issued a /INTR or DISCONTINUE command has been terminated. Informational message only.

CONTINUE? (Y OR N) *ALL*

BEM has displayed a full screen or page and has additional output for the terminal. When ready, the user may respond with a Y to see additional displays, or an N to terminate the display and the command. A response other than Y or N will result in the CONTINUE message being displayed again.

COPY WITH NUMBER OPTION INVALID *EDT*

The COPY command may not be used with the NUMBER command.

DEF MUST PRECEDE REFERENCE IF LOCALS ARE USED *BASIC*

When local variables are used in a multiline user function, the definition must occur at a lower numbered line than the first reference to that function. Move the function definition and rerun.

DESEQ OPTION ONLY ALLOWED WITH READ *EDT*

The DESEQUENCE option is only meaningful when used with the EDT READ command; in all other cases its use is treated as an error.

DEVICE UNAVAILABLE AT THIS TIME *BEM*

The printer or punch is not configured and may not be used. Contact the system administrator to have the printer or punch configured.

DIMENSIONS INCONSISTENT IN SUB CALL *BASIC*

The type of variables used in the SUB and CALL lines differ. Either a scalar variable was used where an array was expected, or the number of subscripts on the SUB and CALL lines differ.

DISPLAY COMMAND PARAMETER ERROR *BEM*

The DISPLAY command has been entered incorrectly. Valid options are:

/DISPLAY {JOBS / VOLUMES}

DIVISION BY ZERO, EXECUTION CONTINUES *BASIC*

The program has attempted a division by zero. The algebraic result of division by zero is undefined; however, execution continues using a high value.

EDT VARIABLE AREA NOT AVAILABLE *EDT*

There is currently insufficient storage available to use EDT variables.

ELEMENT/GROUP NOT FOUND *BEM*

The element or group specified in the DELETE command could not be found. Check the spelling of the name and check the names in the file via FSTATUS.

ELEMENT IS NOT IN THE LIBRARY FILE *LIBRARY*

The program requested by the command is not in the file specified. Check the spelling of the program name and verify that the program is on the file. Also, be sure the correct module type has been used (P for PROCs).

ELEMENT NUMBER DOES NOT EXIST, RE-ENTER ⊳ *BEM*

The user did not select one of the numbers listed by the RECOVER command. Only those elements identified with a number in the left margin may be recovered. Reenter the correct number and the new module name.

END OF FILE ON INPUT OR LINPUT *BASIC*

The program has issued an INPUT or LINPUT statement which attempted to read more records than were in the file. Investigate the program logic to determine why too many records are being read.

END STATEMENT IS MISSING OR MISPLACED *BASIC*

All BASIC programs must have an END statement as the last line. Insert an END statement and rerun.

ENTER ELEMENT NUMBER, NEWNAME OR "STOP"⊳ *BEM*

The RECOVER command has presented a list of elements which could be recovered. Select one by specifying its number, and a new name for it. Other possible responses at this point are STOP to terminate the command, or HELP to obtain additional information.

ENTER FILE NAME *BASIC*

The user has entered a SAVE, OLD, or RUNOLD statement without specifying a file name. Supply the name in response to this message.

ENTER FUNCTION NOT CONFIGURED *BEM*

The system administrator has not elected to make the ENTER command available at your site. Contact the administrator to have the function installed. This error may also be the result of not having OS/3 Spooling configured, or not having any spooled Input Readers.

ERROR IN READING CARDS/ENTER STREAM, USER CANCELLED *BEM*

A fatal I/O error has occurred while reading cards from a batch stream or enter file. The batch is discarded and the user is cancelled.

ERROR IN READING SCRATCH SPACE *WORKSPACE*

An I/O error has occurred while reading from the work area. Retry input or investigate for possible hardware problem.

ERROR IN READING SCRATCH SPACE INDEX *WORKSPACE*

An I/O error has occurred while reading the work area index. Retry input or investigate for possible hardware problem.

ERROR IN SOURCE — RESEQUENCE TERMINATED *BASIC*

One or more of the source statements read in by an OLD command with errors have not been corrected. Only valid programs in the workspace may be resequenced. This error indicates that there is at least one statement which is not syntactically correct.

ERROR ON READ FROM FILE (INVALID NUMBER) *BASIC*

A READ statement attempted to read a numeric variable. The record which was read did not contain numeric data.

ERROR PROCESSING USER FILE LABELS *FILES*

The file being accessed contains user file labels. These cannot be processed by BEM.

ERROR WHILE WRITING INTO SCRATCH SPACE *WORKSPACE*

An I/O error has occurred while writing to the work area. Retry input or investigate for possible hardware problem.

EXPONENT OVERFLOW, EXECUTION CONTINUES *BASIC*

The result (or intermediate result) of a computation has exceeded the largest number the 90/30 is capable of handling. This number is approximately 10^{75}. Machine infinity is supplied and execution continued.

EXPONENT UNDERFLOW, EXECUTION CONTINUES *BASIC*

The result (or intermediate result) of a computation is less than the smallest number the 90/30 is capable of handling. The number is approximately 10^{-78}. Zero is supplied and execution continued.

EXPONENTIATION ERROR *BASIC*

Invalid operands were used with the A**B or A↑B function. This error can occur if "A" is negative and "B" is not an integer between 1 and 15 or − 1 and − 15.

EXPRESSION OUT OF COMPUTED GOTO RANGE *BASIC*

The calculated expression is not a valid number for this computed GOTO. It is either too large or nonpositive. The count of line numbers in the statement determines the largest value the expression may have.

FILE ACCESS HAS BEEN TERMINATED BY USER *LIBRARY*

This indicates that a file access has been terminated when the user did not wish to wait on a FILE IS IN USE message.

FILE ALREADY EXISTS ON VOLUME *BEM*

The user is attempting to allocate a file which already exists on the specified volume.

FILE DOES NOT HAVE VALID "ENDLIB" *LIBRARY*

While searching the directory of the file, BEM could not find the ENDLIB marker. The file's integrity is in question. A possible solution would be to copy all elements to another file, then scratch and rebuild the original file.

FILE IS EMPTY — ENDLIB MISSING *LIBRARY*

The user has attempted to access an empty library file. Initialize the file with the Librarian in order to use it with BEM.

FILE IS IN USE, PLEASE WAIT *LIBRARY/FILES*

Another user is accessing the file. After his command completes, yours will begin. If you don't wish to wait, interrupt the system.

FILE IS NOT AN OS/3 LIBRARY FILE *LIBRARY*

The file specified by the command is not a library file, or has not been initialized by the librarian. Have the system administrator prepare the file, and be sure you are using the correct file.

FILE PARAMETERS DO NOT FOLLOW "FSTATUS" *BEM*

The FSTATUS command requires file parameters in the format:

filename (password), volume

FILE PARAMETER FORMAT ERROR *LIBRARY/FILES*

The file parameters given for a file-access function are not valid. The maximum length for each parameter is: name, 8; filename, 44; password, 6; volume, 6. If a module type has been supplied, it must be S, P, or M.

FILE REQUESTED IS NOT ON DISC VOLUME *LIBRARY/FILES*

The filename requested is not on the volume specified. Check the spelling of the filename or verify that the file is on the volume.

FILE STATEMENT INVALID FOR # 0 *BASIC*

The channel-setter specified with the FILE statement results in a value of zero. Channel zero, the terminal, cannot be defined by a FILE statement.

"FNEND" FOUND WITHOUT FUNCTION DEFINITION *BASIC*

The FNEND statement was detected, but it was not at the end of a function. Remove the statement or place it in the correct location and rerun.

"FNEND" STATEMENT MISSING *BASIC*

A user-defined multiline function exists in the program without a closing FNEND statement. Locate the function and insert the FNEND statement.

FUNCTION ASSIGN DOES NOT MATCH FUNCTION NAME *BASIC*

The name of the function being assigned differs from the name of the function in which it appears. Only the function being defined may be assigned a value.

FUNCTION ASSIGNMENT MUST APPEAR WITHIN FUNCTION *BASIC*

A value must be assigned to a multiline function before the FNEND statement. The function value may not be assigned outside the body of the function.

FUNCTION DEF MUST PRECEDE USE IN "CALL" *BASIC*

In order for a user function to be passed to a subprogram, it must be defined. Move the definition into lower-numbered lines before the CALL.

FUNCTION DEFINITION WITHIN A FUNCTION *BASIC*

BASIC has detected a function within the body of another function definition. Check for a missing FNEND statement or restructure the function.

FUNCTION EXPECTED IN CALL OR SUB LINE *BASIC*

A previous CALL statement passed a function reference. This CALL did not pass a function. The parameter types must be the same. Resolve the conflict and rerun the program.

FUNCTION HAS NOT BEEN DEFINED *BASIC*

The function referenced on the line in error has not been defined. Define the function or remove the reference to it and rerun.

GIVEN LINE EXCEEDS 80 CHARACTERS WHEN RESEQUENCED *BASIC*

The line shown, when resequenced, is larger than 80 characters. This is an informational message, in that the complete resequenced line is written out, and can be modified by EDT, but if the program is later read in by BASIC, it will be flagged with an error for being over 80 characters in length.

GOTO INTO OR OUT OF FUNCTION DEFINITION *BASIC*

A function may not reference program lines which do not occur within the body of the function, nor may statements outside the function reference lines within the function body. This applies to GOTO, GOSUB, ON, and IF statements.

ICAM ERROR (INPUT TOO LONG) RETRY *BEM*

The last message sent from the terminal to BEM did not arrive correctly; retransmit it. Any input to BEM is limited to 128 characters in length. If this error is displayed while transmitting the RSP Spool file descriptor screen, it indicates the UNISCOPE being used does not have the required protected format feature.

ILLEGAL COMBINATION — "NOT" INVALID *EDT*

If the NOT option is specified, then a search-string must also be specified and a change-string must not be specified.

ILLEGAL COMBINATION OF COMMANDS *EDT*

Several command keywords have been entered which conflict. See Table 3-1 in UA-0141 for allowable combinations.

ILLEGAL "VAL" ARGUMENT *BASIC*

The string passed to the VAL function did not contain a valid number. The contents of the string must be either an integer or a decimal number in scientific notation. No extra characters may be prefixed or suffixed to the number.

INCORRECT NESTING OF FOR-NEXT STATEMENTS *BASIC*

A FOR or NEXT statement, which was not nested correctly, was detected. Possible causes are:

1. A FOR statement that has the same index as a previous FOR statement in the nest.

2. A NEXT statement that does not have the same index as the FOR statement immediately preceding it.

3. A NEXT statement that does not follow any open FOR statement.

INCONSISTENT FORMAT IN "USING" STRING *BASIC*

The format field type does not match the type of variable being printed. Either a string was printed into a field beginning with $, + or −, or a number was printed into a field beginning with < or >.

INPUT DATA INCORRECT, RE-ENTER *BASIC*

The data entered for an input statement does not match the variable types required by the program. The entire line must be reentered. This error message could also be caused by too much or too little data in the input response.

INSERT ERROR (DUPLICATE OR INVALID CHANGE STRING) *EDT*

Either the keyword INSERT is preceded by a string, or it is not followed by one. The change string may also be invalid. See Section 3.1.2.4 or 3.1.1.6 of UA-0141.

INSUFFICIENT DATA TO READ *BASIC*

All DATA statements in the program have been used, yet the program attempted to request additional data.

INSUFFICIENT INFORMATION TO CREATE SPOOL FILE *RSP*

The minimum information required to create a Spool file was not specified on the spool descriptor screen. An input file requires either an LBL, or both a JOB NAME and an LFD.

INSUFFICIENT RESOURCES TO LOGON *BEM*

There is not enough memory or user tasks to allow another user to log on to the system. The user should wait until another user has released storage or logged off.

INTERNAL ERROR IN LIBRARY ACCESS ROUTINE *LIBRARY*

The library access routine within BEM has detected a logic error. Take a dump as soon as possible, save all relevant data, and consult your Sperry Univac representative.

INTERNAL ERROR IN RESEQUENCE ROUTINE *BASIC*

A condition which should not normally exist has been detected by the resequence routines. Collect all relevant data, obtain a memory dump, and contact your local Sperry Univac customer representative.

INTERNAL ERROR IN WORKSPACE *WORKSPACE*

An internal error has been detected by the workspace access routines in BEM. If the error persists the user may be forced to halt the current program and reexecute it.

INTERRUPTED: (C)ONT,(D)ISCONT,(S)YSTEM⊳ *BEM*

This message indicates that the user has interrupted BEM by means of the MESSAGE-WAITING key on a UNISCOPE terminal, or the BREAK key on a hardcopy terminal. The user has three options: C- will continue the interrupted operation; D- will discontinue the current operation and return to command mode; S- will temporarily suspend the current operation and allow the user to enter BEM commands; when the user wishes to resume the current operation, the /RESUME command is used.

INVALID @(LABEL) -- MISSING PAREN *EDT*

An.open parenthesis was found to start a label, but there is no closing parenthesis.

INVALID @SET COMMAND *EDT*

An @SET command has been used with an invalid keyword parameter. The only valid keywords for use with SET command are PAGE, LINE, TABS, and CHAR. See Section 3.2.3 of UA-0141.

INVALID ASSIGN STATEMENT *EDT*

An ASSIGN statement must be of the form:

@ASSIGN G*n* = *expression*

INVALID BLOCKSIZE OR RECORD SIZE *FILES*

BEM cannot process the file due to a conflict with the block or record size for this file. If the file already exists, check that the block size or record size is not zero, or greater than 65K.

INVALID BULLETIN OPTION — NOT READ/WRITE/DISPLAY *BEM*

There are only three valid bulletin functions which may be used with the BULLETIN command. These are READ, WRITE, and DISPLAY. Correct the command and retry it.

INVALID BY PARAMETER USAGE *EDT*

The BY specification has been used without the SEQUENCE command, or the form of the parameter is not valid. See Section 3.1.1.2 of UA-0141.

INVALID CHANNEL SET EXPRESSION *BASIC*

The channel-setter in the flagged statement resulted in a number less than zero, or greater than 4095. Channel numbers must be between 0 and 4095.

INVALID COLUMN IN TAB COMMAND *EDT*

One of the column numbers used in a TAB command is not between 1 and 128. See Section 3.2.3 of UA-0141.

INVALID COLUMN RANGE *EDT*

The column range specified in a replacement expression is invalid. It must be of the form:

n:i-j

where $1 \leqslant i \leqslant j \leqslant 128$

INVALID DO OPTION *EDT*

The DO statement has the format:

@DO n [P]

where n is an integer (1-9) and the optional P specifies that each command is to be printed.

INVALID EDT VARIABLE (#Gn) *EDT*

A single number sign (#) is assumed to designate an EDT general variable. This must be followed by the letter G and a digit in the range 0-9. If a number sign is needed in the command, enter two number signs (##).

INVALID ELEMENT TYPE *BEM*

The element type used with the /DELETE command must be one of the following:

S-source	P-proc	M-macro
O-object	L-load	G-group

INVALID EXPONENT FIELD IN USING STRING *BASIC*

An exponent field must consist of exactly five up-arrows (↑) and cannot be followed by a place holder #. Correct program and rerun.

INVALID FIELD DESCRIPTOR, EXPECTING <, > *BASIC*

The user program attempted to print a string variable with a numeric format. Correct the program and rerun.

INVALID FIELD DESCRIPTOR, EXPECTING $,+,— *BASIC*

The user program attempted to print a numeric variable with a string format. Correct the program and rerun.

INVALID FORMAT FOR LOGON COMMAND *BEM*

The LOGON command has been entered incorrectly. It must begin with the word LOGON, and is followed by one to three fields of up to four characters each. Check that none of the fields are too long, and that there is nothing entered after the third field.

INVALID ID, ACCOUNT, PASSWORD FOR LOGON *BEM*

An unlisted id, account, and password combination has been entered; thus the user has been denied access to the system. If the fields have been entered correctly, then the account may have been removed from the system. Contact the system administrator to have the account created.

INVALID IF STATEMENT *EDT*

An IF statement has the following format:

@IF *expression op expression COMMAND*
@IF {.T. / .F.} *COMMAND*

INVALID KEY LENGTH *FILES*

Files containing keys cannot be processed by BASIC.

INVALID LINE RANGE *BASIC*

Valid line ranges consist of single line numbers (a,b) or ranges of lines (a-b). A line number consists of a decimal number in the range 1-99,999.

INVALID LINE SET COMMAND *EDT*

An at sign (@) alone has been entered, or the line number with the line set command is not valid. See Section 3.2.4 of UA-0141.

INVALID OR ZERO LINE NUMBER *EDT*

A line number in an EDT variable expression must be in the form nnnn.nnnn, and must not be zero.

INVALID MAJOR FRAME COMMAND *RSP*

The user has entered a command other than one of those shown on the screen. A new screen will be presented. Valid commands are:

BREAK	END	DISPLAY	RETRIEVE
RELEASE	BUILD	DELETE	HELP
CLEAR	READ	WRITE	SCREEN
TYPE	UPPER	LOWER	SYSTEM

INVALID MARGIN SIZE *BASIC*

The margin expression specified on the flagged statement resulted in a number less than zero, or greater than 4095. This error could also have resulted from attempting to set the size of the margin greater than the limit for the file type.

INVALID NUMBER PARAMETER *EDT*

The number parameter must follow the NUMBER command, must be a valid change string, and must terminate with at least 1 but not more than 15 numeric characters. The parameter must be enclosed in apostrophes and any "or" characters in the string must be entered twice.

INVALID OR DUPLICATE CHANGE STRING *EDT*

The change-string used is not valid or two change-strings have been entered. Change-strings must begin and end with apostrophes. See Section 3.1.1.6 of UA-0141.

INVALID OR DUPLICATE COLUMN RANGE *EDT*

The column range entered is not valid, due to incorrect format, or two column ranges have been entered. See Section 3.1.1.3 of UA-0141.

INVALID OR DUPLICATE COPY-TO LOCATION *EDT*

Either two copy-to locations have been used (i.e., @ COPY 1-10 TO 11 TO 22) or the one given is not valid. The number following the word TO must be a valid line number. See Section 3.1.1.7 of UA-0141.

INVALID OR DUPLICATE LINE RANGE *EDT*

The line range entered is not valid due to incorrect format or two line ranges have been entered. See Section 3.1.1.9 of UA-0141.

INVALID OR DUPLICATE SEARCH STRING *EDT*

The search-string used is not valid or two search-strings have been entered. Strings must begin and end with quotes or apostrophes. See Section 3.1.1.8 of UA-0141.

INVALID PROC GROUP NUMBER *EDT*

The PROC group number must be a single digit integer in the range 1-9.

INVALID RESPONSE, ENTER NUMBER, NEWNAME▷ *BEM*

The user's response to the last query was incorrect. A non-zero number must be entered first, followed immediately by a comma and then the module name. No intervening spaces are permitted.

INVALID SCREEN ROLL COMMAND *RSP*

The user has entered a command other than one of those shown on the top of the screen. A new screen will be presented. Valid commands are:

CMD	UP	DOWN
RIGHT	LEFT	DELETE
INSERT	UPDATE	REFRESH

INVALID SEARCH COMMAND *RSP*

The search command issued to RSP is not correct. It consists of a search-string and an optional column range. The search-string must begin and end with an apostrophe. A column range is a single number, or two numbers separated by a hyphen. The number must be between 1 and 256.

INVALID SEARCH STRING *BASIC*

A search-string consists of any character string enclosed in quotation marks. If a quote appears in the string, it must be typed as " ".

INVALID SUBSTRING EXPRESSION *EDT*

A substring of an EDT variable is written as a starting position (s) and a length (l) enclosed in parentheses--(s,l).

where $1 \leqslant s \leqslant 50$ and $s + l \leqslant 51$

INVALID TAB EXPRESSION FOR PRINTING *BASIC*

The argument of the TAB function was less than one.

INVALID TRIMMER IN MATRIX STATEMENT *BASIC*

Either the trimmer specified did not result in a positive number, or the resultant array would require more storage than the original array.

INVALID VARIABLE EXPRESSION *EDT*

An EDT variable expression must be one of:

STRING — 'ABC'
VARIABLE — Gn
NUMERIC EXPRESSION — n + m, n − m, n
LINE/COLUMN RANGE — n:i−j

I/O AREA COULD NOT BE LOCATED, RETRY *LIBRARY*

An I/O area for the library function could not be acquired by BEM. Wait a few minutes and retry. If the problem persists, contact the system administrator to have the system memory partition enlarged.

I/O ERROR ACCESSING MESSAGE INDEX *BEM*

An I/O error has occurred while writing to the bulletin file. Only part of the bulletin is now valid. The DISPLAY option should be used to determine that status of the bulletin, and the WRITE option may then be retried.

I/O ERROR ON WRITE TO FILE *FILES*

An I/O error has occurred while writing the data management file. Investigate for possible hardware problem or retry the program.

I/O ERROR WHILE ACCESSING V.T.O.C. *LIBRARY/FILES*

An I/O error has occurred while accessing the VTOC for the disk volume specified. Retry or investigate for possible hardware problem.

I/O ERROR WHILE READING CATALOG *LIBRARY/FILES*

An I/O error has occurred while reading the catalog. Retry or investigate for possible hardware problem.

I/O ERROR WHILE READING LIBRARY FILE *LIBRARY*

An I/O error has occurred while reading the library file. Part of the program may be missing. Retry or investigate for possible hardware problem.

I/O ERROR WHILE WRITING LIBRARY FILE *LIBRARY*

An I/O error has occurred while writing the library file. The program has not been saved. Retry the command or investigate for possible hardware problem.

LIBRARY FILE FULL, ELEMENT NOT ADDED *LIBRARY*

The library file has been filled and there is not enough room to write out the program. The old version, if any, is left intact. Have the file expanded or its contents compressed.

LIMIT OF 4 "LIBRARY" STATEMENTS EXCEEDED *BASIC*

BASIC will search at most four libraries for subprograms, the program has attempted to use more than four.

LOADER AT LINE xxxxx *BASIC*

When the error was detected, the BASIC compiler was at the line number given by xxxxx. This message is displayed in conjunction with another error message.

LOG OF A NON-POSITIVE NUMBER UNDEFINED *BASIC*

The LOG function has encountered a nonpositive argument. The logarithm of a nonpositive number is undefined, thus execution is cancelled.

MATRIX DIMENSIONS ARE INCORRECT FOR FUNCTION *BASIC*

The row or column dimension of the matrices in the matrix statement is incorrect. Check DIM statement for the matrices in question.

MISSING FILE PARAMETER *EDT*

A READ or WRITE command has been entered, but the file parameters do not immediately follow the command keyword. Correct and retry.

MISSING FILE PARAMETER *BEM*

File parameters must immediately follow the DELETE, PRINT, or PUNCH keyword and be in the format:

element, filename (password), volume, type

MODULE NOT OVERWRITTEN, COMMAND TERMINATED *LIBRARY*

This is a confirmation message informing the user that the WRITE command was not executed. It results from a NO answer to the OVERWRITE question.

MORE THAN 29 FILES OPEN *BASIC*

BASIC does not support the concurrent use of more than 29 temporary and library files per user. This program has exceeded the limit.

MORE THAN 4 CHARACTERS IN LABEL *EDT*

EDT statement labels may contain no more than four characters. Correct the proc by using shorter labels.

MUST BE PRIVILEGED FOR BULL READ/WRITE *BEM*

Only privileged users may read or write the BEM bulletin. Normally, only the system administrator will have a privileged status in the accounting file.

NEW NAME ALREADY EXISTS, RE-ENTER▷ *BEM*

An element with the specified name already exists in the file. Select another name and retry the response.

NO DISK SCRATCH SPACE AVAILABLE *WORKSPACE*

All the disk cylinders available to BEM have been assigned, wait and retry or contact the system administrator.

NO FORMAT STRING DEFINED IN USING STRING *BASIC*

The user program attempted to print a variable using a format string that does not contain any valid format strings.

NO MEMORY AVAILABLE FOR FILE I/O BUFFERS *FILE*

A memory area to store a block buffer and DTF could not be allocated for your file. Retry later and contact the system administrator if the problem persists.

NO MEMORY AVAILABLE FOR WORKSPACE BUFFERS *WORKSPACE*

An area of memory could not be acquired for I/O buffers. Retry command when memory becomes available. If problem persists, contact system administrator to have the memory partition size increased.

NO PROC TO END *EDT*

The @END statement was issued while no proc was active.

NO SUCH LINE NUMBER FOR A GOTO OR GOSUB OR IF-THEN *BASIC*

The line number referenced in a GOTO, GOSUB, ON, or IF-THEN statement is not present in the program or function. Insert the required statement or remove the reference to it.

NOT A DATA MANAGEMENT FILE *FILES*

The file being accessed is not a valid sequential or direct access file. To be valid, it must have type SQ or DA and contain a single partition.

NOT ENOUGH MEMORY IS AVAILABLE TO LOAD *BEM*

Insufficient storage is available to load the function you are calling for. Wait and retry. If the problem persists, contact the system administrator to have the memory partition size increased.

NOTHING HAS BEEN FOUND TO RECOVER *BEM*

The RECOVER command has searched the library for deleted modules with the same name and type as specified in your command, but could not find any. This response may indicate that the library has been packed, or that you have recovered all deleted elements and there aren't any left to display.

NULL USING STRING NOT ALLOWED *BASIC*

The using string specified in the print statement is a null string. Define the variable and rerun.

NUMBER OF ARGUMENTS INCONSISTENT *BASIC*

The number and type of arguments passed in the CALL statement(s) do not agree with the number and type on the SUB line.

NUMBER OF PARAMS IN FUNCTION CALL INVALID *BASIC*

A maximum of 16 passed parameters and local variables may be specified on a function declaration line. Reduce the number of labels and rerun.

NUMBER OF SUBSCRIPTS FOR ARRAY INCORRECT *BASIC*

The variable that caused the error has been dimensioned with a different number of subscripts than were found in the reference to it.

OPERATION NOT PERMITTED TO FILE *BASIC*

The operation to be performed against the file conflicts with the file type.

OS/3 ALLOCATE ERROR *BEM*

This message is returned when the ALLOCATE command receives an error status from the supervisor when trying to allocate the file. It may indicate that there is insufficient space on the disk volume.

OUT OF MEMORY — RETRY (Y OR N) *ALL*

One of the internal routines within BEM has attempted to acquire additional storage on a temporary basis. No storage was available. The user may wait for storage to become available and reply Y, or may terminate the current program by replying N. If the problem persists, contact the system administrator to have the memory partition size increased.

OVERFLOW ON VARIABLE SUBSTITUTIONS — TRUNCATED *EDT*

When variables in a command line were replaced, the new line exceeded 80 characters. The truncated command was processed.

OVERWRITE? (YES OR NO) *LIBRARY*

The program to be written out by the command already exists on the file. A reply of YES will overwrite the previous version with the new one. A reply of NO will terminate the command.

PAGE/LINE SIZE INVALID *EDT*

The page or line sizes are not within the correct range. PAGE must be between 1 and 255, LINE must be between 1 and 128.

PARAMETER TYPE MIS-MATCH *BASIC*

The type of a parameter passed to a function/subprogram conflicts with the type defined for the function subprogram. For example, a string was passed when a numeric value was expected or a numeric value was passed when a string was expected. Compare the line in error and the definition; correct the discrepancy.

PASSWORD IS INVALID FOR FILE *LIBRARY/FILE*

The password used does not match the one cataloged for the file. Another cause of this error could be failure to specify a password with the file-access command. The user is denied access to the file in either case.

PAUSED AT xxxxx CONTINUE (Y or N) *BASIC*

A PAUSE statement has been encountered at the line number given by *xxxxx*. Answer YES to continue execution; answer NO to terminate the program.

PLEASE LOGON *BEM*

The user's terminal has not been joined to the BEM system. Follow log-on procedures given in Section 2 of UA-0139.

PRINT TO FILE > MARGIN SIZE *BASIC*

The program attempted to print a string, number or USING string with a length greater than the current margin setting. Change the margin size, or reduce the length of the expression printed.

PRINT/PUNCH I/O ERROR *BEM*

A hardware I/O error has been encountered on the printer or punch. Retry the command. If the problem persists, investigate a possible hardware error.

PRINTER/PUNCH IS IN USE, PLEASE WAIT *BEM*

Another user is using the printer or the punch. Your command will be completed after the other command completes. If you do not wish to wait, interrupt the system.

PROGRAM CANNOT BE RESUMED *BEM*

The user tried to resume a program when no program had been loaded. A RESUME command is only effective when the user has interrupted an active program and wishes to return to it.

PROGRAM COULD NOT BE FOUND *BEM*

The program to be executed via an EXECUTE command could not be found. Only EDT, RSP, and BASIC may be loaded under level 4.0.

PROGRAM NOT INCLUDED IN CONFIGURATION *BEM*

The system administrator has not elected to provide the program you have requested.

REFERENCE TO ACTIVE PROC *EDT*

The user has attempted the DO option on a currently active proc, or has attempted to enter the current proc with an @PROC command.

REFERENCED SUBROUTINE NOT FOUND IN LIBRARIES *BASIC*

All user-specified libraries have been searched, but the subprogram listed in the error message could not be found. Execution is inhibited.

RENAME ERROR *BASIC*

The string-expression used to supply the new file name does not contain a valid file parameter or temporary file name. This error may also be the result of attempting to RENAME a data management file.

REQUESTED RECORD NOT FOUND IN DATA FILE *FILES*

BASIC was attempting to read a record which does not exist in the data management file. Probably due to a hardware error. If the problem persists, consult your Sperry Univac representative.

RETURN WITHOUT MATCHING GOSUB CALL *BASIC*

The program has attempted to return from a subroutine that was not called by a GOSUB statement.

ROLL OPTION VALID ONLY AT UNISCOPE TERMINALS *BEM*

The /SCREEN ROLL or /SCREEN COP options cannot be used with a hardcopy terminal. The command is ignored.

RSP AVAILABLE ONLY AT UNISCOPE TERMINALS *RSP*

RSP cannot be used at a hardcopy terminal. Move to a UNISCOPE terminal and reexecute RSP.

RSP/EDT MUST BE LOADED TO USE/BULLETIN *BEM*

The BULLETIN READ or WRITE commands can only be issued while EDT or RSP is loaded (use @SY BULLETIN. . .) since there is no workspace unless one of these is active.

SAME MATRIX APPEARS ON BOTH SIDES OF EQUAL SIGN *BASIC*

The same matrix may be referenced on both sides of the equal sign in a MAT statement, a new matrix must be generated.

SAT ERROR INITIALIZING FILE *LIBRARY*

The INIT=YES option has been selected in the command, and the file could not be initialized. This could be due to a hardware error, or an attempt to initialize a non-SAT file.

SCRATCH AREA IS FULL, TEXT NOT ADDED *WORKSPACE*

The program you are using has tried to acquire an additional unit of disk space and could not do so. The last image entered has been lost. Wait and retry or contact the system operator.

SCRATCH ERROR *BEM*

The file specified in the command could not be scratched. This may be a result of an error status being returned from the supervisor, or could have been caused by an attempt to scratch a file which should not be scratched (a system file for example).

SCREEN COMMAND FORMAT ERROR *BEM*

The SCREEN command has been entered incorrectly. Valid options are:

/SCREEN [ROLL / NOROLL] [COP / NOCOP] [,*height* × *width*]

The default is /SCREEN NOROLL,NOCOP,24×80.

SCREEN DIMENSIONS ARE INVALID FOR RSP *RSP*

RSP may only be used with UNISCOPE terminals; the only valid sizes for these terminals are 12 × 80, 16 × 64, 24 × 80, and 24 × 64. These are the only sizes which will be accepted.

SEARCH STRING NOT FOUND *RSP*

RSP has searched the workspace from the current location to the end, but could not find the string requested. Informational message only.

SEARCH STRING NOT FOUND IN LINE-RANGE *EDT*

The Editor has scanned all lines that the user's command has instructed it to, but did not find the string for which it was searching. This is caused by looking for a word or string which is not in the text. Informational message only.

SECOND DEFINITION OF AN ARRAY NOT ALLOWED *BASIC*

Two-dimension statements have been used to define the same variable. Remove one of the statements and rerun.

SECOND DEFINITION OF THE SAME FUNCTION *BASIC*

The same function has been defined twice within the program. Remove one definition and correct the program. Rerun.

SECOND DEFINITION OF SUB — DEFINITION IGNORED *BASIC*

Two subprograms with the same name have been encountered during the compilation process. The second subprogram will be ignored. The second subprogram may have been found in a library element as a result of a library search. This is a nonfatal error.

SEQUENCE PARAMETER ERROR *EDT*

The name or number used to sequence a module is not correct. This may be caused by using more than 16 numeric characters in the name or increment number. See Section 3.1.2.8 of UA-0141.

SET MARGIN FOR DMS FILE NOT AT RECORD 0 *BASIC*

A MARGIN statement was issued against a data management file while it still has data in it. The MARGIN statement may only be used when the file is empty.

SIMPLE VARIABLE INCONSISTENT WITH CALL *BASIC*

The CALL and SUB lines differ in the specification of a simple variable to be passed to the subprogram. Resolve the inconsistency and rerun.

SOFTWARE CHECK AT ee LLLLLL *BEM*

A software check has been detected by the Monitor. Please take a dump as soon as possible; save all relevant data, and consult your Sperry Univac representative.

SPECIFIED LINE NOT IN FILE *EDT*

The line specified in a replacement expression does not exist in the EDT work space.

SPOOL FILE NOT FOUND — COMMAND IGNORED *RSP*

The file described is not present in the Spool file. Check the spelling of the entries, and check that the correct queue name was specified. The spool element may not have been created yet.

SPOOL I/O ERROR R*U* *RSP*

An I/O error occurred while accessing the system Spool file. Respond R to retry; U to terminate the command. If invalid data has been retrieved, clear the workspace (CLEAR) and retrieve the file again.

SPOOL I/O ERROR WHILE ENTERING TASK *BEM*

The ENTER function has encountered a Spool file access error while writing the command element to the Spool file. If the error persists, contact the system administrator.

SQUARE ROOT OF A NEGATIVE NUMBER UNDEFINED *BASIC*

The SQR function has encountered a negative argument. The square root of a negative number is undefined, thus execution is cancelled.

START AND INCREMENT WILL EXCEED 99999 *BASIC*

The starting number and increment used with the RESEQUENCE command cannot be used as they are, because they would cause one of the new line numbers to exceed the maximum line number (99999) for OS/3 BASIC. Use a different start or increment and reissue the command.

STATEMENT FOLLOWING END/SUBEND NOT SUB/REM *BASIC*

The only permissible statements following an END statement are a REM statement or a SUB statement. Correct the program and rerun.

STATEMENT LABEL NOT IN FILE *EDT*

The label specified on the @GOTO statement could not be found in the EDT proc space.

STATUS COMMAND PARAMETER ERROR *BEM*

The operand of a STATUS command is incorrect. Allowable status commands are:

```
/STATUS        TERM
/STATUS        RESOURCE
/STATUS
```

STOPPED AT xxxxx *BASIC*

A STOP statement has been encountered or an error detected at the line number given by xxxxx.

STRING EXCEEDS 4095 CHARACTERS *BASIC*

A string operation has produced a string with a length in excess of 4095 characters. The maximum number of characters permitted in a string is 4095.

SUB: FNX PRECEDES "CALL" *BASIC*

A SUB statement declaring a passed function cannot occur before the statement that calls it (and defines the function parameters). Relocate the subprogram so it occurs after at least one statement that calls it.

SUB NAME IS GREATER THAN 8 CHARACTERS *BASIC*

The name used on a CALL or SUB statement for a subprogram must be a string constant which is not longer than 8 characters. Correct the spelling of the name or shorten its length.

"SUBEND" OR "SUBEXIT" NOT IN A SUB *BASIC*

A SUBEND or SUBEXIT was encountered which was not in a subprogram. The SUBEND must be the last statement in a subprogram.

"SUBEXIT" NOT ALLOWED IN FUNCTION DEFINITION *BASIC*

A SUBEXIT statement was encountered within a multiline user function definition. It can only be issued from the subprogram level.

SUBROUTINE CALLING ITSELF *BASIC*

A CALL statement has been found which references the subprogram in which it resides. Recursive calls in any form are prohibited.

SUBROUTINE LIMIT OF 30 EXCEEDED *BASIC*

BASIC will not accept more than 30 subprograms. Combine several subprograms or change program logic to eliminate a few.

SYSTEM CLOSED TO NEW USERS, TRY LATER *BEM*

The computer operator has closed the system so that no new users will be allowed on. Wait until later to LOGON.

SYSTEM COMMAND NOT RECOGNIZED *BEM*

A command was entered in monitor mode which was not recognized. All commands must begin with one slash and only commands listed below are allowable:

/DELETE *file-info*
/DISPLAY JOBS
/DISPLAY VOLUMES
/EXEC *program*
/FSTATUS *file-info*
/HELP
/INTR
/LOGOFF
/PAUSE *comment*
/PRINT *file-info*
/PUNCH *file-info*
/RUN *program*
/RESUME
/SCREEN
/STATUS RESOURCE
/STATUS TERM
/TYPE *comment*
/VTOC *volume*

"TAB" CANNOT BE USED WITH "PRINT USING" *BASIC*

The TAB function cannot be used while PRINT USING is active. The TAB should be removed, or a semicolon placed before the function call to terminate the USING clause.

TANGENT/COTANGENT OUT OF RANGE *BASIC*

The result of a TAN or COT function evaluation caused an overflow condition. Machine infinity is supplied and execution continues.

TASK ENTERED IN BACKGROUND MODE *BEM*

This is a confirmational message indicating that the Enter file was successfully queued for execution. The task may already have begun, or may be delayed until a batch processor becomes available.

TERMINAL ALREADY LOGGED ON, PROCEED *BEM*

The previous user did not LOGOFF; this terminal is still logged on.

TERMINAL IDLE TOO LONG, REPLY OR BE CANCELLED *BEM*

This terminal has had no activity for a long period of time, and is assumed to have been left idle. If this terminal is still in use, reply within 30 seconds, or BEM will log the terminal off. The time limit before this message is displayed is set by the system administrator.

THE SUBROUTINE DEFINED IS NOT REFERENCED *BASIC*

This is an informational message only. It notifies the user that he has included a subprogram (either implicitly via LIBRARY or explicitly in the workspace) which is never called. It should be eliminated as it only takes up memory. Compilation continues.

TIME UP — PROGRAM LOOPING *BASIC*

The time limit specified in the TIME statement has been exceeded by the program. It may be looping, or it may require that the time limit be increased.

TOO MANY TAB STOPS *EDT*

More than eight tab stops have been used with the TAB command. See Section 3.2.3 in UA-0141.

TYPE OF FUNCTION PARAMS INCONSISTENT IN CALL *BASIC*

The functions passed to a subprogram do not agree in type or number of parameters expected. Check the CALL statements to see that any functions passed contain the same number and type of parameters, then check the subprogram to be sure it references the function correctly.

UNABLE TO CREATE SPOOL FILE *RSP*

RSP could not successfully build the desired Spool file. Check parameters and retry. If the problem persists, consult your Sperry Univac representative.

UNCORRECTED ERROR IN SOURCE *BASIC*

One of the statements flagged during the previous OLD command has not been eliminated or corrected. The number of that line is shown.

UNKNOWN ERROR ON SAT FILE *LIBRARY*

BEM has received an error code from the SAT processor which it does not expect. If the command issued does not violate any of the constraints placed on it by BEM, contact your local Sperry Univac representative.

UNRECOGNIZABLE COMMAND *EDT*

A command keyword has been used which the Editor does not recognize. Check all keywords used against Appendix A of UA-0141.

USER DID NOT SUPPLY FILE NAME & NO DEFAULT GIVEN *FILE/LIBRARY*

The user has issued a command which requires that a file-name be specified; no filename was stated in the command. If the user expected to use a default file specification, he should contact the system administrator, as the administrator did not declare a default file for this account. To correct the command, enter a filename explicitly.

USER LOGGED OFF, CANCELLED BY OPERATOR *BEM*

The operator has cancelled your task for some reason. Contact the operator to find out why.

USER LOGGED OFF, END OF FILE ON CONTROL STREAM *BEM*

This message is only issued by a batch processor. It indicates that the processor attempted to read more cards from the enter stream and found none left. The enter task is automatically logged off. This is usually caused by a misinterpreted or mistyped LOGOFF command.

USER LOGGED OFF, NO RESPONSE IS ALLOTTED TIME *BEM*

This message is issued 30 seconds after the "TERMINAL IDLE TOO LONG. . ." message if no response is made. To use this terminal, the next user need only log on again.

USER LOGGED OFF, TERMINAL IS NOW FREE *BEM*

This indicates successful completion of a LOGOFF command.

USER'S ACCOUNT DOES NOT PERMIT WRITING TO FILES *FILE/LIBRARY*

The user has attempted to write or update a file and is not permitted to by his account description. To remove this restriction, contact the system administrator to change the access permission.

USER'S ACCOUNT PROHIBITS ACCESS TO THIS FILE *FILE/LIBRARY*

The account description for this user does not permit the specified file to be accessed. This usually is a result of accessing a file other than the default file if only that file is permitted. To remove this restriction, contact the system administrator.

VOLUME IS NOT AVAILABLE TO THE BEM SYSTEM *LIBRARY/FILE*

The disk volume you have requested is mounted, but has not been made available to the BEM system by the system administrator. Contact the system administrator to have the pack included.

VOLUME NAME IS NOT SPECIFIED *LIBRARY/FILE*

The user has not supplied the name of the disk volume to scan, and the volume name is not in the catalog.

VOLUME NOT MOUNTED ON A DISK DRIVE *LIBRARY/FILE*

The volume requested is not mounted on a disk drive. Contact the operator to have the volume mounted.

WAITING FOR OPEN FILE TABLE ENTRY *LIBRARY/FILE*

An "Open File Table Entry" in the preamble could not be secured for this file access. BEM will wait until another file access terminates and releases its entry. If the user does not wish to wait, the interrupt facility of BEM may be used to terminate the file access. If this problem occurs frequently, contact the system administrator to have more entries placed in the preamble.

 # OF FUNCTION PARAMS INCONSISTENT IN CALL *BASIC*

The number of parameters passed to a subprogram does not agree with the number stated on the SUB line, or does not agree with another CALL to the same program.

#0 INVALID ON CHAIN *BASIC*

Channel zero, the terminal, may not be used as the file from which the chained program is to be read. A data management, temporary, or library file must be used.

SPERRY UNIVAC

USER COMMENT SHEET

Your comments concerning this document will be welcomed by Application Services for use in improving subsequent editions.

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