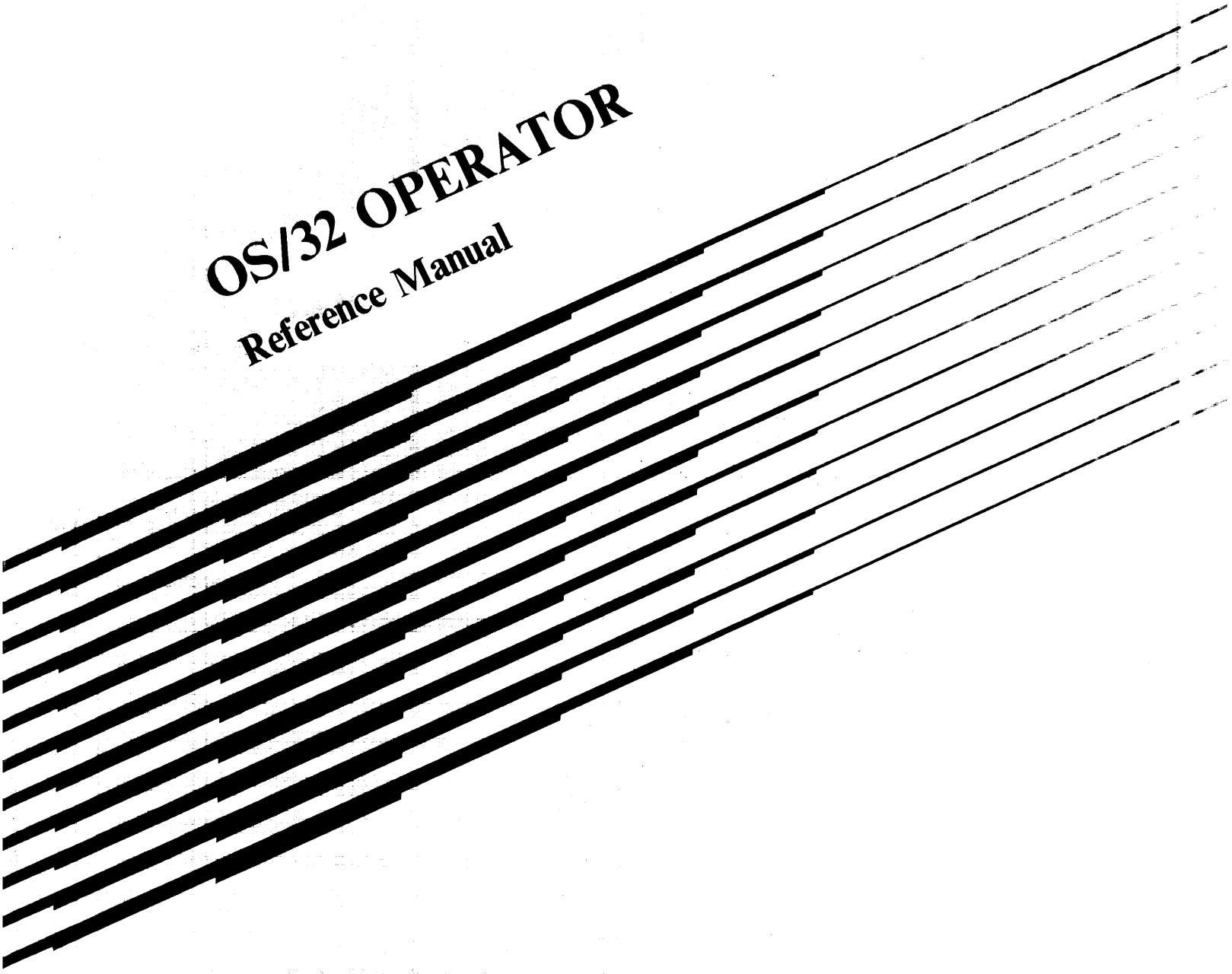
48-030 F00 R03

OS/32 OPERATOR

Reference Manual



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NOTICE

THIS MANUAL CONTAINS REFERENCES TO THE PERKIN-ELMER MODEL 3280 SYSTEM. HOWEVER, THE MODEL 3280 SYSTEM WAS NOT AVAILABLE FOR THE OS/32 8.1 SOFTWARE RELEASE.

FOR FURTHER INFORMATION OR ASSISTANCE CONCERNING THE MODEL 3280 SYSTEM, PLEASE CONTACT YOUR LOCAL PERKIN-ELMER SALES REPRESENTATIVE.

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PREFACE

The OS/32 Operator Reference Manual is intended for OS/32 system operators.

Chapter 1 gives a general description of OS/32. Chapter 2 discusses the procedures for loading either the Perkin-Elmer supplied starter systems or user-generated systems. Chapter 3 defines the operator commands. Chapter 4 discusses error handling and maintenance utility programs. Chapter 5 discusses the command substitution system (CSS). Chapter 6 briefly describes the accounting facility used in monitoring system usage. Appendix A contains a summary of operator command formats. Appendix B is a command message summary. Appendix C describes system messages. Appendix D contains system crash codes. Appendix E is a control summary for the bidirectional input/output control (BIOC). Appendix F describes the virtual console facility (VCF).

This manual is intended for use with the OS/32 R08.1 software release or higher. OS/32 now supports Model 3203 and 3280 Systems. Model 3200MPS System configurations with auxiliary processing units (APUs) and/or input/output processors (IOPs) are also supported. New bootloader procedures have been added to Chapter 2 to support each of these processors. An OS/32 panic dump procedure which supports Model 3203 has been added to Chapter 4. In addition, new command messages, system messages and crash codes have been added to Appendixes B, C and D respectively. Appendix F, which presents the VCF, has been added.

For information on the contents of all Perkin-Elmer 32-bit manuals, see the 32-Bit Systems User Documentation Summary.

CHAPTER 1
INTRODUCTION TO COMPUTER OPERATIONS UNDER OS/32

1.1 INTRODUCTION

OS/32 is a comprehensive multitasking environment with minimal system overhead that is controlled from an interactive console.

1.2 MINIMUM HARDWARE CONFIGURATIONS

The minimum hardware configurations for OS/32 are:

- Perkin-Elmer 32-bit processor with 256kb of memory
- Relocation/protection hardware: memory access controller (MAC), memory address translator (MAT) or virtual address translator (VAT)
- Display panel (for Model 7/32 and 8/32 Processors only)
- Universal clock
- Multiperipheral Controller (MPC) (for Model 3280 only)
- Console device options (at least one of the following):
  - Teletypes (TTYs) (Models 33 and 35)
  - Perkin-Elmer Carousel 15, 30, 35 or 300
  - Perkin-Elmer Model 550, 550B, 1100, 1200, 1250, 1251, 6100 or 6312 Video Display Unit (VDU).
- Power fail/auto restart
- Magnetic media options:
  - Magnetic tape (9-track 800, 1600, 6250 bits per inch (bpi) or 60Mb cartridge tape (streaming tape).
  - Disks (10Mb, 16Mb, 25Mb, 40Mb, 51Mb, MSM80, MSM300, MSM625)
  - Floppy disk

- Input/output (I/O) device options:

  - Line printer (120, 180 characters per second (cps); 300, 600 and 1000 lines per minute (lpm))
  - Card reader (400 or 1000 characters per minute (cpm))

- Data communications interfaces (PALS, PASLA, SSA, QSA, 2- and 8-line communications multiplexor (COMM MUX), current loop communications multiplexor (CLCM))
- Special device options:

  - Loader storage unit (LSU)
  - 8-line interrupt module
  - Video display (TTY interface or PASLA/PALS)
  - Digital multiplexor
  - Mini I/O system
  - Real-time analog system

- OS/32 can be configured to run without direct access devices. However, at least one disk is required to:

  - unpackage the software,
  - perform a system generation (sysgen), and
  - do program development.

1.3 THE OS/32 ENVIRONMENT

OS/32 is a general-purpose multitasking, multienvironment system. Basic OS/32 provides a background environment for program development and debugging and a foreground environment for prioritized real-time applications. Additional environments are provided by these OS/32 products:

- Multi-terminal monitor (MTM) provides a secure multiuser, time-sharing environment for program development and debugging.
- Reliance is a complete on-line transaction processing software package for the commercial user of Perkin-Elmer 32-bit computers.

OS/32 also provides many facilities to allow complete application-oriented environments to be easily constructed.

1.3.1 The Operator in an OS/32 Environment

The OS/32 system is controlled by the system operator through a device designated as the system console. This device can be a TTY, Carousel, or a Model 550, 550B, 1100, 1200, 1250, 1251, 6100 or 6312 VDU. It has a special relationship to the system in that the system receives command input from the console and writes system messages to it. Tasks can log messages to the system console without reference to its device name. A comprehensive command set is provided to allow the system operator to control and interact with the various OS/32 environments. Normally, the operator does not interact with foreground tasks except when loading and initiating them, but the operator can monitor and control them if necessary.

The background facilities offer the operator more control of jobs and job streams. These facilities are used for program development functions such as:

- assembling,
- compiling,
- linking, or
- performing a sysgen.

To use these functions, the operator must understand the task control functions available under OS/32 and the program's specific operational requirements. Through operator commands, the operator frequently interacts with the disk file system. These commands are detailed in Chapter 3. The operator must also understand the OS/32 command substitution system (CSS). These commands are detailed in Chapter 5.

MTM enables as many as 64 users to simultaneously share the resources of a 32-bit processor via terminals, which adds another dimension to the operator's activities.

1.4 SYSTEM CONSOLE USE

The system console is used to enter commands and receive status displays and error responses that are directly related to the functioning of OS/32. Significant events such as disk failures, power fail/restore and task terminations are logged to the console. Generally these actions are performed by the system console unless the virtual console facility (VCF) is loaded. Refer to Appendix F for information about the VCF.

OS/32 provides, through the SET LOG command, an optional copy of all transactions to and from the console. The log may be directed to a hard copy device or to a file for later printing.

The system console can be assigned to tasks for ordinary I/O operations the same as any other device. If the system console is an ASR TTY or Carousel 35, only its keyboard/printer unit can be used for calling tasks; the reader/punch unit is reserved for system use.

1.4.1 Prompts

When the system operator is expected to enter data at the system console, a prompt is output. This prompt takes one of the following forms:

*	Command request
taskid>	Data request
.CMDP>	Build request

The command request prompt (*) is output whenever the system is ready to accept another command.

The data request prompt (taskid>) is output whenever a task is attempting to perform a read request to the system console. The task identifier (taskid) of this prompt is the name of the task requesting data. For the background task, the taskid is .BG[nnnnn] where nnnnn is an optional decimal number.

If a task attempts to write a message to the system console when a data request is in progress, either from the system or from a task, the read will be momentarily interrupted if no operator response has taken place. If the operator has responded to the read request (typed input), there will be no interruption until the RETURN key is pressed.

The build request prompt (.CMDP>) is output whenever the command processor task is requesting input. This occurs during the processing of a BUILD command.

1.4.2 BREAK Key

If a task is in the process of reading from or writing to the system console, the operator can interrupt by pressing the BREAK key (ESC on some devices) of the console device. This forces the system into command mode for the entry of one command line. After the command line has been accepted, the user I/O to the console is restarted. This process is transparent to the user task (u-task).

Command reads prompted by the operator's use of the BREAK key will not be interrupted to allow tasks to write messages.

The BREAK key can also be used by the operator to terminate further system responses to a command. This is particularly useful in cases such as the EXAMINE and DISPLAY commands, where large quantities of data may be output to the system console.

1.5 GENERAL SYNTAX RULES

Multiple commands may appear on one line, but each one must be separated by a semicolon (;). Certain commands must appear last on a line or must be the only command on the line. These restrictions are discussed in the sections dealing with the individual commands. If the first character of any command input is an asterisk (*), the remainder of that line is considered to be a comment and is not executed. It is copied to the system log device if logging is active.

1.5.1 Statement Syntax Conventions

The following statement syntax conventions are used in all statement, command and instruction formats.

Underlining points out the mnemonic of the entry and means that at least the underlined portion must be entered. If an entry is not underlined at all, the entire entry must be entered.

PAUSE

Capital letters must be entered exactly as shown:

DELETE fd_1 [,fd_2,...,fd_n]

Lower-case letters represent parameters or denote information provided by the user:

CANCEL taskid

Punctuation must be entered exactly as shown.

Commas separate parameters and substitute for missing positional parameters:

DELETE fd_1 [,fd_2,...,fd_n]

Commas preceding braces inside brackets must be entered if one of the optional parameters is chosen:

DISPLAY ERRORS [,{fd / system console}]

Commas inside of brackets must be entered if the optional parameter is chosen:

BFILE fd[,lu]

An ellipsis represents an indefinite number of parameters or a range of parameters:

```
BUILD fd
  .
  .
  .
ENDB
```

Brackets represent an optional parameter:

CONTINUE [address]

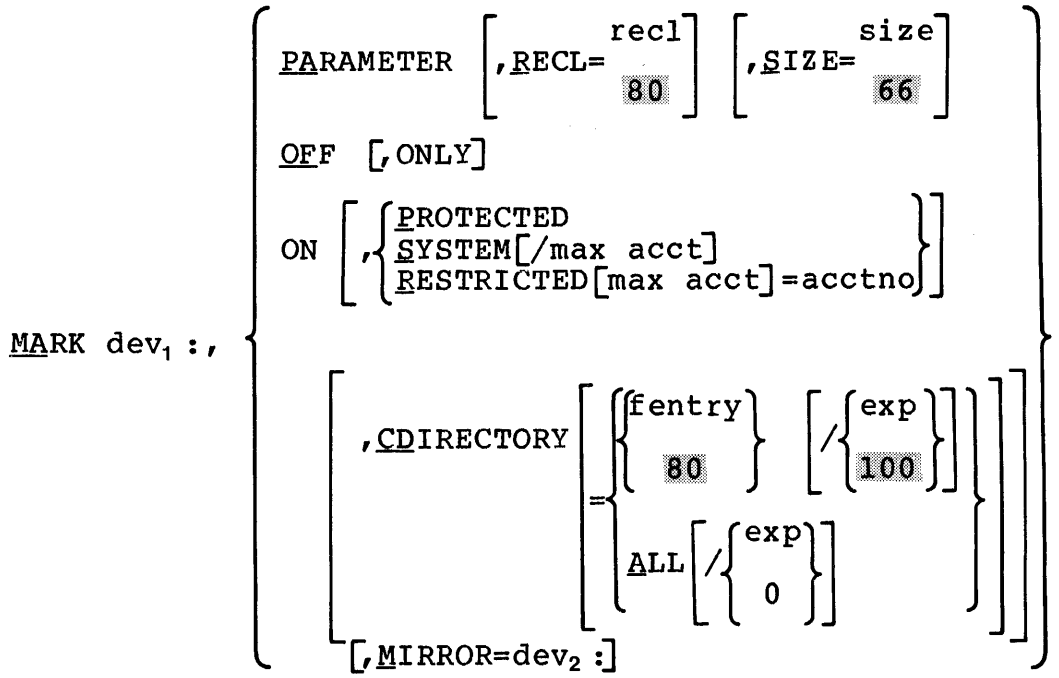
Braces represent required parameters of which one must be chosen:

CLOSE {lu_1 [,lu_2,...,lu_n] / ALL}

Shading represents a default option:

DISPLAY DEVICES [,{fd / system console}]

An equal sign associates a parameter with its keyword:



1.5.2 Upper-Case and Lower-Case Characters

All commands and parameters can be entered in either upper-case or lower-case. Parameters that are retained internally (such as task identifiers) are translated to upper-case. A subsequent display will show the upper-case version.

1.5.3 Decimal and Hexadecimal Numbers

The OS/32 commands use decimal, rather than hexadecimal, numbers for most numeric operands. A major exception is addresses, which are expressed in hexadecimal. Numeric operands are always integers except for the SET SYS and TCOM commands, and the segment size increment field of the LOAD command where the decimal point is permissible. Leading zeros can be omitted in numeric operands, whether decimal or hexadecimal.

1.5.4 Task Identifiers

Task identifiers must consist of one to eight alphanumeric characters; the first character must be alphabetic. Valid task identifiers are:

```
TASK3

MAX

X

T997XY25
```

Examples of invalid task identifiers are:

34TASK	First character is not alphabetic
T43.2	Contains a nonalphanumeric character
TASK12345	Contains more than eight characters

The background task has the special identifier .BG[xxxxx].

1.5.5 File Descriptors (fds)

File descriptors, abbreviated as fd, are entered in a standard format.

Format:

$$\left[\left\{\begin{matrix}\text{voln:}\\ \text{dev:}\end{matrix}\right\}\right] \text{[filename]} \left[\text{.[ext]}\right] \text{[/actno]}$$

Parameters:

voln: is the name of a disk volume. It may be from one to four characters long. The first character must be alphabetic and the remaining, alphanumeric. If voln: is not specified, the default is:

- TEMP volume for temporary files
- SPOOL volume for spool files
- SYSTEM volume for all other files

dev: is a 1- to 4-character device name. The first character must be alphabetic and the remaining, alphanumeric.

filename is the name of a file and is from one to eight characters long. The first character must be alphabetic and the remaining, alphanumeric. If a filename is specified when a device mnemonic is specified as dev:, the filename is ignored.

.ext	is the name of the extension and consists of from one to three alphanumeric characters. If .ext is not specified, a default extension corresponding to the appropriate command is appended. If the period (.) is specified with no extension, the default is blanks.
actno	is a decimal number ranging from 0 to 65,535 specifying the account number associated with the file. Account numbers 1 through 65,535 (excluding 255) are used by MTM. Account number 255 is reserved for the Authorized User Utility. Account number 0 is used for system files and is the default for all operator commands.

Examples:

In the following example, PACK: is the volume name, CAL is the filename, .TSK is the extension name and 0 is the account number.

```
PACK:CAL.TSK/0
```

In the following example, CONV is the filename, and .CAL is the extension name with a default account number on the default volume.

```
CONV.CAL
```

In the following example, CAL is the filename with a default extension, default account number and default volume.

```
CAL
```

In the following example, M300: is the volume name, and MAR is the filename with a default extension and default account number.

```
M300:MAR
```

In the following example, CARD: is the device mnemonic.

```
CARD:
```

1.6 ERROR RESPONSE

If a command is not acceptable to the system or an error condition is detected while processing a command, a message is displayed on the system console. The general format of the message is:

```
xxxx=ERR    TYPE=yyyy    POS=zzzz
```

Where:

xxxx	is an error descriptor of up to four characters (such as MNEM, ALLO, IO, etc.). Error descriptions are defined in each command description.
yyyy	indicates the type of error encountered and is output only when an I/O error, supervisor call 6 (SVC6), or SVC7 file handler error is encountered.
zzzz	represents the last command item processed. This field is most useful when multiple commands are entered on one line.

See Appendix B for a complete list of messages.

The error response to an unrecognized command is:

```
MNEM-ERR
```

All commands following an erroneous command on a command line are ignored if the command line is entered from the system console. If the command line is entered from a CSS, all commands are handled as if they were on individual command lines.

If the particular command cannot be accepted because of the state of the system, the following message is displayed:

```
SEQ-ERR
```

Such restrictions are discussed in the explanations of the particular commands in Chapter 3.

CHAPTER 2
LOADING OS/32

2.1 INTRODUCTION

OS/32 is stored in object or image format on one of these auxiliary devices:

- Floppy disk
- Magnetic tape
- Disk device
- Tape cartridge (Model 3203)

OS/32 can be loaded from an auxiliary device into memory by one of these loaders:

- Relocating (REL) loader if OS/32 is in object format stored on magnetic media
- Direct access bootstrap (BOOT) loader if OS/32 is in image format stored on magnetic tape or disk device and is to be loaded into a Model 7/32 or 8/32 System
- Loader storage unit (LSU) if OS/32 is in image format stored on magnetic tape or disk device
- Control/Diagnostic System (CDS) if OS/32 is in image format stored on magnetic tape or disk device and is to be loaded into a Model 3280 System.

These loaders are described in two sections. The first section describes the loading procedures used for the Model 7/32 and 8/32 Systems, which are entered through the display panel. The second section describes the loading procedures for the Perkin-Elmer Series 3200 Processors, which are entered through the system control terminal (with device address X'10').

2.1.1 Starter Systems

All starter systems can be loaded from a magnetic tape device by the REL loader (object format only), BOOT loader or LSU. OS/32 can also be loaded from a disk device by the BOOT loader or LSU.

Model 3280 Systems contain a modified LSU program within the CDS to load OS/32 from a magnetic tape or disk device. See Section 2.4.5 for details of loading OS/32 through the CDS.

The Model 3203 Processor uses a modified LSU to provide an automatic loading procedure; however, the program also has the capability of reverting to menu operation. See Section 2.4.6 for details on loading OS/32 with a Model 3203.

2.2 OS/32 BOOTSTRAP PUNCHER FOR MODEL 7/32 AND 8/32 PROCESSORS

The OS/32 bootstrap puncher converts the object versions of the 32-bit REL loader and the OS/32 bulk storage bootstrap loader into 50-sequence loadable form.

2.2.1 Starting the Bootstrap Puncher

1. Mount the media containing the bootstrap puncher.

2. Load the bootstrap puncher (BTPCH32).

   LOAD

3. Assign the input device or file from which the REL or BOOT loader is read.

   ASSIGN 1,fd

4. Assign the output device to which the REL or BOOT loader is written.

   ASSIGN 2,fd

5. Start the bootstrap puncher.

   START

The logical unit (lu) assignments do not have to be made using the ASSIGN command; the assignments can be made via the START command.

Format:

START,fd_1,fd_2

Where:

fd is the file descriptor of the input device.

fd is the file descriptor of the output device.

Example:

This example places the BOOT loader on the front end of MAG2, followed by a copy of an OS/32 image file.

```
LO BTPCH32
AS 1,BOOT32.OBJ
AS 2,MAG2:
ST
OS/32 BOOT PUNCHER 03-00
BGG     -END OF TASK CODE=   0    CPUTIME=0.026/0.026
LO COPY32
ST
OS/32 COPY R01-00
OPT BIN,NOT,NOPS
COPY OS32LAB.006,MAG2:
END OF MEDIUM - 665 RECORD(S) COPIED
COPY COMPLETE - 1 FILE(S) COPIED
REW 0
END
BGG     -END OF TASK CODE=   0    CPUTIME=1.687/0.071
```

2.2.2 Messages for Bootstrap Puncher

All messages are output to the system console in the following formats.

Error Messages:

ASGN-ERR TYPE=xxxx LU=yy

indicates that the variable xxxx is a type of input/output (I/O) error and file access error. yy is the lu where the error occurred.

8100 ERROR:LU=xx

indicates that the variable xx is the lu not assigned.

ILLEGAL ASSIGNMENT ON LUx

indicates that the variable x is the lu where the error occurred.

Table 2-1 defines the error types.

TABLE 2-1 ERROR TYPES

ERROR TYPE	xxxx	DEFINITION
I/O	ILLU	Illegal or unassigned lu
	PRTY	Parity or recoverable error
	UNRV	Unrecoverable error
	EOF	End of file
	EOM	End of medium
	DU	Device unavailable
	FUNC	Invalid function or device
File access	FUNC	Illegal function
	VOL	No such volume/device
	LU	Illegal lu
	NAME	Mismatched filename.ext
	SIZE	Erroneous record length or size
	PROT	Mismatched protection key
	PRIV	Mismatched access privileges
	BUFF	Unable to obtain file control block (FCB)
	TYPE	Nondirect access device

2.3 LOADING OS/32 FOR MODEL 7/32 AND 8/32 SYSTEMS

The following sections describe the procedures for loading the desired loader and OS/32 through the display panel.

2.3.1 Loading OS/32 Using the Relocating (REL) Loader

To load OS/32 object format, follow this procedure:

1. Mount the media containing the REL loader and position it at load point.
2. Enter the 50 sequence:

```
DTA-50-ADD
DTA-D500-WRT
DTA-00CF-WRT
DTA-4300-WRT
DTA-0080-WRT
```

3. Enter into memory, starting at location X'78', the device number and output command of the device containing the REL loader:

DTA-78-ADD	Address location X'78'
DTA-0294-WRT	Teletype reader
DTA-0399-WRT	High-speed paper tape reader
DTA-1399-WRT	High-speed reader/punch
DTA-45A1-WRT	Tape cassette (deck 0)
DTA-55A1-WRT	Tape cassette (deck 1)
DTA-85A1-WRT	Magnetic tape (800 bpi)
DTA-C5A1-WRT	Magnetic tape (1600 bpi)

4. Clear the program status word (PSW) by entering:

```
DTA-0-FN-1
```

5. Initialize machine malfunction pointers by entering:

DTA-84-ADD	Address location X'84'
DTA-5000-WRT	Set pointer to 5000
DTA-6000-WRT	Set pointer to 6000

6. If the processor is equipped with an LSU, the LSU must be off.

7. Initialize the processor and start executing at location X'50' by entering:

```
INI-DTA-50-ADD-RUN
```

8. Display the REL loader starting address by entering:

```
FUN-LOC
```

9. If OS/32 is not on the same media as the REL loader, mount the media containing OS/32 and enter into location X'78' the device number and output command of the device containing OS/32. See Step 3.

10. Specify the number of filemarks to skip and execute the REL loader to load OS/32 by entering:

```
DTA-rel addr-ADD
DTA-00nn-RUN
```

Where:

nn	is the number of filemarks.

11. When loading is completed, the OS/32 ID and license or contract are displayed on the system console:

```
OS/32nn-uu.vvvvvvvv   LICENSE x-xxxx-xxxx-x
```

Where:

nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.
vvvvvvvv	is an 8-character alphanumeric string indicating the user version number.
x-xxxx-xxxx-x	is a series of alphanumeric characters identifying the license or contract of the system.

2.3.2 Relocating (REL) Loader Error Check Procedure and Error Codes

If the WAIT light does not come on, the OS/32 revision ID is not displayed on the system console, or zeros are not displayed on the display panel, follow this error check procedure:

1. Ensure that the device containing the REL loader is turned on and is on-line to the system.
2. Ensure that the device containing the REL loader is correctly positioned.
3. Ensure that the data entered in the appropriate locations is correct.
4. Load a different copy of the REL loader.
5. If the error is not detected after performing Steps 1 through 4, a hardware error might exist. Check the display panel for the REL loader error codes (Table 2-2) or system crash codes (Appendix D).

TABLE 2-2 REL LOADER ERROR CODES

ERROR CODE	MEANING
0000	The load terminated normally.
0001	A checksum or parity error occurred. Press RUN to reread.
0002	A sequence error occurred; retry load. OS/32 may be defective or incomplete.
0003	An attempt to load over the loader occurred; retry.
0004	An REF-DEF chain loop occurred; retry.
0005	The device is unavailable or is not positioned to the correct file. Check the device address.
0006	The selector channel (SELCH) specified is incorrect. Check device and SELCH address.
0007	End of file (EOF) was encountered; retry load.
FFnn	A load error occurred because an improper loader item nn was detected. Correct the control item and retry.

2.3.3 Loading OS/32 Using the Direct Access Bootstrap (BOOT) Loader

To load OS/32 image format, follow this procedure:

1. Mount the media containing the BOOT loader (see Section 2.2) and position it at load point.
2. Mount the media containing OS/32 and wait until the READY indicator lights.
3. Enter the 50 sequence:

```
DTA-50-ADD                    Address location X'50'
DTA-D500-WRT
DTA-00CF-WRT
DTA-4300-WRT
DTA-0080-WRT
```

4. Enter into memory starting at location X'78' the device number and output command of the device containing the BOOT loader:

DTA-78-ADD	Address location X'78'
DTA-0294-WRT	Teletype
DTA-0399-WRT	High-speed paper tape reader
DTA-1399-WRT	High-speed reader/punch
DTA-45A1-WRT	Tape cassette (deck 0)
DTA-55A1-WRT	Tape cassette (deck 1)
DTA-85A1-WRT	Magnetic tape (800 bpi)
DTA-C5A1-WRT	Magnetic tape (1600 bpi)

5. Enter into memory starting at location X'7A' the device number and device code of the device containing OS/32:

DTA-7A-ADD	Address location X'7A'
DTA-C631-WRT	2.5Mb disk
DTA-C633-WRT	10Mb removable disk
DTA-C732-WRT	10Mb fixed disk
DTA-FC34-WRT	40Mb disk
DTA-FC35-WRT	MSM80 disk
DTA-FC36-WRT	MSM300 disk
DTA-C137-WRT	Floppy disk
DTA-8540-WRT	Magnetic tape (800 bpi)
DTA-C541-WRT	Magnetic tape (1600 bpi)

6. Enter into memory starting at location X'7C' the controller and SELCH addresses of the device containing OS/32:

DTA-7C-ADD	Address location X'7C'
DTA-B6F0-WRT	2.5Mb disk
DTA-B6F0-WRT	10Mb disk
DTA-FBF0-WRT	40Mb disk
DTA-FBF0-WRT	MSM80 disk
DTA-FBF0-WRT	MSM300 disk
DTA-nn00-WRT	Floppy disk (nn=drive number)
DTA-nnF0-WRT	Magnetic tape (controller included; nn=driver number)

7. If loading from disk, enter into memory at location X'7E' the extension field of the OS/32 file descriptor (fd) (X'000'-X'FFF'):

DTA-ext-WRT

8. Initialize machine malfunction pointers by entering:

```
DTA-84-ADD          Address location X'84'
DTA-5000-WRT        Set pointer to 5000
DTA-6000-WRT        Set pointer to 6000
```

9. If loading from disk, disable the write-protect switch on the disk drive.

10. Initialize the processor and start executing at location X'50' by entering:

```
INI-DTA-50-ADD-RUN
```

11. When loading is completed, the OS/32 ID and license or contract are displayed on the system console:

```
OS/32nn-uu.vvvvvvvv   LICENSE x-xxxx-xxxx-x
```

Where:

nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.
vvvvvvvv	is an 8-character alphanumeric string indicating the user version number.
x-xxxx-xxxx-x	is a series of alphanumeric characters identifying the license or contract of the system.

2.3.4 Direct Access Bootstrap (BOOT) Loader Error Check Procedure and Error Codes

If the OS/32 ID is not displayed on the system console within several minutes after initialization or zeros are not displayed on the display panel, follow these eight steps.

1. Ensure that the BOOT loader device is turned on and is on-line to the system.

2. Ensure that the disk's READY light is on.

3. Ensure that locations X'7A' through X'7D' contain a device address, device code, controller address and SELCH address corresponding to the current hardware configuration.

4. Ensure that the system console is powered on and is on-line to the system.

5. Check the PSW status for a nonzero value.

6. If the error is not detected after performing Steps 1 through 5, a hardware error may exist. Check the display panel for a BOOT loader error code (Table 2-3) or a system crash code (Appendix D).

7. Ensure that the console device configured in the system is correct for the specific hardware configuration.

8. Load a different copy of the BOOT loader.

TABLE 2-3 BOOT LOADER ERROR CODES

ERROR CODE	MEANING
1	No contiguous file having a name starting with the characters OS32 was found, or no OS32xxxx filename with the correct extension was found.
2	Status error for a 2.5Mb or 10Mb disk (device unavailable) occurred.
3	Status error for a 2.5Mb or 10Mb disk (seek incomplete or not ready) occurred.
4	Status error for a 40Mb, MSM80 or MSM300 disk (unsafe, not ready or device unavailable) occurred.
5	Status error for a 40Mb, MSM80 or MSM300 disk (unsafe, seek incomplete or not ready) occurred.
6	Data transfer error occurred; for example, data parity error.
7	Memory access controller (MAC) test fault occurred.
8	Memory test fault.
9	Device or SELCH address error. Check device and SELCH addresses.

2.3.5 Loading OS/32 Using the Loader Storage Unit (LSU)

To load OS/32 from a contiguous disk file or tape using the LSU, follow this procedure:

1. Turn the LSU on/off switch to on.
2. Mount the disk volume or tape containing OS/32 and wait for the READY indicator to light.
3. Enter into memory starting at location X'7A' the device address and device code of the device containing OS/32:

DTA-7A-ADD		Address location X'7A'
DTA-	C631-WRT	2.5Mb disk
	C633-WRT	10Mb removable disk
	C732-WRT	10Mb fixed disk
	FC34-WRT	40Mb disk
	FC35-WRT	MSM80 disk
	FC36-WRT	MSM300 disk
	C137-WRT	Floppy disk
	8540-WRT	Magnetic tape (800 bpi)
	C541-WRT	Magnetic tape (1600 bpi)

4. Enter into memory starting at location X'7C' the disk controller and SELCH addresses of the device containing OS/32:

DTA-	B6F0-WRT	2.5Mb disk
	B6F0-WRT	5Mb disk
	FBF0-WRT	40Mb disk
	FBF0-WRT	MSM80 disk
	FBF0-WRT	MSM300 disk
	nn00-WRT	Floppy disk (n=drive number)
	nnF0-WRT	Magnetic tape (controller included; nn=drive number)

5. If loading from disk, enter into memory starting at location X'7E' the extension field of the OS/32 fd (X'000' to X'FFF'):

   DTA-ext-WRT

6. If loading from disk, disable the hardware write-protect switch.
7. Initialize the processor and load OS/32 by pressing the INIT key.

8. After the LSU loads OS/32 into memory, the OS/32 ID and license or contract are displayed on the system console:

```
OS/32nn-uu.vvvvvvvv   LICENSE x-xxxx-xxxx-x
```

Where:

OS/32	is the standard OS/32 fd.
nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.
vvvvvvvv	is an 8-character alphanumeric string indicating the user version number.
x-xxxx-xxxx-x	is a series of alphanumeric characters identifying the license or the system.

9. Turn the LSU ON/OFF switch to OFF.

2.3.6 Loader Storage Unit (LSU) Error Check Procedure and Error Codes

If the OS/32 ID is not displayed on the system console within several minutes after initialization or zeros are not displayed on the display panel, follow this error check procedure:

1. Ensure that the LSU ON/OFF switch is ON.
2. Ensure that the READY indicator on the disk drive containing OS/32 is lit.
3. Ensure that locations X'7A' through X'7D' contain a device address, output command, controller address and SELCH address corresponding to the current hardware configuration.
4. Ensure that locations X'7E' and X'7F' contain the correct OS/32 fd extension.
5. Ensure that the system console is powered on and is on-line to the system.
6. Check the PSW status for a nonzero value.
7. If the error is not detected after performing Steps 1 through 6, a hardware error may exist. Check the display panel for an LSU error code (Table 2-4) or a system crash code (Appendix D).

8. If a system failure code is not displayed on the display panel, check the hardware configuration for the system console device.

TABLE 2-4 LSU ERROR CODES

ERROR CODE	MEANING
1	No contiguous file having a name starting with the characters OS32 was found, or no OS32xxxx filename with the correct extension was found.
2	A 2.5Mb or 10Mb disk is unavailable.
3	A 2.5Mb or 10Mb disk is unsafe, not ready or unavailable.
4	A 40Mb, MSM80 or MSM300 disk is unsafe, not ready or unavailable.
5	A 40Mb, MSM80 or MSM300 disk is unsafe, not ready or seek incomplete.
6	Data transfer error occurred.
7	The size of OS/32 is larger than the memory in which it is to be located.

2.4 LOADING OS/32 FOR SERIES 3200 SYSTEMS

The starter systems or OS/32 can be loaded from a magnetic tape or contiguous disk file by the LSU. The CDS is used for bootloading OS/32 for the Model 3280. The bootloading procedure for Model 3203 is simplified. When the processor is turned on, OS/32 can be loaded automatically, or, if desired, can be loaded through an interactive session.

2.4.1 Loading OS/32 Using the Relocating (REL) Loader

To load OS/32 object format, follow this procedure:

1. Mount the media containing the REL loader and position it at load point.

2. Turn key to ON. Depress HALT/RUN to obtain prompt.

3. Enter the 50 sequence:

```
@50
=D500
=00CF
=4300
=0080
```

4. Enter into memory starting at location X'78' the device number and output command of the device containing the REL loader:

```
@78                          Address location X'78'
=0294                        Teletype reader
=0399                        High-speed paper tape
                             reader
=1399                        High-speed reader/punch
=45A1                        Tape cassette (deck 0)
=55A1                        Tape cassette (deck 1)
=85A1                        Magnetic tape (800 bpi)
=C5A1                        Magnetic tape (1600 bpi)
```

5. Clear the PSW by entering:

```
P
=0
```

6. Initialize machine malfunction pointers by entering:

```
@84                          Address location X'84'
=5000                        Set pointer to 5000
=6000                        Set pointer to 6000
```

7. If the processor is equipped with an LSU, the LSU must be off.

8. Initialize the processor and start executing at location X'50' by entering:

```
@50
<
```

9. The REL loader starting address is displayed.

10. If OS/32 is not on the same media as the REL loader, load the media containing OS/32 and enter into location X'78' the device number and output command of the device containing OS/32. See Step 3.

11. If the device containing OS/32 is magnetic tape, the SELCH address must be specified in location X'7D'. If the device containing OS/32 is not a tape, 0 must be specified in location X'7D'.

```
@7C                    Address location X'7C'
=00F0                  SELCH X'F0'
=00F1                  SELCH X'F1'
=0000                  No SELCH
```

12. Specify the number of filemarks to skip, and execute the REL loader to load OS/32 by entering:

```
@7E                    Address location X'7E'

=00nn                  nn=number of filemarks

@rel adr               Address REL loader starting
                       address
<
```

13. When loading is completed, the OS/32 ID and license or contract are displayed on the system console:

```
OS/32nn-uu.vvvvvvvv   LICENSE x-xxxx-xxxx-x
```

Where:

nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.
vvvvvvvv	is an 8-character alphanumeric string indicating the user version number.
x-xxxx-xxxx-x	is a series of alphanumeric characters identifying the license or contract of the system.

2.4.2 Relocating (REL) Loader Error Check Procedure and Error Codes

If the WAIT light does not come on and the OS/32 revision ID is not displayed on the system console, follow this error check procedure:

1. Ensure that the device containing the REL loader is turned on and is on-line to the system.

2. Ensure that the device containing the REL loader is correctly positioned.

3. Ensure that the data entered in the appropriate locations is correct.

4. Load a different copy of the REL loader.

5. If the error is not detected after performing Steps 1 through 4, a hardware error might exist. Check the system console for the REL loader messages (Table 2-5) or system crash codes (Appendix D).

TABLE 2-5 REL LOADER MESSAGES

MESSAGE	MEANING
NORMAL END	The load terminated normally.
CKSM or PARITY ERR	A checksum error occurred. Press RUN to reread.
SEQ ERR	A sequence error occurred; retry load. OS/32 may be defective or incomplete.
ADDR ERR	An attempt to load over the loader occurred; retry.
REF-DEF ERR	An REF-DEF chain loop occurred; retry.
DEV ERR	Device is unavailable or is not assigned to the correct file. Check the device address.
CONFIG ERR	SELCH specified is incorrect. Check device address.
EOF ERR	End of file was encountered; retry load.
ILL LOADER ITEM ERR	A load error occurred because an improper control item nn was detected. Correct the control item and retry.

2.4.3 Loading OS/32 Using the 2kb Loader Storage Unit (LSU)

To load OS/32 image format from disk or magnetic tape using the 2kb LSU, follow this procedure:

1. Mount the media containing OS/32. If OS/32 is on a disk device, press the START switch and wait for the READY indicator to light. If OS/32 is on magnetic tape, position the tape at load point.
2. Turn the LOCK/ON/STANDBY key to the ON position.
3. Press the initial power load (IPL) ENABLE/DISABLE switch to ENABLE.
4. Initialize and load the 2kb LSU BOOT loader program by pressing the INIT switch.

After the LSU program is initialized and loaded, the following is displayed on the system console:

```
3200 LSU LOADER Rnn-uu
DEVS
MG85
MGC5
DS5R
DS5F
DS67
D256
FLPY
OTHR
```

Where:

nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.

After the device names are displayed on the system console, the LSU responds with the following prompts. All responses to prompts are lower-case to indicate that they are specified by the user. If an error is made when entering a response, press the BREAK key to discontinue the response and restart the loader. This causes the LSU ID, followed by the device names, to be displayed on the system console again.

```
DEVICE=xxxx
```

Where:

xxxx	is a 1- to 4-character string indicating the name of the device containing OS/32. If the user-specified device mnemonic was not displayed on the system console when the LSU was initialized, enter the letters OTHR. See Table 2-6 for a list of device descriptions.

If a magnetic tape device is specified as the response, the tape is automatically rewound, and this prompt is displayed on the system console:

```
FILEMARKS=xxx
```

Where:

xxx	is a 1- to 3-digit decimal number from 0 to 255 indicating the number of filemarks to skip to reach the OS/32 file. When the number of filemarks is entered followed by a carriage return (CR), the LSU loads OS/32 from the file beginning after the last filemark skipped.

If a disk device is specified as the response, this prompt is displayed on the system console with the volume name of the disk:

```
VOL=vvvv,FILE=filename.ext/act
```

Where:

vvvv	is a 1- to 4-character volume name of the disk containing OS/32. The BOOT loader program reads and displays the existing volume name to the system console.
filename.ext/act	is the OS/32 filename, extension and account number. After the OS/32 filename, extension and account number are entered followed by a CR, the LSU loads OS/32.

If the letters OTHR are specified in response to the DEVICE= prompt, the following five prompts are displayed on the system console one at a time.

1. DEV#=nnn

Where:

nnn	is a 1- to 3-digit hexadecimal number indicating the device address of the device containing OS/32.

2. CODE=cc

Where:

cc	is a 2-digit hexadecimal number indicating the device code of the device containing OS/32. See Table 2-6 for a list of device codes.

3. CTLR=mmm

Where:

mmm	represents a 1- to 3-digit hexadecimal number indicating the controller address of the disk device containing OS/32. This prompt is not displayed if the device code specified a magnetic tape device.

4. SLCH=sss

Where:

sss	represents a 1- to 3-digit hexadecimal number indicating the SELCH address of the magnetic tape or disk device containing OS/32. This prompt is not displayed if the device code specified a floppy disk device.

5. DRV#=n

Where:

n	is a decimal number indicating the spindle containing the floppy disk from which the OS/32 is to be loaded. This prompt is displayed only if the device code indicated a floppy disk device.

TABLE 2-6 STANDARD CONFIGURATIONS SUPPORTED BY LSU

DEVICE NAME	DEVICE DESCRIPTION	DEVICE ADDRESS	DEVICE CODE	CON-TROLLER ADDRESS	SELCH ADDRESS
MG85	800 bpi mag tape	85	40	N/A	F0
MG85	1600 bpi mag tape	C5	41	N/A	F0
DS5F	5Mb disk - fixed	C7	32	B6	F0
DS5R	5Mb disk - removable	C6	33	B6	F0
DS67	67Mb disk	FC	35	FB	F0
D256	256Mb disk	FC	36	FB	F0
FLPY	Floppy disk	C1	37	N/A	N/A

2.4.3.1 2kb Loader Storage Unit (LSU) Messages

FILE NOT FOUND

indicates that the user-specified fd does not exist or is not contiguous.

IOERROR CNFG

indicates that an I/O error occurred because the hardware configuration does not correspond with that specified by the user.

IOERROR DU

indicates that the user-specified device is unavailable.

IOERROR UNRE

indicates that the I/O error that occurred is unrecoverable.

MEMTST ERR nnnnnn

indicates that an error occurred during a memory test before OS/32 was loaded. The faulting memory location is at nnnnnn. Load an OS/32 with a size 2652 bytes less than location nnnnnn to allow more room for the loader; otherwise, repair memory.

2.4.4 Loading OS/32 Using the 8kb Loader Storage Unit (LSU)

To load OS/32 image format from disk or magnetic tape using the 8kb LSU BOOT loader program, follow this procedure:

1. Mount the media containing OS/32. If OS/32 is on a disk device, press the START switch and wait for the READY indicator to light. If OS/32 is on magnetic tape, position the tape at load point.

2. Turn the LOCK/ON/STANDBY key to the ON position.

3. If the device is configured on a common bus under the control of a bus switch, ensure that the bus switch is in the central processing unit (CPU) position.

4. Place the IPL ENABLE/DISABLE switch in the ENABLE position.

5. Initialize and load the 8kb LSU BOOT loader program by pressing the INIT switch.

After the program is initialized and loaded, the following is displayed on the system console.

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER R01
DEVICE
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C13F
C40F
C67F
D300
D19R
D19F
FLPY
OTHR
DEVICE=
```

After the LSU program is loaded, processor capabilities are tested by the basic confidence test. If this test passes, the following message is displayed:

```
BASIC TEST COMPLETE
```

If this test fails, a message is displayed (see Section 2.4.4.2). The basic confidence test also performs a checksum on the data read from the 8kb LSU's privileged read-only memories (PROMs). If the checksum calculated is incorrect, the following message is displayed and the program is terminated:

```
CHECKSUM ERROR
```

If a checksum error occurs, execute Test 1 of the LSU support program. Test 1 tests the contents of the PROMs for accuracy against an error-free BOOT loader program. If the contents of the PROMs are correct, reinitialize the 8kb LSU program. If a checksum error reoccurs, the problem might be hardware related.

After the basic confidence test message is displayed, the following program ID is displayed.

```
3200 8KB LSU BOOTLOADER Rnn-uu
```

Where:

nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.

After the LSU ID is displayed on the system console, the operating system bootable device menu is shown. See Table 2-7 for a list of Perkin-Elmer 8kb LSU-supported device names, descriptions and configurations.

TABLE 2-7 8KB LSU-SUPPORTED DEVICE NAMES AND CONFIGURATIONS

DEVICE NAME	DEVICE DESCRIPTION	DEVICE ADDRESS	DEVICE CODE	CON-TROLLER ADDRESS	SELCH ADDRESS
MG85	800 bpi mag tape	85	40	N/A*	F0
MGC5	1600 bpi mag tape	C5	41	N/A*	F0
MG62	6250 bpi mag tape	85	44,45 or 46	N/A*	F0
DS5R	5Mb disk - removable	C6	33	B6	F0
DS5F	5Mb disk - fixed	C7	32	B6	F0
DS67	67Mb disk	FC	35	FB	F0
D256	256Mb disk	FC	36	FB	F0
MM68	68.7Mb disk - MMD fixed and head per track (HPT)	FC	38	FB	F0
MM01	1.6 Mb disk - MMD HPT	FC	39	FB	F0
MM67	67.2Mb disk - MMD fixed	FC	3A	FB	F0
C13R	13.5Mb disk - CMD removable	FC	3B	FB	F0
C13F	13.5Mb disk - CMD fixed	FC	3C	FB	F0
C40F	40.4Mb disk - CMD fixed	FC	3D	FB	F0
C67F	67.3Mb disk - CMD fixed	FC	3E	FB	F0

TABLE 2-7 8KB LSU-SUPPORTED DEVICE NAMES AND CONFIGURATIONS (Continued)

DEVICE NAME	DEVICE DESCRIPTION	DEVICE ADDRESS	DEVICE CODE	CON-TROLLER ADDRESS	SELCH ADDRESS
D300	Capricorn 300Mb	FC	2C	FB	F0
D19R	18.5Mb disk Lark removable	FC	2A	FB	F0
D19F	18.5Mb disk Lark fixed	FC	2B	FB	F0
FLPY	Floppy disk	C1	37	N/A*	N/A*

*N/A = Not applicable

The program then displays the following prompts. The responses shown are lower-case to indicate that they are specified by the user. If an error is made when entering a response, a correction can be made in one of the following three ways.

1. Press the BACKSPACE key or CTRL H keys to bring the cursor to the character in error.

2. Press the CTRL X keys to delete the entire line.

3. Press the BREAK key to restart the program; the following prompt will appear:

```
>DEVICE=dddd
```

Where:

dddd is a 4-character string indicating one of the supported devices listed in the 8kb LSU device menu. Configurations for these supported devices are automatically represented in the system and are listed in Table 2-7. If a unique device configuration that differs from the configurations presented in Table 2-7 is desired, enter OTHR to the DEVICE= prompt.

The type of device entered in the DEVICE= prompt determines which of the following four prompt sequences is issued.

- Mag Tape Device

  If an 8kb LSU-supported magnetic tape device is specified as a response, the following prompt is displayed on the system console:

  ```
  >FILEMARKS=xxx
  ```

  Where:

xxx	is a 1- to 3-digit decimal number from 0 to 255. This number represents the number of filemarks to skip to reach the OS/32 file. When the number of filemarks is entered followed by a CR, the 8kb LSU program loads OS/32 from the file beginning after the last filemark skipped.

- Hard Disk Device

  If an 8kb LSU-supported disk device name is entered as a response, the following prompt is displayed on the system console:

  ```
  >VOL=vvvv,FILE=filename.ext/act
  ```

  Where:

vvvv	is a 1- to 4-character volume name of the disk containing OS/32. The BOOT loader program reads and displays the existing volume name to the system console.
filename.ext/act	is a 1- to 8-character filename, a 1- to 3-character extension and a 1- to 3-digit decimal account number from 0-255. After filename.ext/act is entered followed by a CR, the 8kb LSU program loads OS/32.

- Floppy Disk Device

  If FLPY is entered as a response, the following prompt is displayed on the system console:

  ```
  >DRV#=n
  ```

  Where:

n	is a decimal number from 0 to 3 specifying the spindle containing the floppy disk from which the OS/32 is to be loaded.

  After the spindle number is specified, the following prompt is displayed:

  ```
  >VOL=vvvv,FILE=filename.ext/act
  ```

  Where:

vvvv	is a 1- to 4-character volume name of the floppy disk containing OS/32. The BOOT loader program reads and displays the existing volume to the system console.
filename.ext/act	is a 1- to 8-character filename, a 1- to 3-character extension and a 1- to 3-digit decimal account number from 0-255. After filename.ext/act and a CR are entered, the BOOT loader program loads OS/32.

- Other

  A response of OTHR to the DEVICE= prompt allows the user to specify a device address other than that listed in Table 2-7 for a particular device. The following six prompt sequences are displayed on the system console.

  1. >DEV ADDR=aaa

     Where:

aaa	is a 1- to 3-digit hexadecimal number indicating the address of the device containing OS/32.

2. >DEV CODE=cc

Where:

cc is a 2-digit hexadecimal number indicating the code of the device from which the operating system is to be loaded. The device codes listed in Table 2-7 are those used for 8kb LSU-supported device names. The device code entered indicates the type of device that contains the operating system. The next prompt displayed in the prompt sequence is dependent upon the type of device indicated by the device code entry.

3. >CTLR ADDR=mmm

Where:

mmm is a 1- to 3-digit hexadecimal number indicating the controller address for the device from which the operating system is to be loaded. If the device is a magnetic tape or a floppy disk, this prompt is not displayed.

4. >SLCH ADDR=sss

Where:

sss is a 1- to 3-digit hexadecimal number indicating the SELCH address. If the device is a floppy disk, this prompt is not displayed.

5. >FILEMARKS=xxx

Where:

xxx is a 1- to 3-digit decimal number from 0 to 255. This number represents the number of filemarks to skip to reach OS/32. This prompt is displayed only if the device code entered indicates a magnetic tape device.

6. >DRV#=n

Where:

n — is the decimal number specifying the spindle containing the floppy disk from which the OS/32 is to be loaded. This prompt is displayed only if the device code indicates a floppy disk device.

After all necessary information has been entered, the LSU begins to load OS/32 into memory.

2.4.4.1 Examples of Loading OS/32 from Different Devices

- Loading OS/32 from an 8kb LSU-supported magnetic tape device:

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER Rnn-uu
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C13F
C40F
C67F
FLPY
OTHR
DEVICE=MG85
FILEMARKS=2
```

The above example, followed by a CR, loads OS/32 from the third file on the tape.

- Loading OS/32 from an 8kb LSU-supported disk device:

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER Rnn-uu
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C134
C40F
C67F
FLPY
OTHR
DEVICE=DS5R
VOL=MT32,FILE=OS3220.KIR/150
```

The above example, followed by a CR, loads OS/32.

- Loading OS/32 from an 8kb LSU-supported floppy disk:

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER Rnn-uu
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C13F
C40F
C67F
FLPY
OTHR
DEVICE=FLPY
DRV#=1
VOL=MT32,FILE=OS3220.KIR/115
```

The above example, followed by a CR, loads OS/32.

- Loading OS/32 from an 8kb LSU-supported disk device that has a nonstandard configuration:

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER Rnn-uu
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C13F
C40F
C67F
FLPY
OTHR
DEVICE=OTHR
DEV ADDR=EC
DEV CODE=35
CTLR ADDR=EB
SLCH ADDR=FA
VOL=MT32,FILE=OS3220.KIR/0
```

The above example, followed by a CR, loads OS/32.

- Loading OS/32 from an 8kb LSU-supported magnetic tape device that has a nonstandard configuration:

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER Rnn-uu
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C13F
C40F
C67F
FLPY
OTHR
DEVICE=OTHR
DEV ADDR=85
DEV CODE=40
SLCH ADDR=F0
FILEMARKS=2
```

The previous example, followed by a CR, loads OS/32 from the third file on the tape.

- Loading OS/32 from an 8kb LSU-supported floppy disk device that has a nonstandard configuration:

```
BASIC TEST COMPLETE
3200 8KB LSU BOOTLOADER Rnn-uu
MG85
MGC5
MG62
DS5R
DS5F
DS67
D256
MM68
MM01
MM67
C13R
C13F
C40F
C67F
FLPY
OTHR
DEVICE=OTHR
DEVICE ADDR=C2
DEVICE CODE=37
DRV#=1
VOL=MT32,FILE=OS3220.KIR/0
```

The above example, followed by a CR, loads OS/32.

2.4.4.2 8kb Loader Storage Unit (LSU) Messages

The following messages can be generated if errors occur using the 8kb LSU. If any of the BASIC CONFIDENCE TEST errors occur, except CHECKSUM ERROR, contact your service representative. See Section 2.4.4 for details on the procedure to follow if the CHECKSUM ERROR occurs.

Error Messages:

BASIC CONFIDENCE TEST ERRORS:

CHECKSUM ERROR

CANNOT CLEAR PSW

EPSR ARGUMENT 00000001, L FLAG NOT SET

EPSR ARGUMENT 00000001, ALSO SET C, V, OR G

EPSR DOESN'T PROPERLY UNLOAD PSW

LA---RX1 FAILURE

LA---RX2 FAILURE

THI---CC NOT CLEAR

THI---1ST OP REGISTER CHANGED

THI---CC NOT SET

OR---INCORRECT RESULT

NR---INCORRECT RESULT

SR---INCORRECT RESULT

EXBR---INCORRECT RESULT

SRLS---INCORRECT RESULT

MHR---INCORRECT RESULT

DH---INCORRECT RESULT

Initial Program Load (IPL) Error Messages:

CONFIGURATION ERROR

indicates that an I/O error occurred because the hardware configuration does not correspond with that specified by the user.

DISC NOT INITIALIZED

indicates that the disk pack (fixed or removable) is not properly initialized.

DEVICE UNAVAILABLE

indicates that the user-specified device is unavailable.

FILE NOT FOUND

indicates that a user-specified fd does not exist, or the file is not contiguous.

MEMORY TEST ERROR @ xxxxxx

indicates that an error occurred during a memory test before OS/32 was loaded. The fault memory location is at xxxxxx.

UNRECOVERABLE ERROR ON DEVICE xxx, STATUS=yy

indicates that an unrecoverable I/O error occurred. The device address is xxx and the bad status code is yy.

2.4.4.3 Loading OS/32 Using the 8kb Loader Storage Unit (LSU) in an Input/Output Processor (IOP)-Configured Model 3200MPS System

The bootloading procedure for an IOP-configured Model 3200MPS System has a few special considerations which are detailed below. Otherwise, the bootload procedure is identical to that outlined within Section 2.4.4.

To load OS/32 image format from disk or magnetic tape using the 8kb LSU BOOT loader program within a Model 3200MPS System environment, follow this procedure:

1. Mount the media containing OS/32. If OS/32 is on a disk device, press the START switch and wait for the READY indicator to light. If OS/32 is on magnetic tape, position the tape at load point.
2. Turn the LOCK/ON/STANDBY key to the ON position.
3. Place the IOP/CPU bus-switch in the MANUAL position and switch it to the CPU. This step is not necessary if OS/32 is booted from a device that is configured under the CPU (not bus-switched).
4. Place the IPL ENABLE/DISABLE switch in the ENABLE position.
5. Initialize and load the 8kb LSU BOOT loader program by pressing the INIT switch.

After the program is initialized and loaded, the standard LSU ID is displayed followed by the operating system bootable device menu. Based upon operator input, various prompts are output for further operator input. See Section 2.4.4 for explicit details of these prompts and the expected operator input. After all device code and address information has been entered by the operator, the LSU begins to load the specified operating system into memory.

For a Model 3200MPS System, prior to device initialization, OS/32 will test the devices to see if they are under a non-IOP configuration. If an IOP is defined, the following message will appear on the system console:

SWITCH ALL IOP BUS-SWITCHES TO AUTO POSITION
AND ENTER 'GO'

It is necessary for the operator to manually switch the IOP bus-switch to the AUTO position and then enter 'GO' at the console. Any other input will result in the repeat of the same message. If 'GO' is entered without switching the bus-switches to the AUTO position, a bus-switch error message will appear for each IOP that failed to access the bus.

```
IOP BUS SWITCH INITIALIZATION FAILED
```

If this message should appear, start the bootloading procedure again.

If no IOPs are supported, OS/32 will continue through device initialization and print out the OS/32 banner message to the system console.

2.4.5 Loading OS/32 Using the Control/Diagnostic System (CDS) in a Model 3280 System

CDS, an internal diagnostic system, allows the operator to monitor hardware status, configure the system and boot the system through commands entered at the system console.

The Model 3280 Processor is not equipped with an LSU device. A modified LSU program is contained within the CDS.

The material that follows specifically relates to booting an operating system through CDS. For more complete information about other features of CDS, refer to the Model 3280 Operator's User Guide and the Model 3280 Control/Diagnostic System (CDS) Maintenance Manual.

To load OS/32 image format from disk or magnetic tape using CDS in a Model 3280 System, follow this procedure:

1. Mount the media containing OS/32. If OS/32 is on a disk device, press the START switch and wait for the READY indicator to light. If OS/32 is on magnetic tape, position the tape at load point.

2. Enter one or more carriage returns (CRs) to allow CDS to determine the terminal baud rate. Once the baud rate has been determined, the following messages are displayed on the system console:

```
WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
THE CURRENT CDS MASTER IS CABINET# 01
ENTER HELP COMMAND FOR ASSISTANCE

CDS>
```

CDS automatically passes control to the IPL program which in turn requests the device and file information contained in the CDS configuration tables. After the IPL program is initialized and loaded, the following is displayed on the system console.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
DEV=300MB WINCHESTER
```

The device description, 300MB WINCHESTER, was derived from the information contained in the CDS configuration tables.

The program then enters a ten second delay loop to allow for possible operator intervention. At this point, the operator can press either BREAK, the asterisk (*), the CR or no input at all. If the operator presses BREAK, the menu mode is entered. This action overrides the load device information derived from the CDS tables and provides the opportunity to choose another supported load device with either standard or nonstandard configuration. If the operator presses either the asterisk (*) or the CR, the delay loop is aborted and the program proceeds with the current selection. If there is no operator input, the program proceeds with the current load device selection (as displayed) after the ten second delay loop has expired. Assuming that there has been no operator input, the following sample messages are displayed on the console:

```
VOLUME=OS80
FILENAME=OS32.80
```

This information has also been derived from the CDS configuration tables.

At this point, the program again enters a ten second delay loop. If BREAK is pressed, menu mode is entered. If the operator presses the question mark (?), an appropriate help message is displayed followed by a list of all files on the disk that contain operating systems. The filename prompt is then repeated. As above, if the asterisk (*) or CR is pressed, the delay period is aborted and the load proceeds. If there is no input, the load proceeds when the delay period expires and the following messages are output:

```
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

If there is no load device information within the CDS configuration tables (e.g., this is the first time the system is being booted), or the operator has pressed BREAK during either of the ten second delay loops, a device menu will appear, such as shown below. This menu may vary depending upon the device configuration of a specific installation.

```
NO CDS IPL PARAMETERS
?   FOR HELP
0   FOR CUSTOM INTERACTIVE SESSION
DEFAULT CHOICES:
   DEV. CODE ADDRESSES      DESCRIPTION
   HEX (DEC) DEV CONT SELCH
1   2C (44)  0FC 0FB 0F0   300MB WINCHESTER
2   2E (46)  0FC 0FB 0F0   135MB WINCHESTER
3   35 (53)  0FC 0FB 0F0   67MB REMOVABLE
4   36 (54)  0FC 0FB 0F0   256MB REMOVABLE
5   38 (56)  0FC 0FB 0F0   68.7MB W/HPT
6   3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
7   3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
8   3C (60)  0FC 0FB 0F0   13.5MB FIXED
9   3D (61)  0FC 0FB 0F0   40.4MB FIXED
10  3E (62)  0FC 0FB 0F0   67.3MB FIXED
11  3F (63)  OFC 0FB 0F0   600MB WINCHESTER
12  41 (65)  0C5     0F0   1600BPI MAG TAPE
13  44 (68)  0C0     0F0   6250BPI MAG TAPE
14  55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
15  58 (88)  0D9 0D8 0F0   IPC WINCHESTER
NUMBER CHOICE = _
```

If operator entry is the question mark (?), the following message is output to the console followed by the device menu once again.

```
ENTER THE DECIMAL NUMBER SHOWN IN THE LEFT HAND
COLUMN OF ONE OF THE MENU LINES.
```

If operator input is invalid, the following message will appear followed by a redisplay of the device menu.

```
INVALID MENU SELECTION.
ENTER THE DECIMAL NUMBER SHOWN IN THE LEFT HAND
COLUMN OF ONE OF THE MENU LINES.
```

2.4.5.1 Interactive Session

Either a full or an abbreviated interactive session will occur depending upon the particular responses made by the operator.

If one of the decimal numbers (1-15) was chosen from the device menu, the program already knows the specific load device and the address information in effect for that device. Therefore, an abbreviated interactive session will occur starting at prompt #5, if loading from a magnetic tape device, or starting at prompt #6, if loading from a hard disk device.

If zero (0) has been chosen as the response to the device menu, it indicates the use of a supported device with a nonstandard configuration. A full interactive session will begin in order to allow the user to supply the load device information. The responses shown in lower-case are those to be supplied by the user.

If a question mark (?) is entered at any point in the prompt sequence during the interactive session, an appropriate help message will appear followed by the same prompt.

The interactive session proceeds as follows:

1. O.S. DEVICE CODE=cc

   Where:

   cc — is a 2-digit hexadecimal number indicating the code of the device from which the operating system is to be loaded. The prompts that follow are dependent upon the type of device indicated by the device code entry.

If a question mark (?) is entered, the following message and informational menu screen will appear:

```
ENTER THE HEXADECIMAL O.S. DEVICE CODE ASSOCIATED
WITH THE DESIRED LOAD DEVICE.
POSSIBLE DEVICE CODES ARE:
 2C  300MB WINCHESTER      2E  135MB WINCHESTER
 35  67MB REMOVABLE        36  256MB REMOVABLE
 38  68.7MB W/HPT          3A  67.2MB WO/HPT
 3B  13.5MB REMOVABLE      3C  13.5MB FIXED
 3D  40.4MB FIXED          3E  67.3MB FIXED
 3F  600MB WINCHESTER      41  1600BPI MAG TAPE
 44  6250BPI MAG TAPE      55  CARTRIDGE TAPE
 58  IPC WINCHESTER
O.S. DEVICE CODE = _
```

2. DEVICE ADDRESS=aaa

Where:

aaa is a 2- to 3-digit hexadecimal number indicating the address of the device containing OS/32.

If a question mark (?) is entered, the following message will appear along with the default device address associated with the current operating system device code:

```
ENTER HEXADECIMAL DEVICE OR DRIVE ADDRESS.
EXAMPLE: xx
DEVICE ADDRESS = _
```

3. CONTROLLER ADDRESS=mmm

Where:

mmm is a 2- to 3-digit hexadecimal number indicating the controller address for the hard disk or IPC device from which the operating system is to be loaded. If the device specified for prompt # 1 is a magnetic tape, this prompt is not displayed.

If a question mark (?) is entered at the prompt, the following message will appear along with the default controller address associated with the current operating system device code:

```
ENTER HEXADECIMAL CONTROLLER ADDRESS.
EXAMPLE: xx
CONTROLLER ADDRESS = _
```

4. SELCH ADDRESS=sss

Where:

sss is a 2- to 3-digit hexadecimal number indicating the SELCH address of the load device.

If a question mark (?) is entered at the prompt, the following message will appear along with the default selch address of the load device:

```
ENTER HEXADECIMAL SELCH ADDRESS.
EXAMPLE: F0
SELCH ADDRESS = _
```

5. FILEMARKS=xxx

Where:

xxx	is a 1- to 3-digit decimal number from 0 to 255. This number represents the number of filemarks to skip to reach the OS/32 file. When the number of filemarks is entered followed by a CR, the CDS program loads OS/32 from the file beginning after the last filemark skipped. This prompt is displayed only if the device code entered (as a response to prompt #1) indicates a magnetic tape device.

If a question mark (?) is entered at the prompt, the following message will appear:

```
ENTER DECIMAL NUMBER OF FILEMARKS TO SKIP PRIOR TO
LOADING.
FILEMARKS = _
```

6. VOLUME = MMD
   FILE NAME =filename.ext/act

Where:

filename.ext/act	is a 1- to 8-character filename, a 1- to 3-character extension and a 1- to 5-digit decimal account number from 0-65,535. If the device code information (entered as a response to prompt #1) indicates that the device is not a magnetic tape, the disk volume name is output followed by the filename prompt.

If a question mark (?) is entered instead of a valid response, the following message and informational menu screen will appear, indicating all operating system filenames on all accounts that have been found on the disk.

```
    ENTER THE FILE NAME OF THE PROGRAM TO BE LOADED.
    CHOOSE FROM THE FOLLOWING:
    OS32MDL2.111/0          MMD          .002/0
    MMD      .DAT/0         OS322623     .288/189
    OS10720  .OS/0          OSEDIT       .110/0
    OS245    .110/134       OS246        .110/188
    FILE NAME = _
```

After receiving valid responses to all prompts, one last prompt is output prior to beginning the load process:

```
    UPDATE CDS CONFIGURATION TABLE?  (Y OR N) >
```

If the response is "Y" for "YES", the load device information just entered is passed to the CDS program to be incorporated into its configuration tables. When the system is powered up the next time, the IPL will not have to prompt the operator for this information again; rather, it will already exist in the CDS configuration tables.

If the response is "N" for "NO", the CDS configuration tables are not updated with this new information. When the system is powered up the next time, the IPL will prompt the operator for this information, provided there is no load device information already contained within the CDS configuration tables.

Regardless of whether or not the CDS configuration tables were updated, the load process begins and runs to completion while displaying the following messages:

```
    TESTING MEMORY
    STARTING LOAD
    LOAD COMPLETE
```

2.4.5.2 Examples of Loading OS/32 - Model 3280 System

When loading OS/32 in a Model 3280 System environment, different messages, menus and prompt sequences are output depending on various factors. One of these factors is whether or not the load device information is contained within the CDS configuration tables. The first four examples below illustrate the sample device menus when there is no load device information contained in the CDS configuration tables.

- Loading OS/32 from a supported magnetic tape device:

```
WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
THE CURRENT CDS MASTER IS CABINET# 01
ENTER HELP COMMAND FOR ASSISTANCE

CDS>
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
NO CDS IPL PARAMETERS
?   FOR HELP
0   FOR CUSTOM INTERACTIVE SESSION
DEFAULT CHOICES:
   DEV. CODE ADDRESSES      DESCRIPTION
   HEX (DEC) DEV CONT SELCH
1   2C (44)  0FC 0FB 0F0   300MB WINCHESTER
2   2E (46)  0FC 0FB 0F0   135MB WINCHESTER
3   35 (53)  0FC 0FB 0F0   67MB REMOVABLE
4   36 (54)  0FC 0FB 0F0   256MB REMOVABLE
5   38 (56)  0FC 0FB 0F0   68.7MB W/HPT
6   3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
7   3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
8   3C (60)  0FC 0FB 0F0   13.5MB FIXED
9   3D (61)  0FC 0FB 0F0   40.4MB FIXED
10  3E (62)  0FC 0FB 0F0   67.3MB FIXED
11  3F (63)  OFC 0FB 0F0   600MB WINCHESTER
12  41 (65)  0C5     0F0   1600BPI MAG TAPE
13  44 (68)  0C0     0F0   6250BPI MAG TAPE
14  55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
15  58 (88)  0D9 0D8 0F0   IPC WINCHESTER
NUMBER CHOICE = 12
FILEMARKS=2
UPDATE CDS CONFIGURATION TABLE? (Y OR N) >Y
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example loads OS/32 from the third file on the tape, mounted on a 1600 bpi tape drive at device address 0C5. The CDS configuration tables are updated with the load device information.

- Loading OS/32 from a supported disk device:

```
        WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
        THE CURRENT CDS MASTER IS CABINET# 01
        ENTER HELP COMMAND FOR ASSISTANCE

        CDS>
        BASIC CONFIDENCE TEST COMPLETE
        PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
        NO CDS IPL PARAMETERS
        ?   FOR HELP
        0   FOR CUSTOM INTERACTIVE SESSION
        DEFAULT CHOICES:
           DEV. CODE ADDRESSES      DESCRIPTION
           HEX (DEC) DEV CONT SELCH
        1   2C (44)  0FC 0FB 0F0   300MB WINCHESTER
        2   2E (46)  0FC 0FB 0F0   135MB WINCHESTER
        3   35 (53)  0FC 0FB 0F0   67MB REMOVABLE
        4   36 (54)  0FC 0FB 0F0   256MB REMOVABLE
        5   38 (56)  0FC 0FB 0F0   68.7MB W/HPT
        6   3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
        7   3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
        8   3C (60)  0FC 0FB 0F0   13.5MB FIXED
        9   3D (61)  0FC 0FB 0F0   40.4MB FIXED
        10  3E (62)  0FC 0FB 0F0   67.3MB FIXED
        11  3F (63)  OFC 0FB 0F0   600MB WINCHESTER
        12  41 (65)  0C5     0F0   1600BPI MAG TAPE
        13  44 (68)  0C0     0F0   6250BPI MAG TAPE
        14  55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
        15  58 (88)  0D9 0D8 0F0   IPC WINCHESTER
        NUMBER CHOICE = 9
        VOLUME = MMD
        FILE NAME = OS32MDL2.111/0
        UPDATE CDS CONFIGURATION TABLE? (Y OR N) >N
        TESTING MEMORY
        STARTING LOAD
        LOAD COMPLETE
```

The above example loads OS/32 from a 40.4Mb fixed disk at device address 0FC. In this case, the CDS configuration tables are not updated with load device information.

- Loading OS/32 from a supported magnetic tape device that has a nonstandard configuration:

```
WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
THE CURRENT CDS MASTER IS CABINET# 01
ENTER HELP COMMAND FOR ASSISTANCE

CDS>
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
NO CDS IPL PARAMETERS
?   FOR HELP
0   FOR CUSTOM INTERACTIVE SESSION
DEFAULT CHOICES:
   DEV. CODE ADDRESSES      DESCRIPTION
   HEX (DEC) DEV CONT SELCH
1   2C (44)  0FC 0FB 0F0   300MB WINCHESTER
2   2E (46)  0FC 0FB 0F0   135MB WINCHESTER
3   35 (53)  0FC 0FB 0F0   67MB REMOVABLE
4   36 (54)  0FC 0FB 0F0   256MB REMOVABLE
5   38 (56)  0FC 0FB 0F0   68.7MB W/HPT
6   3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
7   3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
8   3C (60)  0FC 0FB 0F0   13.5MB FIXED
9   3D (61)  0FC 0FB 0F0   40.4MB FIXED
10  3E (62)  0FC 0FB 0F0   67.3MB FIXED
11  3F (63)  OFC 0FB 0F0   600MB WINCHESTER
12  41 (65)  0C5     0F0   1600BPI MAG TAPE
13  44 (68)  0C0     0F0   6250BPI MAG TAPE
14  55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
15  58 (88)  0D9 0D8 0F0   IPC WINCHESTER
NUMBER CHOICE = 0
O. S. DEVICE CODE = 44
DEVICE ADDRESS = EC
SELCH ADDRESS = F1
FILEMARKS = 5
UPDATE CDS CONFIGURATION TABLE? (Y OR N) >N
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example loads OS/32 from the sixth file on the magnetic tape mounted on a 6250 bpi tape drive located at nonstandard device and SELCH addresses. The CDS configuration tables are not updated.

- Loading OS/32 from a supported disk device that has a nonstandard configuration:

```
WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
THE CURRENT CDS MASTER IS CABINET# 01
ENTER HELP COMMAND FOR ASSISTANCE

CDS>
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
NO CDS IPL PARAMETERS
?   FOR HELP
0   FOR CUSTOM INTERACTIVE SESSION
DEFAULT CHOICES:
   DEV. CODE ADDRESSES      DESCRIPTION
   HEX (DEC) DEV CONT SELCH
1    2C (44)  0FC 0FB 0F0   300MB WINCHESTER
2    2E (46)  0FC 0FB 0F0   135MB WINCHESTER
3    35 (53)  0FC 0FB 0F0   67MB REMOVABLE
4    36 (54)  0FC 0FB 0F0   256MB REMOVABLE
5    38 (56)  0FC 0FB 0F0   68.7MB W/HPT
6    3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
7    3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
8    3C (60)  0FC 0FB 0F0   13.5MB FIXED
9    3D (61)  0FC 0FB 0F0   40.4MB FIXED
10   3E (62)  0FC 0FB 0F0   67.3MB FIXED
11   3F (63)  OFC 0FB 0F0   600MB WINCHESTER
12   41 (65)  0C5     0F0   1600BPI MAG TAPE
13   44 (68)  0C0     0F0   6250BPI MAG TAPE
14   55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
15   58 (88)  0D9 0D8 0F0   IPC WINCHESTER
NUMBER CHOICE = 0
O. S. DEVICE CODE = 2C
DEVICE ADDRESS = FD
CONTROLLER ADDRESS = FB
SELCH ADDRESS = F1
VOLUME = MNO
FILE NAME = OS32T.115/0
UPDATE CDS CONFIGURATION TABLE? (Y OR N) >Y
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example loads OS/32 from a 300MB Winchester disk with nonstandard device, controller and SELCH addresses. The CDS configuration tables are updated.

The following examples illustrate the messages that are output when the CDS configuration tables already contain the load device information.

- Loading OS/32 from a supported disk device:

```
WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
THE CURRENT CDS MASTER IS CABINET# 01
ENTER HELP COMMAND FOR ASSISTANCE

CDS>
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
DEV=67MB REMOVABLE
        .
        . (10 second delay)
        .
VOLUME=OS10
FILENAME=OS32.10
        .
        . (10 second wait)
        .
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example loads OS/32 from a 67Mb removable disk. In this instance, all the load device information is already contained within the CDS configuration tables.

- Loading OS/32 from a supported disk device after entering menu mode to specify a different load device:

```
WELCOME TO THE CONTROL-DIAGNOSTIC SYSTEM
THE CURRENT CDS MASTER IS CABINET# 01
ENTER HELP COMMAND FOR ASSISTANCE

CDS>
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F03RXX
DEV=67MB REMOVABLE
        .
        . (10 second delay)
        . (operator hits BREAK)
?   FOR HELP
0   FOR CUSTOM INTERACTIVE SESSION
DEFAULT CHOICES:
   DEV. CODE ADDRESSES      DESCRIPTION
   HEX (DEC) DEV CONT SELCH
1   2C (44)  0FC 0FB 0F0   300MB WINCHESTER
2   2E (46)  0FC 0FB 0F0   135MB WINCHESTER
3   35 (53)  0FC 0FB 0F0   67MB REMOVABLE
4   36 (54)  0FC 0FB 0F0   256MB REMOVABLE
5   38 (56)  0FC 0FB 0F0   68.7MB W/HPT
6   3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
7   3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
8   3C (60)  0FC 0FB 0F0   13.5MB FIXED
9   3D (61)  0FC 0FB 0F0   40.4MB FIXED
10  3E (62)  0FC 0FB 0F0   67.3MB FIXED
11  3F (63)  OFC 0FB 0F0   600MB WINCHESTER
12  41 (65)  0C5     0F0   1600BPI MAG TAPE
13  44 (68)  0C0     0F0   6250BPI MAG TAPE
14  55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
15  58 (88)  0D9 0D8 0F0   IPC WINCHESTER
NUMBER CHOICE = 9
VOLUME = MMD
FILE NAME = OS32MDL2.111/0
UPDATE CDS CONFIGURATION TABLE? (Y OR N) >Y
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example loads OS/32 from a 40.4Mb fixed disk at device address 0FC, after overriding the information previously contained in the CDS configuration tables. These tables are then updated with the new information.

2.4.5.3 Initial Program Load (IPL) Error Messages

There are two types of IPL error messages generated: IPL basic confidence test errors and IPL loader errors. These error messages are the same as those generated during the operation of the 8kb LSU. See Section 2.4.4.2.

2.4.6 Loading OS/32 - Model 3203 System

The LSU program has been modified to allow OS/32 to be loaded through an automatic loading operation. Once the power is switched on, the LSU will take control to boot the operating system. As the load automatically proceeds, progress messages will appear on the console. The load devices will be selected from those supported under the intelligent peripheral controller (IPC): Winchester disks (1 and 2) and the cartridge tape. If there are no errors and the load device exists, an operating system is sought on the chosen media and loaded.

If errors occur, they are reported to the console screen. The LSU program attempts to load a different device if errors occur for the first device chosen. In the event the program cannot achieve a successful load on its own, it reverts to a menu operation mode whereby the operator interactively chooses another load device and enters the address information, if necessary.

2.4.6.1 Automatic Loading Operation

A successful load operation can take place entirely without operator intervention if the operating system is being loaded from an IPC-supported device and no errors occur during the load operation. The following example presents a possible display to the terminal screen during a successful automatic loading operation.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
        .
        . (10 second wait)
        .
VOLUME=OS72
FILE NAME=DEFAULT.OS
        .
        . (10 second wait)
        .
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

During a successful automatic loading operation, a ten second delay occurs twice to allow for operator intervention, if desired. If there is no operator input during the delay, the load proceeds with the current selection.

If the operator presses the asterisk (*) or CR, the delay is aborted and the load proceeds on its own. If the operator enters a plus sign (+) or a question mark (?) during the first delay period, the delay is aborted and the load operation is attempted from the next of the three possible load devices. If the plus sign (+) is entered twice, the load operation is attempted from the third possible load device. If a question mark (?) is entered during the second delay, an appropriate help message is displayed followed by a list of all the files on the disk that contain operating systems. Then a file name prompt follows. If the operator enters any other input (other that the asterisk (*), CR, plus sign (+) or question mark (?)), it is ignored and the automatic loading operation proceeds.

2.4.6.2 Interactive Session

If the operator presses BREAK during either of the ten second delays, the automatic loading operation is aborted and an interactive menu is output. The program will enter an interactive session to allow the operator to specify load device information. The program will also enter the interactive mode if, during the automatic loading operation, the IPC initial configuration check failure occurred; or if all three of the load devices failed. This means that the program was unable to load the operating system from the possible load devices.

The following menu, or one specific to your installation, will appear to allow for operator input.

```
    BASIC CONFIDENCE TEST COMPLETE
    PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
    IPC INITIAL CONFIGURATION CHECK FAILURE, CODE=xxxxxxxx
    ?   FOR HELP
    0   FOR CUSTOM INTERACTIVE SESSION
    DEFAULT CHOICES:
       DEV. CODE ADDRESSES      DESCRIPTION
       HEX (DEC) DEV CONT SELCH
    1   2A (42)  0FC 0FB 0F0   19.8MB REMOVABLE
    2   2B (43)  0FC 0FB 0F0   19.8MB FIXED
    3   2C (44)  0FC 0FB 0F0   300MB WINCHESTER
    4   2E (46)  0FC 0FB 0F0   135MB WINCHESTER
    5   35 (53)  0FC 0FB 0F0   67MB REMOVABLE
    6   36 (54)  0FC 0FB 0F0   256MB REMOVABLE
    7   38 (56)  0FC 0FB 0F0   68.7MB W/HPT
    8   3A (58)  0FC 0FB 0F0   67.2MB WO/HPT
    9   3B (59)  0FC 0FB 0F0   13.5MB REMOVABLE
    10  3C (60)  0FC 0FB 0F0   13.5MB FIXED
    11  3D (61)  0FC 0FB 0F0   40.4MB FIXED
    12  3E (62)  0FC 0FB 0F0   67.3MB FIXED
    13  40 (64)  085     0F0   800BPI TAPE
    14  41 (65)  0C5     0F0   1600BPI MAG TAPE
    15  44 (68)  0C0     0F0   6250BPI MAG TAPE
    16  55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
    17  58 (88)  0D9 0D8 0F0   WINCHESTER DISK 1
    NUMBER CHOICE = _
```

Any one of the IPC-supported devices with a standard configuration can be chosen by entering the appropriate decimal number.

If an IPC-supported device with a nonstandard configuration is to be the load device, the operator must input zero (0) to begin the interactive session. During the interactive session, the operator is prompted for information. If the operator responds to any prompt with a question mark (?), a message is output defining the expected input followed by a repeat of the prompt.

Keep in mind that the IPC-supported devices specific to your installation will be those displayed within the individual menu and informational screens during the interactive process.

The LSU program will remove from the menu any lines that contain a device address that responds with a false sync signal. For example, if device address X'0FC' responds with a false sync signal, the menu might appear as follows:

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK FAILURE, CODE=xxxxxxxx
?   FOR HELP
0   FOR CUSTOM INTERACTIVE SESSION
DEFAULT CHOICES:
   DEV. CODE ADDRESSES      DESCRIPTION
   HEX (DEC) DEV CONT SELCH
1   40 (64)  085     0F0   800BPI TAPE
2   41 (65)  0C5     0F0   1600BPI MAG TAPE
3   44 (68)  0C0     0F0   6250BPI MAG TAPE
4   55 (85)  0DE 0D8 0F0   CARTRIDGE TAPE
5   58 (88)  0D9 0D8 0F0   WINCHESTER DISK 1
NUMBER CHOICE = _
```

If none of the default device addresses respond, the following messages are output:

```
NO RESPONDING DEFAULT DEVICE ADDRESSES
INTERACTIVE SESSION EVOKED
O. S. DEVICE CODE=_
        .
        .
        .
```

The interactive session proceeds as follows:

1. O.S. DEVICE CODE=cc

Where:

cc is a 2-digit hexadecimal number indicating the code of the device from which the operating system is to be loaded. The device code entered indicates the type of device that contains the operating system. The prompts that follow are dependent upon the type of device indicated by the device code entry.

If a question mark (?) is entered, the following message and informational menu screen will appear:

```
ENTER THE HEXADECIMAL O.S. DEVICE CODE ASSOCIATED
WITH THE DESIRED LOAD DEVICE.
POSSIBLE DEVICE CODES ARE:
 2A  19.8MB REMOVABLE     2B  19.8MB FIXED
 2C  300MB WINCHESTER     2E  135MB WINCHESTER
 35  67MB REMOVABLE       36  256MB REMOVABLE
 38  68.7MB FIXED         3A  67.2MB FIXED
 3B  13.5MB REMOVABLE     3C  13.5MB FIXED
 3D  40.4MB FIXED         3E  67.3MB FIXED
 40  800BPI TAPE          41  1600BPI MAG TAPE
 44  6250BPI MAG TAPE     55  CARTRIDGE TAPE
 58  WINCHESTER DISK 1
O.S. DEVICE CODE = _
```

2. DEVICE ADDRESS=aaa

Where:

aaa is a 2- to 3-digit hexadecimal number indicating the address of the device containing OS/32.

If a question mark (?) is entered, the following message will appear along with the default device address associated with the current OS device code:

```
ENTER HEXADECIMAL DEVICE OR DRIVE ADDRESS.
EXAMPLE: xx
DEVICE ADDRESS = _
```

3. CONTROLLER ADDRESS=mmm

Where:

mmm — is a 2- to 3-digit hexadecimal number indicating the controller address for the hard disk or device from which the operating system is to be loaded. If the device specified for prompt #1 is a magnetic tape, this prompt is not displayed.

If a question mark (?) is entered at the prompt, the following message will appear along with the default controller address associated with the current OS device code:

```
ENTER HEXADECIMAL CONTROLLER ADDRESS.
EXAMPLE: xx
CONTROLLER ADDRESS = _
```

4. SELCH ADDRESS=sss

Where:

sss — is a 2- to 3-digit hexadecimal number indicating the SELCH address of the load device.

If a question mark (?) is entered at the prompt, the following message will appear along with the default selch address of the load device:

```
ENTER HEXADECIMAL SELCH ADDRESS.
EXAMPLE: F0
SELCH ADDRESS = _
```

5. FILEMARKS=xxx

Where:

xxx — is a 1- to 3-digit decimal number from 0 to 255. This number represents the number of filemarks to skip to reach the OS/32 file. When the number of filemarks is entered followed by a CR, the LSU program loads OS/32 from the file beginning after the last filemark skipped. This prompt is displayed only if the device code entered indicates a magnetic tape device.

If a question mark (?) is entered at the prompt, the following message will appear:

```
ENTER DECIMAL NUMBER OF FILEMARKS TO SKIP PRIOR TO
LOADING.
FILEMARKS = _
```

6. VOLUME = MMD
   FILE NAME =filename.ext/act

Where:

filename.ext/act	is a 1- to 8-character filename, a 1- to 3-character extension and a 1- to 5-digit decimal account number from 0-65,535. If the device code information indicates that the device is not a magnetic tape, the disk volume name is output followed by the filename prompt.

If a question mark (?) is entered instead of a valid response, the following message and informational menu screen will appear indicating all filenames on the disk that contain operating systems.

```
ENTER THE FILE NAME OF THE PROGRAM TO BE LOADED.
CHOOSE FROM THE FOLLOWING:
OS32MDL2.111/0          MMD          .002/0
MMD      .DAT/0         OS322623     .288/189
OS10720 .OS/0           OSEDIT       .110/0
OS245    .110/134       OS246        .110/188
FILE NAME = _
```

2.4.6.3 Examples of the Automatic Loading Operation

During an automatic loading operation, a search of only three devices under IPC will be performed: Winchester disks 1 and 2 and the cartridge tape (streaming tape). The following example illustrates the output to the terminal screen during a successful automatic loading operation within a Model 3203 System environment.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
        . (10 second wait)
VOLUME=OS72
FILE NAME=DEFAULT.OS
        . (10 second wait)
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The following displays indicate some possible messages output to the terminal screen if the first supported load device could not be accessed for a successful load procedure.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
VOLUME=OS72
FILENAME=DEFAULT.OS
FILE NOT FOUND
DEV=WINCHESTER DISK 2
VOLUME=MMD
FILE NAME=OS32MDL2.111
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example indicates that the file could not be found on the first Winchester disk, but a suitable file was found on disk 2. Then the LSU program was able to proceed with a successful load operation from the second disk.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
DISK NOT INITIALIZED
DEV=WINCHESTER DISK 2
VOLUME=MMD
FILE NAME=OS32MDL2.111
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

In the above example, disk 1 was not initialized. Therefore, a successful load operation was performed from disk 2.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
VOLUME=OS72
FILENAME=DEFAULT.OS
NO DIRECTORY ON DISK
DEV=WINCHESTER DISK 2
VOLUME=SYS5
FILE NAME=DEFAULT.OS
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example shows that there was no directory found on disk 1, therefore, a successful load operation occurred from disk 2.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
VOLUME=OS53
FILENAME=DEFAULT.OS
FILE NOT FOUND
DEV=WINCHESTER DISK 2
VOLUME=SYSL
FILENAME=DEFAULT.OS
FILE NOT FOUND
DEV=CARTRIDGE TAPE
FILEMARKS=
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above display indicates the messages output to the terminal screen if the first and second supported load devices could not be accessed for a successful load procedure.

```
BASIC CONFIDENCE TEST COMPLETE
PERKIN-ELMER INITIAL PROGRAM LOAD 06-298F01RXX
IPC INITIAL CONFIGURATION CHECK OK
DEV=WINCHESTER DISK 1
UNRECOVERABLE ERROR ON DEVICE xxx, STATUS=yy
DEV=WINCHESTER DISK 2
UNRECOVERABLE ERROR ON DEVICE xxx, STATUS=yy
DEV=CARTRIDGE TAPE
FILEMARKS=
TESTING MEMORY
STARTING LOAD
LOAD COMPLETE
```

The above example shows what would happen if there was a failure on both disks but the tape was present.

When loading from the cartridge tape, no particular operating system name is sought. The program outputs the FILEMARKS= prompt and enters a ten second delay loop. If there is no operator input, no filemarks are skipped and the first entry on the tape is loaded. Any numeric input is interpretated as the decimal number of filemarks to skip. After skipping the specified number of filemarks, the file following the last filemark skipped is loaded. If the operator presses BREAK, menu mode is entered. Any other nonnumeric input results in an error message followed by the filemarks help message and a repeat of the FILEMARKS= prompt. If all three devices fail for any reason, the program reverts to the menu mode of operation. See Section 2.4.6.2.

2.5 MEMORY CONFIGURATION ERROR

When a memory configuration error is detected at system start-up time, the following message is displayed on the system console:

```
MEMORY CONFIGURATION ERROR xx BLOCK yy
MEMORY ERROR RECORDING DISABLED
```

Where:

xx — contains one of the following codes:

- 01 indicates an error occurred during initial clearing of error logger status bits.
- 02 indicates an error occurred during verification of controller address range.
- 03 indicates an error occurred during verification of memory interleaving.
- UN indicates memory error recording was specified at sysgen but the MCONFIG.OBJ file was not included in sysgen. This code occurs only on systems generated by using the configuration utility program (CUP) R06.

yy — specifies the memory block where the error was detected.

Errors 01, 02 or 03 can result from improper specification of physical memory at sysgen time or a hardware malfunction. If an error occurs, check the memory configuration statements used at sysgen; if no incorrect statements are present, check the hardware using the appropriate hardware diagnostic.

For a Model 3280 Processor, the CDS provides configuration information for the resident operating system, therefore memory configuration statements are not needed at sysgen time. The memory configuration error that can occur on the Model 3200MPS, 3203, 3205, 3210, 3220, 3230, 3240 and 3250 Processors (because actual configuration disagrees with sysgened configuration) cannot occur with a Model 3280 Processor.

NOTE

Disabling the memory error recording does not interfere with the operating system's ability to function. However, memory errors will not be recorded.

2.6 MODIFYING OS/32 FOR OTHER PERIPHERAL CONFIGURATIONS

Both starter systems are configured with standard device numbers. If your particular configuration is not standard, these procedures can be used to change device addresses after the appropriate starter system is loaded.

2.6.1 Modification of the Console Device Address

To modify the address of the system console device to that of a device of similar attributes (for instance, from TTY @ DN=02 to TTY @ DN=22) follow this procedure:

1. Obtain the address of the DCB_CON field from the link-edit alphabetic map for the starter system.
2. Read the fullword contents at the address of DCB_CON to obtain the device control block (DCB) address of the current console device.
3. Add X'1A' to the DCB address.
4. Modify the halfword at this address to contain the new physical address of the console device.
5. Press DTA-60-ADD-RUN. The operating system ID should be displayed at the system console.

For Series 3200 Processors, enter:

```
@60
>
```

To modify the system console from one type of device to another (for instance, from TTY @ DN=02 to VDU @ DN=10), follow this procedure:

1. Obtain the address of the DCB_CON field from the link-edit alphabetic map for the starter system.
2. Read the fullword contents at the address of DCB_CON to obtain the DCB address of the current console device.
3. Obtain the address of the device mnemonic table (DMT) field from the alphabetic map.
4. Read the fullword at the address of the DMT field to obtain the address of the DMT.
5. Beginning at this address +8, read every other fullword until the ASCII representation of the mnemonic for a suitable device is found. (For example, CRT would be the fullword 43525420.)
6. Once the mnemonic of a suitable device has been found, read the contents of the following fullword.
7. Modify this fullword to contain the address of the DCB for the current console found in Step 2 above.
8. Modify the fullword at the address of DCB_CON to contain the address of the desired device found in Step 6 above.

2.6.2 Modification of Nonconsole Device Addresses

To modify the address of a nonconsole device, follow this procedure:

1. Obtain the DCB address of the device from the library loader map of the starter system. Each DCB in the system has an address specified on the map.

   Format:

   ```
   DCB-mnemonic
   ```

Parameter:

mnemonic	is the 1- to 4-character mnemonic of the device.

Example:

1. The DCB address field for the device with a mnemonic of TTY1 would appear on the map as DCB_TTY1. (Some line printers produce a less than symbol (<) instead of the underscore symbol (_)).

2. Add X'1A' to the DCB address.

3. Modify the halfword at this address to contain the physical address of the device. The system console should be used to perform this modification. For example:

```
BIAS      1234      (DCB address)
MODIFY    1A,0034
```

   See Chapter 3 for an explanation of the BIAS and MODIFY commands.

2.6.3 Modification of the Selector Channel (SELCH) Address

To modify the address of a SELCH, follow this procedure:

1. Obtain the associated DCB address as in Section 2.6.1.

2. Add X'9C' (DCB.SDN) to this address.

3. Modify the halfword at the resulting location to contain the correct SELCH physical address. The system console should be used to perform this modification.

2.6.4 Modification of the Controller Address

To modify the address of a controller, follow this procedure:

1. Obtain the associated DCB address as stated in Section 2.6.2.

2. Add X'9E' (DCB.CDN) to this address.

3. Modify the halfword at the resulting location to contain the controller physical address. Use the system console to perform this modification.

2.6.5 Modification of the Console Device Name/Type

If the console is a VDU device, rather than a TTY device or vice versa, follow this procedure:

1. Obtain the address of the initial value table from the library loader map of the starter system (entry point IVTBL).

2. Read the two halfwords from memory at this location. The contents at this location should be:

   434F,4E20 (CON in 7-bit ASCII)

3. Modify these four bytes to contain the desired console device name:

   4352,5420 (CRT in 7-bit ASCII)

4. Press DTA-60-ADD-RUN. The operating system ID and license or contract number should be displayed on the VDU. For 3200 Processors, enter:

   ```
   @ 60
   >
   ```

   NOTE

   This procedure should only be followed immediately after system initialization.

To avoid repeating this procedure for each system initialization, the operating system should be image patched using OS/32 Patch.

This procedure assumes the device address is correct. If it is not, perform the procedure to change the address.

CHAPTER 3
CONSOLE USE AND OPERATOR COMMANDS

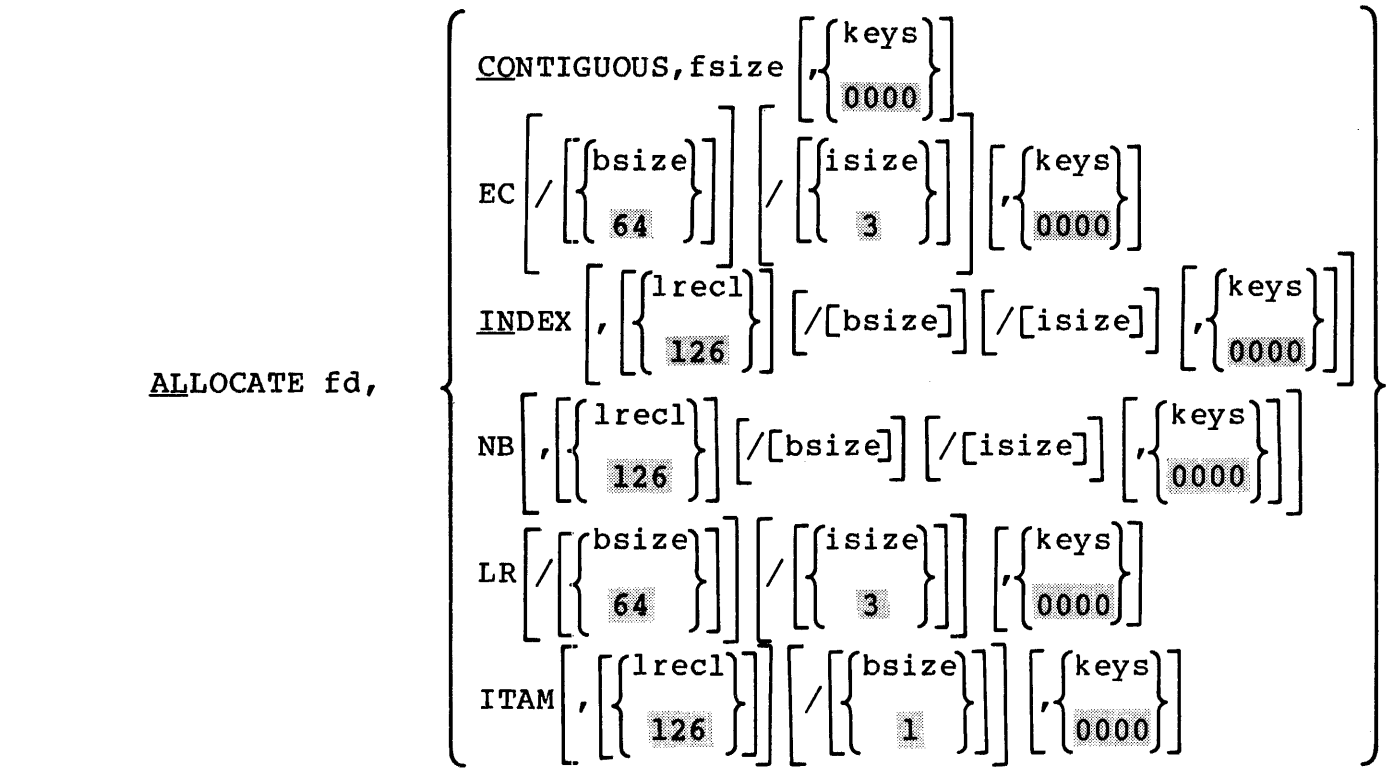
3.1 INTRODUCTION

Communication between the operator and the operating system or user program is accomplished by an operator command language. The operator commands described in this chapter are input to the system via the system console.

3.2 ALLOCATE COMMAND

The ALLOCATE command is used to create a direct access file or a data communications line control block (LCB) for a buffered terminal manager.

Format:



Parameters:

fd	is the file descriptor of the device or file to be allocated.
CONTIGUOUS	specifies that the file type to be allocated is contiguous.
fsize	is a decimal number indicating file size, which is required for contiguous files. It specifies the total allocation size in 256-byte sectors. This size may be any value up to the number of contiguous free sectors existing on the specified volume at the time the command is entered.

keys — specifies the write and read protection keys for the file. These keys are in the form of a hexadecimal halfword, the most significant byte of which signifies the write key and the least significant byte, the read key. If this parameter is omitted, both keys default to 0.

EC — specifies that the file type to be allocated is extendable contiguous.

bsize — is a decimal number specifying the physical block size to be used for buffering and debuffering operations on the index file or data communications device and for the data blocks used for indexed, nonbuffered indexed and extendable contiguous files. When INDEX, EC or NB is specified, bsize represents the block size in sectors of the physical data blocks containing the file. When ITAM is specified, bsize represents the buffer size in bytes. For INDEX files and ITAM buffers, if this parameter exceeds the maximum block size established during sysgen or by the operator, the maximum is used. For EC and NB files, this parameter can be any value between 1 and 255, inclusive. If bsize is omitted, the default established at sysgen or by the operator is used for INDEX and NB files; for EC and LR files, the default is 64 sectors.

isize — is a decimal number specifying the index block size. For INDEX and NB files, the default value is established at sysgen or by the SET BLOCKS command. For EC and LR files, the default value is three sectors (768 bytes). If the index block size exceeds the maximum disk block size established at sysgen or by the SET BLOCKS command, the maximum is used. Neither bsize nor isize may exceed 255.

INDEX — specifies the file type to be allocated is indexed.

lrecl — is a decimal number specifying the logical record length of an indexed or nonbuffered indexed file, or a data communications device. It cannot exceed 65,535 bytes. The default for indexed and nonbuffered indexed files is 126. It may optionally be followed by a slash (/), which delimits lrecl from bsize.

NB — specifies that the file type to be allocated is nonbuffered indexed.

LR — specifies a long record file. For long record files, the logical record length is specified by the data block size (bsize) parameter (i.e., the logical record length is the data block size).

ITAM — specifies that the device to be allocated is a data communications device.

Functional Details:

To assign an indexed file, sufficient room must exist in system space for two data block buffers plus one index block buffer, each of the stated size. Therefore, if bsize is very large, the file may not be assignable in some memory-bound situations. At sysgen time, a maximum block size parameter is established in the system, and bsize cannot exceed this constant.

To assign an EC or NB file, sufficient room must exist in system space to contain only the indexed block of the stated size. The data blocks for EC and NB files are not buffered in system space and, thus, are not constrained to the sysgened block size. For INDEX and NB file types, default data and index block sizes are established during sysgen. These values can be altered by using the SET BLOCKS command. Default block sizes can be displayed by using the DISPLAY BLOCKS command.

A file associated with a nonzero account number cannot be allocated from the system console.

For LR files, the absolute maximum data block size (logical record length) that can be specified is 65,535 (64K) sectors. This equals an absolute maximum logical record length of 16,776,960 (16M) bytes. In practice, however, the actual maximum logical record length for any given system is limited by the amount of memory available for input/output (I/O) buffering.

Examples:

The following example allocates on the system volume a contiguous file named JANE.TSK, which has a total length of 64 sectors (16kb) with protection keys of zero.

```
AL JANE.TSK,CO,64
```

The following example allocates on volume VOL1: an indexed file named AJM.OBJ, which has a logical record length of 126 bytes. The buffer size, index and data block sizes default to the values set at sysgen by the SET BLOCKS command and the protection keys default to zero.

```
AL VOL1:AJM.OBJ,IN,126
```

The following example allocates on volume M300: an indexed file named AJM.BLK, which has a logical record length of 132 bytes, a data block size of four sectors, and a default index block size (isize) of the value set at sysgen or by the SET BLOCKS command. The protection keys default to zero. When this file is assigned, the system must have 2.5kb of available system space for buffers.

```
AL M300:AJM.BLK,IN,132/4
```

The following example allocates on the system volume an indexed file named THISFILE (blank extension), which has a logical record length of 256 bytes, a data block size of four sectors, an index block size of two sectors, and protection keys of zero.

```
AL THISFILE,IN,256/4/2
```

The following example allocates on volume V01: an indexed file named AJM.OBJ, which has a logical record length of 126 bytes. The data block size defaults to the value set at sysgen or by the SET BLOCKS command , the index block size is three sectors, and the protection keys default to zero.

```
AL V01:AJM.OBJ,IN,126//3
```

The following example allocates on volume SYS: an extendable contiguous file named XFILE.DTA with default data block size of 64 sectors and index block size of three sectors. The file initially contains no records and has a record length of one sector (same as a contiguous file).

```
AL SYS:XFILE.DTA,EC
```

The following example allocates on the system volume a nonbuffered indexed file named YFILE.DAT with a logical record length of 240 bytes, a data block size of 250 sectors, and an index block size of five sectors. The file initially contains no records.

```
AL YFILE.DAT,NB,240/250/5
```

Error Messages:

ALLO-ERR TYPE=

indicates that allocation failed for reasons denoted by TYPE field (i.e., displayed to the right of the equal sign). See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid file descriptor (fd).

NODA-ERR

indicates that direct access support was not included in the system at sysgen.

NOPR-ERR

indicates that a required operand is missing.

PARM-ERR

indicates an operand syntax error.

3.3 AUXILIARY PROCESSING UNIT (APU) CONTROL AND DISPLAY COMMAND

The APC command controls or displays the state of the auxiliary processing units (APUs) within a Model 3200MPS System. This command has no effect upon I/O processors (IOPs) within a Model 3200MPS System. It will be rejected if the APU is in IOP mode.

Format:

```
APC [apu#] [ , { ENABLE          } ]
           [   { DISABLE         } ]
           [   { ASSIGN=queue#   } ]
           [   { START           } ]
           [   { STOP            } ]
           [   { fd              } ]
```

Parameters:

apu#	is a number from 1 to 9 that identifies the APU to be selected for control or display. If no subsequent parameter is included, the status of the APU is displayed.
ENABLE	if the specified APU is in a DISABLED state, this parameter marks the specified APU to the ENABLE state.
DISABLE	if the specified APU is in an ENABLE state, this parameter marks the specified APU to the DISABLED state.
ASSIGN=	queue# assigns the APU to the queue specified by queue# (0 through 9).
START	the specified APU will start to execute tasks on the assigned queue (0 through 9).
STOP	the specified APU stops executing tasks.
fd	is the file descriptor where the display will be output if the display option is specified. If APC apu# or APC with no parameters is entered, the display will be output on the system console.

Functional Details:

This command gives the operator control over the APUs of the system. The operator can change the state of an APU, start and stop the execution of an APU, assign an APU to a queue and display APU status. The console operator will not be able to issue APU control commands (ENABLE, DISABLE, etc.) if the control rights to the specified APU is allocated to a foreground task.

In a Model 3200MPS System configured with one or more IOPs, the APC command cannot be used for the IOPs. The APC command only applies to satellite processors that are in the APU mode. If an APC command is directed to an IOP, the following error message will appear:

```
REQUEST INVALID FOR IOP
```

Example:

In this example, APU2 was initially in the DISABLED state so the operator enabled it to prepare it for use. The operator then assigned the APU to queue 1. Finally, the operator instructed the APU to begin execution of the task at the top of its assigned queue via the START command.

```
*APC 2,ENABLE
*APC 2,ASSIGN=1
*APC 2,START
```

Entering APC apu# will display the following items:

- APU state

  ENABLED is available for task execution.

  DISABLED is not available for task execution.

- Queue assignment

  ASSIGN=n assigned to APU queue n.

- Execution status

ACTIVE	running a task (called current task).
IDLE	idle due to STOP command.
ERROR-IDLE	idle because of a hardware error while running the current task.
Q-WAIT	idle because of an absence of tasks available for running (ready queue empty).
WAIT-TASK	idle waiting for a task to return from the central processing unit (CPU).

- Names of associated tasks

CURRENT=taskname	specifies the current task name.
CONTROL=taskname	specifies the name of a task with control rights.
WAIT=taskname	specifies the name of a task expected to return from the CPU before resuming execution.

Examples:

In the following example APU1 is enabled and assigned to queue 3; task EXEC1 is currently executing; the command processor (.CMDP) possesses the control rights.

```
*APC 1
   ENABLED, ASSIGN=3, ACTIVE
   CURRENT=EXEC1, CONTROL=.CMDP
```

In the following example, APU2 is enabled and assigned to queue 2; the current task (WCSSOP) is suspended because of a hardware error (CPU reaction is expected); a task (EXEC) possesses control rights on the APU.

```
*APC 2
   ENABLED, ASSIGN=2, ERROR-IDLE
   CURRENT=WCSSOP, CONTROL=EXEC
```

In the following example, APU3 is disabled and assigned to queue 0.

```
*APC 3
   DISABLED, ASSIGN=0
```

In the following example, APU4 is enabled, assigned to queue 1 and is waiting for a task to be added to that queue.

```
*APC 4
   ENABLED, ASSIGN=1, Q-WAIT
```

In the following example, APU5 is enabled and assigned to queue 4; it is waiting for the task EXEC1 to be returned to it to resume execution; the command processor (.CMDP) possesses the control rights. The display is to be copied to the line printer.

```
*APC 5,,LP:
   ENABLED, ASSIGN=4, TASK-WAIT
   CONTROL=.CMDP, WAIT=EXEC1
```

Following is an example of the display when the APC command with no parameters is executed. The state of each of the configured APUs in the system is displayed on the system console.

```
*APC
 APU 1  ENABLED, ASSIGN=3, ACTIVE
        CURRENT=EXEC1, CONTROL=.CMDP
 APU 2  ENABLED, ASSIGN=2, ERROR-IDLE
        CURRENT=WCSSOP, CONTROL=EXEC
 APU 3  DISABLED, ASSIGN=0
 APU 4  ENABLED, ASSIGN=1, Q-WAIT
 APU 5  ENABLED, ASSIGN=4, TASK-WAIT
        CONTROL=.CMDP, WAIT=EXEC1
 APU 6  ENABLED, ASSIGN=5, ACTIVE
        WAIT_TASK=WCSSOP1
 APU 7  ENABLED, ASSIGN=8
 APU 8  DISABLED, ASSIGN=0
 APU 9  ENABLED, ASSIGN=1, Q-WAIT
```

Error Messages:

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

APU-ERR TYPE=t

where error type t is one of the following:

APU NUMBER	indicates that an illegal number was specified.
RIGHTS BUSY	indicates that APU control rights are possessed by a task other than the command processor.
DISABLED	indicates that the APU is disabled. It cannot be disabled, started or stopped.
ENABLE FAIL	indicates that the APU enable operation has failed.
COMMAND FAIL	is an APU command execution error.
NO RESPONSE	indicates no response from the APU.

QUE-ERR TYPE=t

where error type t equals QUEUE NUMBER, indicating an illegal queue number.

ASGN-ERR

unable to assign specified fd.

FD-ERR

indicates an invalid fd.

IO-ERR

indicates that an I/O error was detected on an output device or file.

3.4 ASSIGN COMMAND

The ASSIGN command assigns a device, file or data communications device to one of a task's logical units.

Format:

NOTE

If the access privileges and keys parameters are omitted, and SVC15, VFC, HI, LOW or MEDIUM is specified, the respective positional commas belonging to the omitted parameters can also be omitted if desired.

If the access privileges and SVC15, VFC, HI, LOW or MEDIUM parameter are specified and the keys parameter is omitted, the positional comma belonging to the keys parameter can be omitted if desired.

Parameters:

lu	is a decimal number specifying the logical unit number to which a device or file is to be assigned.
fd	is the file descriptor of the device or file to be assigned.
access privileges	specify the desired access privileges. The default access privileges are:

- SRW for contiguous files
- SREW for index, EC and NB files

- SRW for devices
- SRO for files with a nonzero account number

keys	signifies the write/read protection keys of the file or device to be assigned.
SVC15 SVCF	signifies that the specified device is to be assigned for SVC15 access. This option pertains to data communications devices only. If SVC15 access is specified, VFC cannot be specified.
VFC	specifies the use of vertical forms control for the assigned lu. If this parameter is omitted, there is no VFC for the device assigned to the specified lu.
HI	indicates that the assigned magnetic tape will operate at the group coded recording (GCR) density rate of 6250 bpi. This parameter is applicable for 6250 tape drives only.
LOW	indicates that the assigned magnetic tape will operate at the nonreturn to zero inverted (NRZI) density rate of 800 bpi. This parameter is applicable for 6250 tape drives only.
MEDIUM	indicates that the assigned magnetic tape will operate at the phase encoded (P-E) density rate of 1600 bpi. This parameter is applicable for 6250 tape drives only.

Functional Details:

Access privileges can be one of the following:

SRO	Sharable read-only
ERO	Exclusive read-only
SWO	Sharable write-only
EWO	Exclusive write-only
SRW	Sharable read/write
SREW	Sharable read, exclusive write
ERSW	Exclusive read, sharable write
ERW	Exclusive read/write

The command is rejected if the requested access privilege cannot be granted.

A file with a nonzero account number can only be assigned with access privileges of SRO or ERO. If the access privileges field is omitted, a default of SRO is assumed for a file with a nonzero account number, and SRW or SREW is assumed for system files. The DISPLAY LU command can be used to determine the current access privileges of all assigned units. See Section 3.23 for more information.

When a file has been assigned to a task, the operator might want to prevent other tasks from accessing that file while it is being used. For this reason, the user can ask for exclusive access privileges, either for read or write, at assignment time. This protection is labeled dynamic because it is only in effect while the file remains assigned.

A file cannot be assigned with a requested access privilege if that privilege is incompatible with some other existing assignment to that file. For example, a request to open a file for EWO is compatible with an existing assignment for SRO or ERO, but is incompatible with any existing assignment for other access privileges. Table 3-1 illustrates compatibilities and incompatibilities between access privileges.

TABLE 3-1 ACCESS PRIVILEGE COMPATIBILITY

	ERSW	ERO	SRO	SRW	SWO	EWO	SREW	ERW
ERSW	-	-	-	-	*	-	-	-
ERO	-	-	-	-	*	*	-	-
SRO	-	-	*	*	*	*	*	-
SRW	-	-	*	*	*	-	-	-
SWO	*	*	*	*	*	-	-	-
EWO	-	*	*	-	-	-	-	-
SREW	-	-	*	-	-	-	-	-
ERW	-	-	-	-	-	-	-	-

* Compatible
\- Incompatible

The keys field is in the format of a 4-digit hexadecimal number. The left two digits signify the write protection key and the right two digits, the read protection key. If omitted, the default is 0000. These keys are checked against the appropriate existing keys for the file or device. The command is rejected if the keys are invalid. The keys associated with a file are specified at file allocation time. They can be changed by a REPROTECT command or through a supervisor call 7 (SVC7) reprotect function call.

If the values of the keys are within the range of X'01' to X'FE', the file or device cannot be assigned for read or write access unless the operator or requesting task supplies the matching keys. If a key has a value of X'00', the file or device is unprotected for that access mode. Any key supplied is accepted as valid. If a key has a value of X'FF', the file is unconditionally protected for that access mode. It cannot be assigned for that access mode to any user task (u-task) or diagnostic task (d-task), regardless of the key supplied. An unconditionally protected file may be assigned to an executive task (e-task), including the system manager.

A file can be deleted only if its write and read protection keys are zero (X'0000'). If the keys are X'FF00', for example, the file cannot be deleted.

Some examples of protection keys are shown in Table 3-2.

TABLE 3-2 PROTECTION KEYS AND THEIR MEANINGS

WRITE KEY	READ KEY	MEANING
00	00	Completely unprotected
FF	FF	Unconditionally protected
07	00	Unprotected for read, conditionally protected for write (user must supply write key=X'07')
FF	A7	Unconditionally protected for write, conditionally protected for read
00	FF	Unprotected for write, unconditionally protected for read
27	32	Conditionally protected for both read and write

The protection keys of a device can be changed by the system operator by the REPROTECT command.

At the time of assignment, an assigned direct access file is positioned at the end of the file for access privileges SWO and EWO. It is positioned at the beginning of the file for all other access privileges. The ASSIGN command is rejected if the specified lu is assigned and the currently selected task is not dormant. To reassign an lu for an active task, the lu must first be closed.

Examples:

The following example assigns the card reader to lu3 with ERO access privilege. The keys default to 0000.

```
AS 3,CR:,ERO
```

The following example assigns a disk file to lu2. The EWO access privilege causes the file to be positioned at the end. New records are appended.

```
AS 2,FILE.DAT,EWO
```

The following example assigns a disk file to lu2. VFC is in use. Access privileges and keys parameters are omitted along with their respective commas.

```
AS 2,TEST.JOB,VFC
```

The following example assigns a disk file to lu2. VFC is in use. Access privileges and keys parameters are omitted, but positional commas are specified.

```
AS 2,TEST.JOB,,,VFC
```

The following example assigns a disk file to lu2. VFC is in use. The positional comma belonging to the omitted access privileges parameter must be specified.

```
AS 2,TEST.JOB,,00FF,VFC
```

The following example assigns a disk file to lu2. VFC is in use. The keys parameter, along with the positional comma, is omitted.

```
AS 2,TEST.JOB,SRO,VFC
```

The following example is an invalid assignment because the positional comma belonging to the omitted access privileges parameter must be specified.

```
AS 2,TEST.JOB,00FF,VFC
```

The following example is an invalid assignment because VFC and SVC15 access are mutually exclusive and cannot be specified in the same assignment.

```
AS 2,TEST.JOB,SRO,VFC,SVC15
```

The following example assigns a mag tape drive to lu2. The low parameter indicates that the drive will operate at the NRZI density rate of 800 bpi.

```
AS 2,MAG1:,LOW
```

The following example assigns a mag tape drive to lu2. The MEDIUM parameter indicates that the drive will operate at the P-E density rate of 1600 bpi.

```
AS 2,MAG1:,SRW,MEDIUM
```

The following example assigns a mag tape drive to lu2. The HI parameter indicates that the drive will operate at the GCR density rate of 6250 bpi. Access privileges and keys parameters are omitted, but positional commas are specified.

```
AS 2,MAG1:,,,HI
```

The following example is an invalid assignment because density select and SVCF access are mutually exclusive and cannot be specified in the same assignment.

```
AS 2,MAG1:,SRW,LOW,SVCF
```

Error Messages:

ASGN-ERR TYPE=

indicates the assign failed for the reason noted by the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd.

LU-ERR

indicates that an invalid lu number or lu was assigned.

NODA-ERR

indicates there is no direct access support in the system.

NOPR-ERR

indicates an invalid operand.

PARM-ERR

indicates an operand syntax error.

PRIV-ERR

indicates an invalid access privilege mnemonic.

SEQ-ERR

indicates that task was not paused or is dormant.

SPAC-ERR

indicates the task exceeds established maximum system space usage.

TASK-ERR

indicates that there is no currently selected task.

3.5 ATTN COMMAND

The ATTN command is used to modify the priority of the system task that processes operator and command substitution system (CSS) commands.

Format:

ATTN [{n / 2}]

Parameter:

n — is a decimal number from 2 to 249 specifying the new priority of the command processor task. If n is omitted, the default is 2.

Functional Details:

The ATTN command should be entered only when critical real-time tasks are executing in the foreground. It lowers the priority of the task that processes system commands and, therefore, could delay execution of a time-sensitive operator command. This command can be entered only from the system console.

Example:

```
ATTN 120
```

This example sets the priority of the system command processor to 120.

Error Message:

ATTN-ERR

indicates that n is not a decimal number from 2 to 249.

3.6 BFILE COMMAND

The BFILE command backspaces to the preceding filemark on magnetic tapes, cassettes and direct access files.

Formats:

BFILE fd	is used for magnetic tapes and cassettes only.
BFILE fd[,lu]	is used for disk devices only.

Parameters:

fd	is the file descriptor of the device or file to be backspaced to a filemark.
lu	is the logical unit to which the file is assigned.

Functional Details:

For magnetic tapes and cassettes, only the parameter fd should be specified; for direct access files, lu optionally can be specified. The account number must be 0 if specified.

Before entering the format for a file, the task using that file must be selected as the current task through the TASK command.

The cartridge tape (streaming tape) does not support this command.

Examples:

The following example causes the device MAG2: to backspace one filemark.

```
BF MAG2:
```

The following example causes file AJM.OBJ, which is assigned to lu4 on volume M300, to backspace one filemark.

```
BF M300:AJM.OBJ,4
```

Error Messages:

ASGN-ERR TYPE=

indicates that the file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates that the specified fd has a syntax error or a nonzero account number.

IO-ERR

indicates that an input/output (I/O) error or an illegal or unassigned lu was encountered.

LU-ERR

indicates that lu was not a valid decimal number or was greater than maximum lu (maxlu) for the task.

NOBC-ERR

indicates that bulk file command support is not included in the operating system.

NOPR-ERR

indicates that no operand was specified.

TASK-ERR

indicates that there was no currently selected task, and a BFILE command with an lu specified was entered.

3.7 BIAS COMMAND

The BIAS command is used to set a bias address for the EXAMINE and MODIFY commands.

Format:

BIAS { address | * | *taskid }

Parameters:

address	is a hexadecimal bias to be added to the address given in any subsequent EXAMINE or MODIFY command. If address is omitted, all addresses specified in subsequent EXAMINE and MODIFY commands are treated as unbiased; they are assumed to be absolute physical addresses.
*	specifies that the bias is set to be the physical address of the first location of the currently selected task. If the currently selected task is rollable, specification of * results in an error.
*taskid	specifies that the bias is set to be the physical address of the first location of taskid. If this task is rollable, specification of BIAS *taskid results in an error. The currently selected task is not changed.

Functional Details:

A BIAS command overrides all previous BIAS commands. The operator should enter a BIAS command if the current value is unknown.

Examples:

The following example sets the currently selected task to task EXAM.

```
TA EXAM
```

The following example sets the bias to first location of task EXAM.

```
BI$*
```

The following example sets the bias to first location of task EXAM.

```
BI *EXAM
```

Error Messages:

PARM-ERR

indicates an operand syntax error.

ROLL-ERR

indicates BIAS * was entered and the currently selected task is rollable, or BIAS *taskid was entered and taskid is a rollable task.

TASK-ERR

indicates BIAS * was specified but there is no currently selected task, or BIAS *taskid was entered and no task with name taskid exists.

3.8 BRECORD COMMAND

The BRECORD command backspaces to the preceding record on magnetic tapes, cassettes and direct access files.

Formats:

BRECORD fd is used for magnetic tapes and cassettes only.

BRECORD fd[,lu] is used for disk files only.

Parameters:

fd	is the file descriptor of the device to be backspaced one record.
lu	is the logical unit to which the file is assigned.

Functional Details:

For magnetic tapes and cassettes, only the parameter fd should be specified; for direct access files, lu optionally can be specified. The account number must be 0 if specified.

Before entering the format for disk devices, the task using the file must be selected as the current task through the TASK command.

The cartridge tape (streaming tape) does not support this command.

Examples:

The following example causes the device MAG2: to backspace one record.

```
BR MAG2:
```

The following example causes the file AJM.OBJ that is assigned to lu4 on volume M300 to backspace one record.

```
BR M300:AJM.OBJ,4
```

Error Messages:

ASGN-ERR TYPE=

indicates that the file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates that the specified fd has a syntax error or a nonzero account number.

IO-ERR

indicates that an I/O error or an illegal or unassigned lu was encountered.

LU-ERR

indicates that lu was not a valid decimal number or was greater than maxlu for the task.

NOBC-ERR

indicates that bulk file command support is not included in the operating system.

NOPR-ERR

indicates that no operand was specified.

TASK-ERR

indicates that there was no currently selected task when a BRECORD command with an lu specified was entered.

3.9 BUILD AND ENDB COMMANDS

The BUILD and ENDB commands copy data from the command stream to a device or file (account number must be zero if specified). These commands are normally used from a CSS file but can also be entered from the system console.

Format:

```
BUILD fd [,APPEND]
  .
  .
  .
ENDB
```

Parameters:

fd	is the file descriptor of the device or file to which data is to be copied. If fd does not contain an extension, .CSS is used as a default. If a blank extension is desired, the period following the filename must be typed. If fd refers to a direct access file, an index file by that name is allocated with a logical record length equal to the sysgened command buffer length, a blocksize of 1, and keys of 0000. If the specified fd already exists, that fd is deleted and a new fd is allocated.
APPEND	allows the user to append data to an existing fd. If the fd does not exist, it is allocated.

Functional Details:

Lines entered from the console following BUILD are not treated as commands, but as data, and are copied to the specified device or file until an ENDB is encountered. The BUILD command must be the last command on an input line. Further data appearing on that line is treated as a comment and causes no action to be taken. The BUILD command can be entered from the console only if no CSS files are active. It can also be entered from a CSS file. If a BUILD command is entered at the console, the prompt .CMDP> indicates that the system command processor is requesting data.

The ENDB command must appear as the first command on a line and may be preceded only by spaces. Any commands following the ENDB on the same command line are executed. No error response is possible from ENDB. If ENDB is not entered as the first command on the command line, the line is copied to the BUILD file.

Error Messages:

ASGN-ERR

indicates that an output file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates invalid fd or no index file support.

IO-ERR

indicates that an I/O error was encountered on an output file or device.

SEQ-ERR

indicates that the CSS file is active; BUILD was entered from the system console.

```
------------
|  CANCEL  |
------------
```

3.10 CANCEL COMMAND

The CANCEL command terminates the task as if the task had executed an SVC3 and terminated with an end of task code of 255.

Format:

CANCEL taskid

Parameter:

taskid	is a 1- to 8-character alphanumeric string of which the first character must be alphabetic, unless it is a system task, e.g., .SPL, .TSK, .OBJ. Taskid is a required parameter.

Functional Details:

If the task is nonresident, it is removed from the system. All outstanding I/O is terminated and the task's logical units are closed. If the task is resident, it is not removed from memory. Its logical units are not closed, but are checkpointed. This command can be entered even when the currently selected task is dormant. It has no effect on a resident task that has already gone to end of task unless preceded by an OPTIONS NONRESIDENT command. If preceded by an OPTIONS NONRESIDENT command, it will remove a task from memory. The normal response to this command is:

```
taskid:END OF TASK CODE= 255    PROCESSOR=hh:mm:ss:mmm  TSK-ELAPSED=hh:mm:ss
```

For users of the Model 3200MPS System, the following information applies.

The CANCEL command can be entered when the currently selected task belongs to either the CPU or an APU. If an APU has been waiting for a cancelled task, it is restarted using the next task in its ready queue.

Error Messages:

PARM-ERR

indicates that taskid is missing or task is not loaded.

SEQ-ERR

indicates that task was not dormant or paused.

TASK-ERR

indicates that there is no currently selected task. This applies to CSS only.

3.11 CLOSE COMMAND

The CLOSE command permits the operator to close (unassign) one or more files or devices assigned to the currently selected task's logical units.

Format:

$$\underline{CL}OSE \quad \left\{ \begin{matrix} lu_1\ [,lu_2,\ldots,lu_n] \\ \underline{A}LL \end{matrix} \right\}$$

Parameters:

lu	is a decimal number specifying the lu assignments.
ALL	specifies that all logical units of the currently selected task are to be closed.

Functional Details:

Closing an unassigned lu does not produce an error message. A CLOSE command can be entered only if the referenced task is dormant or paused.

Examples:

The following example closes logical units 1, 3 and 5 of the currently selected task.

```
CL 1,3,5
```

The following example closes all logical units of the currently selected task.

```
CLOSE A
```

Error Messages:

CLOS-ERR

indicates that CLOSE failed for a reason denoted by the TYPE field.

PARM-ERR

indicates an invalid or missing parameter.

SEQ-ERR

indicates that task was not dormant or paused.

TASK-ERR

indicates that there is no currently selected task.

3.12 CONTINUE COMMAND

The CONTINUE command causes a task that executed a PAUSE (SVC2 code 1) or that was paused by the operator to resume operation on the task's logical processor.

Format:

CONTINUE [address]

Parameter:

address — is a hexadecimal number that specifies where the task is to resume operation. If this parameter is not specified, the task resumes at the next sequential instruction following the pause.

Functional Details:

For the Model 3200MPS System, the CONTINUE command also applies to tasks paused on an APU, in which case the task is returned to the CPU for the duration of the pause. When the task is continued and if it is LPU-directed, it will be redispatched to the logical processor on the next scheduling event.

Error Messages:

PARM-ERR

indicates an invalid parameter.

SEQ-ERR

indicates that the task was not paused.

TASK-ERR

indicates that there is no currently selected task.

3.13 DELETE COMMAND

The DELETE command is used to delete direct access files.

Format:

DELETE fd_1 [,fd_2,...,fd_n]

Parameter:

fd identifies the file(s) to be deleted.

Functional Details:

The file being deleted must not be currently assigned to any lu of any task. The DELETE command is not recognized if there are no direct access devices in the system. A file can be deleted only if its write and read protection keys are 0 (X'0000'). If the keys are nonzero, they can be changed using the REPROTECT command.

Error Messages:

DELE-ERR

indicates that DELETE failed for a reason denoted by the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd.

NODA-ERR

indicates that direct access support is not included in this system.

NOPR-ERR

indicates that no operand was specified.

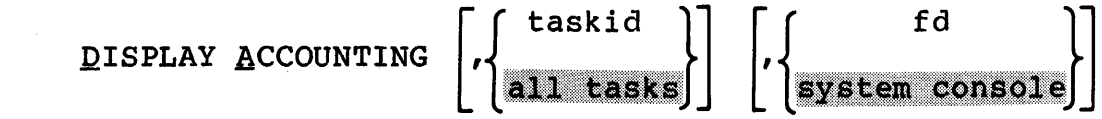
PRIV-ERR

write or read protection keys are nonzero indicating that the file is currently assigned.

3.14 DISPLAY ACCOUNTING COMMAND

The DISPLAY ACCOUNTING command displays to the specified fd all accounting information for the specified task.

Format:



Parameters:

taskid	is the task name for which accounting information is to be displayed. If this parameter is omitted, accounting information is logged for all tasks.
fd	is the device or file to which accounting information is displayed. If this parameter is omitted, the accounting information is displayed to the system console.

Functional Details:

This command is valid only for systems with accounting support. The time is displayed in the following format.

```
hh:mm:ss.t
```

Where:

hh	represents hours.
mm	represents minutes.
ss	represents seconds.
t	represents tenths of a second.

Example:

```
D A ,RCORDEL
TASK NAME CPUTIME APUTIME SVCTIME WAIT TIME ROLL TIME ROLLS I/O
RCORDEL   3:31.60 3:01.50 3.70    45.40      0.0       0   4390
```

Error Messages:

ASGN-ERR TYPE=

indicates that the output file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

I/O-ERR

indicates that I/O error was encountered on the output file or device.

NOAC-ERR

indicates that accounting is not supported for this system.

NO ACTIVE TASK(S) FOUND

indicates no active tasks found in the system.

PARM-ERR

indicates an operand syntax error.

SPAC-ERR

indicates that required system space is not available.

3.15 DISPLAY BLOCKS COMMAND

The DISPLAY BLOCKS command is used to display the default blocking factors that were established at system generation (sysgen) or modified by the last SET BLOCKS command.

Format:

DISPLAY BLOCKS [,{ fd / sys console }]

Parameters:

fd — is the device or file to which accounting information is displayed. If this parameter is omitted, the accounting information is displayed to the system console.

Functional Details:

The current maximum block size along with the current data-indexed block defaults for INDEX, SPOOL and NONBUFFERED files are displayed.

Example:

```
>DISPLAY BLOCKS

MAXIMUM BLOCK SIZE = 3
FILE TYPE      DATA       INDEXED
INDEX            1          1
SPOOL            2          3
NONBUFFERED     64          3
```

Error Messages:

ASGN-ERR=

indicates that optional fd could not be assigned; e.g., fd is assigned for exclusive use already.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

I/O-ERR

indicates that I/O error was encountered on output file or device.

PARM-ERR

indicates an operand syntax error.

3.16 DISPLAY DEVICES COMMAND

The DISPLAY DEVICES command allows the operator to determine the physical address, keys, on-line/off-line state and volume name (for on-line direct access devices) of all devices in the system; to determine the state of error recording for those devices supporting the error recording function; and to obtain the names of the pseudodevices (created by the system tasks using the intercept feature) currently in the system.

For mirrored disks, this command also displays the device name of the other disk of the pair and whether each disk is primary or secondary.

Format:

```
DISPLAY DEVICES [,{ fd             }]
                  { system console }
```

Parameter:

fd — is the file descriptor specifying the file or device to which the display is routed. If fd is omitted, the display is output to the system console.

Example:

```
 D D
NAME  DN KEYS
NULL   0 0000
CON    2 0000
CR     4 0000
PRT   62 0000
PTRP  13 0000
PR     0 0000    SPOL
SPL    0 0000    SPOL
VDU1  30 0000
VDU2  14 0000    ITAM
MAG1  85 0000
DSC1  C6 0000    MUD1     PROT     CDIR
DSC2  C7 0000    FIX2
DSC3  D6 0000    MTM      PROT     ERC
DSC4  D7 0000    FIX4     ERR=10
DSC5  E8 0000    OFF
D300  E6 0000    MIRR     CDIR     ERC     PRI     MIRR=D301:
D301  E7 0000    MIRR     CDIR     ERC     SEC     MIRR=D300:
D67A  FC 0000    V67A     CDIR     OVFL
APU1  50 0000
APU2  52 0000
IOP3  54 0000
APU4  56 0000
VDEV:********.***
*
```

In the DISPLAY DEVICES output, columns 1, 2 and 3 contain the device name, device number (address) and keys, respectively. Column 4 is defined only for pseudo print (spool), data communications and direct access devices. The characters SPOL specify that a device is a pseudo print device used in spooling. The characters ITAM specify that a device is a data communication device.

For direct access devices, column 4 contains the characters OFF to indicate that a device is off-line. If the device is on-line, the volume name is output in column 4. For write-protected disks, column 5 contains the characters PROT. If the secondary directory option is enabled, column 6 contains the characters CDIR. If the secondary directory is in an overflow state, OVFL is also displayed.

Error recording information for devices where error recording is enabled is displayed in columns 5 or 6. ERC indicates that error recording is enabled, but no errors have been detected. ERR=n, where n is the number of errors detected, indicates that errors have been detected. The value of n represents the total number of errors recorded since the device was last marked on.

For mirrored disks, column 7 indicates whether the disk is the primary or secondary disk. Column 8 indicates the name of the other disk in the pair.

For a Model 3200MPS System, the APUs and the IOPs, which were included during sysgen, are also presented in the display.

The output, VDEV:, is a virtual display device. The asterisks indicate that a generic pseudodevice was created by an SVC intercept.

Error Messages:

ASGN-ERR

indicates an optional fd could not be assigned; e.g., fd is assigned for exclusive use already.

FD-ERR

indicates an invalid fd.

FORM-ERR/PARM-ERR

indicates a command/operand syntax error.

IO-ERR

indicates an I/O error was encountered on output device or file.

PARM-ERR

indicates an operand syntax error.

3.17 DISPLAY DFLOAT COMMAND

The DISPLAY DFLOAT command displays to the specified fd the contents of the double precision floating point (DPFP) registers associated with the currently selected task.

Format:

DISPLAY DFLOAT [,{fd / system console}]

Parameter:

fd	is the file descriptor specifying the file (account number must be 0 if specified) or device to which the contents of the DPFP registers associated with the currently selected task are displayed. If fd is omitted, the display is output to the system console.

Functional Details:

The selected task should have been built with the DFLOAT option at Link time.

For Model 3200MPS Systems, the APU associated with the task can be halted to ensure that valid data is recorded.

Example:

```
D DFL
PSW  000077F0   0000E588
0,2  00000000   00000000   00000000   00000000
4,6  00000000   00000000   00000000   00000000
8,A  00000000   00000000   00000000   00000000
C,E  00000000   00000000   00000000   00000000
```

Error Messages:

ASGN-ERR

indicates that the optional fd could not be assigned; e.g., the fd is assigned for exclusive use already.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on an output file or device.

NOFP-ERR

indicates that specified task was not established with the DFLOAT option at Link time.

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that no task was specified or the specified task does not exist.

For the Model 3200MPS System, the following message may be displayed:

APU-ERR

indicates that the task is being actively executed on the APU and that the APU is being controlled by a task other than the operating system command processor.

3.18 DISPLAY ERRORS COMMAND

The DISPLAY ERRORS command displays to the user-specified fd a list of errors that the hardware error logger has detected and the following additional error recording status:

- Status of the error recording function (on or off)
- Date when error recording was turned on (month, day, year)
- Time (hour, minutes, seconds)
- Setting of the error log read-out time period (minutes)

Format:

DISPLAY ERRORS [,{fd / system console}]

Parameter:

fd	is an optional file descriptor specifying the file or device that receives the summary of the hardware logged errors. If fd is omitted, the summary is displayed to the system console.

Examples:

```
ERROR RECORDING STATUS REPORT:
RECORDING STATUS:  OFF
MEMORY ERRORS RECORDED:                0
DISK ERRORS RECORDED:                  0
FILE MANAGER ERRORS RECORDED:          0
SYSTEM DETECTED ERRORS RECORDED:       0
SYSTEM MILESTONES RECORDED:            0
MEMORY ERRORLOG READOUT PERIOD:        10
```

```
ERROR RECORDING STATUS REPORT:
RECORDING STATUS:  ON
START DATE/TIME:  05/15/79  14:57:10
CURRENT ERROR LOG FILE:  FIXD:ERR.LOG
MEMORY ERRORS RECORDED:                0
DISK ERRORS RECORDED:                  2
FILE MANAGER ERRORS RECORDED:          1
CDS UNSOLICITED MESSAGES RECORDED:     0
SYSTEM DETECTED ERRORS RECORDED:       0
SYSTEM MILESTONES RECORDED:           15
MEMORY ERRORLOG READOUT PERIOD:       10
```

Functional Details:

The error counts displayed when a DISPLAY ERRORS command is issued represent the total number of entries recorded since the error logging facility was last turned on. Turning the error logging facility off causes the counters to be reset to zero. The text "CDS UNSOLICITED MESSAGES RECORDED" is only generated on a Model 3280 Processor.

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is assigned for exclusive use already.

ERRC-ERR

indicates that error recording was not specified at sysgen time.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on output file or device.

PARM-ERR

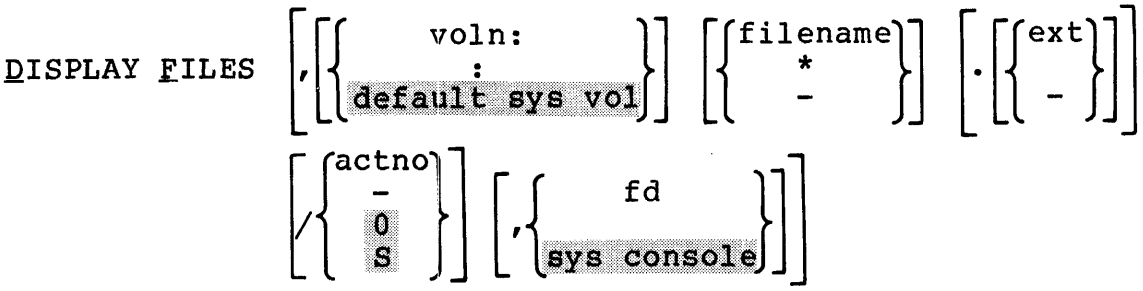
indicates an operand syntax error.

```
 ------------
|  DISPLAY   |
|   FILES    |
 ------------
```

3.19 DISPLAY FILES COMMAND

The DISPLAY FILES command permits information from the directory of one or more direct access files to be output to the system console or, optionally, to a named file or device.

Format:



Parameters:

voln:	is a 1- to 4-character name of a disk volume. The first character must be alphabetic, the remaining alphanumeric. If voln is omitted, the default system volume is assumed.
:	specifies that all files on the system account be displayed regardless of the volume on which they reside.
filename	is a 1- to 8-character name of a file. The first character must be alphabetic, the remaining alphanumeric.
.ext	is a 1- to 3-character extension to the filename.
actno	is a decimal number from 0 to 65,535 specifying the account number associated with the file. The account number field may be omitted, in which case system files (account 0) are displayed.
fd	is an optional file descriptor specifying the file or the device to which the display is output. If fd is omitted, the display is output to the system console.

Functional Details:

- A hyphen (-) in the command format requests that all files starting with the characters preceding the hyphen be displayed, subject to any restrictions specified in the extension, account number and fd fields.

  Examples:

  The following example displays all files whose first five characters are CAL32.

  ```
  CAL32-
  ```

  The following example displays all files named CAL32 with any extension.

  ```
  CAL32.-
  ```

  A hyphen can also be used in a command format to request that all files with the extension following the hyphen be displayed.

  Example:

  This example displays all files with the extension .OBJ.

  ```
  -.OBJ
  ```

- The asterisk (*) requests that all files with matching characters in the same position(s) as those entered are displayed.

  Examples:

  The following example displays all files between five and eight characters in length whose first five characters are CAL32.

  ```
  CAL32***
  ```

The following example displays all files whose first three and last three characters are CAL.

```
CAL**CAL
```

The following example displays all files with a filename containing six characters whose fifth and sixth characters are 32 and whose extension is .OBJ.

```
****32.OBJ
```

- The asterisk and hyphen can be combined in the command format, as previously described, to further delimit displayed files.

Example:

This example displays all files whose first three characters are CAL, and whose sixth character is 1.

```
CAL**1-
```

An example of the display produced by the DISPLAY FILES command is:

```
D F

FILENAME.....     TY DBS/IBS RECL. RECORDS CREATED..... LAST WRITTEN.. KEYS
DISCLAIM.038/00000 IN   5/1     80      35  2/15/82 09:57  2/15/82 09:57 0000
EDITINFO.32 /00000 IN   5/1     80      58  1/27/82 14:34  1/27/82 14:34 0000
PRECAL  .640/00000 IN   5/1     80      84 10/29/81 14:11 10/29/81 14:11 0000
APCMAC  .057/00000 IN   5/1     80     364  3/17/82 13:54  3/17/82 13:54 0000
CONVOY  .DLK/00000 IN   5/1     80      19  5/20/82 09:54  2/09/83 11:16 0000
CROW2   .CMD/00000 IN   1/1    120       7  2/07/83 17:53  2/07/83 17:53 0000
APBFORT .627/00000 IN   5/1     80      52 12/04/80 08:57 12/04/80 08:57 0000
CH2FB   .063/00000 IN   5/1     80     467  2/22/83 11:22  2/22/83 11:22 0000
APCTAM  .541/00000 IN   5/1     80      47 12/15/80 13:23  2/19/81 17:25 0000
APATAM  .541/00000 IN   5/1     80      23 12/15/80 13:21  2/19/81 17:25 0000
INDINP48.086/00000 IN   5/1     80     244  9/22/82 16:56  9/22/82 16:56 0000
APCEM2  .012/00000 IN   5/1     80      81  2/18/80 12:42  2/18/80 12:42 0000
TITCIM  .091/00000 IN   5/1     80      23  6/17/82 09:34  6/17/82 09:48 0000
APBRMA  .579/00000 IN   5/1     80     297 11/29/79 15:39 11/29/79 15:39 0000
MANUALS .SR /00000 IN   5/1     80     183  5/13/82 09:50  5/13/82 09:50 0000
DISCLAIM.478/00000 IN   5/1     80      35 11/13/80 10:50 11/13/80 10:50 0000
CH3FORT .627/00000 IN   5/1     80     221  3/21/80 08:34  3/21/80 08:34 0000
CH1RMA  .579/00000 IN   1/1     80     221  5/06/80 13:48  5/06/80 13:49 0000
TITLE   .466/00000 IN   5/1     80      21  7/09/80 16:44 12/12/80 15:49 0000
CH1AID  .374/00000 IN   5/1     80     299  2/08/80 09:42  2/08/80 09:42 0000
APAFLD  .020/00000 IN   5/1     80      91  3/13/80 09:45  3/13/80 09:45 0000
SORT    .TSK/00000 CO                   81  7/20/79 16:31  7/20/79 16:32 0000
KIRM    .JPC/00000 EC  64/3             100  2/25/83 11:02  2/25/83 11:02 0000
KIRMA   .JPC/00000 NB  64/3     126     78  2/25/83 11:04  2/25/83 11:04 0000
```

For contiguous files, TYPE (TY) is CO, and RECORDS is the size of the file in (decimal) sectors.

For indexed files, TYPE is IN, followed by the data and index blocking factors, RECL is the logical record length in (decimal) bytes, and RECORDS is the number of logical records (in decimal) in the file.

For nonbuffered indexed files, TYPE is NB, RECL is the logical record length in (decimal) bytes, and RECORDS is the number of logical records (in decimal) in the file.

For extendable contiguous files, TYPE is EC, and RECORDS is the length of the file in sectors (i.e., the size of the file).

Spool and temporary files are named as *SPOOLFILE* and *TEMPFILE*, respectively.

For all files, ACT is the associated user account number. For OS/32 systems containing multi-terminal monitor (MTM), the account number denotes the unique user to whom the file belongs. See the OS/32 Multi-Terminal Monitor (MTM) Reference Manual for further information.

Examples:

The following example displays to the console device all files with account number 0 on the default system volume.

```
D F
```

The following example displays file CAL32.TSK in any account.

```
D F,CAL32.TSK/-
```

The following example displays all files on the disk.

```
D F,-/-
```

The following example displays to the device MAG1 all files with account number 0 on the default system volume.

```
D F,,MAG1:
```

The following example displays to the console device all files with account number 0 on volume M300.

```
D F,M300:
```

The following example displays all files on volume M300 with first character A and extension TSK in account number 0.

```
D F,M300:A-.TSK
```

The following example displays all files on the default system volume in account number 0 with blank extension, regardless of filename. The display is routed to device PR1.

```
D F,-.,PR1:
```

The following example displays, to the console device, all files that start with CAL, contain the character 1 in the sixth position, have any extension, and are in account number 0.

```
D F,CAL**1-.-
```

The following example displays all files with the filename CAL32.TSK on all volumes.

```
D F,:CAL32.TSK
```

| The following example displays all files with the extension .CSS
| on the default volume.

```
| D F,.CSS
```

| The following example displays all spoolfiles in any account on
| the default volume.

```
| D F,@-/-
```

| The following example displays all temporary files in account 0
| on the default volume.

```
| D F,&-
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is assigned for exclusive use already.

FD-ERR

indicates an invalid optional fd.

FILE(S) NOT FOUND ON voln

indicates that the specified file was not found on voln.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on an output device or file.

NODA-ERR

indicates that direct access support is not included in this system.

NO DIRECTORY ENTRIES ON voln

indicates that voln has no files on it.

PARM-ERR

indicates that an invalid parameter, such as a nonexistent or unavailable volume, was specified.

```
 ------------
|  DISPLAY   |
|   FLOAT    |
 ------------
```

3.20 DISPLAY FLOAT COMMAND

The DISPLAY FLOAT command displays to the specified fd the contents of the single precision floating point (SPFP) registers associated with a user-specified task.

Format:

DISPLAY FLOAT [,{ fd / system console }]

Parameter:

fd	is an optional file descriptor specifying the file (account number must be 0 if specified) or device to which the display is output. If fd is omitted, the display is output to the system console.

Functional Details:

The specified task must be established with the FLOAT option specified at Link time.

For the Model 3200MPS System, the APU associated with the task can be halted to ensure that valid data is recorded.

Example:

```
D FL
PSW  000077F0   0000E588
0,2  00000000   00000000
4,6  00000000   00000000
8,A  00000000   00000000
C,E  00000000   00000000
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd already is assigned for exclusive use.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on an output file or device.

NOFP-ERR

indicates that the specified task was not established with the FLOAT option at Link time.

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that no task was specified or the user-specified task does not exist.

For the Model 3200MPS System, this message may be displayed:

APU-ERR

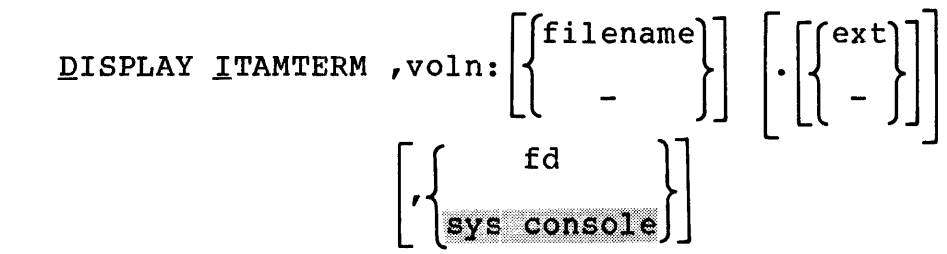
indicates that the task is APU active and that the APU is being controlled by a task other than the operating system command processor.

```
 ------------
|  DISPLAY   |
|  ITAMTERM  |
 ------------
```

3.21 DISPLAY ITAMTERM COMMAND

The DISPLAY ITAMTERM command permits information relative to allocated data communications LCBs to be output to the system console or, optionally, to a named file or device.

Format:



Parameters:

voln:	is the data communications device to be searched.
filename	is a 1- to 8-character name. The first character must be alphabetic, the remaining alphanumeric.
.ext	is a 1- to 3-character extension.
fd	is the file descriptor of the file or device on which the display is to be output. If fd is omitted, the display is output to the system console.

The information displayed is:

- Device name, filename and extension
- Device code (decimal)
- Data communications extended device code (hexadecimal)
- Transmission block size (decimal)
- Logical record size (decimal)
- Number of transmission blocks (decimal)

Examples:

The following example displays all data communications terminal LCBs with device mnemonic BSCI:.

```
D I,BSCI:
```

The following example displays all data communications terminal LCBs with device mnemonic BSCI: and any extension.

```
D I,BSCI:-.-
```

The following example displays all data communications terminal LCBs with device mnemonic BSCI: and extension LIN.

```
D I,BSCI:-.LIN
```

The following example displays all data communications terminal LCBs with device mnemonic BSCI, filename AJM, and extension LIN.

```
D I,BSCI:AJM.LIN
```

The following example displays on device MAG1:, all data communications terminal LCBs with device mnemonic BSCI:.

```
D I,BSCI:,MAG1:
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is assigned for exclusive use already.

FD-ERR

indicates an invalid optional fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on output device.

NOPR-ERR

indicates that a required operand is missing.

PARM-ERR

indicates an operand syntax error or data communications devices not supported in the system.

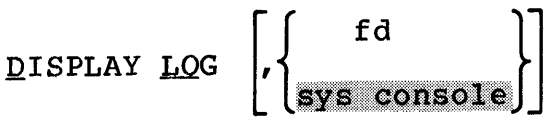
SPECIFIED TERMINAL(S) NON-EXISTENT FOR voln

indicates that a specific data communications terminal is not found or voln has no LCBs allocated for it.

3.22 DISPLAY LOG COMMAND

The DISPLAY LOG command displays, to the specified fd, the name of the system log set by the operator's SET LOG command.

Format:



Parameters:

fd	is an optional file descriptor of the file or device to which the name of the system log is displayed. If fd is omitted, the display is output to the system console.

Examples:

In the following example, the system log is assigned to a disk file.

```
>D LOG

SYSTEM LOG ASSIGNED - M300:CONSOLE.LOG/O
```

In this example, the system log is assigned to a terminal.

```
>D LO

SYSTEM LOG ASSIGNED - RV5:
```

In this example, the system log is assigned to a pseudoprint device.

```
>D LO

SYSTEM LOG ASSIGNED - PR:
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is assigned for exclusive use already.

FD-ERR

indicates an invalid optional fd.

NO SYSTEM LOG ASSIGNED

indicates that no system log has been set.

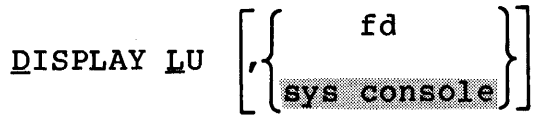
PARM-ERR

indicates an operand syntax error.

3.23 DISPLAY LU COMMAND

The DISPLAY LU command permits the operator to display all assigned logical units of the currently selected task.

Format:



Parameter:

fd	is an optional file descriptor specifying the file or device on which the assigned logical units are to be displayed. If fd is omitted, the display is output to the system console.

Functional Details:

The lu number, file or device name, current access privileges, current record number and percentage through file are displayed. The current record number and percentage through file are displayed only for files.

```
LU   FILE/DEVICE                        RECORD   THRU
 1   M67A:RADPROC.CSS/000,SRO                30   15.0%
 3   CON:,SRW
 5   CON:,SRW
 6   CON:,SRW


 1   M67A:RADPROC.CSS/000,SRO               200  100.0%
 3   CON:,SRW
 4   M67A:&2614586.001/000,SREW               1  100.0%
 5   CON:,SRW
 6   CON:,SRW
```

Example:

```
DISP LU,PR:
```

This example displays assigned logical units to the printer device (PR:).

Error Messages:

ASGN-ERR

indicates that the optional fd could not be assigned; e.g., the fd is assigned for exclusive use already.

FD-ERR

indicates an invalid optional fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was detected on output device or file.

PARM-ERR

indicates an operand syntax error.

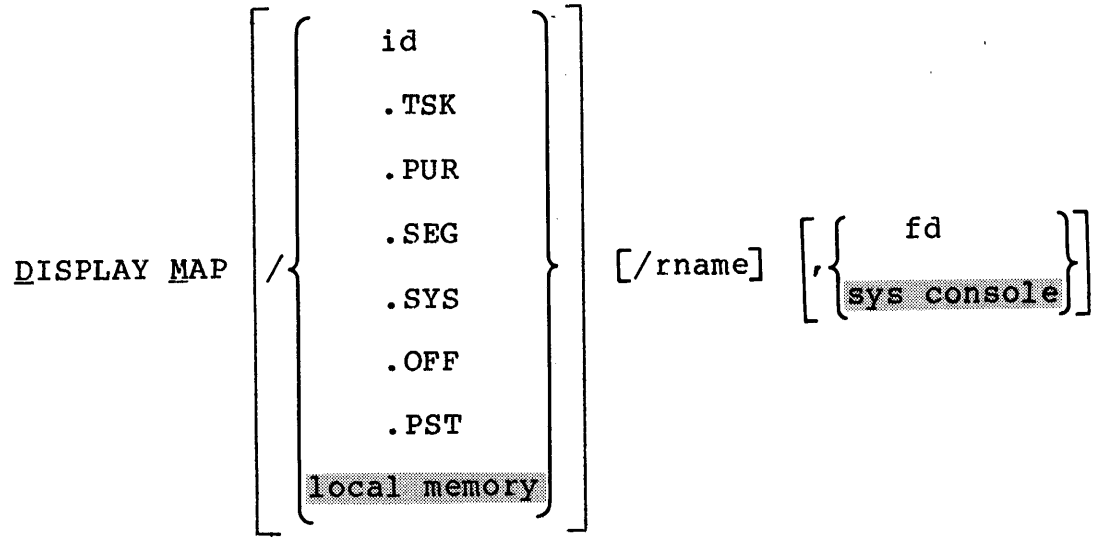
TASK-ERR

indicates that there is no currently selected task.

3.24 DISPLAY MAP COMMAND

The DISPLAY MAP command causes a memory map to be output to the console or to a specified file or device. The display map can be of the entire system or of a particular task, pure, library or task common segment, system space, pseudotask, or marked off memory.

Format:



Parameters:

id	can be either .BG to refer to the background task or the name associated with a task.
.TSK	requests display of task segments.
.PUR	requests display of pure segments.
.SEG	requests display of library and task common segments.
.SYS	requests display of system space.
.OFF	requests display of all OFF memory segments.
.PST	requests display of pseudotasks created by a system task using the intercept feature.

rname — requests display of a specific library segment, task common segment, sharable pure segment, or a taskid.

fd — is the file descriptor specifying the file or device on which the map is to be output; if fd is omitted, the display is output to the system console.

Functional Details:

If segment type and rname are omitted, all tasks, task common, library and pure segments, marked off memory, pseudotasks and system space are displayed. The name, segment type, start address, segment size, size of system space, number of shared segments, status and priority are displayed. If rname is specified, only the information for that task or segment is displayed. For id, all sharable segments are also displayed. The first line of the display indicates the starting address and size of the total task memory space.

Examples:

This example shows the display for two system tasks, two foreground tasks, a background task and two task common segments:

```
  D M
     NAME        TYPE  START     SIZE  SEG  SYS  STAT      PRI
TASK MEMORY            1D000  321.00
.SPL               .TSK  1D000   11.25                A     128
.MTM               .TSK  1FD00   33.00           RES  A     128
USER1              .TSK  28100    4.00      2.29      D     129
USER2              .TSK  29100   25.75      1.95      D     129*
.BG                .TSK  2F800    4.00      1.25      D     128
TSKCOM1            .SEG  30800    2.50
TSKCOM2            .SEG  31200   10.00
SYSTEM SPACE           6D400   75.00      8.34
*
```

The following example shows the display for one sharable pure segment, four library segments, one task common segment, one off memory segment and five foreground task segments.

```
     NAME          TYPE   START     SIZE  SEG  SYS  STAT     PRI
TASK MEMORY               22000  1044.00
M67AEDIT32    TSK .PUR    24800    28.00    1
PLUSRTL           .SEG    2B800     2.00    2
MINUSRTL          .SEG    2C000     2.00    2
MULRTL            .SEG    2C800     2.00    2
DIVIDRTL          .SEG    2D000     2.00    2
ICOM              .SEG    2E000     2.00    2
OFF MEMORY                C0000   256.00             OFF
EDIT32            .TSK    22000    10.00    1  2.25        P  128
TEST1             .TSK    2D800     2.00    4  1.25        D  128
TCOMTEST          .TSK    2E800    24.00    1  1.00        D  128
TEST1IN           .TSK    34800     2.00    4  1.25        D  128
LOOP              .TSK    35000     4.00    1  1.00        A  130
SYSTEM SPACE             127000   100.00      12.75
```

The NAME field is the name of a task or segment, and .BG indicates the background segment. Any other name indicates a foreground task, global task common segment, or library segment. For pure segments, NAME is the fd of the file containing the pure segment.

The TYPE field describes the segment type. Possible values are:

.TSK	Task memory image form (impure)
.PUR	Task memory image form (pure)
.SEG	Task common or library
.PST	Pseudotask

The START field is the absolute starting address of the segment in memory. The system space line contains the starting address of the system space and represents the upper limit of the task space plus one. The task memory line contains the starting address of the task space and represents the upper limit of the operating system space plus one.

The SIZE field indicates the size in kilobytes of the segment. Each size is a multiple of 0.25. The task memory and system space lines contain the maximum available task and system space.

The SEG field contains the number of shared segments for a task. For a shared segment, the SEG field indicates the number of tasks currently sharing the segment.

The SYS field indicates the amount of system space a task is using. In the system space line, this field contains the total amount of system space currently in use.

The STAT field indicates the status of these tasks, as follows:

D	Dormant
P	Paused (console wait)
A	Active (any state other than dormant or paused)

The status can be preceded by RES indicating the task is memory resident, ROL indicating the task is rollable, or ROLLED indicating the task is rolled. A task displayed on the map as active may in fact be in a wait state. The system operator can use the TASK and DISPLAY PARAMETERS commands to get the actual wait status halfword for a given task. The PRI field indicates the priority in decimal of all tasks currently in the system. An asterisk (*) next to a value in the priority field indicates that the actual run priority of that task has been lowered by MTM. OFF identifies marked off memory.

Error Messages:

ASGN-ERR

indicates that the output device or file could not be assigned; e.g., the device returns an unrecoverable error on an I/O attempt.

FD-ERR

indicates that an invalid fd was specified.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error occurred on output device or file; e.g., the device returns an unrecoverable error on an I/O attempt.

PARM-ERR

indicates an operand syntax error.

SEGMENT REQUEST NOT FOUND

indicates that the requested segment was not found, or no tasks exist in memory.

3.25 DISPLAY PARAMETERS COMMAND

The DISPLAY PARAMETERS command is used to display parameters pertinent to the currently selected task. The display appears on the console device, or on a device or file (account number must be 0 if specified) selected by the operator.

Format:

Parameter:

fd	is an optional file descriptor specifying the file (account number must be 0 if specified) or device to which the display is to be output. If fd is omitted, the display appears on the system console.

Functional Details:

Table 3-3 lists the field addresses and data displayed when the DISPLAY PARAMETERS command is entered.

TABLE 3-3 FIELDS DISPLAYED BY THE DISPLAY PARAMETERS COMMAND

TASK	TASKID	TASK NAME
CTSW	xxxxxxxx	Status portion of current task status word (TSW)
PSW	xxxxxx	Least significant three bytes of status portion
CLOC	xxxxxx	Current location
STAT	xxxxx	Task wait status
TOPT	xxxxx	Task options
USSP	xxxxx	Current used system space
MUSP	xxxxx	Maximum used system space
MXSP	xxxxx	Maximum allowed system space
CTOP	xxxxx	Task CTOP
UTOP	xxxxx	Task UTOP
UBOT	xxxxx	Task UBOT
SLOC	xxx	Task starting location
NLU	xx	Number of logical units (decimal)
MPRI	xxx	Maximum priority (decimal)
SVOL	xxxx	Default volume ID
TVOL	xxxx	Current task volume

The addresses displayed as CTOP, UTOP, UBOT and SLOC are not physical addresses, but are addresses within the task's own program space. CLOC may be a program space address or a physical address in a system subroutine being executed on behalf of the task. NLU is given in decimal. SVOL is the ASCII system volume ID. It is not specifically related to the currently selected task, but is given here for operator convenience. TVOL is the ASCII task volume name associated with the currently selected task. CTSW is given in hexadecimal. For a definition of the status portion of the TSW and a description of the fields CTOP, UTOP, UBOT and SLOC, see the OS/32 Application Level Programmer Reference Manual.

TOPT is given in hexadecimal. The definitions of Task Option bits are listed in Table 3-4.

TABLE 3-4 TASK OPTION BIT DEFINITIONS

BIT	MASK	MEANING
0	8000 0000	0 - task type determined by bit 16 1 - task is a d-task
*1	4000 0000	0 - task can run on CPU or APU 1 - task cannot run on CPU
*2	2000 0000	0 - no APU mapping allowed 1 - task can perform APU mapping functions
*3	1000 0000	0 - no APU control allowed 1 - task can perform APU control functions
*4	0800 0000	0 - dynamic priority scheduling disabled 1 - dynamic priority scheduling enabled
5	0400 0000	0 - prompts disabled 1 - prompts enabled
6	0200 0000	0 - no extended SVC1 parameter blocks used (excludes communications I/O) 1 - extended SVC1 parameter blocks used
7	0100 0000	0 - I/O interpreted without VFC (except where specified) 1 - all I/O interpreted with VFC
8	0080 0000	0 - DEBUG/32 table is not present 1 - DEBUG/32 table is present
9	0040 0000	0 - task event all registers saved 1 - task event partial register saved
10	0020 0000	0 - task event no register saved 1 - task event register saved
11	0010 0000	0 - not in system group 1 - in system group
12	0008 0000	0 - no console I/O intercept 1 - console I/O intercept enable (MTM)

TABLE 3-4 TASK OPTION BIT DEFINITIONS (Continued)

BIT	MASK	MEANING
13	0004 0000	0 - universal status reports not allowed 1 - universal status reports allowed
14	0002 0000	0 - allow executive task (e-task) load 1 - prevent e-task load
15	0001 0000	0 - queued I/Os not purged on error 1 - queued I/Os purged on error
16	0000 8000	0 - u-task 1 - e-task
17	0000 4000	0 - task will pause due to arithmetic fault 1 - task will not pause due to arithmetic fault
18	0000 2000	0 - no SPFP 1 - SPFP
19	0000 1000	0 - task will be removed from memory at end of task 1 - task remains in memory after end of task
20	0000 0800	0 - allow SVC6 control call 1 - prevent SVC6 control call
21	0000 0400	0 - allow SVC6 communication call 1 - prevent SVC6 communication call
22	0000 0200	0 - background task pauses upon SVC6 communication request 1 - requests for communication calls by background task are ignored
23	0000 0100	0 - no DPFP 1 - DPFP
24	0000 0080	0 - task is not rollable 1 - task is rollable
25	0000 0040	0 - no overlay 1 - use overlay
26	0000 0020	0 - accounting disabled 1 - accounting enabled
27	0000 0010	0 - task cannot issue intercept calls 1 - task can issue intercept calls

TABLE 3-4 TASK OPTION BIT DEFINITIONS (Continued)

BIT	MASK	MEANING
28	0000 0008	0 - no account privileges 1 - file account privileges
29	0000 0004	0 - bare disk assign not allowed 1 - bare disk assign allowed
30	0000 0002	0 - not universal 1 - universal
31	0000 0001	0 - no keychecks 1 - do keychecks

* Bits 1 through 4 are the task option bits applicable only to the Model 3200MPS System.

STAT is given in hexadecimal. The definitions of Wait Status bits are shown in Table 3-5.

TABLE 3-5 WAIT STATUS BIT DEFINITIONS

BIT	MASK	MEANING
15	0001 0000	Intercept wait
16	0000 8000	I/O wait
17	0000 4000	(Any) Input/output block (IOB)/ WAIT
18	0000 2000	Console wait (paused)
19	0000 1000	Load wait
20	0000 0800	Dormant
21	0000 0400	Trap wait
22	0000 0200	Time-of-day wait
23	0000 0100	Suspended
24	0000 0080	Interval wait
25	0000 0040	Terminal wait

TABLE 3-5 WAIT STATUS BIT DEFINITIONS (Continued)

BIT	MASK	MEANING
26	0000 0020	Roll pending wait
27	0000 0010	Intercept initialization (MTM)
28	0000 0008	Intercept termination (MTM)
29	0000 0004	System resource connection wait
30	0000 0002	Accounting wait

NOTE

Zero status indicates the task is active.

Functional Details:

For Model 3200MPS Systems, the APU associated with the task can be checkpointed to ensure that valid data is displayed.

Example:

The following is an example of the output generated in response to a DISPLAY PARAMETERS command:

```
D P
TASK      EDIT32
CTSW      00001000
PSW          477F0
CLOC         F2B7C
STAT          2000
TOPT         10021
USSP          14F8
MUSP          2208
MXSP          3000
CTOP          24FE
UTOP          2370
UBOT             0
SLOC         F0000
NLU             15
MPRI           128
SVOL          M67A
TVOL          M67A
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is already assigned for exclusive use.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was detected on output device or file.

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that there is no currently selected task.

For the Model 3200MPS System, the following message can also be displayed:

APU-ERR

indicates that the task is APU active and that the APU is being controlled by a task other than the operating system command processor.

3.26 DISPLAY REGISTERS COMMAND

The DISPLAY REGISTERS command displays to the specified fd the contents of the general-purpose user registers associated with a user-specified task.

Format:

DISPLAY REGISTERS [,fd]

Parameter:

fd — is the file descriptor to which the contents of the general-purpose user registers are displayed.

Functional Details:

For Model 3200MPS Systems, the APU associated with the task can be checkpointed to ensure that valid data is displayed.

Example:

```
D R
PSW   000077F0   0000E588
0-3   00000000   00000000   00000000   00004801
4-7   0000E83C   00000000   00000000   0000D2EA
8-B   0000E8CB   00000000   0000E848   00000028
C-F   0000E804   0000E9D0   0000E584   0000E05E
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is already assigned for exclusive use.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was detected on an output device or file.

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that no task was specified or user-specified task does not exist.

For Model 3200MPS Systems, the following message may appear:

APU-ERR

indicates that the task is APU active and that the APU is being controlled by a task other than the operating system command processor.

3.27 DISPLAY SLICE COMMAND

The DISPLAY SLICE command is used to display the current time slice in milliseconds.

Format:

DISPLAY SLICE [, { fd / sys console }]

Parameter:

fd — is the file descriptor of the device or file on which the display is to be output.

In response to this command, OS/32 displays one of two messages:

```
TIME SLICEing TURNED OFF
 or
TIME SLICE = n
```

The first message indicates that time-slice scheduling is not enabled. If time-slice scheduling is enabled, the second message is displayed with n indicating the current time-slice in milliseconds.

Error Messages:

ASGN-ERR/FD-ERR

indicates an optional fd could not be assigned or the fd is invalid.

FORM-ERR/PARM-ERR

indicates a command or an operand syntax error has occurred.

IO-ERR

indicates an I/O error has been encountered on an output device or file.

3.28 DISPLAY STATUS COMMAND

The DISPLAY STATUS command displays to the specified fd the status of assignments to the specific disk volume.

Format:

DISPLAY STATUS ,voln [,{ fd / sys console }]

Parameters:

voln	volume name of the disk for which the status is displayed.
fd	is an optional file descriptor specifying the file or device to which the specified disk volume's status is displayed. If fd is omitted, the display is output to the system console.

Functional Details:

The DISPLAY STATUS command outputs the following information:

- The function of the specified volume (system, spool, roll or temporary)
- The names of the system log and error recording file, if any
- The name of each task assigned to either the specified volume or its disk device and the number of logical units assigned to each task is shown along with its name. The console monitor (.CSL) and the command processor (.CMDP) are included in this display.
- The names of any tasks assigned to the specified volume for rolling or overlaying.

When no lu assignments are reported for the specified volume, the disk may be marked off.

Example:

```
>D S,M301

VOLUME=M301
SYSTEM VOLUME
CORE DIRECTORY
ERROR LOG ASSIGNED:    ERRORLOG.DAT
NUMBER OF LOGICAL UNITS ASSIGNED:
    .CMDP:    1    .MTM:    7    ECM:    2    USER:    1
TASKS ASSIGNED FOR ROLLING or overlaying:
    ***NONE***


>D S,M302
VOLUME= M302
SPOOL ROLL TEMP VOLUME
CORE DIRECTORY
SYSTEM LOG ASSIGNED: CONSOLE .LOG
NUMBER OF LOGICAL UNITS ASSIGNED:
    .CSL:    1    .SPL:    1    DMS:    2    USER:    1
    ITCAT0: 13    ITCAT1: 13    ITCAT2: 13
TASKS ASSIGNED FOR ROLLING or overlaying:
    USER
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is already assigned for exclusive use.

FD-ERR

indicates an invalid optional fd.

FORM-ERR

indicates a command syntax error.

DEVICE NOT A DISK

indicates that the device specified by the voln parameter is not a bulk storage device.

PARM-ERR

indicates an operand syntax error.

NODA=ERR

indicates that direct access support is not included in this system.

NOPR-ERR

indicates a required operand is missing.

3.29 DISPLAY TASKS COMMAND

This command is supported in revision 7.1 or higher of OS/32.

The DISPLAY TASKS command outputs status information for all tasks in the system or for a single specified task.

Format:

DISPLAY TASKS task-id [,{fd / sys console}]

Parameters:

task-id	specifies the task for which status information is to be displayed. If this parameter is omitted, status information for all tasks in the system is displayed.
fd	specifies the destination for the output generated by this command. The destination may be a file with account number 0 or another character handling device. If fd is omitted, the output is directed to the system console.

Functional Details:

This command provides the system operator with the name, size, memory resources, dispatch priority and execution state of each task in the system.

Examples:

```
*DISPLAY TASKS
 TASK-ID  SIZE    SHD  SYS    PRI  LPU#   STATUS
  .SPL    12.00    0          128  0      WAITING I/O, IOB, TRAP
  .MTM    34.00    0          128  0      READY
  EXEC    38.00    1   2.50   129  1-DIR  ACTIVE APU3
  SOAKER  102.25   1   10.25  129  1      READY QUEUE 3


*D TA SOAKER
 TASK-ID  SIZE    SHD  SYS    PRI  LPU#   STATUS
  SOAKER  102.25   1   10.25  129   1     READY QUEUE 3
```

Fields:

TASK-ID	identifies the task name.
SIZE	is the sum of all segment sizes used by this task in kilobytes.
SHD	is the number of shared segments used by this task.
SYS	is the current amount of system space used by this task in kilobytes.
PRI	is the dispatch priority on the CPU; the lower the number the higher the priority.
LPU#	is the logical processor unit number assigned to the task. The abbreviation DIR identifies an LPU-directed task. Zero indicates CPU. This parameter applies to the Model 3200MPS System only.
STATUS	gives the current execution status of the task. The following are valid execution states.
ACTIVE APU#	task active on APU if specified.
READY or READY QUEUE#	task ready to run on CPU or on APU if specified.
READY PASSBACK	task passed back to CPU for servicing.

WAITING "SPECIFIC EVENT"

task is waiting for completion of the specified events. The events defined in the wait field can contain one or more of the following mnemonics.

I/O	input/output
IOB	I/O block
PAUS	pause
SUSP	suspend
TRAP	trap
INTRCP	intercept
INTRVL	interval
CONECT	connection
ACT	accounting
DORM	dormant
LOAD	load
TOD	time of day
TERM	terminal
ROLL	roll
MTM	multi-terminal monitor

Error Messages:

ASGN-ERR

indicates an invalid fd.

FD-ERR

indicates an invalid fd.

FORM-ERR/PARM-ERR

indicates a command/operand syntax error.

IO-ERR

indicates that an I/O error was detected on an output device or file.

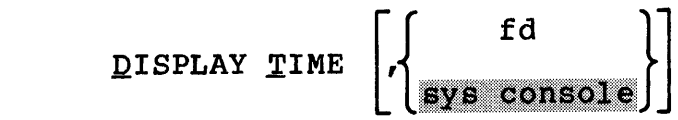
TASK(S) NOT FOUND

specified task(s) was not found in the system or, in the case of a full display, no tasks were found in the system.

3.30 DISPLAY TIME COMMAND

The DISPLAY TIME command causes the current date and time to be output to the system console or to a specified file or device.

Format:



Parameter:

fd — specifies the file or device to which the display is to be output. If fd is omitted, the display is output to the system console.

Functional Details:

The display has the following format:

mm/dd/yy hh:nn:ss

or alternatively by sysgen option:

dd/mm/yy hh:nn:ss

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., the fd is already assigned for exclusive use.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on output device or file.

PARM-ERR

indicates an operand syntax error.

3.31 DISPLAY VOLUME COMMAND

The DISPLAY VOLUME command displays, to the specified fd, the state of the specified disk volume. This command is supported only on disk devices that support error recording; e.g., mass storage media (MSM) disk devices.

Format:

Parameters:

voln	is the volume name of the disk whose status is displayed.
fd	is an optional file descriptor specifying the file or device to which the specified disk volume's status is displayed. If fd is omitted, the display is output to the system console.

Functional Details:

If the disk device for the specified volume name supports error recording, information is displayed showing read, write and total SVC1 requests (REQUESTS=); the number of sectors read from or written to and the total number of sectors accessed (SECTOR=); and the average latency for the SEEK/REQ or ROTATION fields (AVERAGE LATENCY:).

If the disk device for the specified volume name does not support error recording, the only information displayed is the amount of free space on the specified volume (FREESPACE=), the amount of directory space on the specified volume (DIRECTORY=), and the largest contiguous extent on the specified volume (LARGEST EXTENT:).

Examples:

In the following example, volume M300 has error recording capabilities.

```
>D V,M300

VOLUME= M300
DIRECTORY =     4233 FILES       4500 SLOTS       96.06% OF TOTAL
FREESPACE =   189639 SECTORS      241 EXTENTS     18.94% OF TOTAL
REQUESTS  =   114933 READ       23119 WRITTEN       138052 TOTAL
SECTORS   =   215349 READ      162138 WRITTEN       377487 TOTAL
LARGEST EXTENT:   160930 SECTORS  FLBA:   CD09D  LLBA:   F453E
AVERAGE LATENCY:   0.214 SEEK/REQ    46 ROTATION (SECTORS/REQ)
```

In the following example, volume FIXD has no error recording capabilities.

```
D V,FIXD

VOLUME= FIXD
DIRECTORY =        3 FILES     120 SLOTS          2.50% OF TOTAL
FREESPACE =     4534 SECTORS   2 EXTENTS         23.15% OF TOTAL
LARGEST EXTENT:      4502 SECTORS   FLBA:    3AEA   LLBA:  4C7F
```

Fields:

DIRECTORY — is the amount of directory space on the specified volume displayed as number of files, number of slots and percentage of total space.

- FILES — is the number of files allocated on the specified volume.
- SLOTS — is the total number of files that the directory can accommodate.

FREESPACE= — is the amount of free space on the specified volume displayed as number of sectors, number of extents and percentage of total space.

- SECTORS — is the number of free sectors on the specified volume.

EXTENTS — is the number of contiguous free blocks of sectors on the specified volume.

REQUESTS= — is the number of read, write and total SVC1 requests made to the specified volume.

SECTORS= — is the number of sectors read from or written to and the total number of sectors accessed.

LARGEST EXTENT: — is the largest contiguous free block of sectors on the specified volume. FLBA represents the first logical block address of the extent, and LLBA represents the last logical block address of the extent.

AVERAGE LATENCY: — in the SEEK/REQ field, the average latency is the average number of seeks done per I/O request. In the ROTATION field, the average latency is the average wait for disk rotation/request measured in sectors. For MSM disks, one rotation equals 64 sectors. Therefore, half a rotation equals 32 sectors.

Error Messages:

ASGN-ERR

indicates the optional fd or disk device of volume name voln could not be assigned.

DEVICE NOT A DISC

indicates that the specified device with volume name voln is not a bulk storage device.

FD-ERR

indicates an invalid optional fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was encountered on disk device of volume name voln or on output device.

NODA-ERR

indicates that direct access support is not included in this system.

NOPR-ERR

indicates a required operand is missing.

PARM-ERR

indicates an operand syntax error.

3.32 ERROR LOG COMMAND

The ERROR LOG command turns on or off the error recording function, which copies the errors from the error logger to the disk. This command controls general error recording for all processors and memory error recording for the Perkin-Elmer Series 3200 Processors.

Format:

$$\underline{\text{ERR}}\text{OR } \underline{\text{LOG}} \text{ ,} \left\{ \begin{array}{l} \text{ON } [\text{,[fd]} \ [\text{,INIT}]] \\ \underline{\text{OF}}\text{F} \end{array} \right\}$$

Parameters:

OFF — dumps the internal error record buffer to disk and closes the error recording files. Internally, errors are still stored, but not written to disk, which causes error data to be lost if the internal buffer overflows.

ON — turns on the error recording function.

fd — specifies the contiguous file to be used for error recording. If this parameter is omitted, the file specified at sysgen is the default. If the user-specified fd does not currently exist, the file is automatically allocated and assigned.

NOTE

To facilitate easy location of the error recording file by maintenance and support personnel, it is recommended that a standard error recording filename, SYSERROR.LOG, be used and that it be allocated on the default system volume.

INIT — initializes the error recording file so that new error records can be added to the beginning of the file. If this parameter is omitted, subsequent error records are added following the last records written to the file.

Functional Details:

If the date and time parameters of the SET TIME command were not specified, the command ERROR LOG ON cannot record valid dates and times in the error logger file and an error message is displayed.

Error Messages:

CLOS-ERR TYPE=BUFF

indicates an error occurred when closing the error recording file. TYPE=BUFF means system space has become corrupted and buffers and/or file control blocks (FCBs) cannot be returned to the free system space.

DATE-ERR

indicates that the ON parameter was specified but the date and time parameters of the SET TIME command were not specified.

NOPR-ERR

indicates that no parameters were specified.

OFF-ERR

indicates that the OFF parameter was specified but the error recording function was already off.

ON-ERR

indicates that the ERROR LOG command was entered twice with the ON parameter specified.

PARM-ERR

indicates that a syntax error exists in the specified parameter.

PRES-ERR

indicates that error recording is not supported.

```
------------
|   ERROR    |
|   PERIOD   |
------------
```

3.33 ERROR PERIOD COMMAND

The ERROR PERIOD command sets the memory error log readout period to a user-specified number of minutes. The initial value is specified at sysgen time. This command can be used only with Series 3200 Processors.

Format:

ERROR PERIOD [,{minutes / *}]

Parameters:

minutes	is a decimal number from 1 to 1440 specifying the number of minutes between error log read-outs. If this parameter is omitted, the time period is reset to the initial sysgen value.
*	specifies that the memory error logger performs a readout immediately. The previously set readout period is not affected.

Functional Details:

This command operates differently for a Model 3280 Processor with more than one composite memory module (CMM). The time-out period specified will be divided by the number of CMMs. For example, if the command ERR PER, 60 is entered and there are four CMMs, a different CMM will be read every 15 minutes. If the command ERR PER, * is entered, the memory error logger will immediately read out the errors recorded from the next CMM that is due to be read within the time cycle. Therefore, the command does not provide a complete read of memory errors since it is only doing a read of one CMM at a time.

Error Messages:

INIT-ERR

indicates that memory error recording was initialized but it already had been specified and was in progress.

NOPR-ERR

indicates that no parameters were specified.

PARM-ERR

indicates that a syntax error exists in the specified parameter.

PERD-ERR

indicates that the number of minutes specified for the error log readout period was not a number from 1 to 1440.

SPAC-ERR

indicates that there was not enough system space allocated for an error log buffer.

3.34 ERROR RECORDING COMMAND

The ERROR RECORDING command turns error recording on or off for a specified device.

Format:

ERROR RECORDING ,fd,{ON / OFF}

Parameters:

fd	is the file descriptor of the device for which errors are being recorded.
ON	specifies error recording is to be enabled for the specified device.
OFF	specifies error recording is to be disabled for the specified device.

Functional Details:

The number of errors recorded for the specified device is set to zero at system initialization.

Error Messages:

ERRC-ERR

indicates that error recording was not specified at sysgen.

NOPR-ERR

indicates that no parameters were specified.

NSUP-ERR

indicates the device does not support error recording.

PARM-ERR

indicates that a syntax error exists in the specified parameter.

3.35 EXAMINE COMMAND

The EXAMINE command is used to examine the contents of local or shared memory.

Format:

$$\underline{\text{EXA}}\text{MINE address}_1 \left[\left[\begin{array}{l}\text{,n} \\ \text{/address}_2 \\ \text{,1}\end{array}\right]\right] \left[\text{,}\left\{\begin{array}{c}\text{fd} \\ \text{sys console}\end{array}\right\}\right]$$

Parameters:

address	indicates the starting and ending addresses in memory whose contents are to be displayed in hexadecimal. All addresses specified are rounded down to halfword boundaries by the operating system.
n	is a decimal number specifying the number of halfwords to be displayed. If n is omitted, one halfword is displayed.
fd	is the file descriptor specifying the file or device to which the contents of memory are displayed; if omitted, the display is output to the system console.

Functional Details:

Specifying only $address_1$ causes the contents of memory at that location to be displayed (as modified by any previous BIAS command). Specifying $address_1$ and $address_2$ causes all data from the first to the second address to be displayed.

Examples:

The following example examines 10 halfwords starting at relative address 100 (absolute address B100).

```
BI B000
EXA 100,10
```

The following example examines relative locations 100 through 200.

```
EXA 100/200
```

Error Messages:

ASGN-ERR

indicates that an optional fd could not be assigned; e.g., fd already is assigned for exclusive use.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error was detected on output device or file.

NOPR-ERR

indicates that a required operand is missing.

PARM-ERR

indicates an operand syntax error (an attempt to examine memory reserved for memory access controller (MAC) or marked off and possibly nonexistent).

3.36 FFILE COMMAND

The FFILE command forward spaces to the next filemark on magnetic tapes, cassettes and direct access files.

Formats:

FFILE fd — is used for magnetic tapes and cassettes only.

FFILE fd [,lu] — is used for disk devices only.

Parameters:

fd	is the file descriptor of the device or file that is to be forward spaced one filemark.
lu	is the logical unit to which the file is assigned.

Functional Details:

For magnetic tapes and cassettes, only the parameter fd should be specified; for direct access files, lu optionally can be specified. The account number must be 0, if specified.

Before entering the format for disk devices, the task must be selected as the current task through the TASK command.

Examples:

The following example causes the device MAG2: to forward space one filemark.

```
FF MAG2:
```

The following example causes the file AJM.OBJ on volume M300 that is assigned to lu4 to forward space one filemark.

```
FF M300:AJM.OBJ,4
```

Error Messages:

ASGN-ERR

indicates that the file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates that an invalid fd was encountered or a nonzero account number was specified.

IO-ERR

indicates that an I/O error or an illegal or unassigned lu was encountered on the specified device or file.

LU-ERR

indicates that the lu was not a legal decimal number or was greater than maxlu for the task.

NOBC-ERR

indicates that bulk file command support is not included in the operating system.

NOPR-ERR

indicates that no operand was specified.

TASK-ERR

indicates that there was no currently selected task and an FFILE command was entered with lu specified.

3.37 FRECORD COMMAND

The FRECORD command forward spaces one record on magnetic tapes, cassettes and direct access files.

Formats:

FRECORD fd	is used for magnetic tapes and cassettes only.
FRECORD fd [,lu]	is used for disk devices only.

Parameters:

fd	is the file descriptor of the device or file to be forward spaced one record.
lu	is the logical unit to which the device or file is assigned.

Functional Details:

For magnetic tapes and cassettes, only the parameter fd should be specified; for direct access files, lu can optionally be specified. The account number must be 0, if specified.

Before entering the format for disk devices, the task must be selected as the current task through the TASK command.

For cartridge tapes (streaming tapes), this command spaces forward a 512-byte block which may or may not be a full record.

Examples:

The following example causes the device MAG2: to forward space one record.

```
FR MAG2:
```

The following example causes file M300:AJM.OBJ on volume M300 that is assigned to lu4 to forward space one record.

```
FR M300:AJM.OBJ,4
```

Error Messages:

ASGN-ERR

indicates that the file or device could not be assigned for the reason noted in the TYPE field.

FD-ERR

indicates that an invalid fd was encountered or a nonzero account number was specified.

IO-ERR

indicates that an I/O error or an illegal or unassigned lu was encountered on the specified device or file.

LU-ERR

indicates that the lu was not a legal decimal number or was greater than maxlu for the task.

NOBC-ERR

indicates that bulk file command support is not included in the operating system.

NOPR-ERR

indicates that no operand was specified.

TASK-ERR

indicates that there was no currently selected task and a command requiring the specification of lu was entered.

3.38 INIT COMMAND

The INIT command enables the operator to initialize all data on a contiguous file to 0.

Format:

```
INIT fd [,{segsize increment}]
         {      1           }
```

Parameters:

fd	is the file descriptor of any unassigned, unprotected, contiguous file. A file with a nonzero account number can be initialized by specifying the account number.
segsize increment	is a decimal number from 0 to 960kb specifying the size of the buffer space used. The default is 1kb.

Functional Details:

INIT is implemented with a CSS procedure that loads and starts the File Manager Support Utility as a background (.BG) task.

Examples:

The following example initializes the file DATA.FIL.

```
INIT DATA.FIL
```

The following example initializes the file DATA2.FIL using a 50kb buffer.

```
INIT DATA2.FIL,50
```

Error Messages:

ASGN-ERR

indicates an error when an attempt was made to assign the file to be initialized or the task file for the File Manager Support Utility. See the ASSIGN command description for error information.

FD-ERR

indicates that an invalid fd was specified.

fd IS NOT A CONTIGUOUS FILE

indicates that an attempt was made to initialize a noncontiguous file.

FORM-ERR

indicates that an invalid segment size increment was specified.

LOAD-ERR

indicates an error when an attempt was made to load the File Manager Support Utility as a background (.BG) task. See the LOAD command for error information on loading a background task.

MNEM-ERR

indicates that the file INIT.CSS could not be found on the system volume.

NODA-ERR

indicates that there is no direct access support in this system.

SEQ-ERR

indicates that another CSS procedure or background task is active. A second INIT command cannot be executed until the first has completed.

xxxx ERROR ON fd SECTOR n

indicates that an I/O error occurred while attempting to initialize sector n of file fd. xxxx is the type of error; it may be unrecoverable I/O, recoverable I/O, or device unavailable.

3.39 IRBUFFER COMMAND

The IRBUFFER command is used to create, display and free internal reader buffers that are used by the internal reader facility (SVC2, SVC14) of the operating system.

Format:

IRBUFFER { n | DISPLAY | FREE }

Parameters:

n	is a decimal number from 1 to 99 specifying the number of command buffers requested.
DISPLAY	displays how many buffers are available and how many are currently in use (have executable commands in them).
FREE	specifies that existing buffers are to be deleted.

Functional Details:

If the operating system is not generated with internal reader support (IREADER), any attempted use of the IRBUFFER command results in a mnemonic error (MNEM-ERR).

Examples:

```
IRB 5
IRBUF -   5 BUFFER(S) PRESENT
IRBUF -   0 BUFFER(S) IN USE


IRB D
IRBUF -   5 BUFFER(S) PRESENT
IRBUF -   0 BUFFER(S) IN USE
```

```
IRB F
IRBUF -   5 BUFFER(S) FREED
```

Error Messages:

IRBUF-BUFFERS CAN'T GET SYSTEM SPACE

indicates that the requested number of buffers specified by IRBUFFER n exceeds the amount of available system space. To avoid this condition, fewer buffers should be requested, or the size of system space should be increased. Specifying the FREE option or entering IRBUF 0 releases all buffers.

IRBUF-ILLEGAL PARAMETER

indicates that the number of buffers requested by IRBUFFER n exceeds the maximum 99 buffers.

This message can also indicate that IRBUFFER was entered with no parameter.

IRBUF-n BUFFER(S) IN USE

indicates that fewer buffers were requested than were currently in the queue. n represents the number of buffers in use. If this condition exists, the operating system will not reallocate the size of the buffer pool; the currently allocated buffer pool remains in effect.

IRBUF-nn BUFFER(S) FREED

indicates that the IRBUFFER command was entered with the FREE option and all buffers are inactive.

IRBUF-nn BUFFER(S) IN USE

indicates that the IRBUFFER command was entered with the FREE option and all buffers are active.

3.40 LOAD COMMAND

The LOAD command loads background tasks, foreground tasks, system tasks, task common segments and library segments into memory. If this command is entered at the system console (not via a CSS), the system will automatically task to the program just loaded.

Format:

```
        [taskid]
         sysid
         .BG[xxxxx]
LOAD     .TCM        ,fd[,segsize increment]
         .LIB
         .SEG
```

Parameters:

taskid	specifies the name of the task after it is loaded into the foreground segment in memory. The default extension for fd is .TSK.
sysid	specifies the taskid of a system task. The taskid for the Spooler is .SPL; the taskid for the multi-terminal monitor is .MTM.
.BG	specifies that a background task is to be loaded into memory with intertask communication control and capabilities disabled.
xxxxx	is an optional decimal number which can be specified when more than one background task is being loaded into memory. The names of background tasks can be .BG,.BG1,.BG2,...,.BG99999; however, the actual total number of tasks (background and others) cannot exceed the maximum number of tasks specified at sysgen time.
.TCM	specifies that a preinitialized task common segment is to be loaded into memory. It is loaded as a .SEG segment.
.LIB	specifies that a library segment is to be loaded into memory. It is loaded as a .SEG segment.

.SEG	specifies that a task common or run-time library (RTL) segment is to be loaded into memory. The default extension for fd is .SEG.
fd	is the filename used as the taskid or the fd of the established task, library or preinitialized task common segment to be loaded into memory. If this parameter is omitted, the default is taskid.TSK for foreground tasks. This parameter is required for system tasks, background tasks and task common and library segments. However, if the extension of the fd is omitted, the default extension is fd.SEG for task common and library segments and fd.TSK for foreground and background tasks.
segsize increment	is a decimal number (in kilobytes) specifying the amount of get storage area in the task's impure memory segment. If specified, this value overrides the OPTION WORK= values used when the task was linked.

Functional Details:

A task must be prepared by processing the component programs, subroutines and overlays with Link. Once established, the task can be loaded into memory. A task is loaded into the first memory segment large enough to accommodate it. A nonzero account number can be specified in the fd.

System tasks are extensions of the operating system. Currently existing system tasks are the .MTM, the Spooler (.SPL), and the SPL/32 (.SPLR).

Task common segments within OS/32 fall into two classes:

- those in local memory (below MTOP, as set by the sysgen MEMORY statement or the MEMORY operator command), and
- those in global memory (above MTOP).

Local task common segments are under operator control. The number of local task common segments is limited only by the amount of memory available.

Global task common segments are established at sysgen time using the SYSGEN32 TCOM command and are not controlled by the operator.

The size and segment names are fixed at sysgen time. For more information on generating a system containing global task common segments, see the System Generation/32 (Sysgen/32) Reference Manual.

The library segment name specified at Link time is the name by which the library is known to the system.

When a task is loaded into memory, the impure segment size defaults to the size established at Link time, adjusted to a page boundary. Certain utility and applications tasks require various storage area sizes, depending on the particular execution. The common assembly language (CAL/32) task, for example, requires a variable work area in which to build a symbol table. The actual size required for CAL/32 is a function of the size and number of symbols in the program being assembled.

The segsize increment field of the LOAD command gives the user the capability to vary the task's segment size at load time and to override the amount of memory requested by the OPTION WORK= command entered at Link time. If a task is established with a minimum amount of get storage area, the memory available can be increased or decreased with the LOAD command.

If a task requiring a TCOM or RTL is loaded, the command processor attempts to load the required segments if they are not already in memory. In order to accomplish this the fd must be identical to the segment name (including the extension). This is done by specifying an fd only in the BUILD command of Link and letting segment name default to the fd. The command processor searches the user volume/user account, then the system volume/system account to locate the shared segment. This allows MTM users some flexibility. When loading from the system console, the shared segment must be on the system volume in the system account.

Examples:

The following example loads a task from file VOL:CAL.TSK into the background segment.

```
L .BG,VOL:CAL
```

The following example loads a task from file T1.TSK on the default system volume into the foreground and associates the name T1 with the task.

```
L T1
```

The following example loads a task from the default system volume from file named T1 into the foreground and associates the name T1 with the task.

```
L T1,T1
```

The following example loads a task from file X:PSCOPY.TSK into the foreground and associates the name OSCOPY with the task. Specifies an expand area of 1.5kb.

```
L OSCOPY,X:PSCOPY,1.5
```

The following example loads a task from the default system volume on file CAL.TSK into the background and specifies an expand area of 50.5kb.

```
L .BG,CAL,50.5
```

The following example loads a preinitialized task common segment from file TASKCOM.TCM into memory.

```
L .TCM,TASKCOM
      or
L .SEG,TASKCOM.TCM
```

The following example loads the Spooler system task from the default system volume on file SPOOLER.TSK into memory.

```
L .SPL,SPOOLER
```

The following example loads reentrant library segment from file RTL.RTL into memory.

```
L .LIB,RTL
     or
L .SEG,RTL.RTL
```

The following examples load multiple copies of the OS/32 Edit task from the default system volume into the background. The names associated with these multiple background tasks are: .BG,.BG1,.BG202 and .BG99999.

```
L .BG,EDIT/32
ST
.BG>

L .BG1,EDIT/32
ST
.BG1>

L .BG202,EDIT/32
ST
.BG202>

L .BG99999,EDIT/32
ST
.BG99999>
```

Error Messages:

FD-ERR

indicates an fd syntax error.

FORM-ERR

indicates a command syntax error.

LOAD-ERR TYPE=

indicates that load failed for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

NOPR-ERR

indicates that an operand is missing.

PARM-ERR

indicates an operand syntax error.

3.41 LOGICAL PROCESSING UNIT (LPU) MAPPING AND DISPLAY COMMAND

The LPU command is used to alter the mapping of queues to an LPU or to display the mapping of queues to the specified (or all) LPU(s).

Format:

```
LPU [{lpu#}][,queue#/{ADD}]
    [{ * }]  [       {DEL}]
                [,fd      ]
```

Parameters:

lpu#	is the decimal number of the LPU whose queue assignment is to change or be displayed.
*	specifies that all LPUs that are mapped to the specified queue are mapped to 0.
queue#	is the number of the queue that is to be added/deleted from the specified LPU.
ADD	will map the specified LPU to the specified queue. The command will be rejected if the LPU is mapped to a queue other than 0 when the command is executed.
DEL	will verify that the specified LPU is then mapped to the specified queue. This LPU is then mapped to queue 0. If the (*) option is used as lpu#, all LPUs that are mapped to the specified queue are mapped to 0.
fd	is the device or file descriptor where the display is to be output. If LPU lpu# or LPU with no parameters is entered, the display is output to the system console.

Functional Details:

This command gives the operator control over the mapping of LPUs to specific queues. The operator can also display the mapping of one or all LPUs to queues.

If the operator specifies an lpu# with no further parameters (except fd), the LPU-to-queue mapping for that LPU is displayed. If no parameters (except fd) are specified, then the entire LPU mapping table is displayed.

Examples:

The following command will map LPU27 to queue 4 if LPU27 was previously unmapped:

```
*LPU 27,4/ADD
```

The following command will first verify that LPU3 is mapped to queue 2, and if it is, LPU3 will be unmapped (mapped to queue 0):

```
*LPU 3,2/DEL
```

The following command will delete LPU4 from queue 5 and add it to queue 6.

```
*LPU 4,5/DEL
*LPU 4,6/ADD
```

The following command will unmap (map to 0) every LPU that is mapped to queue 9.

```
*LPU *,9/DEL
```

The top command will display the mapping of LPU126, which is shown to be mapped to queue 7. The bottom command will display the mapping of LPU241, which is shown to be unmapped (mapped to queue 0). The following display will be output to the terminal, device CRT1:.

```
*LPU 126
 LPU 126 - QUEUE 7
*LPU 241,CRT1:
 LPU 241 - QUEUE 0
```

Here, the LPU command with no parameters will display the mapping of all LPUs (0 to 255 maximum) in a matrix form. The queues are numbered from 0 to 9 maximum.

```
*LPU
                    LPU TO QUEUE MAPPING TABLE
                  LEGEND:
                   ROWS - LPU MOST SIGNIFICANT DIGIT
                   COLUMNS - LPU LEAST SIGNIFICANT DIGIT
                   QUEUE NUMBERS - 0 TO 9 MAX
      0 1 2 3 4 5 6 7 8 9          0 1 2 3 4 5 6 7 8 9
  ------------------------        --------------------
  00x 0 0 3 0 4 0 6 2 1 0     01x| 1 0 3 4 6 8 9 0 0 8
  02x 1 9 0 0 0 4 0 3 8 9     03x| 0 0 4 0 0 3 0 1 0 0
  04x 0 0 0 0 1 0 0 0 0 0     05x| 0 0 0 1 0 0 0 0 0 0
   '                            '
   '                            '
  22x 0 9 8 7 6 5 0 0 0 0     23x| 0 0 0 0 0 0 0 0 0 0
  24x 0 1 2 3 4 0 0 0 0 0     25x| 1 1 1 1 0 0
```

Error Messages:

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

LPU-ERR TYPE=t

where error type t is one of the following:

LPU NUMBER	indicates an illegal LPU number.
MAPPING	indicates an LPU is not mapped to the queue specified in the DEL option.

QUE-ERR TYPE=t

where the error type t is one of the following:

QUEUE NUMBER	indicates an illegal queue number.

RIGHTS BUSY indicates mapping rights to the specific queue, or to the queue where the LPU is currently mapped (ADD option), or to queue 0 (DEL option) are possessed by a task other than the command processor.

ASGN-ERR

indicates that the file or device could not be assigned.

FD-ERR

specifies an invalid fd.

IO-ERR

indicates an I/O error was detected on an output device or file.

3.42 MARK COMMAND

The MARK command takes a device off-line or brings on-line a device that was previously off-line. For directory devices, the size of a volume's secondary directory and the expansion size can also be specified with the MARK command.

Format:

```
                                  ┌                                                
```

ONLY — marks off one of a pair of mirrored disks.

ON — marks a device on-line.

PROTECTED — marks a device write-protected.

SYSTEM — inhibits write access to the device by a task running under a nonzero account under MTM.

NOTE

Account 255 is the "owner" of a disk marked on as SYSTEM.

RESTRICTED= — actno is the account number of the owner of the restricted device. The device is marked on with restricted access indicating that only the owner has access to it unless otherwise specified via the RVOLUME command under MTM.

max acct — is the maximum account number that is allowed any access to a SYSTEM or RESTRICTED device. If specified, the value will be rounded up to the next multiple of 256 (minus 1). If omitted, no account above 255 will be allowed to access (read or write) the device.

CDIRECTORY= — creates a secondary directory in memory.

fentry is the number of secondary directory file entries, which will be contained in the memory-resident buffer for the secondary directory. The minimum buffer size is 20 file names (256 bytes); the maximum size is limited to the size of system space. If fentry is not specified, the default value 80 is used. If fentry is not a multiple of 20, it is rounded up to the next higher multiple of 20.

exp is the expansion size for the secondary directory file on disk. This is the number of files that can be allocated before the secondary directory file overflows. If the expansion size is omitted, the default is 100.

ALL specifies that the disk is to be marked on-line with a secondary directory large enough to maintain all directory slots in memory (i.e., bsize=SLOTS, exp=0 and PAGES=1; see explanation for SLOTS and PAGES). If enough memory space is available, it is suggested that the ALL parameter be used.

MIRROR=dev_2 : is the device mnemonic of the disc which is the mirror of dev_1 :. If dev_1 : and dev_2 : are compatible as mirrored disks, they are marked on as a mirrored pair. If the disks are not synchronized, a message is output requesting synchronization.

Functional Details (for marking a device on or off):

The command is rejected if it is directed to:

- the system console,
- the NULL device,
- a direct access device containing files that are currently assigned, or
- a device that is currently assigned.

After marking on a direct access device, the volume name associated with it is output to the console device in the format:

device mnemonic: volume name,

(e.g., D300: M300). While a device is off-line, it cannot be assigned to any u-task. E-tasks are permitted to assign off-line devices.

If the device being marked on or off is a direct access device, the fd used in the command is not the volume identifier, but the actual device mnemonic. For example, to mark off a disk named DSC1, which currently contains a volume named SYS1, the operator enters:

MA DSC1:,OF

This action removes the volume SYS1 from the system. The disk can now be removed or changed if DSC1 is a removable cartridge disk. To make the new volume known to the system, the operator enters:

MA DSC1:,ON

This causes the volume descriptor of the pack on DSC1 to be read. The volume ID associated with DSC1 is output to the system console.

NOTE

Removable cartridges should not be dismounted from the system without marking them off.

If the optional parameter PROTECTED is specified in a MARK ON command, the device is marked as write-protected. All assignments for access privileges other than SRO and SRW are rejected with a privilege error. SRW is changed to SRO. A WFILE (write filemark) command to any file on the device is also rejected. The PROTECT option can be used for any device regardless of the state of the hardware write-protect feature. The PROTECT option must be specified for hardware protected disks.

If a direct access device is dismounted without being marked off-line, it can be marked on-line only in the write-protected mode. The FASTCHEK Utility must be run before the volume can be marked on-line without the PROTECT option. This ensures the integrity of files on a pack inadvertently dismounted. However, if the direct access device dismounted was originally marked on-line with the PROTECT option, the disk can be remounted and marked on-line without the PROTECT option.

If an I/O error occurs on a disk while the disk is being marked off, the following message is displayed on the system console:

```
I/O ERROR MARKING OFF DISK ; PLEASE CHECK
```

The disk is marked off and can be marked on-line only in the write-protected mode. The FASTCHEK Utility must be run before the volume can be marked on-line without the PROTECT option.

When marking a direct access device on with a secondary directory, additional information is displayed.

Example:

```
MA DSC1:,ON,,CD=120/0
DSC1:  OS32 CDIR   220 FILES   240 SLOTS   2 PAGES   1.85 K
```

Where:

DSC1:	is the device name of the direct access device.
OS32	is the volume name of the disk.

CDIR	specifies that the disk was marked on with a secondary directory.
FILES	is the number of files on disk.
SLOTS	is the number of directory slots on disk (i.e., the total of the number of active files and the number of free directory slots currently on the disk).
PAGES	is the number of pages of secondary directory pages in SYSTEM.DIR. In the above example, the disk contains 240 directory slots and was marked on to maintain 120 directory slots in memory. Each page of SYSTEM.DIR will contain 120 directory slots requiring two pages to contain all 240 directory slots. Only one page of SYSTEM.DIR is maintained in the in-memory buffer at a time.
K	is the number of kilobytes of system space used for the secondary directory.

For direct access devices, file access time and consequently system performance can be optimized through the correct use of device directories. Three types of directories are available for use on direct access devices:

- Default primary directory (disk resident)
- Fast access primary directory (disk resident)
- Secondary directory (memory resident and disk resident)

A default primary directory is a noncontiguous directory comprised of a series of 1-sector blocks. Each block can contain directory information for up to five files. These directory blocks are allocated when needed as the number of files on a disk increases. When a directory block is filled, (five files allocated on the disk) another directory block is allocated on the next free sector encountered on the disk. This type of directory provides slow file access time due to the noncontiguous format of the directory and provides the least-optimal file access times. This type of directory is used by default if a fast access primary directory or secondary directory is not specified.

A fast access primary directory is allocated at disk initialization time via the BLOCKS= option of the Disk Initializer Utility (see the OS/32 System Support Utilities Reference Manual) or by FASTCHEK (see OS/32 Fastchek Reference Manual) via the BLOCKS= or DIRECTORY= options. When specified, the BLOCKS= or DIRECTORY= option preallocates a contiguous area on the disk to hold the primary directory. The capacity of the directory is based on the number of blocks specified. One block can hold directory information for five files. The contiguous format of this type of directory results in faster access times in comparison to the noncontiguous format of the default primary directory.

A secondary directory can be created when a disk is brought on-line via the MARK ON command. A secondary directory provides optimal access times and consequently, improved system performance by placing a directory of files on the disk directly into an in-memory buffer. The in-memory directory is searched, when necessary, for file directory information. When a disk is marked on-line with the secondary directory option specified, a contiguous file called SYSTEM.DIR, large enough to hold all entries in the primary directory plus any expansion size, is automatically allocated on the disk. This file constitutes the secondary directory.

All or part of the contents of SYSTEM.DIR are then transferred into an in-memory buffer, depending upon the capacity of the buffer. The capacity of the buffer is specified via the bsize entry in this command:

```
MARK disk:,ON,,CD
```

If the buffer capacity is sufficient to contain the total number of file entries in SYSTEM.DIR, the entire contents of the secondary directory are placed into the memory buffer (i.e., one page). If the buffer capacity is not sufficient to contain the total number of file entries in the secondary directory, the contents of the directory are paged into the memory buffer during file access operations. Optimal system performance and access times are obtained if the memory buffer is large enough to contain the entire secondary directory.

NOTE

When specifying the capacity of a secondary directory memory buffer for disks containing large numbers of files, the amount of memory used by the buffer can be prohibitive. Anticipate the size of the buffer using the following formula:

$$\text{memory space used (in bytes)} = \frac{bsize*256}{20}$$

Therefore, a disk with 3,000 files requires 38.4kb of memory to accommodate the entire secondary directory:

$$\frac{3000*256}{20} = 38,400 \text{ bytes} = 38.4\text{kb}$$

The following examples are presented to illustrate the relationship of the fast primary directory, the secondary directory, the secondary directory expansion size and the size of the in-memory secondary directory buffer.

Example 1:

A disk volume contains 2,400 files and was initialized with a fast access primary directory of BLOCKS=550 or DIRECTORY=2750. Thus, the fast access primary directory contains space for 2,750 files (1 block equals 5 files). To establish an optimal performance secondary directory, use the following command.

```
MARK disk:,ON,,CD=2750/0
```

This command allocates a secondary directory and gives the in-memory buffer the capacity to hold 2,750 file entries. No expansion capability is included. The memory buffer will use 35.2kb of system space.

Example 2:

A disk volume contains 2,100 files and was initialized with a fast access primary directory of BLOCKS=400. The fast access primary directory has overflowed the preallocated size area by 100 files. Assume that 500 additional files will be allocated on the disk before it is marked off. To establish an optimal performance secondary directory, the following command is used:

```
MARK disk:,ON,,CD=2600/500
```

This command allocates a secondary directory on the disk and gives the in-memory buffer the capacity to hold 2,600 files. The expansion factor of 500 allows another 500 files to be allocated on the disk. The memory buffer will use 33.3kb of system space.

If many files are created on a disk that is marked on with a small expansion factor, it is possible that the SYSTEM.DIR file may become full. Further attempts to allocate files result in secondary directory overflow. In each case, a message:

```
CDIR FULL-fd
```

is displayed on the system console, where fd is the device mnemonic of the disk. This message is displayed only on the system console. When secondary directory overflow occurs, the system starts using both the secondary and the primary directories when searching for a file. In this case, file accessing time may be greater. To overcome this problem, the disk can be marked off and then marked on again with a desired expansion factor at a convenient time. A disk can also be marked on protected and include a secondary directory, provided a good SYSTEM.DIR file is present on that disk.

Functional Details (for marking mirrored disks on or off):

The Mirror Disk facility is concerned with maintaining duplicate copies of disks so that in the event of a single disk failure, the computer system continues normally without operator intervention.

The duplication of disks is achieved by directing all write operations to two disks. This is controlled by the operating system, once informed of mirror disks and does not require any program changes. Reads are only scheduled from one of the pair of mirrored disks, which is called the primary disk. The remaining disk is called the secondary disk.

The disks are only operational as a mirrored pair when they are synchronized. Synchronization occurs when the operating system knows that the user data files on the disks are identical bit for bit. Initial synchronization and the restoration of synchronization after a disk failure is carried out using the Disk Synchronization Utility, DISCSYNC. This utility is described in the OS/32 System Support Utilities Reference Manual.

Mirror disks cannot be marked off while synchronization is in progress. Since a mirrored pair can be marked off together or singly, the operator must take several factors into account when marking off one disk of a mirrored pair.

If the mirrored pair is currently synchronized and the MARK OFF command is used without the ONLY option, both of the mirrored pair are marked off regardless of which disk (primary or secondary) is the subject of the command. In this case, synchronization is not required when the pair is subsequently marked on.

If the mirrored pair is currently synchronized and the ONLY option is used, the subject disk of the command is marked off as unsynchronized. If the subject of the command is the primary disk, its secondary automatically becomes the primary. Synchronization is required when the disks are subsequently marked on.

If the mirrored pair requires synchronization and the MARK OFF command is used without the ONLY option, the subject of the command must be the primary disk. Otherwise the command is rejected.

If the mirrored pair requires synchronization and the ONLY option is used, both disks are marked off as unsynchronized, provided the subject of the command is the primary disk. If the subject of the command is the secondary disk, the primary disk remains marked on and the secondary disk is marked off as unsynchronized.

Mirrored disks must be configured on the same processor within Model 3200MPS Systems, (i.e., both disks must be on the CPU or both must be on an IOP.)

The following examples illustrate the procedure for marking on mirrored disks.

Example 1:

If both disks have previously been marked off, the format is:

```
MARK D3H1:,ON,,CD=ALL,MIRROR=D3H2:
```

D3H1: is regarded as the primary disk and D3H2: is the secondary. If the disks are compatible as mirrored disks, they are marked on as a mirrored pair. If they are not yet synchronized, the message:

```
'MIRR PROT-ERR PACKS NOT IN SYNC'
```

is output on the log device.

Example 2:

If one disk of the mirrored pair is already marked on, the format is:

```
MARK D3H1:,ON,,,MIRROR=D3H2:
```

D3H2: is regarded as the primary disk and D3H1: as the secondary disk. The disks are assumed to be unsynchronized and are checked for compatibility. This command is only valid if D3H2: is the disk already marked on.

Example 3:

When using the PROTECT option the format is:

```
MARK D3H1:,ON,PROTECT,,MIRROR=D3H2:
```

In this case, both disks are only marked on if they are both synchronized. If neither disk was marked on, D3H1: becomes the primary disk and D3H2: becomes the secondary disk. If D3H2: was already marked on, it would become the primary disk. The PROTECT option would have had to be used when D3H2: was marked on, because it is used when the secondary disk D3H1: was marked on.

The following examples illustrate marking off mirrored disks.

Example 4:

If both disks are synchronized and mirrored, the format is:

```
MARK D3H1:,OFF
```

Both disks of the mirrored pair are marked off as synchronized, regardless of whether D3H1: is the primary or secondary disk. When subsequently marked on as a pair, synchronization is not required.

Example 5:

```
MARK D3H1:,OFF,ONLY
```

Only disk D3H1: is marked off and it is not marked as synchronized. If D3H1: is the primary disk, then D3H2: is automatically switched to be the new primary disk.

Example 6:

If both disks are marked on with synchronization required, the format is:

```
MARK D3H1:,OFF
```

Example 7:

If D3H1: is the primary disk, then both disks are marked off as unsynchronized. If D3H1: is the secondary disk, then the command is rejected.

```
MARK D3H1:,OFF,ONLY
```

If D3H1: is the primary disk, then both disks are marked off unsynchronized. If it is the secondary disk, then only D3H1: is marked off.

Functional Details (for marking on a disk as restricted):

When a disk is marked on restricted, the owner of the disk can allow other users to access it and can assign access privileges via the RVOLUME command under MTM. The Spooler and Backup Utilities are affected by this as shown in Table 3-6. For information on how MTM is affected, see the OS/32 Multi-Terminal Monitor (MTM) Reference Manual.

A disk can be marked on with RESTRICTED=0. This will prevent any access by MTM users. Note, however, that once this is done, access cannot be granted to any account.

TABLE 3-6 EFFECTS OF RESTRICTED DISKS ON SPOOLER AND BACKUP

TASK	READ/WRITE ACCESS TO ACCOUNT 0	READ ONLY ACCESS TO ACCOUNT 0	NO ACCESS TO ACCOUNT 0
.SPL and .SPLR	All access is valid.	Files can be printed, but not deleted. If a delete is attempted, the system operator receives an error message.	Files cannot be accessed.
BACKUP	All access is valid.	Verify Only option is valid. If back-up is attempted, an assign error occurs.	If access is attempted, an assign error occurs.

Functional Details (for modifying parameters of an output device):

Specifying the PARAMETERS option indicates that the record length and form size of an ASCII output device are being modified. The device for which these parameters are being modified cannot be assigned. Modification for a pseudodevice being used by the spooler must be made by canceling the spooler, specifying the new parameters and restarting the spooler.

When modifying the parameters, either parameter can be specified. If both are omitted, the current record length and page size are displayed.

Examples:

The following example verifies the primary directory with the existing secondary directory. Eighty files will be maintained in the memory resident buffer for the secondary directory. Expansion factor, if specified, is ignored.

```
MA DSC1:,ON,P,CD
```

In the following example, 200 files will be maintained in the memory resident buffer for the secondary directory.

```
MA DSC1:,ON,P,CD=200
```

The following example marks a disk on restricted, allowing only the owner of account 4 to have access to it. Accounts above 255 are allowed no access to the disk.

```
MA DSC1:,ON,R=4
```

In the following example, disk DSC2: is marked on-line as a system disk. Accounts 1 through 254 and 256 through 1023 have read-only access; accounts zero and 255 have read/write access. The secondary directory will be created with an in-memory buffer large enough to hold the entire directory.

```
MA DSC2:,ON,SYS/1023,CD=ALL
```

The following example changes the record length and form size of device PRT: to 65 characters per line and 56 lines per page.

```
MA PRT:,PA,R=65,S=56
```

Error Messages:

BPAC-ERR

indicates that a direct access volume I/O error was encountered.

DEV-ERR

indicates that an attempt was made to mark on or off a nonexistent device, a pseudodevice, or the NULL device; or an attempt was made to modify the attributes of a nonexistent device or bulk storage device.

DUPL-ERR

indicates that a duplicate device or volume name exists.

FORM-ERR

indicates a command syntax error.

NOFF-ERR

indicates that an attempt was made to mark on a direct access device not marked off-line before dismounting.

PARM-ERR

indicates an operand syntax error.

READ-ERR

indicates that the device is not hardware enabled, a hardware error exists, or a disk pack is bad.

STAT-ERR

indicates that the fd was already assigned or has files assigned.

WRIT-ERR

indicates that a device is hardware write-protected or a disk pack is bad.

If an attempt to mark a disk on with a secondary directory option fails, the disk is marked on without the secondary directory and one of these messages is generated:

FETCH ATTR ERR

indicates that fetch attributes failed on secondary directory when marking protected with secondary directory.

NO SYSTEM SPACE

indicates that not enough system space was available to create a secondary directory block.

PRI-DIR READ ERR

indicates that an I/O error was encountered when reading the primary directory.

SEC-DIR ALLO ERR

indicates failure to allocate sufficient space on the disk for creating a new secondary directory, or that the disk is write-protected (hardware feature).

SEC-DIR ASGN ERR

indicates that assignment to the secondary directory failed during mark on protected with the secondary directory.

SEC-DIR DELE ERR

indicates that a DELETE command to the old secondary directory failed because the old file was not properly closed. In this case, a disk integrity check should be run on that disk.

SEC-DIR NOT PRESENT

indicates that the secondary directory does not exist on disk and mark on protected with the secondary directory was attempted.

SEC-DIR READ ERR

indicates that an I/O error was encountered when reading the secondary directory during marking on in protected mode.

SEC-DIR VERIFY ERR

indicates that the secondary directory failed to verify with the primary directory when marking protected with the secondary directory.

SEC-DIR WRIT ERR

indicates that an I/O error was encountered when establishing the secondary directory on the disk.

Error Messages (pertaining to the Mirror Disk Facility):

MIRR DUPL-ERR

indicates that the same device is specified for both disks in the mirrored pair.

MIRR LEAF-ERR

indicates that the two disks specified share the same leaf.

MIRR NO SYSTEM SPACE

indicates that there is not enough system space available to carry out a mirrored mark on.

MIRR PACKINFO FLBA-ERR

indicates that the two pack administration files, PACKINFO.DIR, from the specified mirror disks do not start at the same logical block address and, therefore, the disks are incompatible.

MIRR PACKS ARE INCOMPATIBLE SECTOR = nnnnn

indicates that the two disk packs are incompatible. The primary disk contains data at sector nnnnn and the secondary disk either has a defective sector or part of a key control file at that position. If the FASTCHEK Utility is run, it should be run in the NOREADCHECK or READCHECK mode. If the user lets the utility default to the CLOSE MODE, the bit map will not be recreated.

MIRR PRIMARY-DISK PACKINFO CORRUPT

indicates that the primary disk's pack administration file is corrupt.

MIRR PRIMARY-DISK PACKINFO NON EXISTENT

indicates that the primary disk does not have a pack administration file. In this case the disk should be initialized using the FASTCHEK Utility.

MIRR PRIMARY-DISK PACKINFO READ ERROR

indicates that an I/O error was encountered when reading the primary disk's pack administration file.

MIRR PROT-ERR PACKS NOT IN SYNC

indicates that the disk packs are not synchronized and, therefore, cannot be marked on protected.

MIRR SECNDRY-DISK ASGN-ERR

indicates that an assign error other than those specified for STAT-ERR occurred when trying to assign the secondary disk.

MIRR SECNDRY-DISK PACKINFO CORRUPT

indicates that the secondary disk's pack administration file is corrupt.

MIRR SECNDRY-DISK PACKINFO NON EXISTENT

indicates that the secondary disk does not have a pack administration file. The disk should be initialized using the FASTCHEK Utility.

MIRR SECNDRY-DISK PACKINFO READ ERROR

indicates that an I/O error was encountered when reading the secondary disk's pack administration file.

MIRR SECNDRY-DISK PRI-DIR ERR

indicates that an I/O error was encountered when reading the primary directory of the secondary disk.

MIRR SECNDRY-DISK READ-ERR

indicates that the device specified as the secondary disk is not hardware enabled, a hardware error exists, or the disk pack is bad.

MIRR SECNDRY-DISK STAT-ERR

indicats that the fd of the device specified as the secondary disk is already assigned or has files assigned.

MIRR SECNDRY-DISK WRIT-ERR

indicates that the device specified as the secondary disk is hardware write-protected or the disk pack is bad.

MIRR SIZE-ERR

indicates that the two disks specified for mirroring do not have the same number of sectors and, therefore, are not compatible as mirror disks.

MIRR UNABLE TO MARK ON - DISKS ON DIFFERENT PROCESSORS

indicates an attempt was made to mirror two disks that do not reside on the same processor in a Model 3200MPS System.

MIRR VOLUME NAME MISMATCH

indicates that the two disks specified for mirroring do not have the same volume names and, therefore, are not compatible as mirror disks.

3.43 MEMORY COMMAND

The MEMORY command specifies the memory area (in kilobytes) to be designated as local memory, or performs run-time memory diagnostics on a specified memory area.

Format:

```
        ⎧ OFF,address[,size] ⎫
MEMORY  ⎨ ON,address[,size]  ⎬
        ⎪ TEST,address[,size] ⎪
        ⎩        n           ⎭
```

Parameters:

OFF	marks off a block making that area unavailable. This parameter also can be used to mark off the following: - an area from which a memory module is to be removed, and - an area when an on-line test is to be run.
ON	marks on a memory block making that area available.
TEST	tests a marked off block for bad memory areas.
n	is a positive decimal number from 1 to 16,384 specifying the size of local memory in kilobytes. The default value set at sysgen is overridden by n.
address	is a hexadecimal number specifying the starting address of the memory area to be marked off, on or tested.
size	is a decimal number that is a multiple of the processor's page size specifying the number of kilobytes in memory to be marked off, tested or marked on. If this parameter is omitted, the default is one block.

Functional Details:

On Model 7/32, 8/32 and 3220 Systems, the page size is 256 bytes and the maximum local memory size is 1,024kb; on Model 3210, 3230, 3240, 3250 and 3200MPS Systems, the page size is 2,048 bytes and the maximum local memory size is 16,384kb, except for the Model 3210, which is limited to 4,096kb. The Model 3280 Processor has a memory page size of 4,096 bytes with a maximum local memory size of 16,384kb. On Model 3203 and Model 3205, the page size is 4,096 bytes with a maximum local memory size of 4,096kb.

Memory diagnostics consist of initial and run-time memory testing. Before loading the operating system into memory, the loader storage unit (LSU) tests the area of memory into which the operating system will be loaded. The LSU then loads the operating system into memory and transfers control to the operating system. The operating system tests memory from the end of the operating system to the end of local memory. The operating system does not perform memory tests on global memory. If bad or unavailable memory exists, it is marked off and the marked off area is noted on the memory map when the DISPLAY MAP command is entered.

The Model 3280 Processor is not equipped with an LSU device. A modified LSU program is contained within the Control/Diagnostic System (CDS) which performs the necessary memory tests.

Before memory testing begins, the following message is displayed:

```
MEMORY TEST IN PROGRESS
```

Memory testing is then performed on physical memory in block increments. Any bad or missing memory is marked off. Adjacent marked off blocks are concatenated and labeled OFF MEMORY on the memory map. At the end of initial memory testing, a count of bad blocks is displayed:

```
UNAVAILABLE MEMORY BLOCKS = nnnn
```

The decimal count of bad blocks that have been marked off is nnnn. Entering the DISPLAY MAP command displays the location and size of each block. At the end of run-time testing, the following message is displayed:

```
NO. OF BAD MEMORY BLOCKS = xxxx
```

The decimal count of bad blocks is xxxx. A count of zero indicates no bad memory was found in the tested area. If the count is nonzero, a memory map is displayed. When memory testing is over, the following message is displayed:

END OF MEMORY TEST

The following approximate times for testing memory apply to a Model 7/32 Processor. The figures can be reduced by 50 percent for other processors.

- The LSU requires 10 seconds to test memory and load the standard operating system into 128kb of memory.
- Initial memory testing requires 60 seconds to test 1Mb of memory.
- Use of the test parameter requires 10 milliseconds to test 1kb of memory.

The following four sections further describe functions of memory diagnostics.

1. Marking Off Memory

   If a memory parity error (MPE) occurs during execution of a u-task, the affected task is paused with its memory map address displayed when the DISPLAY MAP command is entered.

   Use the OFF parameter to mark off the bad memory area before checkpointing and canceling the task. Failure to mark off the bad memory will cause data in the task memory to be destroyed. After the memory is marked off and the task canceled, the TEST parameter tests the marked off area.

   If an MPE or memory malfunction occurs on a Series 3200 Processor and the operating system is sysgened with memory test support (MEMCHECK), the operating system automatically marks off the affected block, removing it from task space without operator intervention. When the OFF parameter is entered, the required memory area must be located in task or system space. If it is in system space, above system space or between system space, an address or size message is displayed and memory is not marked off. If the block is in system space, that area must be free; otherwise a message is displayed.

   Areas are marked off in memory starting with an address that is a multiple of the processor block size. A block is the smallest area that can be marked off. Rounding off is done by dropping the least significant address bit.

It is legal to mark off an area already marked off or with mark off pending. No errors are reported.

If the area to be marked off is in task space containing free and allocated space, the affected free space is marked off. The affected allocated space is flagged as marked off pending and it remains marked off pending until released by a terminated task. Then that area is automatically marked off.

2. Marking On Memory

Before memory is marked on, a memory diagnostics test is performed.

The affected area must have been marked off or marked off pending and must be located within a single block. It is legal to mark on only a portion of the marked off area. It is also legal to mark on an area that is already marked on. No errors are reported.

Marked on memory is added to the free task space or free system space. If the requested memory was marked off pending, the pending condition is removed.

Memory areas are marked on starting with an address that is a multiple of the memory block size. A block is the smallest area that can be marked on.

3. Testing Memory

The MEMORY command, which specifies a test parameter, tests a memory area after it has been marked off. The test runs at the command processor's priority, causing lower priority tasks to be locked out until the test has been completed.

These restrictions apply to this command:

- The area to be tested must be marked off (not marked off pending) and must exist within task or system space (not cross task or system space boundaries).
- It is legal to test a portion of the marked off memory area.
- The minimum memory area to be tested is a block.
- Memory areas are tested starting with an address that is a multiple of the block size.
- All data in the tested memory area is destroyed.

4. Specifying the Size of Local Memory

The MEMORY command with the specified n parameter can be entered only when no tasks are in the system, before any disks are marked on with a secondary directory and before setting a disk device as the log device.

Examples:

The following example marks on memory 46600-46EFF (2.25kb) for Model 7/32, 8/32 and 3220 Processors. It marks on memory 46000-46FFF (4kb) for the Model 3203, 3205, 3210, 3230, 3240, 3250, 3280 and 3200MPS Processors.

```
MEMORY ON,46600,2.25
```

The following example marks off an area 31600-316FF (0.25kb) for the Model 7/32, 8/32 and 3220 Processors. It marks off an area 31000-317FF (2kb) for Model 3210, 3230, 3240, 3250 and 3200MPS Processors. It marks off an area 31000-31FFF (4kb) for the Model 3203, 3205 and 3280 Processors.

```
MEMORY OFF,3167E
```

The following example marks off an area 46600-46EFF (2.25kb) for the Model 7/32, 8/32 and 3220 Processors. It marks off an area 46000-46FFF (4kb) for the Model 3203, 3205, 3210, 3230, 3240, 3250, 3280 and 3200MPS Processors.

```
MEMORY OFF,4663C,2.25
```

The following example tests an area 46600-46EFF (2.25kb) for the Model 7/32, 8/32 and 3220 Processors. It tests an area 46000-46FFF (4kb) for the Model 3205, 3210, 3230, 3240, 3250, 3280 and 3200MPS Processors.

```
MEMORY TEST,46600,2.25
```

The following sequence of commands illustrates marking off and marking on memory for the Model 7/32, 8/32 and 3220 Processors:

```
*DISPLAY MEMORY
     NAME       TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY             1D500   550.75
OFF MEMORY              1D500     1.00                  OFF
OFF MEMORY              1DB00     0.50                  OFF
SYSTEM SPACE            A7000   100.00
*MEMORY ON,1D500
NO. OF BAD MEMORY BLOCKS = 0
*DISPLAY MEMORY
     NAME       TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY             1D500   550.75
OFF MEMORY              1D600     0.75                  OFF
OFF MEMORY              1DB00     0.50                  OFF
SYSTEM SPACE            A7000   100.00
*MEMORY ON,1D700
NO. OF BAD MEMORY BLOCKS = 0
*DISPLAY MEMORY
     NAME       TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY             1D500   550.75
OFF MEMORY              1D600     0.25                  OFF
OFF MEMORY              1D800     0.25                  OFF
OFF MEMORY              1DB00     0.50                  OFF
SYSTEM SPACE            A7000   100.00
```

To merge blocks marked off and marked off pending, follow the sequence of commands below. This example pertains to the Model 7/32, 8/32 and 3220 Processors.

```
*DISPLAY MEMORY
     NAME          TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY                1D500   550.75
SYSTEM SPACE               A7000   100.00
*TCOM TC1,0.25
*TCOM TC2,0.25
*MEMORY OFF,1D500,0.5
*DISPLAY MEMORY
     NAME          TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY                1D500   550.75
TC1                .SEG    1D500     0.25
OFF MEMORY                 1D500     0.25                  PEND
TC2                .SEG    1D600     0.25
OFF MEMORY                 1D600     0.25                  PEND
SYSTEM SPACE               A7000   100.00
*
REM .SEG,TC2
*DISPLAY MEMORY
     NAME
                  TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY                1D500   550.75
TC1             .SEG       1D500     0.25
OFF MEMORY                 1D500     0.25                  PEND
OFF MEMORY                 1D600     0.25                  OFF
SYSTEM SPACE               A7000   100.00
*
REM .SEG,TC1
*DISPLAY MEMORY
     NAME          TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY                1D500   550.75
OFF MEMORY                 1D500     0.50                  OFF
SYSTEM SPACE               A7000   100.00
*
```

The following sequence of commands illustrates memory testing for the Model 7/32, 8/32 and 3220 Processors.

```
*DISPLAY MEMORY
    NAME          TYPE    START    SIZE    SEG    SYS    STAT    PRI
TASK MEMORY                1D500   550.75
OFF MEMORY                 1D500     4.00                  OFF
SYSTEM SPACE               A7000   100.00
*MEMORY TEST,1D500,4
NO. OF BAD MEMORY BLOCKS = 3
              ADDR    SIZE
BAD  BLK     1D500    0.75
GOOD BLK     1D800    1
BAD  BLK     1DC00    1
GOOD BLK     1E000    1
BAD  BLK     1E400    0.25
```

Error Messages:

FORM-ERR

indicates a command syntax error.

MEM-ERR

indicates that n is less than UBOT, greater than physical memory, or greater than the starting address of global task common. The system contains no memory available for system space.

MEM-ERR TYPE=ADDRESS

indicates that address is outside task or system space.

MEM-ERR TYPE=FIND

indicates that requested system space is not free or requested memory is located in another segment.

MEM-ERR TYPE=NOMD

indicates that the MEMORY command was entered, but the system does not support memory diagnostics.

MEM-ERR TYPE=SIZE POS=XXX

indicates that calculated end address is between task and system space or is outside system space. XXX is the requested value.

MEM-ERR TYPE=SPAC

indicates that insufficient system space exists to mark off the specified memory area; memory is not marked off.

NOPR-ERR

indicates that an operand is missing.

PARM-ERR

indicates that parameter is invalid.

SEQ-ERR

indicates that the system is not quiescent.

3.44 MODIFY COMMAND

The MODIFY command is used to modify the contents of local or shared memory.

Format:

$$\underline{MO}\text{DIFY address } \left[,\left\{\begin{matrix}\text{data}_1\\ 0\end{matrix}\right\}\right] \left[,\text{data}_2,\ldots,\text{data}_n\right]$$

Parameters:

address	is the address at which the contents of memory are to be modified.
data	is a data field consisting of 0- to 4-hexadecimal digits that represent a halfword to be written into memory starting at the location specified by address. Any string of data less than four characters is right-justified and left-zero filled. If the comma but no data is entered, 0 is entered into one halfword. If data is omitted, a message is displayed.

Functional Details:

This command causes the contents of the halfword location specified by address (modified by any previous BIAS command) to be replaced with data. The modify address must be aligned on a halfword boundary.

Example:

This example modifies four halfwords at location 12F0 to contain 0004 0000 0004 0000.

```
BI  0
MOD 12F0,4,0,4,0
```

Messages:

FORM-ERR

indicates a command syntax error.

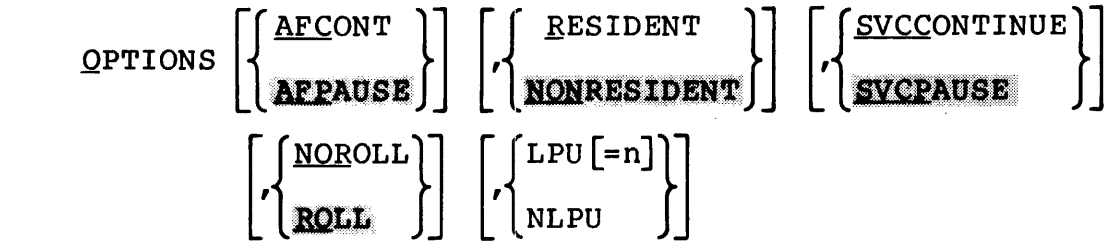
PARM-ERR

indicates an operand error occurred because an address was not aligned on a halfword boundary, an address specified was not in memory or was reserved for MAC, or a specified address was within the marked off section of memory.

3.45 OPTIONS COMMAND

The OPTIONS command is used to specify or change certain options of the currently selected task. An OPTIONS command can be entered if the referenced task is dormant or paused. For users of the Model 3200MPS System, two new options have been added to the command format. They are: LPU [=n] and NLPU.

Format:



Parameters:

AFCONT	specifies that if the arithmetic fault (AF) trap enable bit is set, a trap is taken. If the bit is not set, the task continues after arithmetic fault occurs and the message is sent to the log device.
AFPAUSE	specifies that the task is to pause after any arithmetic fault.
RESIDENT	specifies that the task is memory resident.
NONRESIDENT	specifies that the task is to be removed from memory at end of task.
SVCCONTINUE	specifies that SVC6 is treated as NOP (applies to .BG only). If an SVC6 is executed within a background task, the task is continued.
SVCPAUSE	specifies that SVC6 is treated as an illegal SVC (applies to .BG only). If an SVC6 is executed within a background task, the task is paused.
NOROLL	specifies that the task cannot be rolled.

ROLL specifies that the task can be rolled.

NOTE

The following options apply to Model 3200MPS Systems only.

LPU= n sets the task as an LPU-directed task (a task directed to execute on a specific logical processing unit). The specific LPU can be specified by n.

NLPU sets the task as a CPU-directed task (a task that must execute on the CPU). If the APU ONLY option was set at Link time, NLPU is invalid and an OPT-ERR occurs.

Functional Details:

Unless otherwise specified with the Link OPTIONS command, when a task is loaded, the default options are: AFPAUSE, NONRESIDENT, SVCPAUSE, ROLL and, for Model 3200MPS Systems, NLPU. If accounting is enabled in the system, ACCOUNT also becomes a default option for a task. An OPTIONS ROLL command is invalid unless the directed task is linked as rollable.

If conflicting options are specified, the latest option entered is accepted. Thus, OPTIONS RESIDENT,NONRESIDENT specifies NONRESIDENT.

The AFPAUSE and AFCONT options are normally set up at Link time, but the console operator can modify them.

The sequence TASK taskid, OPT NONRESIDENT and CANCEL taskid always causes the currently selected task to be removed from memory. The sequence TASK taskid, OPT RESIDENT and CANCEL taskid always causes the currently selected task to enter the dormant state.

The SVCPAUSE and SVCCONTINUE parameters apply only to a background task. They are ignored if they are specified for a foreground task.

If an OPTIONS NOROLL is directed to a task currently rolled out, the option goes into effect after the task is rolled into memory.

If any parameter is invalid, previous valid parameters in the same command are processed. In this case, the DISPLAY PARAMETERS command can be used to verify the state of the task options.

For users of the Model 3200MPS System, the following information applies.

The LPU and NLPU parameters do not affect the task options word; instead they affect the LPU-directed task status. The LPU parameter sets the LPU-directed task status and assigns n (if specified) as the task's LPU number. LPU=0 assigns the CPU by system convention (illegal if APU ONLY task option set at Link time). The NLPU parameter resets the LPU-directed task status (i.e., task is CPU-directed). If the combination LPU=N, NLPU is entered, the task's LPU number is set to n and the task is CPU-directed. This assigned LPU number has no effect until the task is changed to LPU-directed.

Error Messages:

FORM-ERR

indicates a command syntax error.

NOROL-ERR

indicates invalid option; task not rollable.

OPT-ERR

indicates invalid option; roll option not specified at Link time; non-APU execution is prohibited at Link time.

PARM-ERR

indicates an operand syntax error.

SEQ-ERR

indicates that task is not dormant or paused.

TASK-ERR

indicates that there is no currently selected task.

3.46 PAUSE COMMAND

The PAUSE command causes the currently selected task to pause.

Format:

PAUSE

Functional Details:

Any I/O ongoing at the time the task is paused is allowed to continue to completion. If the task is in an I/O block (IOB) wait state at the time the PAUSE command is entered, the wait condition must be satisfied before the pause becomes effective. This command is rejected if the task is dormant or paused at the time the command is entered.

For users of the Model 3200MPS System, this command applies also to tasks active or ready on an APU, in which case, the task is removed from the APU's control.

Error Messages:

FORM-ERR

indicates a command syntax error.

SEQ-ERR

indicates that task is paused or dormant.

TASK-ERR

indicates that there is no currently selected task.

3.47 QUEUE CONTROL AND DISPLAY COMMAND

The QUEUE command controls the state of or displays the status of the task queues in a Model 3200MPS System. This command will be rejected if the APU is in IOP mode.

Format:

```
QUEUE  queue#  [ , { ON          } ]
               [   { OFF         } ]
               [   { XON=taskid  } ]
               [   { NOPRIORITY  } ]
               [   { PRIORITY    } ]
               [   { ENFORCED    } ]
               [   { fd          } ]
```

Parameters:

queue#	is the number of the queue that is to have its state changed or status displayed.
ON	enables the specified queue for task scheduling.
OFF	disables task scheduling on the specified queue.
XON=	taskid enables the specified queue for exclusive task scheduling. The taskid portion of the parameter is the 1- to 8-character alphanumeric identifier of the task that is to have exclusive use of the specified queue.
NOPRIORITY	changes the queue scheduling discipline to no priority.
PRIORITY	changes the queue scheduling discipline to priority (not enforced).
ENFORCED	changes the queue scheduling discipline to enforced priority.
fd	is the file descriptor of the device to which the display is to be output. If QUEUE queue# or QUEUE with no parameters is entered, the display will be sent to the system console.

Functional Details:

The scheduling discipline of the specified queue can be changed via this command at any time. Changing a queue to no priority discipline involves no changing of queue order. Changing a queue to priority discipline involves arranging the tasks on the queue in priority order, highest to lowest. Changing a queue to a priority-enforced discipline performs the same as priority discipline, plus the APU(s) assigned to this queue are forced to execute the highest priority task(s) available.

In a system configured with one or more IOPs, the QUEUE command cannot be used for the IOPs. The QUEUE command only applies to satellite processors that are in the APU mode. If a QUEUE command is directed to an IOP, the following error message will appear:

```
REQUEST INVALID FOR IOP
```

Examples:

The following command enables queue 3 for task scheduling.

```
*QUEUE 3,ON
```

The following command disables queue 1 from further task scheduling. Also, any tasks on queue 1 are, from now on, scheduled for execution on queue 0.

```
*QUEUE 1,OFF
```

The following command enables queue 9 for exclusive task scheduling. TASK1 is the exclusive task.

```
*QUEUE 9,XON=TASK1
```

The following command displays the state of, the tasks waiting execution on, the scheduling discipline of and the APU(s) assigned to queue 2.

```
*QUEUE 2
 QUEUE  STATE       MAP TASK  READY QUEUE  DISCIPLINE  APU(S)
   2      ON                    TASK2       NOPRIORITY   1  4
                                EXEC4
```

The following command displays the state of, the tasks waiting execution on, the scheduling discipline of and the APU(s) assigned to all the queues. The output for the display is sent to a file called DISPLAY.QUE on the system volume.

```
*QUEUE ,DISPLAY.QUE
 QUEUE  STATE         MAP TASK   READY QUEUE   DISCIPLINE   APU(S)
   0      ON                                   ENFORCED       1
   1      OFF                                  NOPRIORITY
   2      OFF                                  NOPRIORITY
   3      OFF          .CMDP                   NOPRIORITY
   4      XON=CONVOY   MONITOR                 ENFORCED       5
   5      ON                        TEST1      PRIORITY       2 3
                                    TEST2
   6      OFF                                  NOPRIORITY
   7      OFF                                  ENFORCED
   8      ON                        TEST3      ENFORCED       4
   9      OFF                                  PRIORITY
```

Note that a queue in XON state also displays the taskid of the exclusively assigned task.

```
*QUEUE 6,ENFORCED
```

Assume that prior to the above command being executed there is one APU assigned to queue 6 running task T2 at priority 100. The queue has no-priority scheduling with two tasks on the queue, T3 (priority 120) and T1 (priority 80). After execution of the command, the APU will be executing task T1 (priority 80) and the queue has the tasks T2 (priority 100) and T3 (priority 120) on it.

Error Messages:

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

QUE-ERR TYPE=t

where error type t is one of the following:

QUEUE NUMBER	indicates that an illegal queue number was specified.
ON	indicates that a queue is ON and, therefore, cannot be marked ON-exclusive.
SHARED QUEUE	indicates that more than one APU is assigned to the queue and, therefore, it cannot be marked ON-exclusive.
NO TASK	indicates that the task specified for the XON option does not exist.
RIGHTS BUSY	indicates that the mapping rights over the specified queue are possessed by a task other than the command processor.
QUEUE BUSY	indicates that the specified queue is locked by an APU or an e-task.

ASGN-ERR

indicates that the file or device could not be assigned.

FD-ERR

indicates an invalid fd was specified.

IO-ERR

indicates an I/O error on output device or file.

3.48 REMOVE COMMAND

The REMOVE command is used to remove from memory a shared segment that is loaded by a LOAD command or established by a TCOM command. The memory area it occupied is freed for system use.

Format:

REMOVE .SEG,segment name

Parameters:

.SEG	specifies that a shared segment is to be removed.
segment name	is the symbolic name of the shared segment.

Error Messages:

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

REM-ERR

indicates that an attempt to remove a segment failed for reasons noted in TYPE field. See Appendix B for possible entries in the TYPE field.

3.49 RENAME COMMAND

The RENAME command is used to change the name of an unassigned direct access file or device.

Format:

RENAME oldfd,newfd

Parameters:

oldfd	is the current file descriptor of the file or device to be renamed.
newfd	is the new file descriptor to which the file or device is renamed.

Functional Details:

The volume ID field of the new file descriptor (newfd) can be omitted for direct access files. If it is entered, the system ignores it, (i.e., the volume on which a file resides cannot be changed via this command.) This command cannot be used to rename a direct access volume; the FASTCHEK Utility must be used for this. Attempts to rename the console device or the null device or to rename a real or a pseudodevice to an existing device or volume result in an error. A file can only be renamed if its write and read protection keys are 0 (X'0000').

By specifying different account numbers in the oldfd and newfd, a file can be logically transferred from one user to another (the file is not copied). Files in account 255 cannot be transferred in this way.

Examples:

The following example renames file AJM.CUR to AJM.NEW on volume VOL.

```
REN VOL:AJM.CUR,AJM.NEW
```

The following example renames device MT01 to MT02.

```
REN MT01:,MT02:
```

Error Messages:

ASGN-ERR TYPE=PRIV POS=REN

indicates that fd is currently assigned, or the RENAME is directed to the system console.

ASGN-ERR TYPE=PROT POS=fd

indicates that protection keys are nonzero.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

NOPR-ERR

indicates that a required parameter is missing.

NULL-ERR

indicates an attempt to rename the null device.

PARM-ERR

indicates an operand syntax error.

RENM-ERR TYPE=BUFF POS=fd

indicates that an error occurred when closing an lu for a RENAME or the system space control blocks are corrupted.

RENM-ERR TYPE=NAME POS=REN

indicates that a duplicate device or volume name exists.

RENM-ERR TYPE=NAME POS=fd

indicates that a duplicate filename exists.

3.50 REPROTECT COMMAND

The REPROTECT command permits the operator to modify the protection keys of an unassigned direct access file or device.

Format:

REPROTECT fd,new keys

Parameters:

fd	is the file descriptor of the file or device to be reprotected.
new keys	is a hexadecimal halfword whose most significant byte signifies the new write keys and whose least significant byte signifies the new read key.

Functional Details:

If a file with a nonzero account number is to be reprotected, the account number field must be specified in the fd. This facility is provided mainly to enable changing the keys to 0 so that a nonzero account number file can be renamed or deleted. Unconditionally protected files or devices can be conditionally reprotected or unprotected. See the ASSIGN command.

Error Messages:

ASGN-ERR

indicates that reprotect failed for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

PRIV-ERR

indicates an attempt to reprotect a pseudo spool device.

REPR-ERR

indicates that reprotect failed for the reason noted in TYPE field. See Appendix B for possible entries in the TYPE field.

3.51 REWIND AND RW COMMANDS

The REWIND and RW commands rewind magnetic tapes, cassettes and direct access files. Either command is entered from the system console.

Formats:

REWIND fd or RW fd	are used for magnetic tapes and cassettes only.
REWIND fd[,lu] or RW fd[,lu]	are used for disk devices only.

Parameters:

fd	is the file descriptor of the device or file to be rewound.
lu	is the logical unit assigned to the device or file.

Functional Details:

For magnetic tapes and cassettes, only the parameter fd should be specified; for direct access files, lu optionally can be specified. The account number must be 0, if specified.

Before entering the format for disk devices, the task must be selected as the current task through the TASK command.

Examples:

This example causes the tape on device MAG1: to be rewound.

```
REW MAG1:
```

This example causes file AJM.OBJ, as assigned to lu4 on volume M300, to be rewound.

```
REW M300:AJM.OBJ,4
```

Error Messages:

ASGN-ERR

indicates that the file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd or the file has a nonzero account number.

FORM-ERR

indicates a command syntax error.

IO-ERR

indicates that an I/O error or an illegal or unassigned lu was encountered on the specified device or file.

LU-ERR

indicates that an invalid fd was encountered or a nonzero account number was specified

NOPR-ERR

indicates that no operand was specified.

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that there was no currently selected task and a REWIND command with lu specified was entered.

3.52 RVOLUME COMMAND

The RVOLUME command allows the system operator to display to the system console the accounts that have access to a privately owned restricted disk.

Format:

RVOLUME voln

Parameter:

voln is the volume name of the restricted disk.

Functional Details:

When an operator displays the accounts having access to a privately owned disk, the accounts are displayed at the system console along with their access privileges.

Example:

```
RVOL M300
OWNER = 20
0/RO    20/RW    22/RO    36/RO    80/RW    88/RW
```

Error Messages:

PARM-ERR

indicates a parameter is missing or invalid.

PRIV-ERR

indicates that the specified volume is not a restricted disk.

VOLN-ERR

indicates that the volume is not on-line or the volume name is invalid.

3.53 SEND COMMAND

The SEND command is used to send a message to the currently selected task.

Format:

SEND message[;]

Parameter:

message	is a variable length string of 1 to 64 alphanumeric characters.

Functional Details:

The message is passed to the selected task in the same manner as an SVC6 send message. Following standard SVC6 procedures, the message consists of an 8-byte taskid identifying the system manager, followed by the operator-supplied character string. The message data passed to the selected task begins with the first nonblank character following SEND and ends with a carriage return or semicolon (;) as a line terminator. A message cannot be sent to a task currently rolled out.

The receiving task must have intertask message traps enabled in its TSW and must have established a message buffer area. Since background tasks cannot have intertask message traps enabled, a message cannot be sent to a task in the background. See the OS/32 Supervisor Call (SVC) Reference Manual for more information on the SVC6 send message function.

Example:

```
TASK ANITA
SEND CLOSE LU2,ASSIGN LU3
```

The above example produces the following message for the task ANITA:

```
.CMDP CLOSE LU2, ASSIGN LU3
```

Error Messages:

ARGS-ERR

indicates that a message exceeded 64 characters.

NOPR-ERR

indicates that no message was provided. The first nonblank character following the SEND command was a carriage return.

SEQ-ERR

indicates that task is paused, not yet started, or not capable of receiving a message.

SVC6-ERR

indicates that an SVC6 error was returned specifying that the task could not receive a message trap.

TASK-ERR

indicates that there was no currently selected task.

3.54 SET BLOCKS COMMAND

The SET BLOCKS command specifies the maximum physical block size for data and index blocks for an indexed file, or index blocks for nonbuffered files.

Format:

$$\underline{\text{SE}}\text{T } \underline{\text{BL}}\text{OCKS } [n] [,\underline{\text{MX}}\text{BLKSZ}=n] \left[,\underline{\text{IN}}\text{DEX}=\left[\begin{Bmatrix} d \\ 1 \end{Bmatrix}\right] \left[/\begin{Bmatrix} i \\ 1 \end{Bmatrix}\right]\right]$$

$$\left[,\underline{\text{SP}}\text{OOL}=\left[\begin{Bmatrix} d \\ 1 \end{Bmatrix}\right] \left[/\begin{Bmatrix} i \\ 1 \end{Bmatrix}\right]\right] \left[,\underline{\text{NO}}\text{NBUF}=\left[\begin{Bmatrix} d \\ 64 \end{Bmatrix}\right] \left[/\begin{Bmatrix} i \\ 3 \end{Bmatrix}\right]\right]$$

Parameters:

n	is a decimal number from 1 to 255 indicating the maximum number of 256-byte segments that can be specified for data or index blocks in an ALLOCATE command or an SVC7. This parameter is invalid if MXBLKSZ is specified.
MXBLKSZ=	n is a decimal number from 1 to 255 indicating the maximum number of 256-byte segments that can be specified for data or index blocks in an ALLOCATE command or an SVC7. This parameter is invalid if the first positional parameter, n is specified.
INDEX=	is used to specify default data and index block sizes for indexed files; d specifies the data block size and i specifies the index block size. These values are used as defaults in an ALLOCATE command or an SVC7. If d is omitted, the default is 1. If i is omitted, the default is 1. Both d and i are decimal numbers that range from 1 to MXBLKSZ.

SPOOL= is used to specify default data and index block sizes for SPOOL files; d indicates the data block size and i indicates the index block size. These values are used as defaults in an ALLOCATE command or an SVC7. If d is omitted, the default is 1. If i is omitted the default is 1. Both d and i are decimal numbers that range from 1 to MXBLKSZ.

NONBUF= is used to specify default data and index block sizes for nonbuffered files; d specifies the data block size and i specifies the index block size. These values are used as defaults in an ALLOCATE command and an SVC7. If d is omitted, the default is 64. If i is omitted, the default is 3. d ranges from 1 to 65,535 and i ranges from 1 to MZBLKSZ.

Functional Details:

The SET BLOCKS command enables the operator to override the default block sizes that were established at sysgen.

Example:

The following command sets a maximum block size of five sectors. The default data and index block sizes of INDEX files are set to three sectors, respectively. For NB files, the default data block size is set to one sector and the default index block size is set to three sectors.

```
*SE BL  5,IN=3/5,NONBUF=/3
```

Error Messages:

FORM-ERR

indicates a command syntax error.

NOPR-ERR

indicates that no parameters were specified.

PARM-ERR

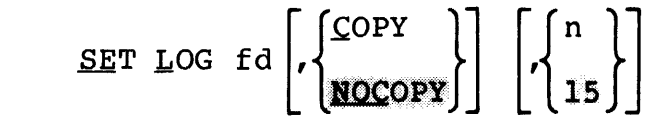
indicates one or more of the input values exceeds the bounds established by MXBLKSZ.

3.55 SET LOG COMMAND

The SET LOG command is used to specify the system log device. The system log device receives all system console I/O. This includes:

- all command lines entered from the console or from the CSS,
- all responses to these commands (other than prompts), and
- all messages logged by tasks.

Format:



Parameters:

fd	is the file descriptor of the log device.
COPY	specifies that a copy of all system console I/O is to be sent to the system console device, as well as to the log device.
NOCOPY	specifies that the system console is not to receive a copy of the I/O. If COPY is not specified, the system will default to NOCOPY.
n	is a decimal number from 0 to 65,535 specifying the number of lines after which the system log file is to be checkpointed. If this parameter is omitted, the default is 15 lines.

Functional Details:

If COPY is specified, the system console continues to receive all system console I/O and a copy is sent to the log device. If COPY is not specified, the system console receives nothing.

Checkpointing is only meaningful for indexed files on disk. If n is specified as 0, no checkpointing occurs. If n is omitted, the default is 15 lines. This ensures that any lines not checkpointed will not be visually lost and can be manually recorded by the operator, if necessary.

The log device can be shared with u-task output. It can be changed at any time by another SET LOG command. If no parameters are specified, logging is terminated. Logging is automatically terminated under these conditions:

- I/O error on the log device
- System initialization
- Power restoration

When logging is terminated, the system console device again receives all output.

SET LOG is primarily used for:

- providing a historical record of system operation, often on magnetic tape or direct access file; and
- allowing system output displays, log messages, etc., to proceed on a high-speed device rather than on the system console.

Example:

```
SET LOG PR:,COPY
```

This example sets the log device to a printer (PR:), and sends a copy of all system console I/O to the system console device as well as to the log device.

Error Messages:

ASGN-ERR

indicates that a log device or file could not be assigned; that is, the device is off-line or assigned for exclusive use to a task.

FD-ERR

indicates an invalid fd.

IO-ERR

indicates that an I/O error occurred on an output device or file.

PARM-ERR

indicates an operand or command syntax error.

3.56 SET PRIORITY COMMAND

The SET PRIORITY command is used to modify the priority of the currently selected task.

Format:

SET PRIORITY n

Parameter:

n	is a decimal number ranging from a high priority of 10 to a low priority of 249 specifying the new priority for the currently selected task.

Functional Details:

The priority of the currently selected task is set to n, subject to the following restriction. If the task is a foreground task, its priority cannot exceed the maximum priority set when the task was built. To increase the maximum priority, reestablish the task. The maximum priority a background task can attain is set at sysgen. To increase this priority, resysgen the system. The default priority for all tasks is 128.

The priority assigned to a task affects scheduling on the CPU. On Model 3200MPS Systems, it also affects scheduling on the priority execution APU queues. It does not affect the no-priority type of APU queue.

Example:

This example sets the priority of task ABC to 150.

```
TA  ABC
SET PRI 150
```

Error Messages:

FORM-ERR

indicates a command syntax error.

NOPR-ERR

indicates that required parameter n was omitted.

PARM-ERR

indicates a parameter syntax error.

PRTY-ERR

indicates that the new priority is greater than maximum priority specified at Link time.

TASK-ERR

indicates that there was no currently selected task.

3.57 SET SLICE COMMAND

The SET SLICE command is used to invoke the time-slice scheduling option. For the Model 3200MPS System, the option applies to the CPU only.

Format:

SET SLICE n

Parameter:

n	is zero or a decimal number from 20 to 65,536 specifying the time-slice allocated to each task.

Functional Details:

If n is 0, time-slice scheduling is disabled; otherwise, n represents the maximum time in milliseconds that any one task can remain active if another task of equal priority is ready. The time-slice option is initially disabled.

Two types of scheduling algorithms are available. Tasks can be scheduled in strict priority order or time-sliced within priority. In the former case, if two tasks of equal priority are started, a task remains active until it relinquishes control of the processor. Assign priorities carefully so that tasks that do not frequently relinquish control of the processor do not inadvertently lock out other tasks. A task can relinquish control in one of the following ways:

- The task is paused by the console operator.
- The task is cancelled by the operator or another task.
- A higher priority task becomes ready because of some external event.
- Task executes an SVC that places it in wait, pause or dormant state.
- The task is executing a Reschedule (RSCH) instruction.

Rather than scheduling on a strict priority basis, tasks can be time-sliced within priority. This option allows the user to ensure that tasks of equal priority receive equal shares of processor time. When a task becomes ready, it is queued on a round-robin basis behind all ready tasks of equal priority. For Model 3200MPS Systems, the task can elect to relinquish the remainder of the time-slice by use of the RSCH instruction.

Example:

```
SET SLICE 20
```

This example sets the maximum time that a task can remain active to 20ms if another task of equal priority is ready.

Error Messages:

FORM-ERR

indicates a command syntax error.

NOPR-ERR

indicates that operand n was missing.

PARM-ERR

indicates that operand n is not 0 or a decimal number within the required bounds.

3.58 SET SYS COMMAND

The SET SYS command is used to vary the size of system space. System space is used to hold system control blocks and buffers (TCBs, FCBs, etc.).

Format:

SET SYS n

Parameter:

n	is a decimal number from 0.25 to 16,384 specified in increments of .25kb. The value n is rounded up to the next page boundary.

Functional Details:

This command is rejected if insufficient memory is available. It is also rejected if a decrease in system space size is requested and the current usage exceeds the new size. Otherwise, it is accepted whenever contiguous memory is available to accommodate the request. The SET SYS command cannot cause a rollout of any task.

A page is the minimum amount of memory that can be allocated for a given processor. Page size varies by processor with 256 bytes for Model 7/32, 8/32 and 3220 Processors; 2K for Model 3210, 3230, 3240, 3250 and 3200MPS Processors; and 4K for Model 3203, 3205 and 3280 Processors.

The OS/32 data structures and file control block (FCB) requirements for each are:

Contiguous files	280 bytes
Indexed files	528 + blocking factor x 512 + index block factor x 256
Nonbuffered files	528 + index block factor x 256
Timer queue entries	24 bytes

Task control blocks	560 + 4 x maximum number of logical units + 12 x number of accounting I/O classes

Example:

The following example adjusts the amount of system space available to 75.25kb for Model 7/32, 8/32 or 3220 Processors. On Model 3203, 3205, 3210, 3230, 3240, 3250 and 3280 Processors, the amount of system space is adjusted to 76kb.

```
SET SYS 75.25
```

Error Messages:

FORM-ERR

indicates a command syntax error.

MEM-ERR POS=XXX

indicates insufficient memory. XXX is the requested value.

NOPR-ERR

indicates required operand is missing.

PARM-ERR

indicates an operand or command syntax error, or that n is not a decimal number specified in increments of .25kb.

3.59 SET TIME COMMAND

The SET TIME command sets the current date and time of day.

Format:

SET TIME { [mm/dd/yy],hh:nn:ss | OFF | 0 }

Parameters:

mm	is a decimal number from 01 to 12 specifying the month.
dd	is a decimal number from 01 to 31 specifying the day.
yy	is a decimal number from 00 to 99 specifying the year.
hh	is a decimal number from 00 to 23 specifying the hour.
nn	is a decimal number from 00 to 59 specifying minutes.
ss	is a decimal number from 00 to 59 specifying seconds.
OFF	turns off the clock for system debugging.
0	turns off the clock for system debugging.

Functional Details:

The SET TIME command must be entered when the system is first loaded and after any power failure occurs. It may be entered whenever the system clock is incorrect. The day, month and year are automatically updated by the system (even during leap years).

At system initialization, following the display of the operating system ID, the following message is output to the system console:

ENTER DATE AND TIME

If a command other than SET TIME is entered, the prompt ENTER DATE AND TIME is repeated until a SET TIME command is entered. If a SET TIME command is entered while incomplete time intervals exist, the tasks that initiated the incomplete intervals are affected in these ways:

- Seconds from midnight - The time and day are updated; however, this has no effect on any time of day interval even if the date entered differs from the date previously entered. The time difference is used to adjust all seconds from midnight intervals.
- Milliseconds from now - Elapsed time intervals are unaffected by a change in the time by a SET TIME.

For example, if the current date is 11/22/80 and the current time is 11:50 AM, and there are three intervals outstanding:

1. Time of day interval is set to complete on 11/22/80 at 2:00 PM.
2. Time of day interval is set to complete on 11/23/80 at 8:00 AM.
3. Elapsed time interval is set to complete on 11/22/80 at 1:00 PM.

If SET TIME 11/21/80, 10:50:00 is entered, the time intervals are as follows:

1. Time of day interval is set to complete on 11/21/80 at 2:00 PM.
2. Time of day interval is set to complete on 11/22/80 at 8:00 AM.
3. Elapsed time interval is set to complete on 11/21/80 at 12 PM.

When the system is restarted after a power failure, the clock is automatically turned on and the date and time at the time of power failure is used. The operator should correct the time after the power failure.

During system debugging, it is often desirable to eliminate interrupts. The SET TIME command provides the system debugging feature. This feature is performed by entering:

SET TIME { 0 / OFF }

System debugging mode may be selected at any time. When this mode is selected, the clock is turned off, clock interrupts are inhibited, the display panel is cleared, and the previous date and time setting (if previously set) is cleared. The operator may exit from this mode at any time by entering SET TIME with the desired date and time specified.

Example:

```
SET TIME 2/24/80,03:05:00
```

Alternatively, by sysgen option, the date parameter can be entered in the format:

```
dd/mm/yy
```

The date parameter is optional only if it has been previously set. Therefore, at system start-up, both the date and time must be specified.

Error Messages:

FORM-ERR

indicates a command syntax error.

NOPR-ERR

indicates that an operand is missing.

PARM-ERR

indicates an operand syntax error.

3.60 SPOOLFILE COMMAND

The SPOOLFILE command allows a user to allocate a spool file on behalf of a specified pseudodevice and assign that file to a specified lu of the currently selected task. This command makes all spooling options available at a terminal or CSS level. This command is not processed by SPL/32 as a spooler command. It is handled by the operating system and MTM.

The SPOOLFILE command cannot be used with the OS/32 Spooler.

Format:

```
SPOOLFILE lu&lu1,pseud dev,FORM=formname [,{VFC   }]
                                          {IMAGE}

[,{NOIMAGE}] [,{CHECKPOINT  }] [,COPIES=n] [,{HOLD   }]
  {NOVFC  }  {NOCHECKPOINT}                {RELEASE}

[,BLOCK= blocksize/indexsize] [,{DELETE  }] [,PRIORITY=p]
                               {NODELETE}
```

Parameters:

lu	is a decimal number specifying the logical unit to which the pseudo device is to be assigned.
lul	indicates that lu is to be assigned to the same spool file as lul. lul must be the first lu assigned to the spool file.
pseud dev	is the 1- to 4-character name of a pseudodevice. The first character must be alphabetic; the remaining alphanumeric.
FORM=	formname is a desired preprinted name of a form than can be specified here. If the form specified was not previously enabled using a FORM command, an error message is sent to the monitoring control or subcontrol task and the request is processed using the default standard form name, STD.

VFC	specifies the use of vertical forms control for the assigned lu. When VFC is used, the first character of each record is interpreted as a VFC character.
IMAGE	specifies that there is no VFC for the device assigned to the specific lu.
NOIMAGE	turns the IMAGE option off for the assigned lu.
NOVFC	turns the vertical forms control option off for the assigned lu. This is the default option.
CHECKPOINT	turns on checkpointing for the assigned lu. This is the default option. The global checkpoint option must be on.
NOCHECKPOINT	turns off CHECKPOINT option for the assigned lu.
COPIES=	n identifies the number of copies to be output. It must be between 1 and 255 or an error message is sent.
HOLD	causes the specified file to remain on the spool queue until a RELEASE request is issued.
RELEASE	enables a spool file for output when the lu is closed.
BLOCK=	specifies the index and/or data block size. blocksize is a decimal number specifying the physical block size in 256-byte sectors, to be used for buffering and debuffering operations involving the file. The default size is 1 or the value entered using the BLOCK command. If this value exceeds the maximum block size established at sysgen time, an error will be printed when attempting to allocate the file. indexsize is a decimal number specifying the index block size in 256-byte sectors. The default size is 1 or the value entered using the BLOCK command. Index size cannot exceed the maximum index block size established at sysgen time or an error will occur when attempting to allocate the file.
DELETE	the file is deleted after output. This is the default option.
NODELETE	the file is not deleted after output.

PRIORITY= p is the desired print priority. If this option is not specified, the print priority becomes the same as the priority of the task the spool file assign is on behalf of.

Functional Details:

The SPOOLFILE command can be used to make an assignment to a pseudodevice from the terminal or CSS level. If two conflicting parameters are entered in a single SPOOLFILE command, such as DELETE and NODELETE, the second parameter is executed and an error message is generated. The SPOOLFILE command is primarily for users operating in an MTM environment.

Example:

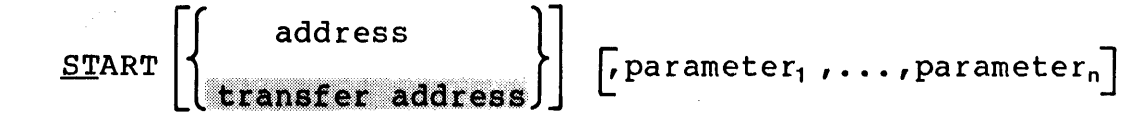
This example causes a spool file to be allocated for pseudodevice pd1: and assigns that file to lu4 of the current task. VFC has been specified for the specified lu and the DELETE option has been selected, which means the file will be deleted after output.

```
SPOOLFILE 4,pd1:,VFC,DELETE
```

3.61 START COMMAND

The START command is used to initiate task execution. The currently selected task is started only if it is dormant; otherwise, the command is rejected.

Format:



Parameters:

address — specifies the address at which task execution is to begin. For u-tasks, this is not a physical address, but is an address within the task's own logical address space. For e-tasks, it is a physical address. If address is omitted, the currently selected task is started at the transfer address specified when the task was established.

parameter — specifies optional parameters to be passed to the task for its own decoding and processing. Parameters must be separated by a comma. All characters between the first comma and the command terminator (carriage return (CR) or semicolon) are moved to memory beginning at UTOP. The characters are terminated in memory by a CR. If this operand is omitted, a CR is stored at UTOP. If there is not enough memory between UTOP and CTOP to pass all the characters, the call is rejected with an ARGS-ERR.

Examples:

The following example starts the currently selected task at X'138'.

```
ST 138
```

The following example starts the currently selected task at X'100' and passes NOSEG,SCRAT to the task.

```
ST 100,NOSEG,SCRAT
```

The following example starts the currently selected task at the transfer address specified when the task was built and passes 1000,ABC to the task.

```
ST ,1000,ABC
```

Error Messages:

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

SEQ-ERR

indicates that task is active.

SVC6-ERR TYPE=ARGS

indicates insufficient memory between UTOP and CTOP to pass all parameters.

SVC6-ERR TYPE=DORM

indicates a START was entered but task is in time delay wait.

TASK-ERR

indicates that there was no currently selected task.

3.62 SWOP COMMAND

The SWOP command enables the operator to manipulate a pair of mirrored disks.

Format:

SWOP OLDPRIMARY=dev_1 : [,NEWPRIMARY=dev_2 :]

Parameters:

OLDPRIMARY= dev_1 : is the device mnemonic of the mirrored pair from which reads are scheduled.

NEWPRIMARY= dev_2 : is the device mnemonic of the disk that is currently mirroring the primary disk.

Functional Details:

When the SWOP COMMAND is executed, dev_2 : becomes the new primary disk and dev_1 : becomes the secondary disk. The NEWPRIMARY parameter is optional because this can be deduced from known information on the mirrored pair.

Example:

In the following example, D3H2: becomes the new primary disk and D3H1: becomes the secondary disk.

```
SWOP OLDPRIMARY=D3H1:,NEWPRIMARY=D3H2:
```

3.63 TASK COMMAND

The TASK command is used to specify the current foreground, background or system task.

Format:

TASK [taskid]

Parameter:

taskid	is the name of a foreground task, background task (.BG) or system task (.MTM or .SPL). If taskid is not specified, the taskid of the currently selected task is displayed on the console device.

Functional Details:

Task-related commands operate on the currently selected task. All task-related commands are affected by the TASK command. Also affected are the BFILE, BRECORD, FFILE, FRECORD, REWIND, RW and WFILE commands. Some CSS commands are affected by TASK as described in Chapter 5.

NOTE

When CSS is started, the current value of TASK is associated with the CSS file as the currently selected CSS task. If a CSS file executes a TASK command, it affects only that CSS file's commands and does not change the value of TASK associated with the console.

If the currently selected task is deleted from the system, or if no TASK command has been entered, task-related commands (other than TASK) are rejected with a TASK-ERR.

Examples:

T ABC	Sets current task to ABC.
CL 2,3,4	Closes logical units 2, 3 and 4 of task ABC.
AS 2,CARD:	Assigns lu2 of task ABC to device CARD.
T XYZ	Sets current task to XYZ.
OPT RES	Makes task XYZ resident.
CAN XYZ	Cancels task XYZ.
ST 100	Starts task XYZ at relative address 100.
T .BG	Sets current task to background.
PAUSE	Pauses the background task.

Error Messages:

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that there was no currently selected task.

3.64 TCOM COMMAND

The TCOM command is used to allocate an area of memory for a local task common segment to be referenced by u-tasks.

Format:

TCOM segment name,segment size

Parameters:

segment name	is the symbolic name of the common block used by programs in referencing the common segment.
segment size	is the size of the memory area to be allocated. Size is a positive decimal number in kilobytes, specified in multiples of 256-byte increments for the Model 7/32, 8/32 and 3220 Processors; 2,048-byte increments for the Model 3210, 3230, 3240, 3250 and 3200MPS Processors; and 4,096-byte increments for Model 3203, 3205 and 3280 Processors, with the maximum value depending on the available task space.

Functional Details:

The segment is resident until removed via the REMOVE command.

Examples:

The following example allocates a 2.5kb task common segment COM1 for Model 7/32, 8/32 and 3220 Processors. It allocates a 4.0kb task common segment COM1 for Model 3203, 3205, 3210, 3230, 3240, 3280 and Model 3200MPS Processors.

```
TCOM COM1,2.5
```

The following example allocates a 20kb task common segment COMM2 for all processors.

```
TCOM COMM2,20
```

Error Messages:

FORM-ERR

indicates a command syntax error.

PARM-ERR

indicates an operand syntax error.

TCOM-ERR

indicates that the creation of a task common segment failed for the reason noted in the TYPE field. TYPE field responses are:

MAP

indicates that the shared segment table (SST) is full or the file was not found when an automatic attempt was made to load a sharable segment.

MAP-ERR

indicates that the LPU is already mapped to an APU.

MEM

indicates that there is no vacant area of sufficient size.

NAME

indicates that a task common of the same name already exists.

SYS

indicates that there is not enough system space for the required segment descriptor entry (SDE).

3.65 TEMPFILE COMMAND

The TEMPFILE command causes a temporary file to be allocated and assigned to one of the logical units of the currently selected task. A temporary file exists only for the duration of the assignment. When a temporary file is closed, it is also deleted.

Format:

```
                 CONTIGUOUS,fsize
                 EC[/[{bsize}]] [/[{isize}]] [,{keys}]
                    [{ 64 }]] [{ 3 }]] [{0000}]
TEMPFILE lu,     INDEX[,[{lrecl}] [/[bsize]] [/[isize]] [,{keys}]]
                       [{ 126 }]                         [{0000}]]
                 NB[,[{lrecl}] [/[bsize]] [/[isize]] [,{keys}]]
                    [{ 126 }]                         [{0000}]]
                 LR[/[{bsize}]] [/[{isize}]] [,{keys}]
                    [{ 64 }]] [{ 3 }]] [{0000}]
```

Parameters:

lu	is a decimal number specifying the logical unit of the currently selected task to which a temporary file is assigned.
CONTIGUOUS	specifies that the file type to be allocated is contiguous.
fsize	is a decimal number specifying the total allocation size in 256-byte sectors. This size can be any value up to the number of contiguous free sectors existing on the specified volume at the time the command is entered.
EC	specifies that the file type to be allocated is extendable contiguous.

bsize — is a decimal number specifying the physical block size to be used for buffering and debuffering operations on the index file or data communications device and for the data blocks used for indexed, nonbuffered indexed and extendable contiguous files. When INDEX, EC or NB is specified, bsize represents the block size in sectors of the physical data blocks containing the file. When ITAM is specified, bsize represents the buffer size in bytes. For INDEX files and ITAM buffers, if this parameter exceeds the maximum block size established during sysgen or by the operator, the maximum is used. For EC and NB files, this parameter can be any value between 1 and 255, inclusive. If bsize is omitted, the default established at sysgen or by the operator is used for INDEX and NB files. For EC and LR files, the default is 64 sectors.

isize — is a decimal number specifying the index block size. For INDEX and NB files, the default value is established at sysgen or by the SET BLOCKS command. For EC and LR files, the default value is three sectors (768 bytes). If the index block size exceeds the maximum disk block size established at sysgen or by the SET BLOCKS command, the maximum is used. Neither bsize nor isize can exceed 255.

keys — specifies the write and read protection keys for the file. These keys are in the form of a hexadecimal halfword, the most significant byte of which signifies the write key and the least significant byte, the read key. If this parameter is omitted, both keys default to 0.

INDEX — specifies the file type to be allocated is buffered indexed.

lrecl — is a decimal number specifying the logical record length of an indexed or nonbuffered indexed file, or a data communications device. It cannot exceed 65,535 bytes. Its default is 126 bytes.

NB — specifies that the file type to be allocated is nonbuffered indexed.

LR — specifies a long record file. For long record files, the logical record length is specified by the data block size (bsize) parameter (i.e., the logical record length is the data block size).

Functional Details:

A temporary file is allocated on the default TEMP volume.

To assign an indexed file, sufficient room must exist in system space for three buffers (two data buffers and one index buffer), each of the stated size. Therefore, if bsize or isize is very large, the file cannot be assigned in some memory-bound situations. At sysgen, a maximum block size parameter is established in the system and bsize and isize cannot exceed this constant.

To assign an EC or NB file, sufficient room must exist in system space to contain only a single index block of the stated size. The data blocks for EC and NB are not buffered in system space and, thus, are not constrained to the sysgened block size.

Examples:

The following example allocates on the default temporary volume a contiguous file with a total length of 64 sectors (16kb) and assigns it to lu2 of the currently selected task.

```
TE 2,CO,64
```

The following example allocates on the default temporary volume an indexed file with logical record length of 126 bytes. The buffer size and index block size default to the value set at sysgen or by the SET BLOCKS command. The file is assigned to lul4 of the currently selected task.

```
TE 14,IN,126
```

The following example allocates on the default temporary volume an extendable contiguous file with the default data block size of 64 sectors and the default index block size of 3 sectors. The file is assigned to lu4 of the currently selected task.

```
TE 4,EC
```

The following example allocates on the default temporary volume a temporary nonbuffered indexed file with a logical record length of 240 bytes, a data block size of 250 sectors and the default index block size that was set at sysgen or by the SET BLOCKS command. The file is assigned to lul2 of the currently selected task.

```
TE 12,NB,240/250
```

Error Messages:

ALLO-ERR

indicates that allocation failed for a reason denoted by the TYPE field.

ASGN-ERR

indicates that the assign failed for a reason noted by the TYPE field. See Appendix B for possible entries in the TYPE field.

FORM-ERR

indicates a command syntax error.

LU-ERR

indicates an invalid lu number or lu was assigned.

NODA-ERR

indicates that direct access support is not included in this system.

NOPR-ERR

indicates a required operand is missing.

PARM-ERR

indicates an operand syntax error.

SEQ-ERR

indicates that the currently selected task is not dormant.

SPAC-ERR

indicates that the task exceeds established maximum system space usage.

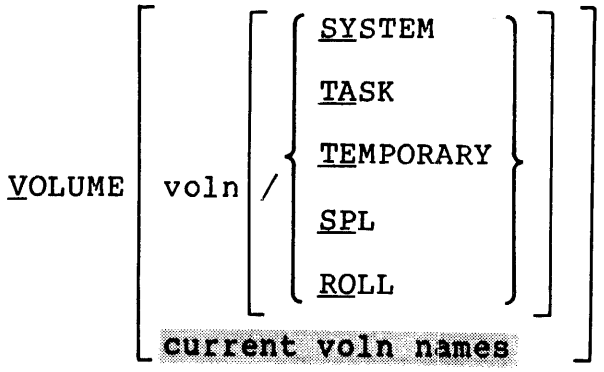
TASK-ERR

indicates that there is no currently selected task.

3.66 VOLUME COMMAND

The VOLUME command is used to set or change the name of the system, task, roll, spool or temporary volume. Alternatively, it is used to interrogate the system for the current names associated with these volumes.

Format:



Parameters:

voln	is a 4-character volume identifier. If all parameters are omitted, all current system, task, roll, spool and temporary volume names are displayed.
SYSTEM	specifies the system volume.
TASK	specifies the task volume of the currently selected task.
TEMPORARY	specifies the temporary volume.
SPL	specifies the spool volume.
ROLL	specifies the roll volume.

Functional Details:

Any commands that do not explicitly specify a volume name use the system volume as a default. No test is made to ensure that the volume is actually on-line at the time the command is entered. If voln is not specified, the names of the current default volumes are output to the console device.

Examples:

The following example establishes volume ABCD as a spool volume.

```
VOL ABCD/SPL
```

This example displays all current volume names to the console.

```
V
SYSTEMV=MT4
TASKVOL=MT4
TEMPVOL=FIXD
SPOOLV =FIXD          (Will be displayed if spool  support
                      included at sysgen.)
ROLLVOL=FIXD          (Will be displayed if  roll  support
                      included at sysgen.)
```

Error Messages:

NODA-ERR

indicates that no direct access support was sysgened.

PARM-ERR

indicates an operand syntax error.

TASK-ERR

indicates that there is no currently selected task.

| WFILE |

3.67 WFILE COMMAND

The WFILE command writes a filemark on magnetic tapes, cassettes and direct access files.

Formats:

WFILE fd	is used for magnetic tapes and cassettes only.
WFILE fd[,lu]	is used for disk devices only.

Parameters:

fd	is the file descriptor of the file or device to which a filemark is to be written.
lu	is the logical unit to which the device or file is assigned.

Functional Details:

For magnetic tapes and cassettes, only the parameter fd should be specified; for direct access files, lu optionally can be specified. The account number must be 0, if specified.

Before entering the format for disk devices, the task must be selected as the current task through the TASK command.

Examples:

The following example causes a filemark to be written on the magnetic tape on MAG1:.

```
WF MAG1:
```

The following example causes a filemark to be written on file AJM.OBJ, which is assigned to lu4 on volume M300.

```
WF M300:AJM.OBJ,4
```

Error Messages:

ASGN-ERR

indicates that the file or device could not be assigned for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd.

FORM-ERR

indicates that a command syntax error was encountered.

IO-ERR

indicates that an I/O error or an illegal or unassigned lu was encountered on the specified device or file.

LU-ERR

indicates that an invalid lu was encountered.

NOPR-ERR

indicates that no operand was specified.

PARM-ERR

indicates that an operand syntax error was encountered.

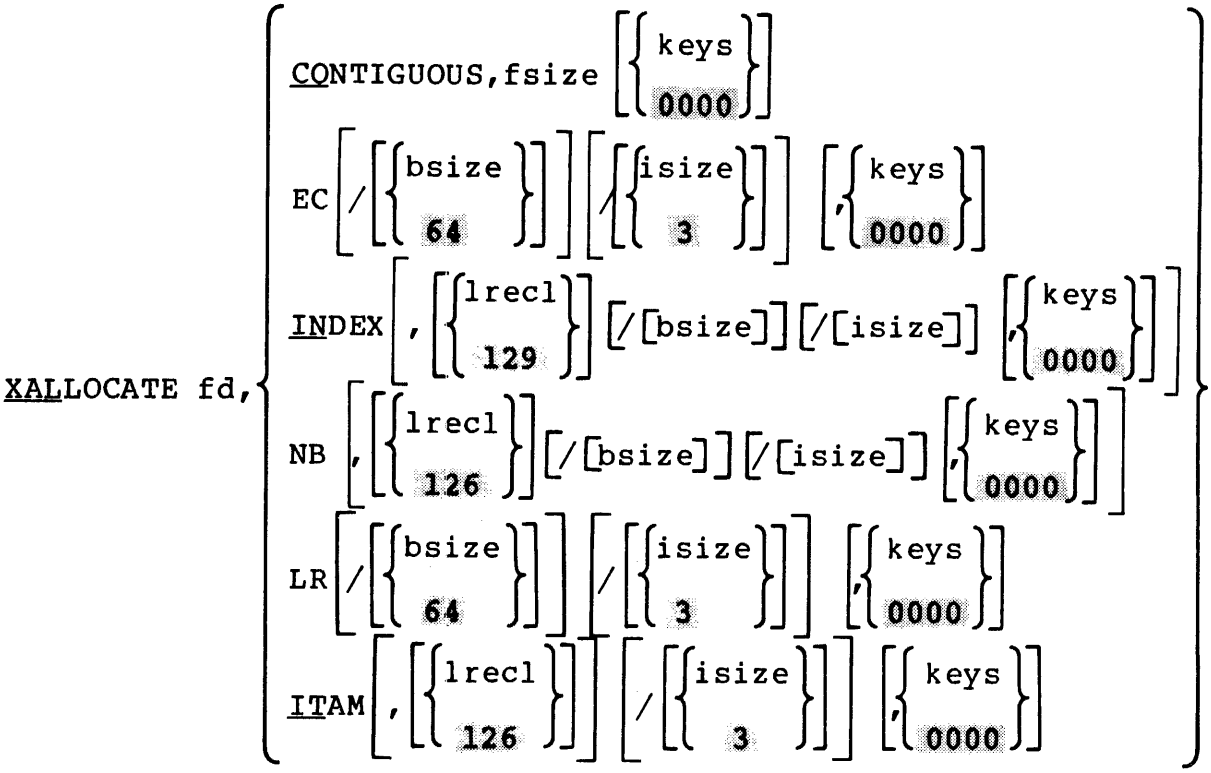
TASK-ERR

indicates that there was no currently selected task and a WFILE command with lu specified was entered.

3.68 XALLOCATE COMMAND

The XALLOCATE command deletes an existing file and allocates a file with the same name.

Format:



Parameters:

fd	is the file to be deleted and the name of the new file to be allocated.
CONTIGUOUS	specifies that the file type to be allocated is contiguous.
fsize	is a decimal number indicating file size, which is required for contiguous files. It specifies the total allocation size in 256-byte sectors. This size may be any value up to the number of contiguous free sectors existing on the specified volume at the time the command is entered.

keys — specifies the write and read protection keys for the file. These keys are in the form of a hexadecimal halfword, the most significant byte of which signifies the write key and the least significant byte, the read key. If this parameter is omitted, both keys default to 0.

EC — specifies that the file type to be allocated is extendable contiguous.

bsize — is a decimal number specifying the physical block size to be used for buffering and debuffering operations on the index file or data communications device and for the data blocks used for indexed, nonbuffered indexed and extendable contiguous files. When INDEX, EC or NB is specified, bsize represents the block size in sectors of the physical data blocks containing the file. When ITAM is specified, bsize represents the buffer size in bytes. For INDEX files and ITAM buffers, if this parameter exceeds the maximum block size established during sysgen or by the operator, the maximum is used. For EC and NB files, this parameter can be any value between 1 and 255, inclusive. If bsize is omitted, the default established at sysgen or by the operator is used for INDEX and NB files. For EC and LR files, the default is 64 sectors.

isize — is a decimal number specifying the index block size. For INDEX and NB files, the default value is established at sysgen or by the SET BLOCKS command. For EC and LR files, the default value is three sectors (768 bytes). If the index block size exceeds the maximum disk block size established at sysgen or by the SET BLOCKS command, the maximum is used. Neither bsize nor isize may exceed 255.

INDEX — specifies that the file type to be allocated is buffered indexed.

lrecl — is a decimal number specifying the logical record length on an indexed or nonbuffered indexed file, or a data communications device. It cannot exceed 65,535 bytes. Its default is 126 bytes. It may optionally be followed by a slash (/), which delimits lrecl from bsize.

NB — specifies that the file type to be allocated is nonbuffered indexed.

ITAM — specifies that the device to be allocated is a data communications device.

LR — specifies a long record file. For long record files, the logical record length is specified by the data block size (bsize) parameter (i.e., the logical record length is the data block size).

Functional Details:

If the file to be deleted by the XALLOCATE command does not exist, no error will occur. A file can be deleted and reallocated only if it is not currently assigned to a task and its write and read protection keys are 0 (X'0000').

To assign an index file, sufficient room must exist in system space for three buffers (two data buffers and one index buffer), each of the stated size. Therefore, if bsize is very large, the file may not be assignable in some memory-bound situations. At sysgen, a maximum block size parameter is established in the system and bsize cannot exceed this constant.

To assign an EC or NB file, sufficient room must exist in system space to contain only a single index block of the stated size. The data blocks for EC and NB files are not buffered in system space and, thus, are not constrained to the sysgened block size.

Examples:

The following example allocates on the system volume an indexed volume named PROG1.TSK with a logical record length of 80 bytes. Because no other parameters are entered, the file will have a physical block size and index block size of the default values set at sysgen or by the SET BLOCKS command. The write and read protection keys for the file will default to zero.

```
XAL PROG1.TSK,IN,80
```

The following example allocates on volume SYS an extendable contiguous file named XFILE.DTA with a default data block size of 64 sectors and a default index block size of three sectors. The file initially contains no records and has a record length of one sector (same as a contiguous file). If the file already exists, has keys of 0000 and is not currently assigned to any task, it is deleted before being allocated. If any of these conditions are not met, an error occurs.

```
XAL SYS:XFILE.DTA,EC
```

The following example reallocates on the system volume a nonbuffered indexed file named YFILE.DAT with logical record length of 240 bytes, data block size of 250 sectors and index block size of five sectors. The file initially contains no records.

```
XAL YFILE.DAT,NB,240/250/5
```

Error Messages:

ALLO-ERR

indicates that the allocation failed for reasons denoted by the TYPE field. See Appendix B for possible entries in the TYPE field.

DELE-ERR

indicates an error occurred while trying to delete a file. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates that an invalid fd is specified.

NODA-ERR

indicates that direct access support was not included in the system at sysgen.

NOPR-ERR

indicates that a required operand is missing.

PARM-ERR

indicates that an operand syntax error occurred.

3.69 XDELETE COMMAND

The XDELETE command is used to delete one or more files. If the file does not exist, no error is generated.

Format:

XDELETE fd_1 [,fd_2,...,fd_n]

Parameter:

fd is the file descriptor to be deleted.

Functional Details:

A file can be deleted only if it is not currently assigned to a task and its write and read protection keys are 0 (X'0000').

Example:

```
XDEL FIXD:OS323240.817,RADPROC.FTN
```

Error Messages:

DELE-ERR

indicates that delete failed for the reason noted in the TYPE field. See Appendix B for possible entries in the TYPE field.

FD-ERR

indicates an invalid fd.

NODA-ERR

indicates that direct access support was not included in the operating system.

NOPR-ERR

indicates that no operand is specified.

CHAPTER 4
SYSTEM ERROR HANDLING

4.1 ERROR TYPES

There are three kinds of system level error conditions that can occur during operation of OS/32:

- Recoverable errors
- Abnormal task termination
- System failures

A recoverable error occurs when the system detects a condition that requires operator intervention in order to continue. In this case, the system prints a message describing the condition (e.g., PARM-ERR). The operator can then issue a command to correct the error. See Appendix B for the messages output by OS/32 while processing operator commands.

An abnormal task termination occurs when a malfunction is detected during execution of a user task (u-task) and the system cannot continue executing the task without destroying the system or user information. At this point, the system prints a message that describes the error detected (e.g., ILLEGAL INSTRUCTION, ILLEGAL SVC) and the location of the instruction causing the error. The u-task is then paused. The operator can correct the error condition and use the CONTINUE command to proceed, or the task can be aborted with a CANCEL command.

A system failure occurs when a hardware or software malfunction is detected during execution of system code and the system cannot proceed without running the risk of destroying information, either on some peripheral device or in memory. At this point, the system displays a crash code on the display panel and the system console. It also displays on the system console a program status word (PSW) status and location of the crash condition; it then stops. System crash codes are summarized in Appendix D.

4.2 SYSTEM FAILURE RECOVERY

The system failure handler is designed to minimize destruction of user data when a failure occurs and to facilitate system debugging. The following steps must be performed to retrieve the information needed to determine the cause of the failure. Steps 3 and 4 must be performed whenever any failure occurs.

1. Record the system failure code and the sequence of the operator commands leading to the failure. This information can be obtained as follows:

   - Failure code - This code is displayed on the console display panel and is also stored in location SPT.CRSH in the system pointer table (SPT). System crash codes are summarized in Appendix D.

   - Operator command - If the console is a video display unit (VDU) device, note the information remaining on the screen. If the console is a hard copy device or LOG was set to a hard copy device, all information logged since the last operating system initialization should be preserved.

2. When possible, obtain a panic dump. See Section 4.6.

3. Reload the operating system. Do NOT restart at location X'60'.

4. If any direct access devices were marked on at the time of the failure, run the FASTCHEK Utility. See the OS/32 FASTCHEK Reference Manual.

5. To interpret the information produced by Step 2, run the OS/32 Dump Print Utility. See the OS/32 System Support Utilities Reference Manual.

4.2.1 Submitting Problems for Investigation

When submitting this information to Perkin-Elmer, please include the following information:

- PSW and location counter (LOC) at time of failure
- Panic dump tape
- Configuration statements and link-edit map of system
- Console log prior to failure
- Time of failure
- Description of the failure including any system messages
- Conditions surrounding the failure

4.3 POWER FAIL/RESTORE

When a power fail is detected by the processor, an interrupt occurs and OS/32 saves the registers and prepares itself for another interrupt when power is restored. The following message appears on the console when power is restored:

```
POWER RESTORE - RESET PERIPHERALS AND ENTER GO
```

After the message is printed, operator intervention may be required to reset any devices that might be in an off-line or write-protected state as a result of the power failure. The operator intervention requirement is a source system generation (sysgen) option. If operator intervention is required, the operator can continue the power restoration process by entering GO followed by a carriage return (CR) on the system console.

Upon completion of the power restoration process, the following message is output to the system console:

```
POWER FAILURE AT mm:dd:yy,hh:mm:ss
```

The date and time are displayed in the format specified at sysgen time. All nondirect access input/output (I/O) operations in progress at the time of the failure are aborted and an error status is returned to the task. Direct access I/O operations are retried when power is restored.

The power restoration module schedules power restoration traps for those tasks that require such knowledge and have the power restoration trap enable bit set in the current task status word (TSW). When there is a power outage, a TSW swap occurs when power is restored and all tasks with the power restoration trap bit enabled enter the user-defined power restoration trap routine. All other tasks are paused with the message:

```
taskid:TASK PAUSED
```

See the System Generation/32 (Sysgen/32) Reference Manual for information on eliminating operator intervention requirements. See the OS/32 Application Level Programmer Reference Manual for further information on power fail/restoration traps.

For Model 3200MPS Systems, when an auxiliary processing unit (APU) is shut down for maintenance purposes, it is suggested that the APU be stopped first and its task paused and then continued on another processor or execution queue. This action will enhance APU recovery reliability in case of a failure.

4.3.1 Shared Memory Power Failure

When a power failure occurs in a shared memory cabinet, the following message is displayed on the system console of each system utilizing shared memory:

```
SHARED MEMORY POWER FAILURE AT hh:mm:ss,mm:dd:yy
```

The time and date are displayed in the format selected at sysgen time.

Tasks that attempt to access an area of shared memory will receive the following error message and will be paused:

```
MEMORY ERROR ON DATA FETCH AT xxxxxx
```

Once power is restored, the tasks can be continued.

4.4 DISK INPUT/OUTPUT (I/O) ERRORS

Certain disk-related I/O errors and bit map errors indicate that the integrity of the disk volume is in doubt. When possible, OS/32 warns the operator of disk-related errors by issuing the following messages:

```
BIT MAP ERROR ON voln:  MARK OFF AND CHECK

I/O ERROR ON voln:  MARK OFF AND CHECK
```

In the event of these errors, the operator should mark off the disk volume as soon as possible and execute the FASTCHEK Utility.

4.4.1 Secondary Directory Overflow Error

When the secondary directory becomes full, the operator is informed by the following message:

```
CDIR FULL - devn
```

The device mnemonic of the disk is devn. See the MARK command description in Chapter 3 for further information and action necessary in this situation.

4.5 SYSTEM SHUTDOWN AND RESTART

In disk-oriented OS/32 systems, it is necessary that the system be shut down or restarted in an orderly fashion to ensure the integrity of the disk volumes in use. In particular, before shutting down or restarting OS/32, the operator should:

- cancel and delete (make nonresident) all tasks, and
- mark all disk devices off-line.

If the system is reloaded as a result of a system failure, the FASTCHEK Utility should be used to restore the integrity of the data on all disk volumes on-line at the time of the failure.

NOTE

If a system fails, it must not be restarted at X'60'. It must be reloaded to ensure system integrity.

4.6 OS/32 PANIC DUMP PROCEDURE

The panic dump procedure allows the user to copy the entire contents of memory to a user-specified magnetic tape or disk device. Within a Model 3203 environment, the panic dump program only supports a panic dump to a cartridge tape (streaming tape).

Panic dumps should be performed immediately following a system failure due to a malfunction in:

- hardware,
- system software,
- a user-written driver, or
- areas in the operating system modified by the user.

After a panic dump has been performed, the contents of the dump should be listed to a print device using the Dump Print Utility. See the OS/32 System Support Utilities Reference Manual for instructions regarding the use of the Dump Print Utility.

4.6.1 Electing to Perform a Panic Dump

To perform a panic dump of a system that has not crashed, start executing at location X'70'. It is recommended that the PSW be cleared before execution is started.

The user has the option to perform a panic dump whenever a system failure occurs. The following message is displayed immediately below the system crash code and status information display:

```
DO YOU WISH A SYSTEM DUMP? (Y/N)
```

If a panic dump is not desired, enter N (no), which causes the system to halt. Manual recovery must then be performed using the procedure outlined in Section 4.2. If a panic dump is desired, enter Y (yes), which causes the following program ID message to be displayed on the system console:

```
OS/32 SYSTEM DUMP Rnn-uu
```

Where:

nn	is a decimal number indicating the revision level.
uu	is a decimal number indicating the update level.

Immediately following the program ID, a menu containing the names of the magnetic tape and disk devices with standard configurations supported by the panic dump program is displayed as follows:

```
DEVS
MG85
MGC5
MG62
MGD6
DS67
C13R
D19R
OTHR
```

The default configurations for each device in the menu are presented in Table 4-1.

If the operator wishes to dump memory to a device under an I/O processor (IOP) within a Model 3200MPS System, the bus switch for that IOP must be placed in MANUAL mode and switched to the central processing unit (CPU) side prior to the panic dump. After the panic dump is complete, the bus switch should be switched back to the IOP.

TABLE 4-1 PANIC DUMP PROGRAM-SUPPORTED DEVICES WITH STANDARD CONFIGURATIONS

DEVICE NAME	DEVICE DESCRIPTION	DEVICE CODE	DEVICE ADDRESS	CONTROLLER ADDRESS	SELCH ADDRESS
MG85	800 bpi mag tape	40	85	N/A	F0
MGC5	1600 bpi mag tape	41	C5	N/A	F0
MG62	6250 bpi mag tape	44	85	N/A	F0
MGD6	cartridge tape (streaming tape)	55	DE	0D8	F0
DS67	67Mb disk	35	FC	FB	F0
C13R	13.5Mb disk - CMD removable	3B	FC	FB	F0
D19R	18.5Mb disk -Lark removable	2A	FC	FB	F0

The following prompt is displayed immediately following the device menu:

DEVICE=dddd

Where:

dddd — is a 4-character string indicating one of the supported devices listed in the device menu. Standard configurations for these supported devices are automatically represented in the system as listed in Table 4-1. If a unique configuration is desired for a device listed in the menu, enter OTHR. The type of device entered in response to the DEVICE= prompt determines which of the following three prompt sequences is issued.

When a device is specified, the panic dump program compares the amount of free space available on the device to the size of memory to be dumped. If there is insufficient free space on the device to hold the entire memory dump, the following message is displayed:

```
DUMP WILL NOT FIT
```

The panic dump program then returns to the DEVICE= prompt to allow the user to select a different device.

- Mag Tape Device

  If a magnetic tape device with a standard configuration is specified in response to the DEVICE= prompt, the panic dump program begins execution. Memory contents are written to tape in 2kb records. When the dump is successfully completed, this message is displayed on the system console:

```
SYSTEM DUMP COMPLETE
```

  The tape is immediately rewound, registers are restored and the machine is halted. At this point, a manual recovery from the system failure should be performed. See Section 4.2. If the tape does not rewind, the dump was not successful. Ensure that the tape drive is functional, that the write ring is inserted and that the heads are clean; then restart the procedure.

- Disk Device

  If a disk device with a standard configuration is specified in response to the DEVICE= prompt, the following message is displayed:

```
VOLUME=DUMP,FILE=filename.ext
```

  Where:

  DUMP — is the name of the volume to which memory contents are to be dumped. If the requested disk device has a valid volume mounted with a name other than DUMP or whose directory structure is not consistent with the panic dump format, the following message is displayed:

```
VOL xxxx IS TO BE OVERWRITTEN (Y/N)
```

If Y (yes) is entered, the panic dump program generates a new volume descriptor and directory. Ensure that there are no files that are required for future use on the volume to be overwritten. Panic dump could overwrite these files and the data will not be accessible in any case.

If N (no) is entered, the panic dump program will return to the DEVICE= prompt. This allows the user to specify a different device or change the disk pack.

filename.ext is a 1- to 8-character filename, followed by a 1- to 3-character extension for the file that will hold the memory dump contents. The panic dump program automatically assigns the specified file to account 0. After the file descriptor (fd) is entered, the panic dump program begins execution. If the file already exists, the following message is displayed:

ERROR...FILENAME EXISTS ON DUMP DISK

If an invalid character is entered as part of the filename, the following message is displayed:

ERROR...FILENAME ENTRY

- Other

A response of OTHR to the DEVICE= prompt allows the user to specify a nonstandard device configuration for a supported device. The following four prompt sequences are displayed on the system console:

1. DEV #=aaa

Where:

aaa is a 1- to 3-digit hexadecimal number indicating the I/O bus address of the device to which the dump contents are to be sent.

2. DEV CODE=cc

Where:

cc is a 2-digit hexadecimal number indicating the code of the device to which the dump contents are to be sent. The device codes listed in Table 4-1 are the only valid device codes. The device code entered here identifies the type of device to which the dump contents are being written. The next prompt in the sequence is dependent upon the type of device indicated by the device code entry.

3. CTLR ADDR=nnn

Where:

nnn is a 1- to 3-digit hexadecimal number indicating the I/O bus address of the controller address for the device indicated by the device code. This prompt is not displayed if the device is a magnetic tape device.

4. SLCH ADDR=sss

Where:

sss is a 1- to 3-digit hexadecimal number indicating the I/O bus address of the selector channel (SELCH).

4.6.2 Disk Utilization

A single disk can hold no more than five panic dumps, depending upon the size of the disk and the size of memory to be dumped. If a disk directory already contains five dump entries and a sixth is attempted, the following message is displayed:

```
VOL xxxx IS TO BE OVERWRITTEN (Y/N)?
```

If the panic dump program determines that there is not enough disk space to hold an entire memory dump, the following message is displayed on the system console before the dump begins:

```
DUMP WILL NOT FIT
VOL xxxx IS TO BE OVERWRITTEN (Y/N)?
```

If Y is entered, the panic dump program generates a new volume descriptor and directory. If N is entered, the program returns to the DEVICE= prompt to allow the user to specify a different device or change the disk pack.

If Y is entered, the panic dump program reinitializes the disk specified as the storage disk and executes. Data on the disk will be overwritten. Therefore, before entering Y as a response to this prompt, ensure that there is no data to be saved for future use on the disk. Once the panic dump has been completed, the user can access the dump file through the operating system by marking the disk on, via the MARK ON PROTECT command and then assigning the dump file, via the ASSIGN command. A panic dump cannot be accessed unless the disk has been run through FASTCHEK or is marked on protected. In order to delete a dump file, the user must first run the FASTCHEK Utility on the disk to rebuild the bit map. The panic dump routine can be restarted at X'70' following an error condition.

4.6.3 Examples of Panic Dump Device Specifications

The following are examples of the panic dump prompt sequence for various devices. Underlining indicates user-supplied information.

- Writing the contents of a panic dump to an 800 bpi magnetic tape with a standard configuration:

```
DO YOU WISH A SYSTEM DUMP (Y/N)? Y
OS/32 SYSTEM DUMP R06-02
DEVS
MG85
MGC5
MG62
DS67
C13R
OTHR
DEVICE = MG85
.
.
.
SYSTEM DUMP COMPLETE
```

- Writing the contents of a panic dump to a cartridge disk drive (CDD) removable disk with a standard configuration:

```
DO YOU WISH A SYSTEM DUMP (Y/N)? Y
OS/32 SYSTEM DUMP R06-02
DEVS
MG85
MGC5
MG62
DS67
C13R
OTHR
DEVICE = C13R

VOLUME = DUMP,FILE=DUMP0928.001
.
.
.
SYSTEM DUMP COMPLETE
```

- Writing the contents of a panic dump to an 800 bpi magnetic tape device with a nonstandard configuration:

```
DO YOU WISH A SYSTEM DUMP (Y/N)? Y
OS/32 SYSTEM DUMP R06-02
DEVS
MG85
MGC5
MG62
DS67
C13R
OTHR
DEVICE = OTHR
DEV # = 85
DEV CODE = 40
SLCH ADDR = F4
.
.
.
SYSTEM DUMP COMPLETE
```

- Writing the contents of a panic dump to a 67Mb fixed disk with a nonstandard configuration:

```
DO YOU WISH A SYSTEM DUMP (Y/N)? Y
OS/32 SYSTEM DUMP R06-02
DEVS
MG85
MGC5
MG62
DS67
C13R
OTHR
DEVICE = OTHR
DEV # = EC
DEV CODE = 35
CTRL ADDR = EB
SLCH ADDR = FA
VOLUME=DUMP,FILE=DUMP0928.001
.
.
.
SYSTEM DUMP COMPLETE
```

- Writing the contents of a panic dump to a cartridge tape device (streaming tape) (only applicable to Model 3203):

```
DO YOU WISH A SYSTEM DUMP (Y/N)? Y
OS/32 SYSTEM DUMP R08-01
INSERT TAPE CARTRIDGE AND ENTER GO
.
.
.
SYSTEM DUMP COMPLETE
```

4.6.4 Panic Dump Messages

ERROR...FILENAME EXISTS ON DUMP DISC

The filename entered by the user for the dump file already exists on the specified disk.

IOERROR DU STATUS=XX

The user-specified device is unavailable. XX is the hexadecimal hardware status sent from the device. See the appropriate device hardware manual for an explanation of the status setting.

IOERROR CNFG STATUS=XX

An I/O error occurred because the hardware configuration does not correspond with that specified by the user. XX is the hexadecimal hardware status sent from the device. See the appropriate device hardware manual for an explanation of the status setting.

IOERROR UNRE STATUS=XX

An unrecoverable I/O error has occurred. XX is the hexadecimal hardware status sent from the device. See the appropriate device hardware manual for an explanation of the status setting.

CHAPTER 5
THE COMMAND SUBSTITUTION SYSTEM (CSS)

5.1 INTRODUCTION

The OS/32 CSS is a versatile command language that can be used to control anything from a single batch stream to complex macro commands. CSS has many of the characteristics of a programming language. Its structure, however, allows simple functions to be performed without complete familiarity with CSS. This chapter is intended as a guide for the user, from the beginning stages to the more advanced stages of CSS use. It is assumed that the user is familiar with the functions of the OS/32 operator commands, or at least with their most common forms, described in Chapter 3 of this manual. While CSS is active, the system console remains available for operator commands and task input/output (I/O).

5.2 COMMAND SUBSTITUTION SYSTEM (CSS) FILES

A CSS file is a series of OS/32 operator commands. Every operator command can be executed from a CSS file. In addition, a number of special CSS commands can be executed. The special CSS commands (except SET CODE) begin with a dollar sign, making them easy to identify. The series of operator commands contained in a CSS file exists on media such as cards, disk or magnetic tape. When the CSS file is called, the commands contained within the file are executed in order. When the special CSS command $EXIT is executed, CSS execution is stopped and control is returned to the caller. CSS files can be called by the operator or other CSS files.

If the CSS procedure is to be contained in a disk file, the CSS filename specified must be different from all standard operator commands and mnemonics, including any abbreviations. Thus, these are valid CSS filenames:

ABC.CSS

XYZ.CSS

AB.CSS

The following filenames would be valid only when accompanied by the .CSS extension:

```
AL.CSS
RW.CSS
P1.CSS
```

If the .CSS extensions are omitted from the above filenames, they would become invalid because the mnemonic scan stops at the first nonalphabetic character and:

- AL is the abbreviation for the ALLOCATE command.
- RW is an abbreviation for the REWIND command.
- P is the abbreviation for the PAUSE command.

These filenames can be made valid by prefixing the call to CSS with a volume name. For example:

```
M300:AL
M301:RW
MTM:P1
```

5.2.1 Calling Command Substitution System (CSS) Files

The CSS file is read from a source input device; e.g., from a card reader, magnetic tape, etc. The device being used must be on-line. CSS files may also exist as direct access files. To call the CSS file, the operator enters the name of the device or disk file in the same way as a command is entered. For example, if the file is on cards and the card reader is named CARD, the operator enters the following and the card file is executed:

```
CARD:
```

5.2.2 One Command Substitution System (CSS) File Calling Another

To OS/32, a CSS file is the same as the system operator. Therefore, one CSS file can call another. However, when too many CSS files are active, the command processor buffers may fill and a new CSS file cannot be called. The maximum nesting depth is set at system generation (sysgen). If one CSS file tries to call another, exceeding the designated depth, the system produces the following error message and CSS processing ceases:

```
LVL-ERR
```

When one CSS file calls another, the first file is still active. When the second file finishes processing, execution continues in the first CSS file at the command following the call to the second CSS file.

5.3 USING COMMAND SUBSTITUTION SYSTEM (CSS) FOR BATCH CONTROL

CSS can be used to control a batch job. This allows the user to prepare a sequence of operator commands and the data for the job, then enter the entire job stream to OS/32 through CSS.

5.3.1 Job Control Decks

The following job control deck illustrates the use of CSS to control a batch job from the card reader (CR:):

```
LOAD .BG,CAL32.TSK              Load assembler from file
                                CAL32.TSK.
TASK .BG
ASSIGN 1,CR:                    Assign source input to this
                                file.
ASSIGN 2,MAG1:
ASSIGN 3,PR:
TEMPFILE 4,IN,80
START ,TARGT=32,SCRAT           Start assembler.
   .
   . (source program)
   .
REWIND MAG1:
BUILD LNK.CMD
MAP PR:,ADDR,ALPH,XREF
INCL MAG1:
BUILD PROG.TSK                  Load module is now built.
END
ENDB
LOAD .BG,LINK                   Load Link.
TASK .BG
START ,COM=LNK.CMD,L=CON:       Start Link.
LOAD .BG,PROG.TSK               Load new module.
TASK .BG
START                           Run program.
$EXIT                           End job.
```

The first statements load the CAL/32 assembler, assign logical units to devices and files and start the assembly process. Following these statements are the source statements of the program to be assembled. Next, are the command statements to load Link. The START command begins execution of Link. It is followed by a series of Link commands, terminated by the Link END command. The Link commands are followed by a LOAD command that loads the module Link produced and runs the program. Finally, the $EXIT command returns control to the operator.

5.3.2 Separation of Jobs

When any error occurs in processing a CSS file, CSS processing stops and control is returned to the system console. This may be desirable in some cases, but not when batch jobs are being run. If there are several sets of job control statements in the CSS file (for example, in the card reader), the faulty termination of one job must not cause all jobs to be aborted. The CSS commands $JOB and $TERMJOB are used to confine the effects of errors to a single job. Each job control deck may start with a $JOB statement and end with a $TERMJOB statement. Then, if an error in a given job is detected, the CSS processor skips all commands until a $TERMJOB is found and resumes normal CSS processing.

A typical batch deck, consisting of several jobs, might look like this:

```
$JOB                              Start of first job
   .
   .  (first job control deck)
   .
$TERMJOB                          End of first job

$JOB
   .
   .  (second job control deck)
   .
$TERMJOB                          End of second job

$JOB
   .
   .  (further job control decks)
   .
$TERMJOB
$EXIT                             End of batch stream
```

NOTE

It is not permissible to nest jobs.

5.3.3 Program Pauses and Other Interactions

It is not a good practice to let CSS processing continue while a program called by CSS is running. In any job control deck, the job steps are sequential. When a program is started, it should run to completion before more CSS statements are executed. Otherwise, the CSS processor might try to perform device assignments for the second job step before the first one is finished.

When a background program pauses, CSS processing does not resume. Instead, a pause message is routed to the system console. The operator is responsible for correcting the error and issuing a CONTINUE command. As far as CSS is concerned, the program is still active, whether or not it has paused. If the program goes to end of task or if it is cancelled by the operator, CSS processing resumes. This procedure assumes that programs pause only due to an error or due to the occurrence of some abnormal condition for which the program is unable to take corrective action by itself. Thus, operator intervention is required. Programs that pause arbitrarily or common assembly language (CAL) assemblies with PAUSE or PPAUS statements in their source decks cannot be properly handled under CSS batch control.

5.3.4 $PAUSE, $CONTINUE and $WAIT Commands

The $PAUSE command suspends CSS, allowing time for the operator to respond to an external event; e.g., mount a tape. The $PAUSE command is valid only from CSS and cannot be entered from the system console. If entered, the following message is displayed:

```
PAUS-ERR
```

The $CONTINUE command continues a CSS suspended by a $PAUSE or $WAIT. The $WAIT command suspends a CSS for a specified period of time. It is valid only in CSS. If the user does not want to wait the specified period of time, the $CONTINUE command can be entered to continue the CSS.

The formats for these commands are:

$PAUSE

$CONTINUE

$WAIT [{*, n, 1}]

The parameter n in the WAIT command is a decimal number from 1 to 900 indicating the number of seconds that CSS is suspended. If * is specified, the CSS will be suspended until completion of the current task. If the parameter is omitted, the default is one second.

5.4 USING COMMAND SUBSTITUTION SYSTEM (CSS) TO AVOID REPETITIOUS ACTIONS

CSS is not used for batch control only. It can also be used to avoid lengthy, repetitious operator instructions. Assume that at a given installation, all CAL assemblies are done with a standard set of logical unit (lu) assignments. Command statements for these assignments are placed into a CSS file and that CSS file is put on disk and used before each CAL assembly. For example, assume a disk file named CALASIGN.CSS contains the following commands:

```
CLOSE 1,2,3,4,5,6,7,8,9
XALLOCATE CALSCRAT.TMP,IN,80
XALLOCATE CROSSREF.TMP,IN,256
XALLOCATE SYMDUMP.TMP,IN,256
XALLOCATE SQUEEZ.TMP,IN,256
XALLOCATE ERRLST.TMP,IN,80
ASSIGN 1,CR:
ASSIGN 2,MAG1:
ASSIGN 3,PR:
ASSIGN 4,CALSCRAT.TMP
ASSIGN 5,CROSSREF.TMP
ASSIGN 6,SYMDUMP.TMP
ASSIGN 7,SORCELIB.CAL
ASSIGN 8,SQUEEZE.TMP
ASSIGN 9,ERRLST.TMP
$EXIT
```

The operator places the source program deck in the card reader device (CR:), mounts an output tape on the magnetic tape device (MAG1:), and types:

```
LOAD .BG,CAL32
TA .BG
CALASIGN
START ,SCRAT,CROSS,ERLST
```

and the assembly proceeds. The LOAD and START commands can also be put in the CSS file. This procedure reduces operator intervention and the possibility of error.

CSS can be used to modify OS/32 with patch information after system start-up. If an installation has a list of patches to be entered, the patches are prepared on a card deck, with verification information in the card reader and the command CR: is entered from the console. See the following example.

Example:

```
BIAS 0
MODIFY 1FE0,220,80A,4300,1ED4
EXAMINE 1FE0,4
$EXIT
```

The CSS file is then read and the patches are made to the system without the problem of typing errors. The EXAMINE command displays the contents of the patch area following the modification.

5.5 USING COMMAND SUBSTITUTION SYSTEM (CSS) TO BUILD COMPLEX COMMANDS

CSS also is used as a system macro command language to build complex commands. The basic set of commands provided in the command processor is sufficient to perform any function, but may require operator interaction.

5.5.1 Passing Arguments to Command Substitution System (CSS) Files

The CAL assignment example given in Section 5.4 does not work if some of the devices vary from assembly to assembly. When executed, file CALASIGN always assigns lu1 to CR:, lu2 to MAG1:, etc.

To make assignments more flexible, it is necessary to pass arguments to a CSS file. This is accomplished by using the character sequence @n. Whenever the sequence @n (where n is an integer greater than or equal to 0) is detected in a CSS command, the CSS processor uses the n argument in the CSS calling statement. For example, assume that CSS file ASINE123.CSS contains the following commands:

```
ASSIGN 1,@1
ASSIGN 2,@2
ASSIGN 3,@3
$EXIT
```

The operator enters:

```
ASINE123 CR:,MAG1:,PR:
```

The CSS file is executed as though it contains:

```
ASSIGN 1,CR:
ASSIGN 2,MAG1:
ASSIGN 3,PR:
$EXIT
```

This form of argument to a CSS call is known as a positional parameter; its use within the CSS is dependent upon its position within the calling statement. The first argument passed in the calling statement replaces every occurrence of @1 in the CSS; the second argument replaces @2; and so on. Any occurrence of @0 is replaced with the name by which the CSS is called.

The first argument of the calling statement shown above is CR:, and every occurrence of the sequence @1 in the CSS file is replaced with CR:. An argument is always terminated with a comma, semicolon or carriage return. Therefore, the second argument is MAG1: and the third argument is PR:. In the previous example, CALASIGN can be turned into a generalized ASSEMBLE CSS as follows:

```
LOAD .BG,CAL32
TASK .BG
CLOSE 1,2,3,4,5,6,7,8
XALLOCATE CALSCRAT.TMP,IN,80
XALLOCATE CROSSREF.TMP,IN,256
XALLOCATE SYMDUMP.TMP,IN,256
XALLOCATE SQUEEZE.TMP,IN,256
XALLOCATE ERRLST.TMP,IN,80
ASSIGN 1,@1                    ;*VARIABLE INPUT
ASSIGN 2,@2                    ;*VARIABLE OUTPUT
ASSIGN 3,@3                    ;*VARIABLE LISTING
ASSIGN 4,CALSCRAT.TMP
ASSIGN 5,CROSSREF.TMP
ASSIGN 6,SYMDUMP.TMP
ASSIGN 7,@4                    ;*VARIABLE SOURCE LIBRARY
ASSIGN 8,SQUEEZE.TMP
ASSIGN 9,ERRLST.TMP
START ,SCRAT,CROSS,ERLST
$EXIT
```

This file can be called as follows:

```
ASSEMBLE CR:,MAG1:,PR:,SORCELIB.CAL
```

The first argument is the input device; the second, the output device; the third, the listing device; and the fourth, the source library device. Note that a semicolon may be used to separate one CSS command statement from another; an asterisk in the first position of a CSS statement causes it to be treated as a comment statement.

5.5.2 Testing Arguments for Existence

Assume that the operator wants to assemble the previous program without using a source library device.

Example:

```
ASSEMBLE CR:,MAG4:,PR:
```

The fourth argument is missing. A missing argument is considered to be a null string, that is, a sequence of no characters. Therefore, the command ASSIGN 7,@4 is executed as:

```
ASSIGN 7,
```

This is an illegal command and execution of the CSS file aborts.

It is possible to test whether or not an argument exists. This is done with one of the special CSS commands, $IFNULL or $IFNNULL. The $IFNULL command tests to see whether an argument does not exist. The $IFNNULL command tests to see whether an argument does exist.

If the tested condition is true, the CSS processor executes every command until either the $ELSE or $ENDC command is encountered. The $ELSE command indicates the beginning of commands to be executed if the tested condition is false. In the case of a true condition, the CSS processor skips all commands following $ELSE until it finds an $ENDC command, and then resumes executing with the command following $ENDC.

If the tested condition is false, the CSS processor skips all commands until either an $ELSE or $ENDC command is encountered, at which time the CSS processor resumes executing commands. If, when skipping, the CSS processor attempts to skip beyond a $TERMJOB or end of file (EOF), an error occurs. The command ASSIGN 7,@4 can be replaced with the following:

```
$IFNNULL @4                    Is there a source library?
ASSIGN 7,@4                    If so, assign it to lu7.
$ELSE                          If not, assign lu7 to the
ASSIGN 7,NULL:                 null device.
$ENDC                          End of conditional.
```

A combination of parameters can be tested simultaneously. For example:

```
$IFNULL @1@2@3
```

CSS's can also be used to set up default assignments. For example, assume the list device is normally the printer (PR:). The following sequence is put into the ASSEMBLE.CSS file:

```
$IFNULL @3                     Is there a list device
                               specified?
ASSIGN 3,PR:                   If not, use PR:.
$ELSE                          If there is, assign it to lu3.
ASSIGN 3,@3
$ENDC
```

If the operator then enters:

```
ASSEMBLE MAG2:,MAG3:,,MAG4:
```

argument 3 is null; therefore, the listing is assigned to the printer (PR:).

5.5.3 Testing Files for Existence

It is often desirable to allocate files by using commands in a CSS file. Continuing with the ASSEMBLE.CSS file, the existence of the desired scratch files can be tested. For example:

- if the scratch file already exists, it is an error to try to reallocate it and the CSS file aborts; or
- if the file is not allocated and it does not exist, the ASSIGN command is in error and the CSS file aborts.

To solve this problem, a facility is provided to allow the CSS file to test for the existence of certain files. This is done with the $IFX (if file exists) and $IFNX (if file does not exist) commands. These special commands work in the same way as the $IFNULL and $IFNNULL commands. That is, if the tested condition is true, CSS commands are executed up to the corresponding $ELSE or $ENDC. If the test proves false, subsequent commands are skipped up to the corresponding $ELSE or $ENDC. If the program skips beyond a $TERMJOB, an EOF error occurs. For example:

```
$IFNX CALSCRAT.TMP              Does CALSCRAT.TMP exist?
ALLOCATE CALSCRAT.TMP,IN,80     No, allocate it.
$ENDC                           End of conditional.
```

This sequence checks to see if the temporary file already exists and allocates it if it does not exist.

CSS can be used to test for the existence of a file passed to the CSS file as an argument. For example, consider this CSS file:

```
LOAD .BG,TASK1                  Load a task named TASK1.
TASK .BG
$IFNX @1                        If the file does not exist,
 ASSIGN 1,CON:                  input source from CON:.
$ELSE                           If the file does exist, use
 ASSIGN 1,@1                    it for input.
$ENDC
ALLOCATE T1.TMP,IN,80           Allocate an output file.
ASSIGN 2,T1.TMP,ERW             Assign for exclusive
                                read/write.
ASSIGN 5,CON:                   Assign command input to
                                CON:.
START                           Start the task.
$IFX @1                         If the CON: was not used,
 RENAME @1,T1.OLD               rename the input file.
RENAME T1.TMP,@1                Rename the output file.
$ENDC
$EXIT
```

If argument 1 is the name of an existing file, that file is processed. The output file is named T1.TMP, but after execution is completed, the output file is given the name of the input file and the input file is renamed T1.OLD. If argument 1 specifies a file that does not exist yet, the input device is assumed to be CON:. The RENAME command is not applicable to nondirect access devices.

5.5.4 Multilevel Parameter Passing

Use of the multiple @ notation is permitted to reference higher level parameters; i.e., in a CSS file that is called by other CSS files, but not by the system operator, it is possible to refer to parameters passed in both the current CSS file and its caller. This is done by using more than one @ sign to indicate the parameter number. For example:

@1	is the first parameter passed to the current file.
@@4	is the fourth parameter passed to the caller of the current file.
@@@7	is the seventh parameter passed to the caller's caller.

If the number of @ signs exceeds the current nesting level, the null string is returned. This can be tested for by using the $IFNULL command. The multiple @ sign convention can also be used with the special code @0. The @0 sign refers to the identifier of the current file, @@0 refers to the identifier of the caller of the current file and @@@0 refers to the caller's caller, etc.

5.5.5 End of Task Codes and Error Handling

When a program executed due to CSS action detects an error and abnormally terminates, the CSS should take special action. In a job control deck that performs a compilation, assembly, creation of a load module, loading and execution of a program, it is useless to continue the process if the first step (the compilation) terminates in error. The CSS must be informed of the erroneous end of task. This is done through the end of task code. Each program, on terminating, returns an end of task code that can be used to show why the program terminated. This end of task code is a number defined by the programmer in the supervisor call 3 (SVC3) call that terminates the program. For details on SVC3, see the OS/32 Supervisor Call (SVC) Reference Manual. An end of task code of 0 means the program terminated properly with no errors. A nonzero end of task code means the program terminated abnormally. An end of task code of 255 means the task was cancelled by the system operator.

CSS files can test the end of task code with a set of special CSS commands. These are:

$IFE n	Equal to
$IFG n	Greater than
$IFL n	Less than
$IFNE n	Not equal to
$IFNG n	Not greater than
$IFNL n	Not less than

Examples of these commands are as follows:

```
$IFE 14                          If end of task code = 14
$IFG 0                           If end of task code > 0
$IFL 255                         If end of task code < 255
$IFNE 1                          If end of task code ≠ 1
$IFNG @3                         If end of task code ≤ the third
                                 argument
$IFNL 12840                      If end of task code ≥ 12840
```

If the tested condition is true, CSS continues to execute commands until a $ELSE or $ENDC is found. If the condition is false, CSS skips all statements until a $ELSE or $ENDC is found. In such skipping, attempts to skip beyond a $TERMJOB or to EOF cause an error.

The special command $SKIP causes CSS to skip to the next $TERMJOB command unconditionally if it is inside a job control deck. This has the same effect as any error detected in a CSS statement. For example:

```
LOAD .BG,CAL32                   Load the assembler.
TASK .BG
  .
  .
  .
START                            Start it.
$IFNE 0                          Any errors?
$SKIP                            If yes, skip further pro-
                                 cessing.
$ENDC                            Otherwise, continue.
```

This is the simplest way to handle errors. If the program has multiple error end of task codes, each with a distinct meaning, the CSS file may inform the operator of the nature of the problem, as follows:

```
LOAD .BG,PROG                    * Load the task and
TASK .BG                         * make it current.
START                            * Start it.
$IFNE 0                          * Any errors?
  $IFG 1                         * Yes,EOT > 1?
    $SKIP                        * Yes,fatal error, abort.
  $ELSE                          * No,non-fatal error.
    $COPY
    *NONFATAL ERROR DETECTED     * Notify operator.
    $NOCOPY
  $ENDC                          * End inner conditional.
$ENDC                            * End outer conditional.
```

Notice the nesting of the $IFNE...$ENDC sequences. Nesting of any $IF tests is permitted, with no restrictions on nesting depth.

A CSS file may test or set the end of task code. This is possible as CSS is active when the controlled program is inactive, and therefore, the end of task code is not used asynchronously. The end of task code is set using the command:

```
SET CODE n
```

which sets the end of task code to n, which is any number from 0 to 255.

The ability of CSS to set the end of task code may be used by one part of a CSS file to signal another, provided there are no programs started between the setting and testing of the end of task code.

5.5.6 Logging Messages to the Console

The special CSS commands $COPY and $NOCOPY or $WRITE allow the CSS file to log messages to the system console and the system log file, if present. Normally, CSS should be in $NOCOPY mode. Under these conditions, CSS commands are executed but are not printed on the console or on the log file. If the CSS command $COPY is executed, a copy of all CSS statements executed up to and including the next $NOCOPY is printed at the console, on the log file, or both. The choice of routing is set up by the system console operator with the SET LOG command and CSS must not attempt to override this choice.

Since comments are printed, as well as commands, an easy way to log a message is:

```
$COPY
*THIS IS A MESSAGE FOR THE OPERATOR
$NOCOPY
```

The easiest way to log a message is:

```
$WRITE THIS IS A MESSAGE FOR THE OPERATOR
```

5.6 CREATING COMMAND SUBSTITUTION SYSTEM (CSS) FILES ON DISK

CSS files can be created on disk in one of two ways:

- An OS/32 Edit or the OS/32 Source Updater Utility program can be used.
- BUILD and ENDB commands can be used to create a CSS file directly from the system console.

The BUILD command is used as follows:

```
BUILD filename.ext
```

This command causes an indexed file named filename.ext to be allocated, with a logical record length equal to the buffer length determined at sysgen and with protection keys of zero. If the fd already exists, it is deleted and reallocated unless APPEND is specified. .CSS is the default extention.

In this case, the new statements are appended to the existing file. The console enters into data entry mode so that data can be written to the allocated file. Every line typed at the console, from that time until an ENDB command is found, is written to the file being built. No parameter substitution is possible with the BUILD...ENDB sequence. This data may include any text, including commands, @n sequences, etc. The command processor does not attempt to execute any commands contained in the text, nor does it attempt to expand @n sequences; it merely builds a text file on behalf of the user. The only item that cannot be written to a file being built is a line with the characters ENDB as the first command on the input line. When an ENDB command is read, the console reverts to its normal command mode. When the console is in the build data entry mode, the prompt issued at the console is:

```
.CMDP>
```

To build a CSS file named EDIT.CSS, this sequence is entered:

```
BUILD EDIT
.CMDP>*THIS IS A CSS FILE NAMED EDIT.CSS
.CMDP>LO .BG,EDIT32;TA.BG
.CMDP>ST
.CMDP>$EXIT
.CMDP>ENDB
```

This CSS file is now ready for execution. It can be called as follows:

```
EDIT.CSS
```

or

```
EDIT
```

since the CSS processor uses the default extension .CSS if the system operator does not enter an extension. The BUILD command also assumes the extension .CSS if the specified name does not include an extension.

A $BUILD...$ENDB sequence can be nested inside a BUILD...ENDB pair.

5.7 BUILDING TASK CONTROL FILES

Although it is possible to embed task control commands within a CSS file, certain problems can occur when using this technique. In this example the statements between START and $EXIT are not CSS commands but are commands to Link.

```
LOAD .BG,LINK                    * Load Link
TASK .BG
START ,COMM=@0,L=CON:
INCL PROG.OBJ
MAP PR:,XREF
BU PROG.TSK
END
$EXIT
```

The START command activates Link, which then reads from the beginning of the CSS file. An error occurs as Link tries to process the LOAD command. Link is ready to execute another Link command and does not recognize LOAD.

To prevent these problems, the BUILD and ENDB commands can be used. For example:

```
$BUILD COMMAND.TMP                      * Build command file.
INCL PROG.OBJ
MAP PR:,XREF
BUILD PROG.TSK                          * Link's BUILD command
END
$ENDB
LOAD .BG,LINK                           * Load Link.
TASK .BG
START ,COMM=COMMAND.TMP,L=CON:          * Start Link.
DELETE COMMAND.TMP                      * Delete command file.
$EXIT
```

This sequence builds a separate task control file called COMMAND.TMP and assigns it to the Link command input lu. The control file is then deleted from the disk before the CSS file terminates.

The $BUILD and $ENDB commands allow parameter substitution within the file being built. If the specified fd does not already exist, it is created as it is with the BUILD command. The account number must be zero if specified. If the fd already exists, it is deleted and reallocated.

As with BUILD, no nesting of $BUILD is possible. Nesting will result in an invalid CSS file. $BUILD and BUILD must appear last on the input line. If any additional commands are entered on the line, they are ignored. $ENDB and ENDB must be the first commands on the input line. Commands following $ENDB and ENDB are executed. A BUILD...ENDB sequence can be nested within a $BUILD...$ENDB pair.

Using the feature of parameter substitution, the following example shows how the fd PROG.OBJ can be passed as a parameter from the caller.

```
$BUILD COMMAND.TMP                      * Build command file.
INCL @1
MAP PR:,XREF
BUILD PROG.TSK                          * Link's BUILD command
END
$ENDB
LOAD .BG,LINK                           * Load Link.
TASK .BG
START ,COMM=COMMAND.TMP,L=CON:          * Start Link.
DELETE COMMAND.TMP                      * Delete command file.
$EXIT
```

Assuming the CSS file is named LNKBUILD.CSS, it could be invoked as follows:

```
LNKBUILD PROG.OBJ
```

5.8 EXITING FROM COMMAND SUBSTITUTION SYSTEM (CSS) FILES

Three commands are provided for exiting from CSS files: $EXIT, $TRANSFER and $CLEAR. $EXIT causes control to return to the place from which the CSS file was called. Control returns either to the console or to a higher level CSS file. $EXIT must be the last command in any CSS file. $CLEAR causes control to return to the console, immediately terminating all CSS activity. The $TRANSFER command causes the program to exit from the current CSS with all other levels closed and to enter into a new CSS. The formats of the commands are:

```
$EXIT

$CLEAR

$TRANSFER NEWCSS paraml, param2,...
```

5.9 USING STANDARD FILE EXTENSIONS

In a disk-based system, standard file extensions can be used to save the system operator work and to allow CSS files to perform sophisticated functions. The concatenation facility of CSS allows the use of standard extensions. In an example of FORTRAN compilation, useful standard file extensions are:

```
.FTN        FORTRAN source
.CAL        CAL source
.LST        List file
.ERR        Error listing file
```

A file COMPILE.CSS can be created to control compilation. For example:

```
*COMPILE CSS FILE
LOAD .BG,FORTRAN            Load the compiler
ASSIGN 1,@1.FTN             Assign FORTRAN input
ASSIGN 2,@1.CAL,ERW         Assign CAL output
ASSIGN 3,@1.LST,EWO         Assign listing (append)
ASSIGN 7,@1.ERR             Assign error message file
START                       Start compiler
$EXIT                       And exit
```

This CSS procedure is called as follows:

```
COMPILE
```

The COMPILE CSS procedure assumes the FORTRAN source is on a file called progname.FTN and puts the output, listing and error messages onto files named progname.CAL, progname.LST and progname.ERR, respectively. This procedure assumes that all the named files already exist.

5.10 INTERACTION OF COMMAND SUBSTITUTION SYSTEM (CSS) WITH FOREGROUND/BACKGROUND SYSTEMS

CSS is essentially a single-stream processor. Usually it is not possible to write a CSS file that can fully control a complex foreground/background system. Manual intervention by the system operator is often required to control such a system. Foreground systems are controlled, under normal circumstances, by intertask communication (SVC6) calls between foreground tasks. The system operator is required to intervene only in abnormal cases. The background system, however, must be controlled fairly often by the operator, or by CSS files, if the background is being run in a batch-like mode.

The background taskid (.BG) is used to control the coordination between task execution and CSS execution. CSS is active only if a CSS file is invoked when the background task is dormant. While the background task is in any state other than dormant, CSS is inactive. The state of foreground tasks has no effect on CSS activity.

While CSS is active, the operator still can enter commands from the system console. The execution of these commands may be delayed while a CSS command is being executed; however, this delay should not be excessive under normal circumstances. If a CSS file is active, any attempt to call another CSS file from the system console is rejected with a SEQuence-ERRor.

CSS files may affect foreground tasks, but extreme care should be used, since a task in the foreground, once initiated, is no longer under CSS control. A TASK command read from a CSS file establishes the currently selected CSS task. Commands from the console are not affected by TASK commands read from CSS and CSS is not affected by TASK commands input via the console. All task-related commands (Chapter 3) and CSS end of task code testing encountered in a CSS file affect the currently selected CSS task.

When a CSS file is activated from the console, the currently selected CSS task is set equal to the currently selected task. If the currently selected CSS task is deleted from the system, any subsequent task-related or CSS end of task code testing commands are rejected with a task error (TASK-ERR).

5.11 COMMAND SUBSTITUTION SYSTEM (CSS) COMMAND SUMMARY

The following is a summary of CSS commands and their meanings:

BUILD fd [,APPEND]	constructs a CSS file without parameter substitution.
ENDB	specifies end of BUILD.
SET CODE n	sets the end of task code to n.
$BUILD fd [,APPEND]	constructs a CSS file with parameter substitution.
$CLEAR	returns control to the console.
$CONTINUE	continues a CSS file that was suspended by a $PAUSE or $WAIT command.
$COPY	produces a listing.
$ELSE	reverses the effect of $IF until a $ENDC corresponding to $IF is encountered.
$ENDB	specifies end of $BUILD.
$ENDC	delimits conditionals described above.
$EXIT	specifies exit from a CSS file.
$IFE n	specifies that if the end of task code equals n, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFG n	specifies that if end of task code is greater than n, continue executing commands; otherwise, skip to corresponding $ELSE or $ENDC.
$IFL n	specifies that if the end of task code is less than n, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFNE n	specifies that if the end of task code is not equal to n, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFNG n	specifies that if the end of task code is not greater than n, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.

$IFNL n	specifies that if the end of task code is not less than n, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFNNULL @n	specifies that if the nth parameter exists, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFNULL @n	specifies that if the nth parameter does not exist, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFNX fd	specifies that if fd does not exist, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$IFX fd	specifies that if fd exists, continue executing commands; otherwise, skip to the corresponding $ELSE or $ENDC.
$JOB	starts a job, resets the end of task code.
$NCOPY	prevents a listing.
$PAUSE	suspends a CSS file.
$SSKIP	skips to $TERMJOB.
$TERMJOB	specifies end of job (EOJ). Any $SKIP or error condition within this job causes CSS processing to transfer to this command with an end of task code = 255; otherwise, the end of task code is defined by the job itself.
$TRANSFER	transfers out of current CSS and enters a new CSS. All active CSS levels are terminated.
$WAIT n	suspends a CSS for a specified number of seconds.
$WRITE	logs a message to the system console and, if present, the system log file.

5.12 COMMAND SUBSTITUTION SYSTEM (CSS) ERROR CONDITIONS

The following is a list of possible error messages output after issuing CSS commands.

Error Messages:

BUFF-ERR

indicates that the expanded command line exceeds the CSS buffer; skips to $TERMJOB or $EXIT.

FD-ERR

indicates there is not enough space to build a file or required file support is not in the system; skips to $TERMJOB or $EXIT.

FORM-ERR

indicates a command syntax error; skips to $TERMJOB or $EXIT.

IO-ERR

indicates $TERMJOB or $EXIT was found while skipping to $ENDC within a job. Sets the end of task code to 255 and ends the job. (This is only detected if the conditional that caused the skip was also inside the job; i.e., a skip to $ENDC can skip over a complete job.)

or

EOF was found while skipping to $ENDC.

or

EOF was found before ($)ENDB while ($)BUILD was in progress.

JOBS-ERR

indicates second $JOB was encountered before a $TERMJOB; returns control to the console.

LVL-ERR

indicates that required CSS levels exceed the number of levels sysgened; returns control to the console.

MNEM-ERR

indicates command was not recognized; skips to $TERMJOB or $EXIT.

PAUS-ERR

indicates $PAUSE was entered from the system console.

PARM-ERR

indicates command syntax error; skips to $TERMJOB or $EXIT.

SEQ-ERR

indicates that a task or another CSS was active; returns control to the console.

TASK-ERR

indicates that a command in the CSS could not be executed because the currently selected CSS task is not in the system; skips to $TERMJOB or $EXIT.

WAIT-ERR

indicates $WAIT was entered from the system console.

NOTE

The program skips to $TERMJOB if an error is detected within a CSS job. The job is aborted and the next command obeyed is the first command after the $TERMJOB, at which point the end of task code is 255. If the error occurs outside a job, control is returned to the console.

CHAPTER 6
ACCOUNTING DATA COLLECTION AND REPORTING

6.1 INTRODUCTION

Data regarding system usage is collected via the accounting facility and reported via the Accounting Reporting Utility. The accounting facility is available for systems running in either a multi-terminal monitor (MTM) environment or a non-MTM environment.

6.2 ESTABLISHING THE ACCOUNTING FACILITY IN A MULTI-TERMINAL MONITOR (MTM) ENVIRONMENT

See the OS/32 Multi-Terminal Monitor (MTM) Reference Manual for the procedures involved in establishing the data collection component of the accounting facility. See the System Support Utilities Reference Manual for the procedures involved in reporting accounting facility data.

6.3 ESTABLISHING THE ACCOUNTING FACILITY IN A NON-MULTI-TERMINAL MONITOR (MTM) ENVIRONMENT

Systems operating in a non-MTM environment can also collect and report accounting data through the use of a dummy accounting task. The operating system must be generated (at sysgen) with accounting support enabled.

A dummy task, which performs the data collection duties of the accounting facility, is then loaded and started using the following command sequence:

```
LOAD .MTM/,AFDCP
TASK .MTM
START ,ATF = fd
```

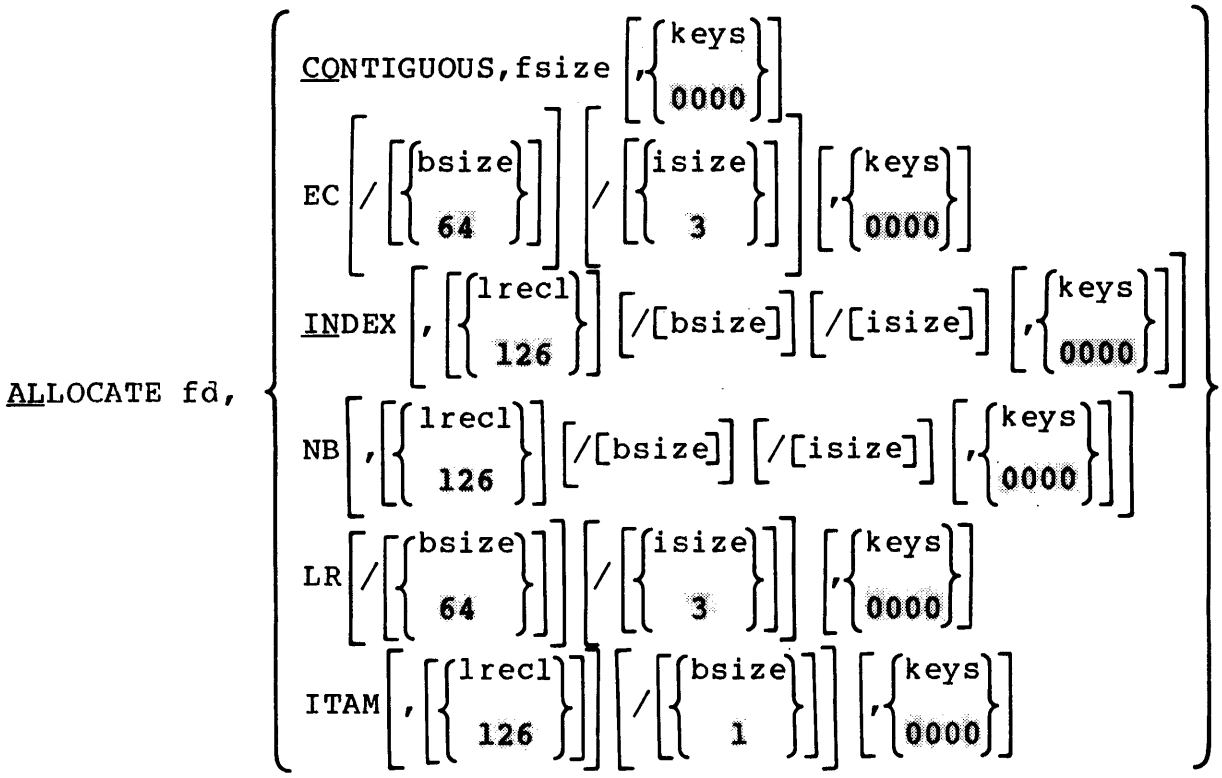
The AFDCP program is able to accept two .MTM commands.

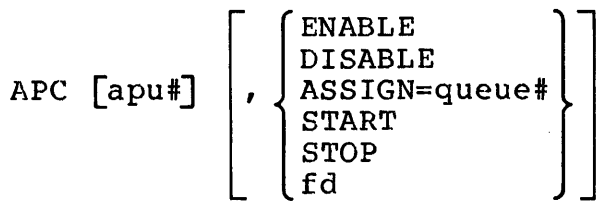
```
.MTM QUIESCE
.MTM ATF fd
```

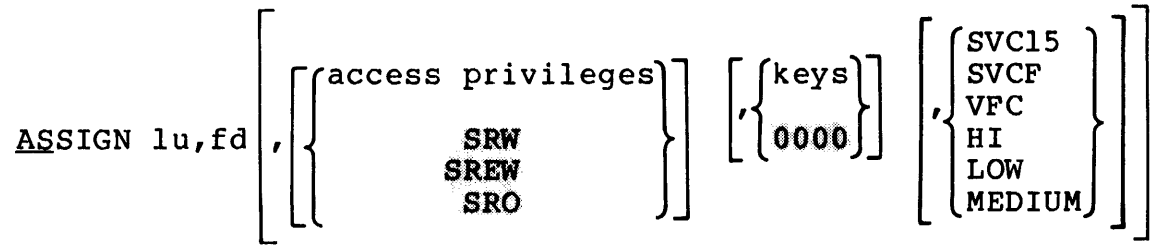
The .MTM QUIESCE command terminates AFDCP. The .MTM ATF command changes the accounting transaction file (ATF) to the specified file descriptor (fd). The current ATF is closed and a new ATF is allocated (if necessary) and assigned.

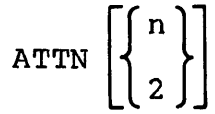
See the OS/32 Multi-Terminal Monitor (MTM) System Planning and Operator Reference manuals for a description of the various accounting facility commands and the OS/32 System Support Utilities Reference Manual for a description of the Reporting Utility commands.

APPENDIX A
OPERATOR COMMAND SUMMARY









BFILE fd Used for magnetic tapes and cassettes only.

BFILE fd[,lu] Used for disk devices only.

BIAS { address | * | *taskid }

BRECORD fd Used for magnetic tapes and cassettes only.

BRECORD fd[,lu] Used for disk devices only.

BUILD fd[,APPEND]
.
.
.
ENDB

CANCEL taskid

CLOSE { lu_1 [,lu_2,...,lu_n] | ALL }

CONTINUE [address]

DELETE fd_1 [,fd_2,...,fd_n]

DISPLAY ACCOUNTING [,{ taskid | all tasks }] [,{ fd | system console }]

DISPLAY BLOCKS [,{ fd | sys console }]

DISPLAY DEVICES [,{ fd | system console }]

DISPLAY DFLOAT [,{ fd | system console }]

DISPLAY ERRORS [,{fd / system console}]

DISPLAY FILES [,[{voln: / : / default sys vol}]] [{filename / * / -}] [.[{ext / -}]]
[/{actno / - / 0 / S}] [,{fd / sys console}]

DISPLAY FLOAT [,{fd / system console}]

DISPLAY ITAMTERM ,voln:[{filename / -}] [.[{ext / -}]]

DISPLAY LOG [,{fd / sys console}]

DISPLAY LU [,{fd / sys console}]

DISPLAY MAP [/{id / .TSK / .PUR / .SEG / .SYS / .OFF / .PST / local memory}] [/rname] [,{fd / sys console}]

DISPLAY PARAMETERS [,{fd / sys console}]

DISPLAY REGISTERS [,fd]

DISPLAY SLICE [,{fd / sys console}]

DISPLAY STATUS ,voln [,{fd / sys console}]

DISPLAY TASKS [task-id] [,{fd / sys console}]

DISPLAY TIME [,{fd / sys console}]

DISPLAY VOLUME ,voln [,{fd / sys console}]

ERROR LOG ,{ON ,[fd] [,INIT] / OFF}

ERROR PERIOD [,{minutes / *}]

ERROR RECORDING ,fd,{ON / OFF}

EXAMINE address [{,n / /address$_2$ / ,1}] [,{fd / sys console}]

FFILE fd Used for magnetic tapes and cassettes only.

FFILE fd [,lu] Used for disk devices only.

FRECORD fd Used for magnetic tapes and cassettes only.

FRECORD fd [,lu] Used for disk devices only.

```
INIT fd [,{segsize increment}]
         {          1         }

IRBUFFER {n       }
         {DISPLAY }
         {FREE    }

LOAD {[taskid]   }
     {sysid      }
     {.BG[xxxxx] }
     {.TCM       },fd[,segsize increment]
     {.LIB       }
     {.SEG       }

LPU [{lpu#}] [,queue#/{ADD}]
     [{ *  }]         {DEL}
                 [,fd        ]

MARK dev1 :, {PARAMETER [,RECL=recl] [,SIZE=size]
             {          80         66
             {OFF [,ONLY]
             {ON [,{PROTECTED                    }]
             {     {SYSTEM[/max acct]            }
             {     {RESTRICTED=acctno[/max acct] }
             {     [,CDIRECTORY [={{fentry} [/{exp}]}]
             {                    {  80   }   {100}
             {                    {ALL [/{exp}]    }]
             {                    {     {  0  }]    }]
             {     [,MIRROR=dev2 :]                 }
```

```
MEMORY { OFF,address[,size]  }
       { ON,address[,size]   }
       { TEST,address[,size] }
       {        n            }

MODIFY address [,{data1}] [,data2,...,datan]
               [,{ 0  }]

OPTIONS [{AFCONT  }] [,{ RESIDENT    }] [,{SVCCONTINUE}]
        [{AFPAUSE }]  [{NONRESIDENT }]  [{SVCPAUSE   }]
        [,{NOROLL}] [,{LPU[=n]}]
        [{ROLL  }]  [{NLPU    }]

PAUSE

QUEUE  queue#  [,{ ON          }]
               [{ OFF         }]
               [{ XON=taskid  }]
               [{ NOPRIORITY  }]
               [{ PRIORITY    }]
               [{ ENFORCED    }]
               [{ fd          }]

REMOVE .SEG,segment name

RENAME oldfd,newfd

REPROTECT fd,new keys

REWIND fd          Used for magnetic tapes and cassettes only.
   or
RW fd

REWIND fd[,lu]     Used for disk devices only.
   or
RW fd[,lu]

RVOLUME voln
```

SEND message[;]

SET BLOCKS [n][,MXBLKSZ=n] [,INDEX=[{d / 1}] [/{i / 1}]]

[,SPOOL=[{d / 1}] [/{i / 1}]] [,NONBUF=[{d / 64}][/{i / 3}]]

SET LOG fd [,{COPY / NOCOPY}] [,{n / 15}]

SET PRIORITY n

SET SLICE n

SET SYS n

SET TIME {[mm/dd/yy],hh:nn:ss / OFF / 0}

SPOOLFILE lu&lu$_1$,pseud dev,FORM=formname [,{VFC / IMAGE}]

[,{NOIMAGE / NOVFC}] [,{CHECKPOINT / NOCHECKPOINT}] [,COPIES=n] [,{HOLD / RELEASE}]

[,BLOCK= blocksize/indexsize] [,{DELETE / NODELETE}] [,PRIORITY=p]

START [{address / transfer address}] [,parameter$_1$,...,parameter$_n$]

SWOP OLDPRIMARY=dev$_1$: [,NEWPRIMARY=dev$_2$:]

TASK [taskid]

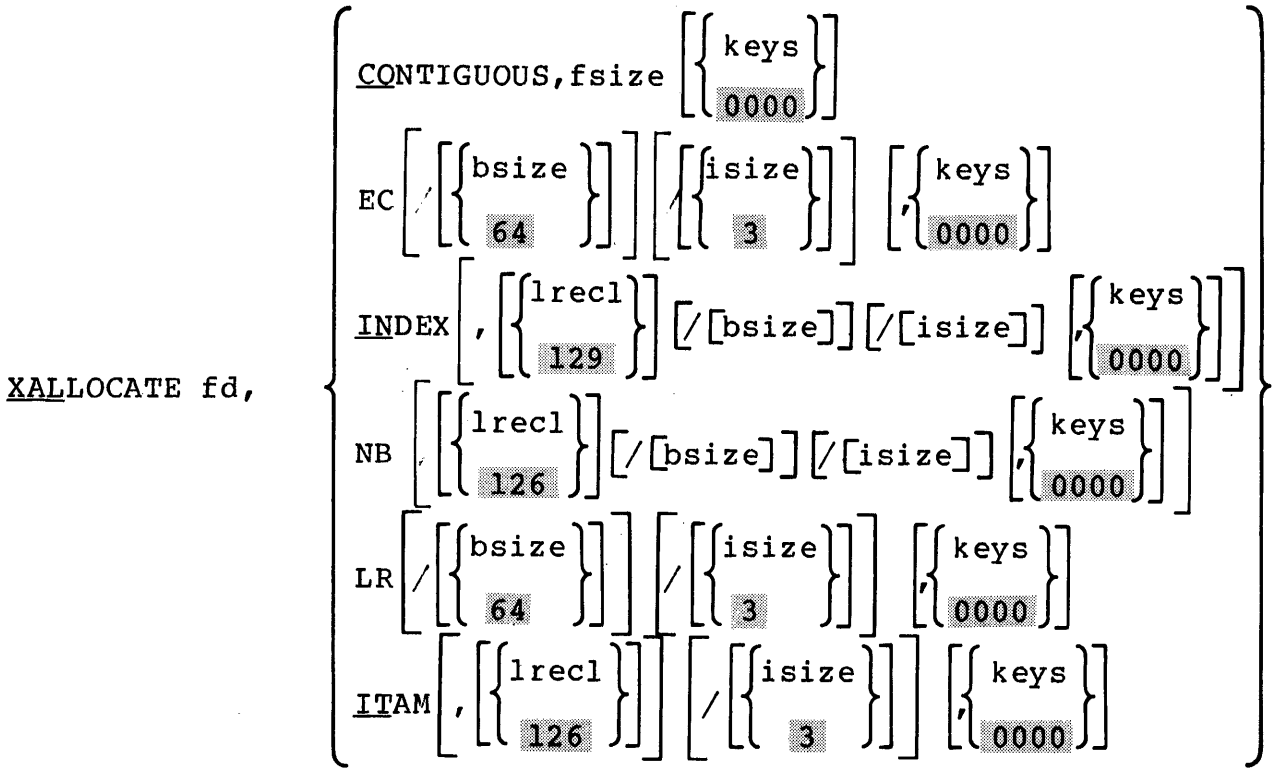
TCOM segment name,segment size

TEMPFILE lu, { CONTIGUOUS,fsize
EC [/[{bsize / 64}]] [/[{isize / 3}]] [,{keys / 0000}]
INDEX [[{lrecl / 126}]] ['[bsize]] ['[isize]] [,{keys / 0000}]
NB [[{lrecl / 126}]] [/[bsize]] ['[isize]] [,{keys / 0000}]
LF [/[{bsize / 64}]] [/[{isize / 3}]] [,{keys / 0000}] }

VOLUME [voln [/ { SYSTEM / TASK / TEMPORARY / SPL / ROLL }]]
current voln names

WFILE fd — Used for magnetic tapes and cassettes only.

WFILE fd [,lu] — Used for disk devices only.



XDELETE fd_1 [,fd_2,...,fd_n]

BUILD fd[,APPEND]

ENDB

SET CODE n

$BUILD fd[,APPEND]

$CLEAR

$CONTINUE

$COPY

$ELSE

$ENDB

$ENDC

$EXIT

$NOCOPY

$PAUSE

$SKIP

$TERMJOB

$IFE n

$IFG n

$IFL n

$IFNE n

$IFNG n

$IFNL n

$IFNNULL @n

$IFNULL @n

$IFNX fd

$IFX fd

$JOB

$TRANSFER

$WAIT [{*, n, 1}]

$WRITE

APPENDIX B
OPERATOR COMMAND MESSAGE SUMMARY

When the system detects a recoverable error condition that requires operator intervention in order to continue, the system prints a message describing the condition (e.g., PARM-ERR). The operator can then take corrective action. The messages describing recoverable error conditions are as follows:

ALLO-ERR TYPE=NAME

indicates desired filename currently exists on the specified volume.

ALLO-ERR TYPE=SIZE

indicates that insufficient room was available on the disk to allocate the file. The block size of indexed file exceeds the limit established at sysgen. For an indexed file, a zero logical record length or block size was specified.

ALLO-ERR TYPE=TYPE

indicates the volume specified is not a direct access device. Ensure that the specified volume is the disk volume name, not its device name.

ALLO-ERR TYPE=VOL

indicates that the volume name specified or the default volume is not the name of any disk currently on-line. Ensure that the desired disk is on-line.

APU-ERR

indicates that the task is auxiliary processing unit (APU) active and the APU is being controlled by another task, or that the command processor was unable to gain access to the APU.

APU-ERR TYPE = APU NUMBER

indicates an illegal APU number was used.

APU-ERR TYPE = COMMAND FAIL

indicates that an error was encountered during transmission of the specified command.

APU-ERR TYPE = DISABLED

indicates that an APU is disabled; it cannot be disabled, started or stopped.

APU-ERR TYPE = ENABLE FAIL

indicates that an APU enable operation failed.

APU-ERR TYPE = NO RESPONSE

indicates that there was no response from an APU.

APU-ERR TYPE = RIGHTS BUSY

indicates that APU control rights are possessed by a task other than the command processor.

ARGS-ERR

indicates the amount of space between CTOP and UTOP is insufficient for the command processor to place the parameters of the START command.

ASGN-ERR

indicates the optional file descriptor (fd) or disk device of voln could not be assigned; e.g., fd or disk is assigned for exclusive use only.

ASGN-ERR TYPE=BUFF

indicates an attempt was made to assign a file when there was insufficient system space available to accommodate the file control block (FCB). Close any currently assigned files that are no longer required, or increase the size of system space with a SET SYS command.

ASGN-ERR TYPE=LU

indicates an attempt was made to assign a logical unit (lu) that is greater than the maxlu number specified at Link time.

ASGN-ERR TYPE=NAME

indicates an assignment was directed to a nonexistent file.

ASGN-ERR TYPE=PRIV

indicates a file that is currently assigned to an lu with a given privilege could not be assigned to another lu because the access privileges were in conflict. Request a compatible access privilege on second assignment or change the access privileges currently associated with the file.

ASGN-ERR TYPE=PROT

indicates the file assigned is unconditionally protected or the read/write keys specified in the assign statement do not correspond to those associated with the file.

ASGN-ERR TYPE=SIZE

indicates an indexed file was assigned and there is not enough room on the disk to allocate a physical block. Ensure sufficient space on the disk by deleting old files or reducing the block size of the file. Alternatively compress the disk using the Disk Backup Utility.

ASGN-ERR TYPE=SPAC

indicates an attempt was made to assign a file that required buffer space exceeding the task maximum system space allotment.

ASGN-ERR TYPE=TGD

indicates an attempt was made to assign a trap-generaing device that does not support such assignment.

ASGN-ERR TYPE=VOL

indicates the volume name specified or default volume is not the name of any disk currently on-line.

ATTN-ERR

indicates the priority specified in an ATTN command was not a decimal number from 2 to 249.

fd-BAD LINE COUNT

indicates the value of n in a .SPL FORWARD or BACKWARD command exceeded file limits.

BPAC-ERR

indicates the disk was not ready or was not readable. If the disk is ready and is not write-protected, reformat using the FASTCHEK Utility.

BUFF-ERR

indicates the expanded command substitution system (CSS) line exceeds the CSS buffer size. Specify a larger CSS buffer length at next sysgen, or modify CSS statements. Ensure that the expanded CSS line does not overflow the buffer by shortening the length of the unexpanded line.

CLOS-ERR TYPE=LU

indicates the lu number is greater than maxlu specified at Link time.

CLOS-ERR TYPE=BUFF

indicates system space has become corrupted and buffers and/or FCBs cannot be returned to the free system space.

fd IS NOT A CONTIGUOUS FILE

indicates the fd specified in an INIT command is not a contiguous file.

DATE-ERR

indicates an ERROR LOG command was entered with the ON parameter specified, but the date and time parameters of the SET TIME command were not specified.

DELE-ERR TYPE=ASGN

indicates an attempt was made to delete a file that is currently assigned.

DELE-ERR TYPE=BUFF

indicates that there is insufficient memory available in system space to perform the delete operation. Enlarge system space with a SET SYS command or make more space available by closing one or more logical units.

DELE-ERR TYPE=NAME

indicates that the file specified does not exist.

DELE-ERR TYPE=PRIV

indicates that the file is currently assigned to a task.

DELE-ERR TYPE=PROT

indicates the read/write protection keys are not 0.

DELE-ERR TYPE=TYPE

indicates the volume name specified or default volume is not a direct access device.

DELE-ERR TYPE=VOL

indicates the specified volume is not mounted, the volume was not marked on, or the incorrect volume name was given.

DEV-ERR

indicates an attempt was made to mark on or off a nonexistent device or a pseudodevice; or an attempt was made to modify the attributes of a nonexistent device or bulk storage device.

DEVICE NOT A DISK

indicates the specified device with voln is not a bulk device.

DIR-ERR

indicates a DISPLAY FILES command was directed at a disk containing one or more invalid directory entries. Run the FASTCHEK Utility to verify the contents of the disk pack.

DUPL-ERR

indicates that when marking on a direct access device, the volume name associated with the device was an existing device or volume name. Run the FASTCHEK Utility to change the disk volume name, or mark the other disk off-line.

ERRC-ERR

indicates a DISPLAY ERRORS or ERROR RECORDING command was entered, but error recording was not specified at sysgen.

xxxx ERROR ON fd SECTOR n

indicates an input/output (I/O) error occurred when an attempt was made to initialize sector n of file fd. xxxx is the type of error.

FD-ERR

indicates the fd was syntactically incorrect; or a program on the disk was being loaded and there was not enough system space for the load operation.

FETCH ATTR ERR

indicates a fetch attributes failed on secondary directory when marking on protected with secondary directory.

FILE NOT FOUND

indicates that the specified file was not found.

FILE fd NOT ENTERED ONTO PRINT QUEUE

indicates that the spooler was not active at the time a filename was to be added to the spool queue. The operator should start the spooler and enter the filename on the queue using the PRINT or PUNCH parameter.

FILE filename NOT ON QUEUE

indicates the file specified by the PURGE parameter of the .SPL command is not on the spooler queue.

FILE filename SPOOLING

indicates the file specified by the PURGE parameter of the .SPL command is currently being spooled out.

FORM-ERR

indicates the command format was syntactically incorrect.

IDLE-ERR

indicates a .SPL REWIND, CANCEL, FORWARD, BACKWARD or CONTINUE command was isssued to an idle device. Verify the name of the device to which the command is directed.

INVALID FD=fd

indicates the filename specified is a device, not a file, or the device specified is not a valid pseudodevice.

INVALID SYNTAX fd

indicates an invalid fd was specified with the PRINT or PUNCH parameter of the .SPL command.

I/O-ERR

indicates a device accessed by the command processor returned a nonzero I/O status. The following type fields can be displayed:

TYPE=PRTY

Parity or other recoverable error occurred. Retry the operation with another unit, if possible.

TYPE=UNRV

An unrecoverable error occurred.

TYPE=UNRV

An error occurred while writing the impure segment of the segment name (SS) out to its roll file in order to read task R3 into memory. No action is necessary. The segment SS has been flagged nonrollable.

TYPE=EOF,EOM

The device reached EOF or EOM before completing the operation.

TYPE=DU

The device is unavailable. Ensure that the device is on-line and ready.

TYPE=FUNC

An invalid operation is being directed toward a device; e.g., attempting to write to a read-only device.

TYPE=LU

The lu is illegal or unassigned. Close and reassign a proper lu.

INIT-ERR

indicates memory error recording was initialized, but it had already been specified and was in progress.

IRBUF - ILLEGAL PARAMETER

indicates the number of buffers requested by IRB n exceeded the maximum 99 buffers. The command IRB was entered with no parameter.

IRBUF - n BUFFER(S) IN USE

indicates fewer buffers were requested than were currently in the queue.

IRBUF - BUFFERS CAN'T GET SYSTEM SPACE

indicates the requested number of buffers specified by IRB n exceeds the amount of available system space.

IRBUF - nn BUFFER(S) IN USE

indicates the IRBUF command was entered with the "free" option and the current buffers are active.

IRBUF - nn BUFFER(S) FREED

indicates the IRBUF command was entered with the "free" option and all buffers are inactive.

JOBS-ERR

indicates a $JOB statement was encountered following another $JOB statement but prior to a $TERMJOB statement.

LOAD-ERR TYPE=IO

indicates an I/O error was generated during the load operation. Retry the load operation. If the same condition results, verify the status of the medium from which the task is being loaded.

LOAD-ERR TYPE=LIB

indicates the data in the loader information block (LIB) was invalid. This error most frequently occurs when an attempt is made to load a task that was not established with Link.

LOAD-ERR TYPE=LOPT

indicates a conflict between the load options requested and those specified at Link time.

LOAD-ERR TYPE=MAP

indicates that while loading a task, an attempt was made to automatically load a sharable segment, but fd could not be found or the shared segment table overflowed.

LOAD-ERR TYPE=MEM

indicates a load was attempted when no memory area large enough was available. Change priorities or rollability of current tasks to allow a roll operation to occur, or cancel one or more current tasks.

LOAD-ERR TYPE=MTCB

indicates an attempt was made to load more tasks than the system permits.

LOAD-ERR TYPE=NAME

indicates that the fd was not found or cannot be assigned.

LOAD-ERR TYPE=NOFP

indicates an attempt was made to load a task requiring floating point support and the required floating point option is not supported in the system.

LOAD-ERR TYPE=OPT

indicates that the task was not established as a system task.

LOAD-ERR TYPE=PRES

indicates the specified taskid is already present in the system.

LOAD-ERR TYPE=PURE

indicates a duplicate pure segment name.

LOAD-ERR TYPE=REL

indicates that the relocation table within a relocatable e-task was invalid. An address in the relocation table was either on an odd-byte boundary or was pointing outside the program's task space.

LOAD-ERR TYPE=ROIO

indicates an I/O error encountered in writing a roll file. Retry the load operation. If the same condition occurs, verify the status of the roll volume.

LOAD-ERR TYPE=RVOL

indicates an allocation or assignment error on the roll file. Ensure that the roll volume is on-line and write enabled. Retry the load operation.

LOAD-ERR TYPE=SEG

indicates an attempt was made to load a task requiring the run-time library (RTL) or a TCOM prior to establishing an RTL or TCOM segment.

LOAD-ERR TYPE=SPAC

indicates there was not enough system space for the loader task control block (TCB). Increase system space.

LOAD-ERR TYPE=SYS

indicates that there was not enough system space for the segment descriptor entry.

LOAD-ERR TYPE=TKID

indicates invalid taskid syntax.

LOAD-ERR TYPE=USE/

indicates an attempt to load a task common over one of the same name that is presently is use.

LPU-ERR TYPE=LPU NUMBER

indicates an illegal logical processing unit (LPU) number.

LPU-ERR TYPE=MAPPING

indicates that the LPU is not mapped to the queue specified in the DEL option.

LU-ERR

indicates an invalid lu number or lu assignment was attempted, an invalid fd was encountered, or a nonzero account number was specified.

LVL-ERR

indicates the number of sysgened CSS nesting levels was exceeded.

MAP

indicates the shared segment table (SST) is full or the file was not found when an automatic attempt was made to load a sharable segment.

MAP-ERR

indicates the LPU is already mapped to an APU.

MEM-ERR

indicates the system contains insufficient memory to support the command request.

MEM-ERR TYPE=ADDRESS

indicates that the address is outside task or system space.

MEM-ERR TYPE=FIND

indicates that requested system space is not free or requested memory is located in another segment.

MEM-ERR TYPE=NOMD

indicates that the MEMORY command was entered, but the system does not support memory diagnostics.

MEM-ERR TYPE=SIZE POS=xxx

indicates that calculated end address is between task and system space or is outside system space. xxx is the requested value.

MEM-ERR TYPE=SPAC

indicates that insufficient system space exists to mark off the specified memory area; memory is not marked off.

MIRR DUPL-ERR

indicates that the same device is specified for both disks in the mirrored pair.

MIRR LEAF-ERR

indicates that the two disks specified share the same leaf.

MIRR NO SYSTEM SPACE

indicates that there is not enough system space available to carry out a mirrored mark on.

MIRR PACKINFO FLBA-ERR

indicates that the two pack administration files, PACKINFO.DIR, from the specified mirror disks do not start at the same logical block address and, therefore, the disks are incompatible.

MIRR PACKS ARE INCOMPATIBLE SECTOR = nnnnn

indicates that the two disk packs are incompatible. The primary disk contains data at sector nnnnn and the secondary disk either has a defective sector or part of a key control file at that position. If the FASTCHEK Utility is run, it should be run in the noreadcheck or readcheck mode. If the user lets the utility default to the close mode, the bit map will not be recreated.

MIRR PRIMARY-DISK PACKINFO CORRUPT

indicates that the primary disk's pack administration file is corrupt.

MIRR PRIMARY-DISK PACKINFO NON EXISTENT

indicates that the primary disk does not have a pack administration file. In this case the disk should be initialized using the FASTCHEK Utility.

MIRR PRIMARY-DISK PACKINFO READ ERROR

indicates that an I/O error was encountered when reading the primary disk's pack administration file.

MIRR PROT-ERR PACKS NOT IN SYNC

indicates that the disk packs are not synchronized and, therefore, cannot be marked on protected.

MIRR SECNDRY-DISK ASGN-ERR

indicates that an assign error other than those specified for STAT-ERR occurred when trying to assign the secondary disk.

MIRR SECNDRY-DISK PACKINFO CORRUPT

indicates that the secondary disk's pack administration file is corrupt.

MIRR SECNDRY-DISK PACKINFO NON EXISTENT

indicates that the secondary disk does not have a pack administration file. The disk should be initialized using the FASTCHEK Utility.

MIRR SECNDRY-DISK PACKINFO READ ERROR

indicates that an I/O error was encountered when reading the secondary disk's pack administration file.

MIRR SECNDRY-DISK PRI-DIR ERR

indicates that an I/O error was encountered when reading the primary directory of the secondary disk.

MIRR SECNDRY-DISK READ-ERR

indicates that the device specified as the secondary disk is not hardware enabled, a hardware error exists, or the disk pack is bad.

MIRR SECNDRY-DISK STAT-ERR

indicates that the fd of the device specified as the secondary disk is already assigned or has files assigned.

MIRR SECNDRY-DISK WRIT-ERR

indicates that the device specified as the secondary disk is hardware write-protected or the disk pack is bad.

MIRR SIZE-ERR

indicates that the two disks specified for mirroring do not have the same number of sectors and, therefore, are not compatible as mirror disks.

MIRR UNABLE TO MARK ON - DISKS ON DIFFERENT PROCESSORS

indicates an attempt was made to mirror two disks that do not reside on the same processor in a Model 3200MPS System.

MIRR VOLUME NAME MISMATCH

indicates that the two disks specified for mirroring do not have the same volume names and, therefore, are not compatible as mirror disks.

MNEM-ERR

indicates the entered command was not recognized.

NOAC-ERR

indicates that accounting is not supported for this system.

NO ACTIVE TASK(S) FOUND

indicates no active tasks were found in the system.

NOBC-ERR

indicates a BFILE, BRECORD, FFILE or FRECORD command was entered and bulk file command support is not included in the operating system.

NODA-ERR

indicates a direct access support was not included in the operating system.

NO DIRECTORY ENTRIES ON voln

indicates the specified volume has no files on it.

NOFF-ERR

indicates an attempt was made to mark on a disk device when the integrity of the data on the disk was questionable. Run the Disk Integrity Check Utility on the disk. The disk can be marked on protected.

NOFP-ERR

indicates the specified task was not established with the DFLOAT option at Link time.

NOPR-ERR

indicates a command was entered that required more parameters than specified in the command line.

NROL-ERR

indicates an OPTIONS ROLL command was directed to a nonrollable task.

NO SYSTEM LOG ASSIGNED

indicates that no system log has been set.

NO SYSTEM SPACE

indicates an attempt to mark a disk on with a secondary directory option failed because there was not enough system space available for creating a secondary directory block.

NSUP-ERR

indicates the device does not support error recording.

NULL-ERR

indicates an attempt was made to rename the null device.

OFF-ERR

indicates an ERROR LOG command specified the OFF parameter, but the error recording function was already off.

ON-ERR

indicates an ERROR LOG command was entered twice with the ON parameter specified.

OPT-ERR

indicates a conflict exists between requested options and options specified at Link time.

OSP-ERR

indicates a device specified in a .SPL REWIND, CONTINUE, FORWARD or BACKWARD command is not an output spool device.

PARM-ERR

indicates a command was entered with invalid parameters.

PERD-ERR

indicates the number of minutes specified for the error log readout period was not a number from 1 to 1440.

PRES-ERR

indicates an ERROR LOG command was entered, but the operating system does not support error reporting.

PRI-DIR READ ERR

indicates an attempt to mark a disk on with a secondary directory option failed because an I/O error occurred when reading the primary directory.

PRIV-ERR

indicates the access privilege mnemonic was syntactically incorrect.

PRTY-ERR

indicates a SET PRIORITY command was entered and the requested priority is greater than the maximum priority set at Link time.

QUE-ERR TYPE = NO TASK

indicates the task specified for the XON option does not exist.

QUE-ERR TYPE = ON

indicates queue is ON and therefore cannot be marked ON-exclusive.

QUE-ERR TYPE = QUEUE BUSY

indicates specified queue is locked by an APU or a task with queue control rights.

QUE-ERR TYPE = QUEUE NUMBER

indicates an illegal queue number.

QUE-ERR TYPE = RIGHTS BUSY

indicates mapping rights to the specified queue, or to the add queue where the LPU is currently mapped (ADD option), or to queue 0 (DEL option) are possessed by a task other than the command processor.

QUE-ERR TYPE = SHARED QUEUE

indicates more than one APU is assigned to the queue and therefore cannot be marked ON-exclusive.

READ-ERR

attempt was made to mark a disk on that is not hardware enabled for write, or that returns an I/O error when it is accessed.

REM-ERR TYPE=NAME

indicates that the shared segment name does not exist.

REM-ERR TYPE=RMV

indicates that the task common to be removed is a global task common that is not removable.

REM-ERR TYPE=USE

indicates that the shared segment is presently in use.

RENM-ERR TYPE=ASGN

indicates the file or device cannot be assigned for ERW (required to perform the rename) because the file or device is currently assigned to at least one lu.

RENM-ERR TYPE=BUFF

indicates that an error occurred when closing an lu for a RENAME, or the system space control blocks are corrupted.

RENM-ERR TYPE=NAME

indicates the new filename already exists in the volume directory, or the new device name already exists within the DMT.

REPR-ERR TYPE=ASGN

indicates the file or device cannot be assigned for ERW (required for reprotection) because the file or device is currently assigned to at least one lu.

REQUEST INVALID FOR IOP

indicates that the specified APU within a Model 3200MPS System is in IOP mode. The APC or QUEUE commands are not operable when the APU is in IOP mode.

ROLL-ERR

indicates a BIAS * command was entered and the currently selected task is rollable, or BIAS * taskid was entered and taskid is a rollable task.

SEC-DIR ALLO ERR

indicates an attempt to mark a disk on with a secondary directory option failed because there was insufficient space on the disk or the disk was write-protected (hardware feature).

SEC-DIR ASGN ERR

indicates an assignment to secondary directory failed during marking on protected with the secondary directory.

SEC-DIR DELE ERR

indicates a DELETE command to the old secondary directory failed because an old file was not properly closed.

SEC-DIR NOT PRESENT

indicates a secondary directory does not exist on disk and mark on protected with the secondary directory was attempted.

SEC-DIR READ ERR

indicates an attempt to mark a disk on protected with a secondary directory option failed because an I/O error occurred when reading the secondary directory.

SEC-DIR VERIFY ERR

indicates the secondary directory failed to verify with the primary directory when marking on protected with the secondary directory.

SEC-DIR WRIT ERR

indicates an attempt to mark a disk on with a secondary directory option failed because an I/O error occurred when establishing the secondary directory on the disk.

SEGMENT REQUEST NOT FOUND

indicates a DISPLAY MAP command was entered and the requested segment mask was not found, or no tasks exist in memory.

SEQ-ERR

indicates a command was entered out of sequence when:

- attempting to pause a task when none was active,
- assigning of a currently assigned lu while a task was active,
- entering an OPTION command for an active task, or
- attempting to continue a task that was not paused.

SKIP-ERR

indicates an attempt was made to skip beyond the end of a CSS job. The CSS job concept delimits CSS jobs with the $JOB and $TERMJOB statements. Conditional CSS statements allow skipping to a $ENDC if certain conditions are met. If the nesting of conditional statements is incorrect, a $TERMJOB statement can be encountered prior to terminating all of the conditional statements.

SLOC-ERR

indicates the starting location of a task was specified below UBOT or was omitted when it was required.

SPAC-ERR

indicates an assign on behalf of a task was refused because system space available for task use was exceeded. Reestablish the task with a larger maximum system space.

SPECIFIED TERMINAL(S) NON-EXISTENT FOR voln

indicates the communications terminal specified in a DISPLAY ITAMTERM command was not found, or voln has no LCBs allocated for it.

STAT-ERR

indicates an attempt was made to mark a device on or off while an lu was assigned to it.

SVC6-ERR TYPE=ARGS

indicates insufficient memory exists between UTOP and CTOP to pass all parameters.

SVC6-ERR TYPE=DORM

indicates an attempt was made to issue an SVC6 to a task that was in the dormant state.

SVC6-ERR TYPE=NMSG

indicates a SEND command was entered and the receiving task could not receive a message trap.

SVC6-ERR TYPE=PRES

indicates an attempt was made to send a message to a nonexistent task.

TASK-ERR

indicates a task-related command was entered and there was no currently selected task.

TASK(S) NOT FOUND

indicates the specified task was not found in the system; no tasks found in the system.

TCOM-ERR

indicates a TCOM command failed for one of the following reasons:

TYPE=MEM

indicates no vacant memory area of sufficient size exists.

TYPE=NAME

indicates a task common of the same name already exists.

TYPE=SYS

indicates not enough system space exists for required segment descriptor entry.

TKID-ERR

indicates an invalid taskid syntax was entered on a LOAD command.

VOLN-ERR

indicates that the volume is not on-line or the volume name is invalid.

WRIT-ERR

indicates an attempt was made to mark on a device that is hardware-protected without the PROTECT option. Use the PROTECT option in the MARK command.

APPENDIX C
SYSTEM MESSAGES

C.1 INTRODUCTION

Different types of system messages are displayed to the system console. Some system messages are issued on behalf of a specific user task (u-task) and are preceded with the taskid. They signal the presence of error or fault conditions which must be addressed before the task can proceed. Other system messages are more general in nature and inform the operator of system-wide conditions.

Within a Model 3280 environment, the Control/Diagnostic System (CDS) isolates and diagnoses fault or error conditions. The CDS formats messages to either be displayed on the system console or be displayed to executing software. See the Model 3280 System, Control/Diagnostic System (CDS) Maintenance Manual for a full description of CDS messages and their meanings.

C.2 USER TASK (U-TASK) SYSTEM MESSAGES

An abnormal task termination occurs when a malfunction is detected during execution of a u-task and the system cannot continue executing the task without destroying the system or user information. At this point, the system prints a message that describes the error detected (e.g., ILLEGAL INSTRUCTION, ILLEGAL SVC) and the location of the instruction causing the error. The u-task is then paused. The operator can correct the error condition and use the CONTINUE command to proceed, or the task can be aborted with a CANCEL command.

The following messages may appear on behalf of a u-task during its execution to reflect error or fault conditions:

taskid: ACCESS LEVEL ADDRESS ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that when memory access was attempted by the current program, the memory access level of the program status word (PSW) (bits 10-11) contained a lesser value than the access level field of the appropriate segment table entry (STE). The program address is xxxxxx and the physical address is yyyyyy. The memory fault address is given on Perkin-Elmer Series 3200 Processors.

taskid: ACCESS PRIVILEGE ADDRESS ERROR AT RRxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that the user program tried to store into a write-protected segment, execute instructions from an execute-protected segment or load from a read-protected segment. The program address is RRxxxx, the segmentation register is RR and the physical address is yyyyyy. The memory fault address is given on Perkin-Elmer Series 3200 Processors.

taskid: ADDRESS FAULT IN SVC AT xxxxxx (yyyyyy)

indicates that the address of supervisor call (SVC) parameter block or an address parameter in the parameter block points to a data structure that is outside the task taskid memory allocation or does not point to a data structure that is properly aligned.

taskid: ALIGNMENT FAULT INSTRUCTION AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that the data instruction is not properly aligned to specific fields for fullword or halfword alignment. The program address is xxxxxx and the physical address is yyyyyy. The memory fault address is the memory location that is not properly aligned and is given on Perkin-Elmer Series 3200 Processors.

taskid: ARITHMETIC FAULT AT xxxxxx (yyyyyy)

indicates that a fixed or floating point error is detected at location xxxxxx in the taskid address space (physical address yyyyyy) or an attempt was made to divide by zero. This fault occurs only on Perkin-Elmer 7/32 and 8/32 Processors.

taskid: DECIMAL OVERFLOW ERROR AT xxxxxx (yyyyyy)
NEXT INSTRUCTION AT xxxxxx (yyyyyy)

indicates that the result of a load packed decimal string as binary LPB instruction was too large to be stored as a binary number. The program address of the LPB instruction is xxxxxx; the physical address is yyyyyy. The instruction aborts and the next instruction is at xxxxxx. This fault occurs only on the Perkin-Elmer Series 3200 Processors.

taskid: END OF TASK n

indicates that the task taskid has ended. The end of task code in decimal is n.

taskid: EXECUTE PRIVILEGE ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an attempt was made by the current program to execute instructions for a segment that is execute-protected. The memory fault address is given on Perkin-Elmer Series 3200 Processors.

taskid: FIXED POINT-ZERO DIVIDE ERROR AT xxxxxx (yyyyyy)
NEXT INSTRUCTION AT xxxxxx (yyyyyy)

indicates that an attempt was made to divide by zero at location xxxxxx in the taskid address space (physical address yyyyyy). The current instruction is aborted and the next instruction is at location xxxxxx in the taskid address space (physical address yyyyyy). This error can occur only on the Perkin-Elmer Series 3200 Processors.

taskid: FIXED POINT-ZERO OVERFLOW ERROR AT xxxxxx (yyyyyy)
NEXT INSTRUCTION AT xxxxxx (yyyyyy)

indicates that a fixed point arithmetic result, at location xxxxxx in the taskid address space (physical address yyyyyy), is too large to be represented. The instruction aborts and the next instruction is at location xxxxxx in the taskid address space (physical address yyyyyy). This error can occur only on the Perkin-Elmer Series 3200 Processors.

taskid: FLOATING POINT - FUNCTION RANGE ERROR AT xxxxxx

indicates that a task-related arithmetic fault has occurred because a floating point instruction operand at address xxxxxx is not within the valid range for the function. This message applies only to the Model 3280 Processor.

taskid: FLOATING POINT-UNDERFLOW ERROR AT xxxxxx (yyyyyy)
NEXT INSTRUCTION AT xxxxxx (yyyyyy)

indicates that the result of a floating point operation is too small to be represented at location xxxxxx in the taskid address space (physical address yyyyyy). The instruction aborts and the next instruction is at location xxxxxx in the taskid address space (physical address yyyyyy). This error can occur only on the Perkin-Elmer Series 3200 Processors.

taskid: FLOATING POINT-OVERFLOW ERROR AT xxxxxx (yyyyyy)
NEXT INSTRUCTION AT xxxxxx (yyyyyy)

indicates that the result of a floating point arithmetic operation is too large to be represented at location xxxxxx in the taskid address space (physical address yyyyyy). The instruction aborts and the next instruction is at location xxxxxx in the taskid address space (physical address yyyyyy). This error can occur only on the Perkin-Elmer Series 3200 Processors.

taskid: FLOATING POINT-ZERO DIVIDE ERROR AT xxxxxx (yyyyyy)
NEXT INSTRUCTION AT xxxxxx (yyyyyy)

indicates that an attempt was made to perform a floating point divide by zero at location xxxxxx in the taskid address space (physical address yyyyyy). The instruction aborts and the next instruction is at location xxxxxx in the taskid address space (physical address yyyyyy). This error can occur only on the Perkin-Elmer Series 3200 Processors.

taskid: ILLEGAL INSTRUCTION AT xxxxxx (yyyyyy)

indicates that an illegal instruction fault is detected at location xxxxxx in the taskid address space (physical address yyyyyy).

taskid: ILLEGAL SVC-INSTRUCTION AT xxxxxx (yyyyyy)
SVC PARAMETER BLOCK AT xxxxxx (yyyyyy)

indicates that an illegal SVC call was attempted at location xxxxxx in the taskid address space (physical address yyyyyy). The SVC parameter block is located at location xxxxxx in the taskid address space (physical address yyyyyy).

taskid: INTERNAL REGISTER PARITY FAULT, INSTRUCTION AT
xxxxxx (yyyyyy)

indicates that a parity error machine malfunction is detected at location xxxxxx (physical address yyyyyy). This is an unrecoverable hardware-generated fault possibly due to faulty registers external (REX). This fault occurs only on Model 3203 and 3205 Processors.

taskid: INVALID SEGMENT ADDRESS ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that the task tried to address a segment outside the address space of the program. The program address is xxxxxx and the physical address is yyyyyy. The memory fault address is given on Perkin-Elmer Series 3200 Processors.

taskid: I/O-ERR TYPE=xxxx SEGNAME=yyyy SEGTYPE=2222

indicates that an input/output (I/O) error type xxxx was encountered while trying to write the segment named yyyy to the roll volume. Task space is needed to load or roll in task taskid. Segment yyyy is set as nonrollable and the write error flag is set in the segment descriptor entry (SDE). To insure full integrity of the segment, reload the pertinent module(s).

taskid: MAT PARITY FAULT, INSTRUCTION AT xxxxxx (yyyyyy)

indicates that a memory address translator (MAT) parity error machine malfunction is detected at location xxxxxx (physical address yyyyyy). This is an unrecoverable hardware-generated fault possibly due to faulty MAT circuitry or a bad chip. This fault occurs only on Model 3203 and 3205 Processors.

taskid: MEMORY ERROR ON DATA FETCH AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an attempt was made to retrieve or to load data from a failing memory area on Perkin-Elmer Series 3200 Processors. If affected memory is within task space and the operating system has memory diagnostic support, the affected page is automatically marked off and the following message is displayed:

AFFECTED MEMORY PAGE MARKED OFF AT xxxxxx (yyyyyy)

taskid: MEMORY ERROR ON INSTRUCTION FETCH AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an attempt was made to execute an instruction from a failing memory area on Perkin-Elmer Series 3200 Processors. If affected memory is within task space and the operating system has memory diagnostic support, the affected page is automatically marked off and the following message is displayed:

AFFECTED MEMORY PAGE MARKED OFF AT xxxxxx (yyyyyy)

taskid: MEMORY PARITY ERROR AT xxxxxx (yyyyyy)

indicates that a parity machine malfunction is detected at location xxxxxx of the taskid address space (physical address yyyyyy) on Model 7/32 and 8/32 Processors. This is an unrecoverable hardware-generated fault which is possibly due to bad memory circuitry.

taskid: NON EXISTENT SEGMENT ERROR (PST) AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates an attempt was made to access a memory location greater than the maximum valid program address; i.e., an attempt to access a memory location outside of task space. The program address is xxxxxx and the physical address is yyyyyy. The memory fault address is given on Perkin-Elmer Series 3200 Processors.

taskid: NON EXISTENT SEGMENT ERROR (SST) AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that the current program has made reference to a nonexistent segment in the shared segment table (SST). The program address that caused the fault is xxxxxx; the physical address is yyyyyy. If the nonexistent segment is loaded, the instruction that caused the fault can be reexecuted. The memory fault address appears on the Perkin-Elmer Series 3200 Processors.

taskid: PACKED FORMAT-SIGN ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an illegal sign digit was detected in a packed decimal number at location xxxxxx in the taskid address space (physical address yyyyyy) for Perkin-Elmer Series 3200 Processors.

taskid: PACKED FORMAT-DATA ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that a data error was detected in a packed decimal number at location xxxxxx in the taskid address space (physical address yyyyyy) for Perkin-Elmer Series 3200 Processors.

taskid: READ PRIVILEGE ADDRESS ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an attempt was made by the current program to read from a segment that is read-protected. The memory fault address is given for Perkin-Elmer Series 3200 Processors.

taskid: SEGMENT LIMIT ADDRESS ERROR AT RRxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that the task attempted to access an address outside allowable limits for one of its segments. The program address is RRxxxx, segmentation register is RR and physical address is yyyyyy. The memory fault address is given on Perkin-Elmer Series 3200 Processors.

taskid: SVC ADDRESS ERROR-INSTRUCTION AT xxxxxx (yyyyyy)
SVC PARAMETER BLOCK AT xxxxxx (yyyyyy)

indicates that the address of the SVC parameter block at xxxxxx in the taskid address space (physical address yyyyyy) was incorrect. The SVC parameter block must be on a fullword boundary.

taskid: TASK PAUSED

indicates that the task taskid paused. The pause results from an SVC2 code 1 or the operator PAUSE command.

taskid: UNDEFINED DATA FORMAT FAULT AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an undefined data format or alignment fault was detected at location xxxxxx in the taskid address space (physical address yyyyyy) for Perkin-Elmer Series 3200 Processors.

taskid: WRITE PRIVILEGE ADDRESS ERROR AT xxxxxx (yyyyyy)
MEMORY FAULT ADDRESS=xxxxxx (yyyyyy)

indicates that an attempt was made by the current program to write to a segment that is write-protected. The memory fault address is given for Perkin-Elmer Series 3200 Processors.

taskid>

indicates an SVC1 read request to console device from task taskid. Data should be entered immediately to avoid blocking the console.

C.3 GENERAL SYSTEM MESSAGES

General system messages inform the console operator of system wide conditions. Some messages are merely informational in nature; no operator action is required. Other messages may require some intervention or corrective action to be taken by the operator.

The messages presented below are those that may appear on all Perkin-Elmer processors unless otherwise specified:

CDIR FULL-devn

indicates the secondary directory on disk devn is full. See the MARK command description in Chapter 3 for required action.

FLOATING POINT HARDWARE NOT PRESENT

is a warning message that occurs if the operating system is sysgened with hardware floating point support, but at loading time, the operating system is loaded on a machine that does not support hardware floating point. In this case, the operating system will run, but it cannot successfully run programs requiring floating point support.

I/O ERROR ON voln; MARK OFF AND CHECK
BIT MAP ERROR ON voln; MARK OFF AND CHECK

indicates an I/O error on voln, the disk volume name. An I/O error is reported to the system when reading or writing a directory block, bit map sector or volume descriptor (sector 0). A bit map error is reported to the system console in the event of a bit map error; i.e., attempting to allocate an already allocated sector or volume, or attempting to release an already released sector.

When either of these errors occurs, any operations that require bit map changes are rejected with device unavailable status. This action permits read and write of preallocated contiguous files and read-only of the preallocated index files. An attempt to allocate or delete a file is rejected with device unavailable status. The operator is advised to run a disk check on that disk.

OS32MTrr-uu

is printed after system initialization. The release level is rr; uu is the update level.

PIC NOT ACTIVE AT ADDRESS XX

When the operating system is generated, the precision internal clock (PIC) address is specified. At operating system START time, the operating system checks to see if the PIC is operational at that address. If not, the above message is displayed. The operating system continues to run, but without the PIC.

POWER RESTORE - RESET PERIPHERALS

indicates that a power fail restore sequence has taken place; no operator response is required.

POWER RESTORE - RESET PERIPHERALS AND ENTER GO

indicates that a power fail restore sequence has taken place; perform any manual intervention required at the peripheral device(s) and then type GO (CR) to complete the power recovery.

C.3.1 Model 3200MPS System Messages

The following are system-related messages for users of Model 3200MPS Systems:

APB LINKAGE ERROR, "APU-n" IDLE

indicates that during auxiliary processing block (APB) queue processing, the specified auxiliary processing unit (APU) detected an APB linkage fault. Faults indicated include corrupted pointer values, improper address alignment and queue overflow.

APB QUEUE ACCESS TIME-OUT "APU-n" IDLE

indicates the specified APU was not able to gain exclusive access to either the corresponding APU ready queue or the central processing unit (CPU) receive queue within the allowable time frame (two minutes maximum).

This time-out may occur as a result of heavy activity by various APUs accessing the CPU receive queue; or if, upon recognition by the APU of a task control block (TCB) count transition from zero to nonzero for the APU TCB queue, queue access could not be gained before expiration of the hardware time-out.

This message can result from the following CPU control functions received by the APU over the real-time support module (RTSM):

START EXECUTION
RESCHEDULE
RESCHEDULE FROM APU TO CPU

COMMAND RESPONSE FAILURE, "APU-n" STATE INDETERMINATE

indicates the specified APU does not respond to control functions initiated by the CPU via the RTSM.

HOST/APU CONTROL FUNCTION ERROR, "APU-n" IDLE

indicates the specified APU received an unrecognizable command from the host via the RTSM. This indicates a control function parity error or the receipt of an unsupported command byte.

LINK CHECK FAILURE, "APU-n" IDLE

indicates a link check sequence failure occurred between the host and the specified APU. This failure may be detected during the APU power-up sequence or due to the execution of the link check control function initiated by the CPU.

TCB LINKAGE ERROR, "APU-n" IDLE

During TCB queue processing, the specified APU detected a TCB linkage fault. Faults indicated include corrupted pointer values and improper address alignment.

C.3.2 Input/Output Processor (IOP) System Messages

The following is information about system-related messages for users of Model 3200MPS Systems with IOPs:

When an IOP-related error is detected, the IOP error recovery sub system is activated to take appropriate action. This action can include printing a message on the system console, stopping the IOP and/or initiating a system crash. Messages are preceded by an identifier of the following form:

IOPMSG: IOP#=n; IPB=iiiiiiii; CALLER#=cccc

where n is the number of the associated IOP, iiiiiiii is the memory address of the IOP parameter block and cccc is the internal caller number of the routine that is activating the IOP error recovery subsystem.

A QCB CONTAINED AN INVALID ACTION CODE

A queue control block (QCB) was passed to the CPU with an invalid action code. Since safety checking (SGN.SAFE) is on, the system will crash. This message is associated with system crash 911.

IOP BUS SWITCH INITIALIZATION FAILED

The specified IOP was unable to obtain control of the bus switch that was indicated during sysgen. This may have occurred because the bus switch is in the MANUAL mode or because of a hardware error. This error is not usually associated with a system crash.

IOP gave an error response to RTSM COMMAND

The specified IOP gave an error response to a command over its RTSM link. This probably indicates an incorrect field in the IPB or other data structure. If the error is corrected while the system is still running, momentarily power-fail the system to allow the CPU to restart the IOP. This error is only associated with a system crash if the IOP had been running previously. This error is associated with system crash 933.

IOP POWER DOWN SEQUENCE FAILED

The specified IOP failed to save its status during a power failure. This probably indicates a hardware failure. This error is associated with system crash 931.

IOP RTSM LINK FAILED TO OPERATE

The specified IOP failed to respond to a command over its RTSM link. This was probably caused by an error in the RTSM link or in the IOP hardware itself. If the error is corrected while the system is still running, momentarily power-fail the system to allow the CPU to restart the IOP. This error is only associated with a system crash if the IOP had been running previously. This error is associated with system crash 932.

IOP STARTED SUCCESSFULLY

The specified IOP was not operating before the power failure. After the power failure, the IOP was restarted correctly. This error is not associated with a system crash.

IOP SOFTWARE FAILED TO OPERATE PROPERLY

The software which runs on the IOP to initialize its devices failed to indicate completion. This could be caused by an IOP hardware failure. If the error is corrected while the system is still running, momentarily power-fail the system to allow the CPU to restart the IOP. This error is only associated with a system crash if the IOP had been running previously. This error is associated with system crash 934.

IOP TRIED TO RELEASE AN INVALID QCB

The specified IOP tried to release a QCB which was either not a QCB or was not marked as being in use. This error is associated with system crash 912.

UNABLE TO RELEASE SYSTEM SPACE

A QCB was obtained from system space. When trying to release system space, an error occurred. Since safety checking (SGN.SAFE) is on, the system will crash. This error is associated with system crash 122.

APPENDIX D
SYSTEM CRASH CODES

A system crash occurs when the operating system detects an unrecoverable internal error. When a crash occurs, the system displays a message on the system console, informing the operator of the system crash and gives a hexadecimal crash code number. This number can be used as a diagnostic to help determine the cause for system failure.

The system source system generation (sysgen) parameter, SGN.SAFE, controls the inclusion of safety checking code into the operating system modules. This code is dispersed throughout the system. It performs consistency checks at various places in the operating system code. If a consistency check fails, then a system crash occurs.

Generally, operating systems provided to the customer are assembled with SGN.SAFE set to zero because the safety check code increases operating system overhead. However, if modifications are to be made to the system, it is recommended that the system be reassembled with SGN.SAFE equated to 1 to assemble in the checks. These checks allow the operating system to detect internal errors sooner than otherwise possible, making it easier to track down problems.

The system signals a crash by executing a SINT instruction for device 0. The resulting input/output (I/O) interrupt causes control to be passed to the crash handler. The crash handler prints out the crash message, which includes the crash code.

After the system has crashed, data contained in registers 0, 1, 2 and 3 of register set 0 have been destroyed. Registers 0 and 1 of register set 0 contain the program status word (PSW) that was active at the time that the crash SINT instruction was executed. Note that the destruction of data contained in these registers makes it more difficult to track down problems in interrupt service routines (ISRs) because these routines use registers 0 through 7 of register set 0. In the following list of crash codes, an asterisk (*) following the crash code indicates that the crash code can occur only in systems assembled with SGN.SAFE equated to 1. The other crash codes can occur in any system. The crash code descriptions include a description of registers containing information that might help find the problem. The register set referred to in these descriptions is the same register set selected by the PSW saved in register 0 of set 0. Register mnemonics R0 through R9 and RA through RF correspond to registers 0 through 9 and 10 through 15 of the register set specified.

Crash code: 1
Modules: CMON, CMSP, EXIO

The system console device mnenomic from SPT.IVT was not found in the device mnemonic table (DMT), or CMON was unable to start CMDP. CMDP could not assign the system console device, or the write of the operating system identifier message returned bad status.

In an IOP-configured Model 3200MPS System, the input/output processor (IOP) error recovery subsystem could not locate the system console device.

Crash code: 3
Module: CMON

CMON received an unexpected item on its task queue. R15 contains the item that was found on the task queue.

Crash code: 4
Module: EXIN

The address of the memory access controller (MAC) is greater than the value specified in the SYSGEN/32 DEVADS statement.

Crash code: 5
Module: EXIN

An operating system sysgened with hardware floating point support attempted to execute floating point instructions on a machine not equipped with floating point hardware.

Crash code: 6
Module: EXMY

The shared segment table (SST) was exhausted while mapping global task commons. This can occur only on memory address translator (MAT) or virtual address translator (VAT) systems.

Crash code: 7
Module: CMDB

An on-line disk was discovered to have no associated entry in the volume mnemonic table (VMT).

Crash code: 10
Module: CMDB

An attempt to mark a disk on or off occurred, but direct access support is not included in the system. This crash can occur only when disk devices are included in a system without direct access support.

Crash code: 100
Module: EXIN

An arithmetic fault occurred while a user task was executing in RS or RSA state. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 101
Module: EXIN

An arithmetic fault occurred while executing system code, but RS or RSA state was not entered on behalf of a user task (u-task). The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 102
Module: EXIN

An illegal instruction was detected in system code. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 106
Module: EXIN

A supervisor call (SVC) interrupt occurred, but the SVC instruction that caused the interrupt was not found as expected. RA contains the relocated (real) address of the instruction following the instruction that caused the interrupt. RC contains the unrelocated (virtual) address of the instruction following the instruction that caused the interrupt. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 107*
Module: EXTM

TMUCHN is trying to remove a task with an invalid task control block (TCB) address from the ready queue. Register R9 contains the address of the current TCB.

Crash code: 108*
Module: EXTM

TMREMW is trying to remove wait conditions from a task whose TCB address is invalid. Register R9 contains the invalid TCB address. Register RD contains the wait bit masks that are to be removed.

Crash code: 109*
Module: EXTM

TMRDISP is trying to dispatch the task at the top of the ready queue, but the TCB address of this task is invalid. Register R9 contains the invalid TCB address.

Crash code: 10A*
Module: EXTM

TMENQPRI discovered a ready queue count of zero, but the queue front pointer was not zero.

Crash code: 10B*
Module: EXTM

TMCHN is trying to put a task with an invalid TCB address onto the ready queue. Register R9 contains the invalid TCB address.

Crash code: 10C*
Module: EXTM

An attempt was made to add an item to a task's task queue, but the TCB address of the task is invalid. Register R9 contains the invalid TCB address. Register RA contains the parameter that is to be added to the task queue.

Crash code: 10D*
Module: EXTM

A task is being dispatched into user state by TMRDISP, and the task owns the user register set, but not the MAC/MAT. Register R9 contains the TCB address of the task. Register RC contains the value that was expected in SPT.MCOW.

Crash code: 10E*
Module: EXTM

TMRDISP found that the last task executing was interrupted during an uninterruptible instruction. The TCB of this task was obtained in order to save the scratchpad registers, but was found to be invalid. Register RB contains the TCB address of the task being dispatched. Register R9 contains the TCB address of the interrupted task. Registers RE and RF contain the dispatch PSW.

Crash code: 10F*
Module: EXTM

TMENQTL discovered a ready queue count of zero, but the queue front pointer was not zero.

Crash code: 110*
Module: EXTM

TMSTRT is trying to start a dormant task, but the TCB address is invalid. Register R9 contains the invalid TCB address. Register RF contains the unrelocated (virtual) starting address of the task.

Crash code: 111*
Module: EXTM

TMREMW was trying to remove wait conditions from a task, but the wait conditions to be removed were not valid. Register R9 contains the TCB address. Register RD contains the mask for the wait bits that are to be reset. RB contains masks for the invalid wait bits that caused the crash.

Crash code: 112*
Module: EXTM

TMSTART entered in wrong system state (not nonreentrant system (NS)).

Crash code: 113*
Module: EXTM

TMSTART discovered that the user's context area pointer, TCB.UCTX, was zero.

Crash code: 114*
Module: EXTM

TMSTOP entered in wrong system state (system queue service (SQS) interrupts not disabled).

Crash code: 115*
Module: EXTM

TMSTOP finds that the TCB address of the task whose registers are to be saved is invalid. Register R9 contains the address of the TCB.

Crash code: 116*
Module: EXTM

TMREMW entered in wrong system state (SQS interrupts not disabled).

Crash code: 117*
Module: EXTM

TMSETW entered in wrong system state (SQS interrupts not disabled).

Crash code: 118
Module: EXTM

TMUCHN is trying to remove from the ready queue a task that is absent from the queue. Register R9 contains the address of the TCB.

Crash code: 119
Module: EXIN

A MAC or memory address translator (MAT) fault occurred while executing system code. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 11A*
Module: EXTM

TMATQ entered in wrong system state (SQS interrupts not disabled).

Crash code: 11B*
Module: EXTM

TMSTSW entered in wrong system state (SQS interrupts not disabled).

Crash code: 11C*
Module: EXTM

TMDISP entered in wrong system state (not NS).

Crash code: 11D*
Module: EXTM

TMRDISP entered in wrong system state (not NS).

Crash code: 11E*
Module: EXTM

TMCDISP entered in wrong system state (not NS).

Crash code: 11F*
Module: EXTM

TMSETW was passed an invalid TCB address. Register 9 contains the invalid TCB address.

Crash code: 120*
Module: EXTM

TMSETW was called to set an invalid task wait condition. Register 11 contains the invalid wait bits that were specified.

Crash code: 121*
Module: EXMY

RELMEM is trying to release a task memory block not in task memory; or, during the release of the memory, the free list for task memory was found not to be in increasing address order.

Crash code: 122*
Module: EXMY

RELSYP is trying to release a system space block that does not exist in system space; or, during the release of the memory, the free list for system space was found not to be in decreasing address order. Register R9 contains the address

of the current TCB. The value contained in register R9 can be zero.

Crash code: 123*
Module: EXMY

GETSSUB found that a shared segment's SSUB counts do not equal the segment's USE + ROLL counts.

Crash code: 124
Module: EXMY

RELSSUB could not find the SSUB for the task disconnecting from a shared segment.

Crash code: 125*
Module: EXMY

RELSSUB found that a shared segment's SSUB counts do not equal the segment's USE + ROLL counts.

Crash code: 131
Module: EXIN

An SVC was issued, but there is no current task. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 132
Module: EXIN

An illegal SVC call was issued from system code. This was caused by issuing an SVC with an invalid SVC number, or the execution of an SVC instruction in a system state that does not permit SQS interrupts. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 142
Module: EXIN

An SVC has an invalid parameter block address, or a parameter inside the parameter block is invalid. This could be caused by not having the parameter block fullword aligned. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 145
Module: EXIN

An invalid reason code was received during a MAT fault. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 150
Module: FLTP

A bad vector table offset was generated by the floating point emulator while processing an opcode to see if it was a floating point instruction.

Crash code: 152
Module: EXIN

A parity or error check and correction (ECC) error occurred while executing system code. This fault can be caused by referencing an address outside of physical memory or by a noncorrectable memory error. The contents of register set 0 at the time the fault was detected are saved at EREGS. Locations X'20' through X'27' contain the current PSW at the time of the machine malfunction interrupt. For Series 3200 Processors, locations X'2C' through X'2F' are used to store the effective second operand address if an LM instruction was in progress at the time of the interrupt. Locations X'44' through X'47' contain the address that caused the interrupt. The word at locations X'40' through X'43' contains a reason code for the interrupt.

Crash code: 153
Module: EXIN

An instruction data format fault or alignment fault occurred in system code. This fault can only occur on a Series 3200 machine. The contents of register set 0 at the time the fault was detected is saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 175
Module: EXSP

An SVC2 call was issued from system code, but the RS register set is not owned by the caller. Register R9 contains the address of the current TCB. Register RA contains the value that was expected to be found in either SPT.RSOW or SPT.UTOW.

Crash code: 176*
Module: EXTM

TMRSRSA or TMRSARS found that the RS register set is not properly owned by the calling task. Register R2 contains the address of the current TCB. Register R8 contains the value that was expected to be found in either SPT.RSOW or SPT.UTOW.

Crash code: 177
Module: EXTM

An interruptible instruction was executed within the system code and interrupted. This condition is detected when a task is being dispatched into system state by TMRD.SYS. Register R9 contains the address of the TCB. Registers RE and RF contain the dispatch PSW.

Crash code: 178*
Module: EXTM

TMRD.SYS, TMRSIN or TMRSAIN detected an attempt to enter RS/RSA state with floating point enabled in the PSW.

Crash code: 180*
Module: EXTI

The line frequency clock (LFC) event service routine (ESR) was dispatched even though no outstanding request existed for dispatch of this routine.

Crash code: 185*
Module: EXTI

TOCHOFF found the head of the device control block (DCB) time-out chain to be zero. This should never happen since the chain uses nonzero address pointers or -1 to signify the end of the chain. Or, TOCHOFF found that the DCB that it was trying to remove from the DCB time-out chain was not on the chain. Register RD contains the address of the DCB that was to be removed from the time-out chain.

Crash code: 186*
Module: EXTI

The precision interval clock (PIC) or line frequency clock (LFC) event service routine (ESR) found that the head of the timer chain that it was servicing was zero. This should not occur since the chain uses either a nonzero address pointer or -1 to signify the end of the chain.

Crash code: 190
Module: EXTM

A task manager queueing routine was unable to gain exclusive access to a task queue before timing out.

Crash code: 191*
Module: EXTM

TMENQPRI entered in wrong system state (SQS interrupts not disabled).

Crash code: 192*
Module: EXTM

TMENQTL entered in wrong system state (SQS interrupts not disabled).

Crash code: 193*
Module: EXTM

TMDEQ entered in wrong system state (SQS interrupts not disabled).

Crash code: 194*
Module: EXTM

TMDEQHD entered in wrong system state (SQS interrupts not disabled).

Crash code: 195*
Module: EXTM

TMRDYENQ entered in wrong system state (SQS interrupts not disabled).

Crash code: 196*
Module: EXTM

TMRDYDEQ entered in wrong system state (SQS interrupts not disabled).

Crash code: 197*
Module: EXTM

TMRINENQ entered in wrong system state (SQS interrupts not disabled).

Crash code: 198*
Module: EXTM

TMRINDEQ entered in wrong system state (SQS interrupts not disabled).

Crash code: 1F0
Module: EXIN

A system queue service interrupt occurred, but the interrupt old PSW status had the system queue service interrupt enable (IE) bit turned off. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 1F1
Module: EXIN

On a machine with two register sets, the user register set was not available for exclusive use. This can be caused by having an ESR not return via SQSEXIT. The contents of register set 0 at the time the fault was detected are saved at EREGS. Registers RE and RF contain the interrupt old PSW.

Crash code: 203*
Module: EXIO

COMQ found that the queueing number that was passed to it as a parameter was not in the range of one to four. Register R9 contains the queueing parameter that was passed to COMQ. This number should not be in the range one to four. Register RB contains the leaf to which the input/output block (IOB) is being queued. Register RA contains the IOB that is being queued to the leaf.

Crash code: 220*
Module: EXIO

GETIOB found that no IOBs were available when it tried to allocate one. This should never happen because task is placed into connect wait until an IOB becomes free at the time the last remaining free IOB is allocated. Register R9 contains the address of the TCB.

Crash code: 221*
Module: EXIO

RELIOB is trying to release an IOB that is not found in the TCB IOB list. It could be either an IOB from a DCB, or a corrupted IOB. Register R9 contains the address of the TCB.

Register RB contains the IOB type. The crash occurred because this number was not one. Register RA contains the address of the IOB that RELIOB attempted to release.

Crash code: 230
Module: EXIO

A leaf that was added to the system queue had the address of its ESR as 0. Register RF contains the address of the leaf being processed. Register RD contains the DCB address that was obtained from the leaf.

Crash code: 250
Module: INTC

A system sysgened without the SVC intercept feature tried to process an SVC interception. R8 contains the address following the call to the intercept routine.

Crash code: 300
Module: EXTM

A task ESR is being dispatched, but the task does not have a task queue head (TQH). R9 contains the TCB address.

Crash code: 301
Module: EXTM

An attempt is made to dispatch a task event when there are none available for dispatching. R9 contains the TCB address.

Crash code: 401*
Module: EXTM

The TCB address of the task being rolled in is not at the head of the roll queue, or the TCB.STAT field of the task being rolled in has a status bit turned on that is not valid when a task is being rolled in. Register R9 contains the address of the TCB.

Crash code: 402*
Module: EXTM

RINQUE is trying to put a task on the rollin queue, but the task's TCB address is invalid. Register R9 contains the address of the TCB.

Crash code: 403*
Module: EXTM

RINDQUE is trying to remove a task from the rollin queue, but the task's TCB address is invalid. Register R9 contains the address of the TCB.

Crash code: 404
Module: EXTM

In a system without roll support, TMCKUTET found a task was being dispatched without any memory allocated to its impure segment. Register R9 contains the address of the TCB. Register RD contains the flag field TCB.STAT of the TCB.

Crash code: 405
Module: EXTM

In a system without roll support, TMCKUTET found the rollin pending bit on in the TCB. Register R9 contains the address of the TCB. Register RD contains the flag field TCB.STAT of the TCB.

Crash code: 500
Module: INITMSM

The operating system was overwritten by a misdirected direct memory access (DMA) transfer into memory. Register D contains A(DCB), register 0 contains the last location overwritten and register 2 contains the I/O bus address of the DMA device.

Crash code: 501
Module: INITSUBS

An attempt was made to use two level translation, but the second level translation table was not specified. Register 4 contains A(CCB); register 6 contains the character being translated.

Crash codes 600 through 640 apply only to users of Model 3200MPS Systems with APUs.

Crash code: 600
Module: APSV

ZAPWAIT found the task's status had APU waiting set, but the auxiliary processing unit (APU) number was zero, or no APB could be found for the APU number, or the APB information did not indicate that it was waiting for the task.

Crash code: 601
Module: APSV

(SVC 13, APUINIT, APUESR) The APB directory pointer located at X'CO' was not quadword-aligned.

Crash code: 602
Module: APSV

(SVC 13, APUINIT, APUESR) The APB address obtained from the APB directory was not quadword-aligned.

Crash code: 603
Module: APSV

GRABTASK could not find the APB for the APU number assigned to the task, or time-out occurred while attempting to access that APU's ready task queue.

Crash code: 604*
Module: APSV

RELAPU discovered an APU waiting for a task that does not have the APU waiting status set. In systems without safety checking, the APU is simply restarted.

Crash code: 605
Module: APSV

APUINIT, APUESR or RTSMDRVR discovered an invalid number of APUs.

Crash code: 608*
Module: APSV

TMCKAPU discovered that the task being dispatched was assigned a nonzero logical processing unit (LPU) number, but the SPT.LPMT pointer was zero.

Crash code: 609*
Module: APSV

TMCKAPU discovered that the task being dispatched was assigned an LPU number that was greater than LPMT.LPU.

Crash code: 610
Module: APSV

RCVRESR was unable to access the central processing unit (CPU) receive queue to process a task passback from an APU (queue lock time-out).

Crash code: 611*
Module: APSV

RCVRESR received a "passback to CPU" signal from an APU, but no TCB could be found on the CPU receive queue. Typically caused by a spurious interrupt from the real-time support module (RTSM), causing the last signal received to be reread as a new signal.

Crash code: 60A*
Module: APSV

TMCKAPU discovered that the APU number found in the logical processor mapping table (LPMT) for task's LPU assignment was greater than LPMT.APU.

Crash code: 60B*
Module: APSV

TMCKAPU discovered that the APB for the APU on which the task was to be dispatched could not be found, or if found, its APB.ID did not equal the expected APU number.

Crash code: 60C
Module: APSV

TMAPUFH discovered that the task's passback reason code (TCB.PRCA) indicated an SVC interrupt.

Crash code: 620
Module: APSV

The number of queue parameter blocks (QPBs) defined in the LPMT is different from the number of APBs in a Model 3200MPS System.

Crash code: 621
Module: APSV

An invalid QPB address was found.

Crash code: 640
Module: APSV

An inconsistent condition has been encountered while executing file manager code on the APU.

Crash code: 700*
Module: EXCC

CDSCMD received a status from an RCDSR/WCDSR instruction indicating an invalid channel control block (CCB). This can occur only on a Model 3280 Processor.

Crash code: 801
Module: ITAM.M01

ITAM buffer management - End Buffer routine finds a CCB with zero as the address of the current buffer. This is usually due to improper management of the channel command word (CCW) buffer select bit in the CCB.

Crash code: 802
Module: ITAM.M01

During an attempt to form ring in ITAM timer chain, the CCB is found to be already on the timer chain.

Crash code: 803
Module: ITAM.M01

DCB.ITB field is in illogical state. The field is being changed incorrectly.

Crash code: 804
Module: ITAM.M01

Loss of buffer control using queued buffers. Internal queued buffer count is greater than zero but no buffers exist.

Crash code: 805
Module: ITAM.M01

ITAM Buffer Management - Read After Write Next Buff routine finds zero as the address of the current buffer.

Crash code: 806
Module: ITAM.M01

ITAM Buffer Management - Next Buff routine entered, but buffer type is neither chained nor queued.

Crash code: 807
Module: ITAM.M01

ITAM Buffer Management - Next Buff routine finds zero as the address of the current buffer.

Crash code: 808
Module: ITAM.M01

ITAM Buffer Management - Next Buff routine finds zero as the address of the noncurrent buffer.

Crash code: 811
Module: ITFM.M00

CANITAM invoked on a non-ITAM system.

Crash code: 812
Module: INITDIOS

Direct memory access I/O subsystem (DIOS) hardware problem using a non-ITAM driver.

Crash code: 813
Module: CTM

Illegal response mode code.

Crash code: 814
Module: CTM

Illegal trap code from the channel terminal manager (CTM).

Crash code: 815
Module: CTM

Illegal FRMR reason code received.

Crash code: 816
Module: CTM

No allocated drop control tables (DCTs).

Crash code: 817
Module: CTM

DCB.NACD is less than the number of entries on the DCT chain.

Crash code: 819
Module: CTM

DCB.ONRT is not set up for retransmission.

Crash code: 820
Module: CTM

Illegal poll outstanding on line.

Crash code: 821
Module: CTM

Read pool not set up.

Crash code: 822
Module: CTM

Attempted Write when Write active.

Crash code: 823
Module: CTM

Read After Write attempted with Read active. No read pool present.

Crash code: 827
Module: CTM

Missing frame on the internal done write (IDW) list.

Crash code: 828
Module: CTM

Frame out of sequence on internal done read (IDR) list.

Crash code: 830
Module: CTM

Problem returning buffer to user read buffer pool. Either the address of the buffer is invalid, or the address of the buffer is equal to the address of the buffer at the bottom of the list.

Crash code: 831
Module: CTM

Address translation problem in returning buffer to user.

Crash code: 832
Module: INITMSUP

An attempt was made to reenter the asynchronous terminal manager kernel for a nonpolling extended function. Only polling extended functions require and allow a second entry.

Crash code: 833
Module: INITMSM

An assignment to a drop on a multidrop line was found disconnected while attempting to process an I/O. A conversational I/O was attempted using a drop on a multidrop line.

Crash code: 834
Module: HSUP

An attempt was made to process a logical unit (lu) that either is not assigned to a drop or for which a drop does not exist.

Crash code: 835
Module: INITMSUP

An attempt was made to add to an internal SVC15 buffer that was already full.

Crash code: F01
Module: EXIO

A leaf being disconnected from the current task is not queued to the task TCB. Register R9 contains the address of the current TCB. Register R15 contains the address of the leaf being disconnected.

Crash code: F02
Module: EXIO

An attempt was made to direct I/O to a pair of mirror disks, however, the disks' device control blocks (DCBs) contain invalid cross-reference information.

Crash codes in the range 900-999 are related to the operation of IOPs (Model 3200MPS I/O Processors). These messages are often preceded by messages printed by the IOP error recovery subsystem. The user should read both the explanation of the crash code and the explanation of the specific message to determine whether they are related or represent two different problems.

Crash code: 901
Module: EXIO

The RTSM link to an operating IOP has failed. RF points to the input/output processor parameter block (IPB). The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 902
Module: EXIO

The IOP error recovery subsystem has detected an IOP failure. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 903
Module: EXIO

An operating IOP encountered an error condition in system structures. Details should precede the crash message. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 904
Module: EXIO

An operating IOP encountered a HALT instruction. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 911*
Module: EXIO

An IOP returned a QCB with an illegal action code. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 912
Module: EXIO

An attempt was made to release a bad QCB. Either it was not a QCB or was not in use. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 931
Module: EXIO

An IOP was unable to save its status during a power failure. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 932
Module: EXIO

When attempting to restart an IOP after a power failure, its RTSM link failed. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 933
Module: EXIO

When attempting to restart an IOP after a power failure, it responded with an error status to an RTSM command. RF points to the IPB. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 934
Module: EXIO

When attempting to restart an IOP after a power failure, its software malfunctioned. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 951
Module: EXIO

In an IOP-configured system, the IOP error recovery subsystem detected an internal error. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 952
Module: EXIO

In an IOP-configured system, the IOP error recovery subsystem was called with an illegal caller code. The registers of the routine calling the IOP error recovery subsystem are stored at SAN.REGS. R8 is the return address.

Crash code: 999*
Module: EXIO

Either an IOP was found executing code intended for the CPU, or the CPU was found executing code for the IOP, within a Model 3200MPS System.

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* Indicates that the crash code can occur only in systems assembled with SGN.SAFE equated to 1.

APPENDIX E
CONTROL SUMMARY FOR BIDIRECTIONAL INPUT/OUTPUT CONTROL (BIOC) CRT DRIVER

BIOC is a standard OS/32 terminal driver. Listed in this appendix are function control codes for the BIOC, the standard control characters generated by the use of the codes and the functions performed. On terminals that do not generate standard control characters for any of the function keys, it is necessary to determine which key will produce the required control characters in order to invoke a desired function.

When a combination of control and ASCII keys cannot be accepted, BIOC rejects that combination and responds with a bell code. An example of this is a "cancel" request (CTRL-X) on a line that has no character on it. ASCII control characters for BIOC are not echoed (displayed to the console) to prevent confusion between BIOC functions and terminal functions.

ASCII Read Mode:

CTRL-A (SOH) Adjust Baud Rate

The baud rate adjust function must be enabled by the system programmer before CTRL-A can be used. When connection to a terminal is made over a dial-up line, the adjust baud rate mode is automatically entered.

To change the baud rate on a Model 1200 terminal, for example, locate the front panel and remove the cover. It is important to know which baud rates have been made available to the terminal via strapping on the PASLA, 8-line COMM MUX, etc. When this is known, depress CTRL-A and then change the baud rate setting inside the panel, using the scale depicted on the inside of the panel cover (see Figure E-1). By depressing the carriage return (CR) key repeatedly, the user synchronizes communication at the new baud rate. BIOC then responds with an asterisk (*) and continues with the newly selected baud rate.

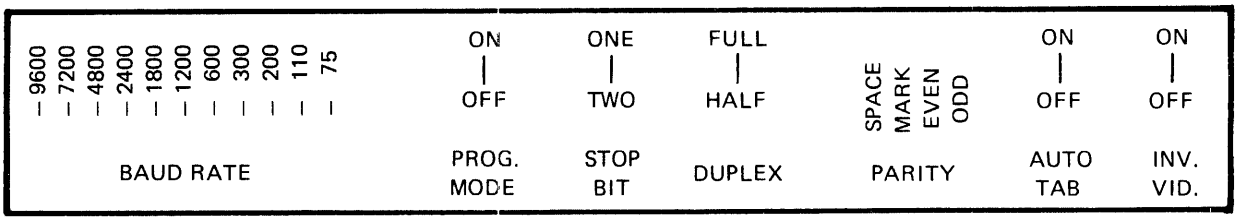

Figure E-1 Model 1200 Mode Selectors

CTRL-B (STX) Backspace (Nondestructive)

This code causes the cursor to backspace one character each time the code is used. To be effective, CTRL-B cannot be entered at the first character position on a line. When the cursor has been backspaced to the desired character position, the line may be changed by typing the desired characters. All other characters backspaced over can be restored and the cursor brought back to the end of the line in one of two ways:

- CTRL-F moves the cursor forward one character at a time.
- CTRL-Z "zooms" the cursor immediately to the end of the line.

CTRL-C (ETX) Capture the Last Line Entered

Entering this code causes the last line entered (maximum of 80 characters) to be displayed on the console. By using CTRL-C repeatedly, character strings can be concatenated. If an insert or delete function is performed, the CTRL-C code is rejected and a bell sounds to remind you that the buffer has now been overwritten. CTRL-C is also rejected if the display of data to the console has been suppressed by the use of CTRL-E.

CTRL-D (EOT) Device Control -- Echo Only

The next character entered after the CTRL-D code is echoed to the terminal but is not stored in the input buffer. This function could be helpful, for example, if an auxiliary peripheral is used that requires certain control characters to be entered at the console. The CTRL-D code can prevent the peripheral control characters from being interpreted as program input.

CTRL-E (ENQ) Echo Toggle

Each entry of CTRL-E changes the current echo state from ON to OFF, or from OFF to ON. This means that data display to the console screen can be controlled. Suppression of data display is useful for entering passwords without others being able to observe them. All functions work with echo off except CTRL-C, CTRL-R, CTRL-W, CTRL-], CTRL-^ and CTRL-_. A CTRL-M (carriage return), buffer full or CTRL-X turns echo back on. A CTRL-E is rejected if insert mode is in effect.

CTRL-F (ACK) Forward Space and Restore

This code is used to restore a line that has been backspaced over by the CTRL-B, CTRL-W or CTRL-] code. After the cursor has been moved to the desired position and the correction has been made, CTRL-F moves the cursor forward one character position at a time until it reaches the end of the line. CTRL-F is rejected if there are no characters to be restored.

CTRL-H (BS) Backspace (Destructive)

This code is used to delete a character or characters. Unlike CTRL-B, however, any character(s) backspaced over by using the the CTRL-H code cannot be restored by using the CTRL-F or CTRL-Z codes and must be retyped. If they are not retyped, blank spaces appear in those character positions. CTRL-H is rejected if attempted at the first character position in a line. On most terminals the CTRL-H code can be generated by the "backspace" key.

CTRL-L (FF) Set Page Pause Line Count

To set the CRT screen display for a specific number of lines, the CTRL-L code is entered, followed by depressing the control key again with another ASCII character. The numeric value of the ASCII character sets the number of lines to be displayed. To select a count for a 24-line CRT, enter the sequence: CTRL-L, CTRL-X (CTRL-X has a decimal value of 24).

The following table shows the proper combinations for line displays ranging from 1 to 24.

TABLE E-1 LINE DISPLAY COMBINATIONS

SEQUENCE	NUMBER OF LINES
CTRL-L CTRL-A	1
CTRL-L CTRL-B	2
CTRL-L CTRL-C	3
CTRL-L CTRL-D	4
CTRL-L CTRL-E	5
CTRL-L CTRL-F	6
CTRL-L CTRL-G	7
CTRL-L CTRL-H	8
CTRL-L CTRL-I	9
CTRL-L CTRL-J	10
CTRL-L CTRL-K	11
CTRL-L CTRL-L	12
CTRL-L CTRL-M	13
CTRL-L CTRL-N	14
CTRL-L CTRL-O	15
CTRL-L CTRL-P	16
CTRL-L CTRL-Q	17
CTRL-L CTRL-R	18
CTRL-L CTRL-S	19
CTRL-L CTRL-T	20
CTRL-L CTRL-U	21
CTRL-L CTRL-V	22
CTRL-L CTRL-W	23
CTRL-L CTRL-X	24

Each display of the requested number of lines is terminated with a bell sound. At this point the user may continue to the next page by entering a CR. This causes the same number of lines to appear; each CR, in fact, produces that number of lines until the page pause line count is changed. To change the count, terminate write by entering ESC or Break and enter a different sequence for the desired new line count (e.g., CTRL-L CTRL-O = 15 lines, etc.).

To cancel the page pause mode, use the sequence CTRL-L, CTRL-@ or CTRL-N. If the page pause mode is not terminated within five minutes, BIOC automatically continues output to prevent the terminal from being permanently tied up.

CTRL-M (CR) Terminate Read

This function is a carriage return. Entering CTRL-M indicates to BIOC that read should be terminated. If CTRL-M is entered at a location other than the end of the line, BIOC performs a zoom to the end of the line (EOL) before storing the carriage return and terminating the read request.

CTRL-N (SO) Neutralize Selected Options Back to Default

This code is entered to reset options to their default values. CTRL-N can be entered during read operations, during write operations, or between read and write operations. Entering CTRL-N performs the following functions:

- Resets the page pause to zero.
- Resets the backspace prompt character to CTRL-H.
- Resets the ASCII read prompt character to sysgen default.
- Resets the backspace and CR/LF protocol to sysgen default.
- Resets the output mode to print-on state.

CTRL-O (SI) Toggle Output Between Print-on and Print-off

To suppress output in the write mode, CTRL-O is used. To resume output, this code is used again. Alternately depressing CTRL-O causes output to terminate and resume; hence, the "toggle" characteristic. When using CTRL-O to select the print-off mode, a prompt can be immediately received by a terminate read (CTRL-M). If this is not done within 15 seconds after output ceases, BIOC prompts and reinstates the print-on mode automatically. The print-on mode is also reinstated upon successful completion of a read request, or upon entering CTRL-N for a neutralize function.

CTRL-P (DLE) Set ASCII Read Prompt Character

By entering CTRL-P and any ASCII character, that character becomes the designated prompt. When making the selection, the ASCII character is not displayed to the console, but is output by BIOC upon receipt of an ASCII read request. The read prompt function can be turned off by the sequence CTRL-P CTRL-X. To reset the ASCII read prompt character to the sysgen default, enter CTRL-N.

CTRL-Q (DC1) Removed from Input to Allow X-ON/X-OFF Flow Control

CTRL-R (DC2) Reprint Entered Line

When this code is entered, the current cursor location within the line determines the number of characters that are reprinted on the next line. All characters to the left of the cursor including blank spaces, are reprinted. The CTRL-R function is rejected if the echo state is not in effect (see CTRL-E).

The CTRL-R function is especially useful for hardcopy terminals where corrections are made over the existing typed lines. To view a "clean" line after all corrections have been made, CTRL-R is used.

CTRL-S (DC3) Removed from Input to Allow X-ON/X-OFF Flow Control

CTRL-T (DC4) Single Character Transparent Mode

The use of this code allows the entry of function control characters into the input buffer. The next character entered after a CTRL-T is entered directly into the input buffer.

CTRL-W (ETB) Word Backspace (Nondestructive)

CTRL-W causes the cursor to be backspaced (nondestructively) to the nearest nonalphabetic character. Thus, CTRL-W allows the cursor to backspace over one complete word, rather than one character, as with CTRL-B. Words backspaced over may be restored by the use of CTRL-F or CTRL-Z. CTRL-W is rejected if attempted at the beginning of a line.

CTRL-X (CAN) Cancel Current Input Line

All characters previously entered on the current line are deleted upon use of the code. Characters may not be restored with the CTRL-F or CTRL-Z functions. If no characters are on the line, CTRL-X is rejected. CTRL-X turns echo back on if it has been turned off with CTRL-E.

CTRL-Z (SUB) "Zoom" to Furthest End of Line

CTRL-Z can be used to restore a line that has been backspaced over by CTRL-B, CTRL-W, or CTRL-]. CTRL-Z causes the cursor to "zoom" to the end of the line, but is rejected if there are no characters to be restored.

CTRL-] (GS) Backward Character Search (Nondestructive)

This code serves to locate a specific character on the current line. For example, to find the character $, enter CTRL-]$. BIOC backspaces until the first $ is found. To find any additional dollar signs on the same line, the code must be entered again for each time the $ symbol appears. Characters backspaced over may be restored by using CTRL-F or CTRL-Z. CTRL-] will be rejected if attempted at the beginning of the line.

CTRL-^ (RS) Toggle Between Insert On and Insert Off

Each CTRL-^ toggles from insert on to insert off or from insert off to insert on. When the insert mode is selected, characters typed are inserted to the left of the character currently at the cursor position. The insert mode may be selected only when the echo state is in effect and the cursor is positioned at a location other than end of the line. Insert mode is terminated by another CTRL-^ or by any command that moves the cursor to the end of line (e.g., CTRL-Z). The CTRL-C and CTRL-E functions are not valid while in the insert mode. All other functions are valid if the cursor is not in motion. All data entered while the cursor is in motion is ignored until the cursor has stopped.

CTRL-_ (US) Delete Character

Each CTRL-_ deletes the character currently at the cursor position. The delete code is valid only when the echo state is in effect and the cursor is positioned at a location other than end of line. Characters entered while the cursor is in motion are ignored.

Write Mode:

If the following codes are entered while BIOC is writing to the console, the described actions occur:

BREAK

This key terminates Write with a Break status.

ESC

This key terminates Write with a Break status.

CTRL-Q

This code resumes Write after Write has been suspended by CTRL-T or CTRL-S functions.

CTRL-R

This code resumes Write after Write has been suspended by CTRL-T or CTRL-S functions.

CTRL-S

This code suspends Write until Write is resumed by CTRL-R or CTRL-Q, or until the BREAK or ESC key is depressed.

CTRL-T

This code suspends Write until Write is resumed by CTRL-R or CTRL-Q, or until the BREAK or ESC key is depressed.

APPENDIX F
VIRTUAL CONSOLE FACILITY (VCF)

F.1 INTRODUCTION

The VCF provides the ability to operate a system without a dedicated system console or to use any terminal as the system console. This is accomplished through the supervisor call (SVC) intercept support of OS/32 with redirection of input/output (I/O) from the system console to some other device or to the VCF log file.

See Figure F-1 for a representation of the relationship of other system task environments (Reliance, ECM or MTM) to VCF.

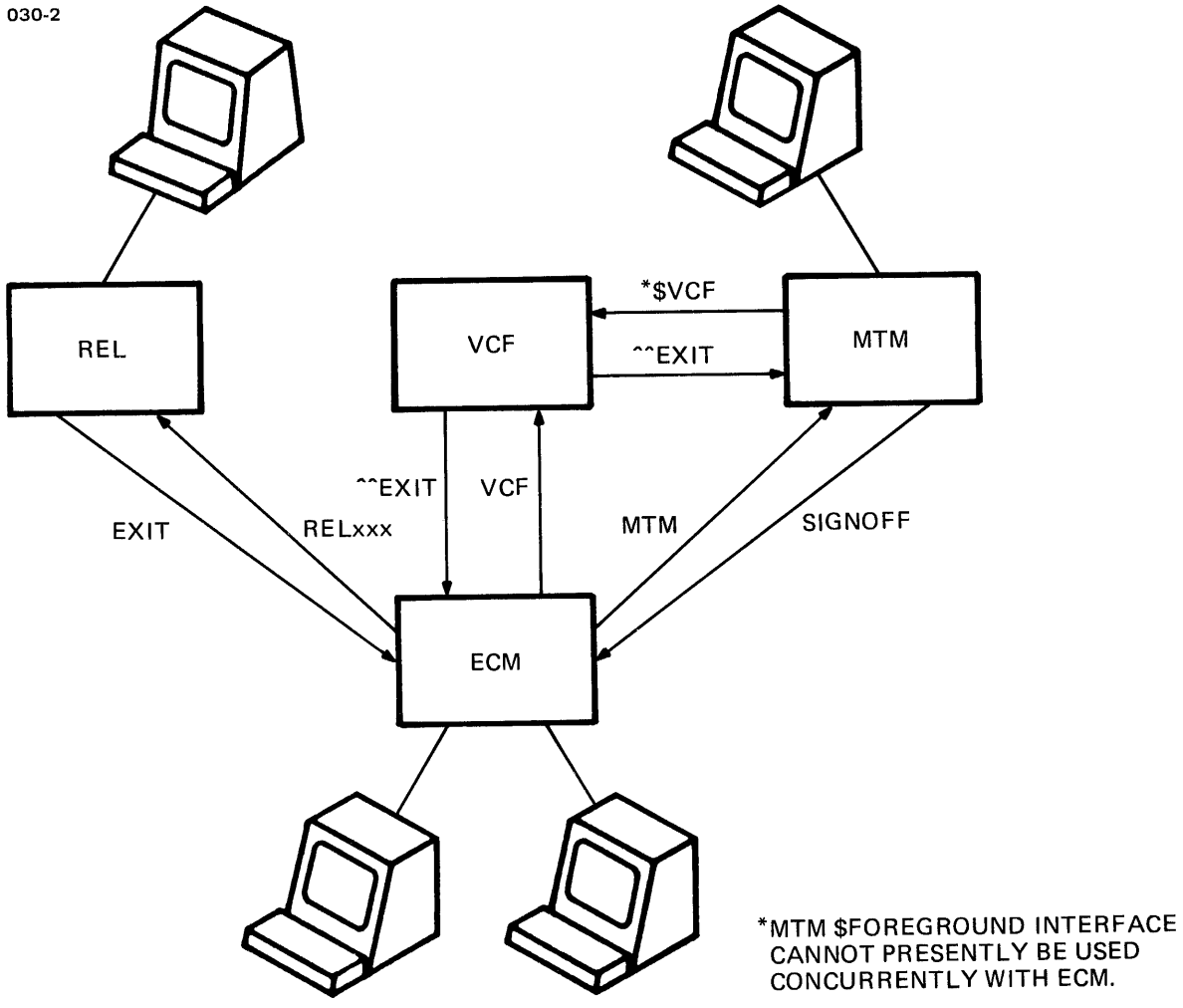

Figure F-1 Relationship of System Tasks to VCF

An overview of VCF's operational states is provided in Figure F-2.

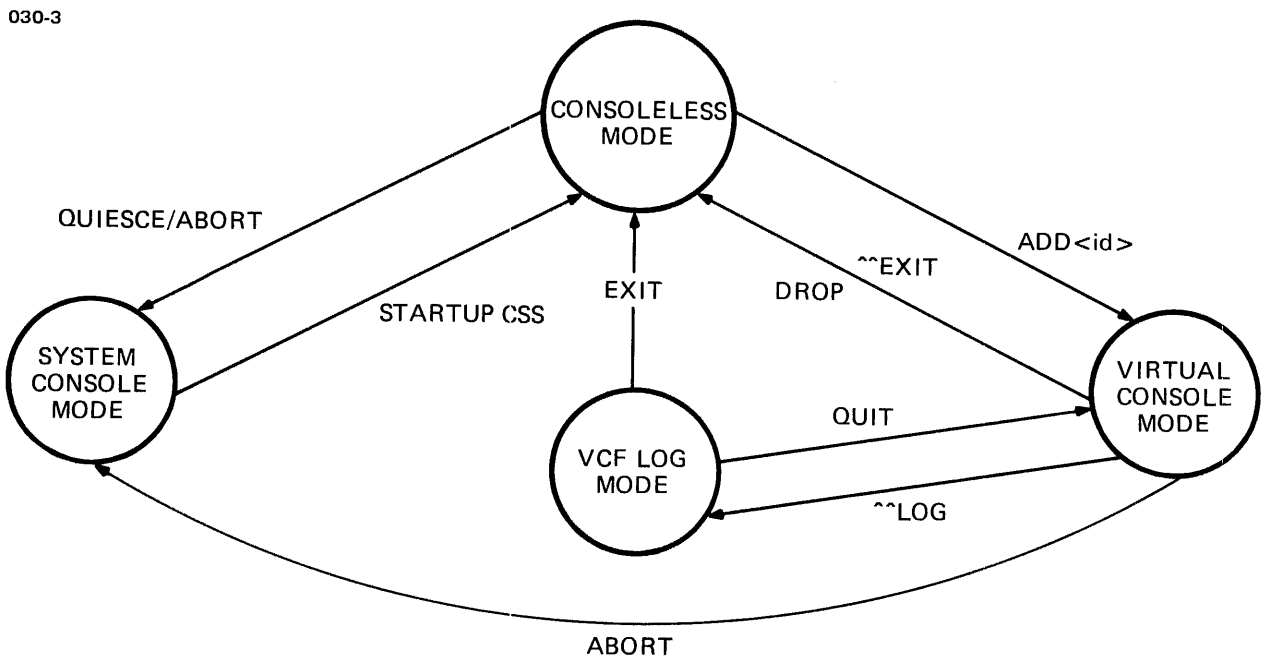

Figure F-2 VCF State Diagram

F.2 REQUIREMENTS

Since VCF utilizes SVC intercept support to achieve the redirection of I/O, the operating system must be system generated (sysgened) with intercept support. If VCF is to support a VCF log file, the system must be configured with one or more disks and indexed file support.

If a terminal is being used as both the system console and an application user terminal, it must be sysgened as two devices sharing the same address but having different names. The actual console should be named CON: and the alternate device name can be any acceptable device name, however, CONA: is suggested. Therefore, there will be two paths and data structures (DCBs) to the same physical device.

F.3 VCF START COMMAND

The START command parameters (PSWD, LOGFILE and NEWLOG) are used to control password checking and to establish a log file.

Format:

```
                    ,LOGFILE=logfd
START ,PSWD=pfd
                    ,NEWLOG=logfd
```

Parameters:

PSWD= pfd specifies the file descriptor of the VCF password file which is used to validate attempts to attach a terminal to VCF. If a password file is specified, it must reside on account 255. If no password is specified, the default password file (VCF32.PWF/255) on the system volume is used.

LOGFILE= logfd specifies the file descriptor of the VCF log file to be used for the storage of output that would normally go to the system console. Use of this parameter will append to an existing file or allocate the file if none exists. The log file will be disabled if LOGFILE=NULL: is specified.

NEWLOG= logfd specifies the file descriptor of the VCF log file to be used for the storage of output that would normally go to the system console. Use of this parameter will allocate a new VCF log file. If the log file exists, it will be deleted and reallocated. The log file will be disabled if NEWLOG=NULL: is specified.

Functional Details:

If neither the LOGFILE nor NEWLOG parameters are used when VCF is started, the default log file VCF32.LOG/S on the system volume is used.

The log established by the SET LOG operator command is completely independent of the VCF log file.

F.3.1 Use of Command Substitution System (CSS) to Start VCF

Since VCF enters consoleless mode when it is loaded and started, there is no way to enter system commands in a single terminal

configuration or even to be able to enter virtual console mode. To avoid these difficulties, it is necessary to use a CSS to load and start VCF. When a CSS is used, the system is receiving commands from the CSS and not from the console. A CSS remains in effect until it encounters a $EXIT command or an error. A simple CSS could be structured in the following mannner:

```
LOAD  taskid, fd
TASK taskid
START[,PSWD=passwordfd][,NEWLOG=logfd]
TASK monitor task
SEND ADD nonintercepted_device_name
$EXIT
```

The monitor task specified could be .MTM, a Reliance controller task, ECM or some other task.

A typical example follows:

```
LOAD VC,VCF.TSK
TA VC
ST,PSWD=VC.PWF,NEW=LOG.LOG
TA .MTM
SEND ADD CON1:  ;*ADD THE TERMINAL TO MTM
$EXIT
```

F.4 CONSOLELESS SYSTEM OPERATION

When no terminal is connected to VCF, the system is operating in consoleless mode. The usual system output is routed to the VCF log file instead of to the system console. The contents of the VCF log file can be reviewed through the VCF log command mode or any other other application designed to output ASCII files.

Foreground tasks which request input from the system console should not be run when the system is in consoleless mode. However, if this is done, VCF will return a "device unavailable" status to the user. When the system enters consoleless mode, VCF terminates CSS BUILDs and preserves any active or queued command reads until a console is reestablished.

When the system console terminal is being used as an application terminal, the system is in consoleless mode. It is during this time that there is no means for the user to be alerted to serious problems. Since the operating system crash handler is independent of SVCs and SVC intercept, if a crash should occur, it will bypass VCF.

F.5 USER TERMINAL AS THE SYSTEM CONSOLE

Any user terminal can become the system console and be used to issue system commands by attaching the user terminal to VCF in the virtual console mode. This is done in different ways depending upon the particular environment in effect. From the ECM menu, a user would enter the taskid with which VCF was loaded. From the MTM environment, a user would enter $taskid, if the account in use has the $foreground privilege. From Reliance, a user would exit the Reliance environment to the ECM menu and then enter the taskid with which VCF was loaded. Each of these methods would also include the use of a password if there was a password contained in the VCF password file being used when the VCF was loaded and started.

Only one terminal can be the system console at one time. If another user attempts to connect an additional terminal to VCF, a message will be displayed to their terminal as follows:

```
Sorry.  Console already in use
```

If this condition should occur and the terminal is under MTM control, a TSPC-ERR will be generated. MTM is informing the user that the maximum number of allowed terminals has been exceeded.

The virtual console differs from the system console in one case. When the operator is typing at the system console and must be prompted with a message, the message appears after the operator depresses the carriage return (CR). When using the virtual console, the message is written immediately, it does not wait until the carriage return is depressed.

F.6 PASSWORD PROTECTION FOR CONSOLE ACCESS

If the password is null in the VCF password file, then no password is required when the user attempts to attach a terminal to VCF.

When a VCF password file is established, it must exist on account 255. Within the password file, the password must start in the first byte of the record. It must be terminated by a colon (:). Upper-case characters are considered different from lower-case characters. Leading or imbedded blanks and non-printing characters are considered part of the password.

In addition to the password (if required), a multi-terminal monitor (MTM) user must have the $foreground privilege in order to access VCF from the MTM environment.

F.7 VCF LOG FILE

VCF will optionally place a copy of all I/O which would have ordinarily been displayed on the system console into a disk file

called the VCF log file; whether or not there is a terminal attached to VCF. The purpose of this file is to keep a record of console activity for later review. If space on the disk is exhausted, VCF outputs a message if a terminal is attached or waits until one is attached. Logging to the VCF log file is suspended until corrective action is taken.

The user has control over the specification of the VCF log file through the LOGFILE and NEWLOG parameters of the START command. The LOGFILE parameter will append to an existing file or allocate one if none exists. The NEWLOG parameter will delete a file if it exists and reallocate a new log file with the same name. If the NEWLOG parameter of the START command is used within the CSS to load and start VCF, an empty VCF log file will be created each time VCF is loaded and started.

F.8 VCF LOG FILE COMMANDS

VCF supports a small set of commands to manipulate the log file from within the log file command mode. These commands are internal to VCF and do not get copied into the log file.

The ^^LOG command allows the user to enter the log file command mode. While in this mode, if any input is entered other than the set of valid log file commands, a HELP menu will be displayed.

F.8.1 TOP Command

This command positions VCF to the top (i.e., the oldest records) of the log file and then displays as many messages as will fit on one screen.

Format:

TOP

F.8.2 BOTTOM Command

This command positions VCF to the bottom (i.e., the newest records) of the log file and then displays as many messages as will fit on one screen.

Format:

BOTTOM

F.8.3 PREVIOUS Command

This command displays a screenful of messages older than the screenful of messages currently displayed.

Format:

PREV

F.8.4 NEXT Command

This command will display a screenful of messages more recent than the current screenful of messages. A carriage return (CR) will also perform this function.

Format:

NEXT

F.8.5 LOGFILE Command

This command selects a new file to be used for logging. See the ^^LOGFILE command.

Format:

LOGFILE = fd

Parameter:

fd	specifies the file descriptor of the VCF log file. The current file, if any, will be closed, and the specified file will become the VCF log file.

F.8.6 NEWLOG Command

This command either creates a new log file or deletes and reallocates an existing log file. See the ^^NEWLOG command.

Format

NEWLOG = fd

Parameter:

fd	specifies the file descriptor of the new log file for the storage of system output. If the fd specified already exists, it will be deleted and reallocated.

F.8.7 QUIT Command

This command will return the terminal to the virtual console mode, (i.e., exit the log browse mode).

Format:

QUIT

F.8.8 EXIT Command

This command will return the terminal to the ECM or MTM mode. Consoleless mode will be resumed.

Format:

EXIT

F.9 VCF "^^" COMMANDS

VCF recognizes a set of commands beginning with "^^". These commands are entered when the terminal is in virtual console mode. Since invalid ^^ commands will not be recognized by VCF, they will be passed on to the system where they will generate a MNEM-ERR response.

F.9.1 ^^LOG Command

This command switches VCF from virtual console mode into log file command mode to allow for the review of the VCF log file. Once the user has entered the log file command mode, all of the VCF log file commands may be used. See Section F.8 for information about the VCF log file commands.

Format:

^^LOG

F.9.2 ^^LOGFILE Command

This command selects the log file.

Format:

^^LOGFILE = fd

Parameter:

fd	specifies the file descriptor of the log file to be selected. If logging is currently enabled, the current log file will be closed and the specified file will be used as the log file. If necessary, the file will be allocated. If logging is disabled, the specified file will be used and logging will become enabled.

F.9.3 ^^NEWLOG Command

This command creates a new log file.

Format:

^^NEWLOG = fd

Parameter:

fd	specifies the file descriptor of the new log file for the storage of system output. If logging is currently enabled, the current log file will be closed and the specified file will be used as the log file. If it already exists, it will be deleted and reallocated. If logging is currently disabled, this command will enable it using the specified file. If ^^NEWLOG is entered with no argument, the current file will be deleted and reallocated.

F.9.4 ^^EXIT Command

This command is used to exit from the virtual console mode and return to the previous environment (ECM or MTM). VCF resumes consoleless mode. The VCF log file, if any, continues to store the output which would have normally been displayed on the system console.

Format:

```
^^EXIT
```

F.9.5 ^^PASSWORD Command

This command allows the user to specify a new password for the VCF password file while in virtual console mode. If a password already exists, the user will be prompted for it. Then the user will be prompted for a new password. When the user enters both passwords, they will not be echoed to the screen. Once the new password is entered, it will be requested again to verify that it was not mistyped.

Prompt sequence:

```
^^PASSWORD or ^^PSWD
CURRENT PASSWORD:          (entry not echoed)
    NEW PASSWORD:          (entry not echoed)
    NEW PASSWORD:          (entry not echoed)
```

When the above prompt sequence is complete, a new password will be established within the VCF password file.

F.10 CONSOLE RECOVERY

The operating system provides a mechanism whereby the system console is recovered when there are errors in VCF. If VCF is cancelled or terminates itself, the system console will be recovered.

In addition to the operating system providing for system console recovery mechanisms, VCF also supports a message interface for recovery when problems occur within VCF. VCF will accept messages to release a terminal or to terminate itself. These messages can be included in tasks (via SVC6) that are written to monitor VCF and intervene if there are problems. They may also be sent directly from the virtual console, but in a slightly different format. See the following functional details.

NOTE

No such recovery tasks are supplied as part of the OS/32 package.

F.10.1 DROP Message

This message will cause VCF to clean up any I/O to the attached terminal, close the logical unit (lu) and release the terminal.

Format:

DROP (or SEND DROP)

Functional Details:

If the message is entered at the virtual console, the SEND DROP format is used.

F.10.2 QUIESCE Message

This message will terminate VCF by removing the SVC intercept as soon as the attached terminal exits from VCF.

Format:

QUIESCE (or SEND QUIESCE)

Functional Details:

If this message is entered at the virtual console, the SEND QUIESCE format is used.

F.10.3 ABORT Message

This message causes pending I/O to be halted, the virtual console terminal to be deassigned (dropped) and VCF to be terminated. The system console will be recovered immediately.

Format:

ABORT (or SEND ABORT)

Functional Details:

If this message is entered at the virtual console, the SEND ABORT format is used.

F.11 ERROR HANDLING

Errors encountered before VCF creates the SVC intercept are routed to the system console. After the intercept is created, errors appear either on the virtual console terminal or within the log file. Fatal errors cause VCF to remove the intercept path and terminate, returning control to the physical console.

F.12 END OF TASK (EOT) CODES

The possible task termination codes that will be issued at the termination of the VCF task are as follows:

- 0 indicates normal termination.
- 1 indicates an invalid start parameter was used (see Section F.3). The invalid parameter will be displayed prior to the EOT code.
- 2 indicates that the SVC7 assign for the password file failed.
- 3 indicates that the SVC7 allocate for a new log file failed.
- 4 indicates that the SVC7 delete for the old log file failed.
- 5 indicates that the SVC7 assign for the old log file failed.
- 6 indicates that the VCF log file is not an indexed file.
- 8 indicates that VCF failed to create an intercept on the system console.
- 9 indicates VCF was unable to insert data into the intercepted I/O buffer or parameter block.
- 10 indicates VCF was unable to get data from the intercepted buffer or parameter block.
- 11 indicates that the task intercepted could not be released for I/O proceed.
- 12 indicates that an attempt to post I/O completion status and release an intercepted I/O failed.
- 13 indicates that an attempt to continue an intercepted I/O failed.

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