PERKIN-ELMER

SYSTEM GENERATION/32
(SYSGEN/32)

Reference Manual

48-037 F00 R00

The information in this document is subject to change without notice and should not be construed as a commitment by The Perkin-Elmer Corporation. The Perkin-Elmer Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license, and it can be used or copied only in a manner permitted by that license. Any copy of the described software must include the Perkin-Elmer copyright notice. Title to and ownership of the described software and any copies thereof shall remain in The Perkin-Elmer Corporation.

The Perkin-Elmer Corporation assumes no responsibility for the use or reliability of its software on equipment that is not supplied by Perkin-Elmer.

The Perkin-Elmer Corporation, Computer Systems Division 2 Crescent Place, Oceanport, New Jersey 07757

Printed in the United States of America

TABLE OF CONTENTS

CHAPTERS (Continued)

CHAPTERS (Continued)

CHAPTERS (Continued)

APPENDIXES

FIGURES

TABLES

TABLES (Continued)

PREFACE

This is a new manual that describes the System Generation/32 (Sysgen/32) program and the procedures to produce a 32-bit operating system. This manual is intended for system programmers and operators.

Chapter 1 introduces the SYSGEN CSS procedure and describes its phases. Chapter 1 also explains how to load and start the Sysgen/32 program. The Sysgen/32 commands that cause a configuration input file to be processed are described in detail. Chapter 2 details the sysgen configuration input statements that make up the input file. Chapter 3 lists and describes the libraries required by the Sysgen/32 program and explains how to tailor library modules to user needs and include the modified modules in the appropriate library. Chapter 4 details the OS/32-supported devices. Chapter 5 is written for the less experienced user and contains sample Sysgen/32 sessions.

Appendix A compares the Sysgen/32 and the OS/32 configuration utility program (CUP) configuration statement defaults. Appendix B lists the sysgen messages, and Appendix C is a summary of the Sysgen/32 commands and configuration statements. Appendix D compares OS/32 CUP and Sysgen/32 configuration statements.

This manual applies to the OS/32 R06.1 software release and higher. The following manuals can be used in conjunction with this manual:

MANUAL TITLE	PUBLICATION NUMBER
OS/32 Mini I/O System User Manual	S29-485
OS/32 Basic Data Communications Reference Manual	S29-541
OS/32 Copy User Guide	S29-676
OS/32 Link Reference Manual	48-005
OS/32 System Macro Library Reference Manual	48-006
OS/32 Edit User Guide	48-008

OS/32 Library Loader Reference Manual	48-020
OS/32 System Planning and Configuration Guide	48-024
OS/32 Operator Reference Manual	48-030
OS/32 Application Level Programmer Reference Manual	48-039
OS/32 Asynchronous Communications Reference Manual	48-047
Common Assembly Language (CAL) Reference Manual	48-050
CAL Macro/32 Processor and Macro Library Utility Reference Manual	48-057
32-Bit Systems User Documentation Summary	50-003

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

CHAPTER 1
INTRODUCTION TO SYSGEN/32

1.1 INTRODUCTION

Sysgen/32 is a program designed to enable a user to create and tailor an operating system to accomodate particular systems requirements. In Sysgen/32, hardware and software features for the operating system are selected and defined through the use of sysgen configuration statements. These statements are defined in a sysgen configuration input file. Driver and system modules provided in the OS/32 package are selected by Sysgen/32, based on the requirements indicated in these sysgen statements.

The user can create a new configuration input file or modify an existing configuration input file using Sysgen/32 commands. The Sysgen/32 EDIT command enables the user to use all of the OS/32 EDIT command repertoire. The HELP command and the CONVERSATIONAL command are available to aid the user during the creation of a configuration input file.

Once a configuration input file is created, it is processed by the Sysgen/32 program to produce macro calls. These macros are subsequently expanded, assembled, and linked to yield an operating system. Figure 1-1 details the step-by-step process that results in the generation of an operating system using Sysgen/32.

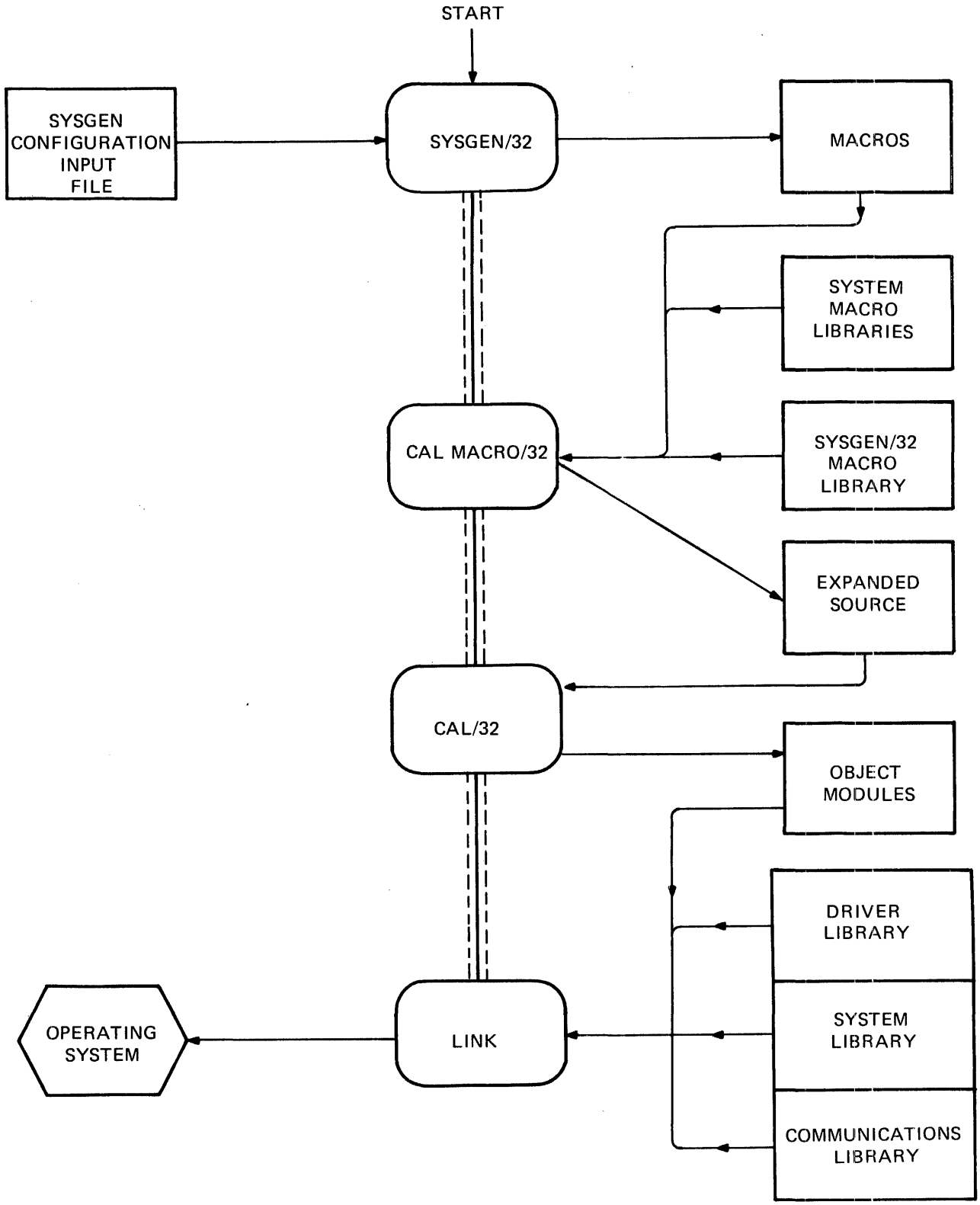


Figure 1-1 Generation of an Operating System Using Sysgen/32

As shown in Figure 1-1, the system generation process involves four general steps:

1. A configuration input file is created and processed via the Sysgen/32 program, resulting in a set of macro calls.

2. The macro calls are expanded using CAL MACRO/32.

3. The expanded macros are assembled using CAL/32, resulting in object modules.

4. The object modules are linked using OS/32 LINK to yield an operating system.

The user has the option to perform these steps in a single process, by using a CSS procedure called SYSGEN, or in steps, by loading and executing each program in the overall procedure.

1.2 CREATING AN OPERATING SYSTEM USING THE SYSGEN CSS

The SYSGEN CSS can be used to create an operating system with minimal user interaction. The user creates the sysgen configuration input file and passes the filename and other optional parameters to the CSS.

The macro generation, expansion, assembly, and linkage steps are performed automatically according to the SYSGEN CSS instructions. Figure 1-2 details the components of the SYSGEN CSS.

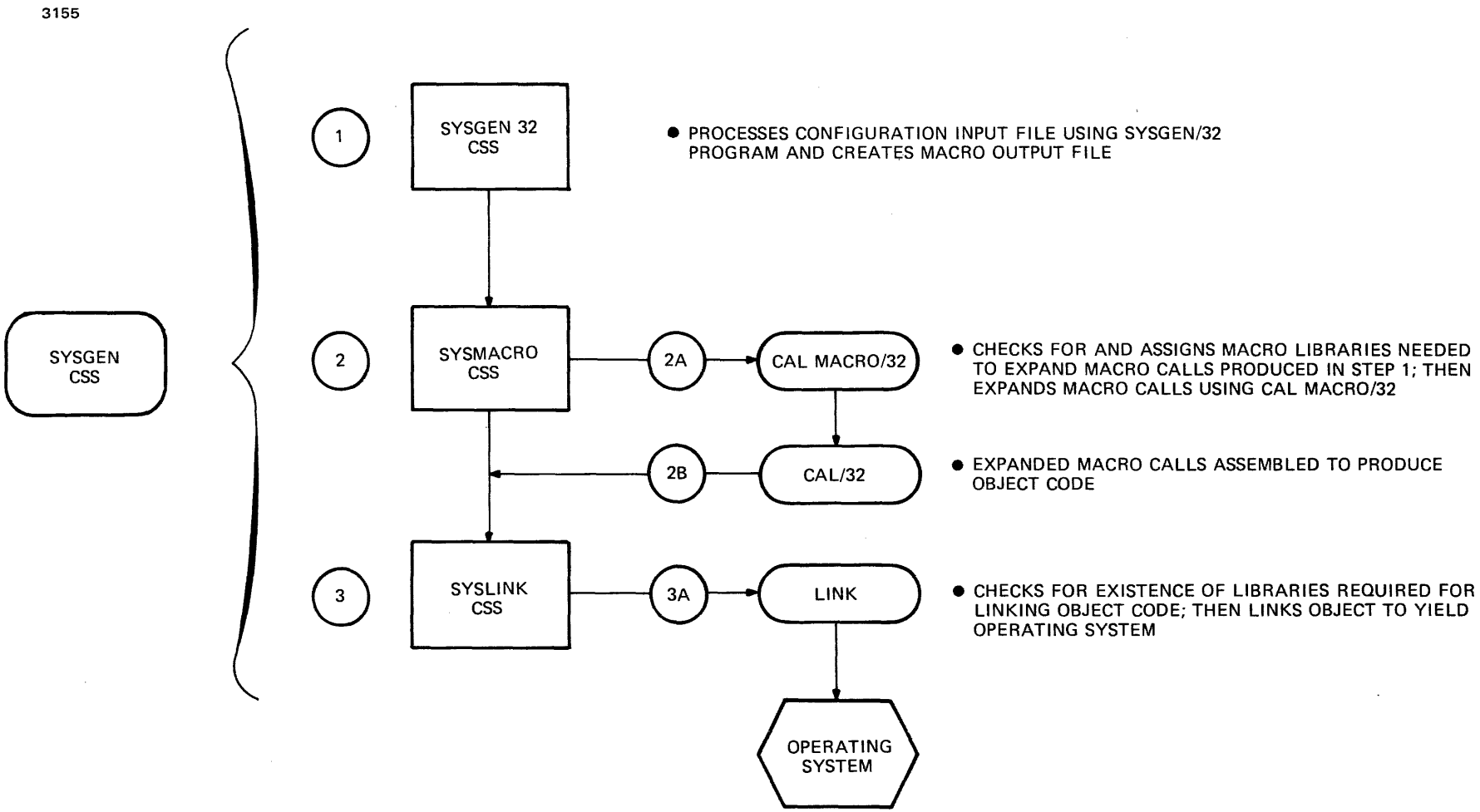


Figure 1-2 Generating an Operating System Using the SYSGEN CSS

1.2.1 Starting the SYSGEN CSS

The following format is used when starting the SYSGEN CSS.

Format:

```
SYSGEN input filename,[list filename],[segsize inc]
      ,[library vol ]  ,[output vol ]
       [ user vol   ]   [ user vol  ]
      ,[print filename]
```

Parameters:

input filename is the 1- to 8-character name of the sysgen configuration input file. The CSS assumes a default extension of .SYS. If the file specified does not exist, an error message is generated and the CSS will abort.

list filename is the file descriptor of the list file to which all messages are written. If this parameter is omitted, a default file with the name (input filename) .LST, is allocated.

segsize inc is a decimal number specifying the number of kilobytes of additional memory available for use by the Sysgen/32 program.

library volume is a 1- to 4-character name (with colon) of the disk volume containing the libraries used by CAL MACRO/32 and LINK during CSS execution. If this parameter is omitted, the user volume is the default.

output volume is a 1- to 4-character name (with colon) of the disk volume where the newly created operating system will reside. If this parameter is omitted, the user volume is the default.

print filename is the file descriptor of the file that will contain the list output of the CAL/32 program if macro expansion is successfully completed, or of the CAL MACRO/32 program if macro expansion was not successfully completed. The contents of this file are useful as a debugging aid if macro expansion or assembly results in an error. If this parameter is omitted, the CSS assigns output to the NULL device.

Example:

```
SYSGEN CONFIG1, LIST1, 10, M300:, M301:, PRINT1
```

This example initiates the SYSGEN CSS and passes the following information to the CSS:

- CONFIG1 is the configuration input file. An extension of .SYS is assumed by the CSS.
- LIST1 is the list file for messages.
- 10 is the segment size increment.
- M300: is the library volume containing the libraries used by CAL MACRO/32 and LINK.
- M301: is the volume on which the new operating system will reside.
- PRINT1 is the file that will contain the CAL MACRO/32 or CAL/32 list output for debugging purposes.

Functional Details:

If an error occurs during the execution of the SYSGEN CSS, an error message is written to the console and the CSS is aborted. If the CSS reaches a successful completion, the following information is displayed to the console:

- The OSMAP filename = (input filename) .LST or user-specified fd
- The OS Object filename = (input filename) .OBJ
- The OS Task filename = (output volume name + input filename) .OS

1.2.2 Components of the SYSGEN CSS

The SYSGEN CSS is comprised of three CSS modules:

- SYSGEN32 CSS,
- SYSMACRO CSS, and
- SYSLINK CSS.

These modules can be run independently, outside of the SYSGEN CSS procedure. However, when they are executed independently, the user must pass the appropriate parameters to each CSS. It is particularly useful to be able to execute the SYSLINK CSS routine independently, since this enables a previously linked OS to be relinked to incorporate changes in system and driver library modules. The following sections detail the procedures for executing the SYSGEN32, SYSMACRO, and SYSLINK CSS routines independently.

1.2.2.1 Executing the SYSGEN 32 CSS

The SYSGEN32 CSS executes the Sysgen/32 program which processes the sysgen configuration input file and generates macro calls.

Format:

SYSGEN32 input filename ,[list filename],[segsize increment]

Parameters:

input filename	is the 1- to 8-character name of the sysgen configuration input file. The CSS routine assumes an extension of .SYS. If the file specified does not exist, an error messge is generated and the CSS aborts.
list filename	is the file descriptor of the list file to which messages are written. If this parameter is omitted, a list file (input filename .LST) is allocated.
segsize increment	is a decimal number specifying the number of kilobytes of additional memory available for use by the Sysgen/32 program.

Functional Details:

If the CSS encounters an error while executing (end of task code other than 0), an error message is generated and the CSS will abort. The list file should be checked for errors. If the CSS reaches a successful completion (end of task code = 0), the file containing the macro calls generated by the Sysgen/32 program will be contained in a file named:

(input filename).MAC

This file is used by the next CSS procedure, SYSMACRO.

1.2.2.2 Executing the SYSMACRO CSS

The SYSMACRO CSS takes the macro calls generated by the Sysgen/32 program, expands them using MACRO/32, and assembles the expanded source modules using CAL/32.

Format:

```
SYSMACRO macro output filename,[library volume]
                               [user volume   ]

        ,[print filename]
```

Parameters:

macro output filename	is the 1- to 8-character name of the file containing the macro calls generated by the Sysgen/32 program. The CSS assumes an extension of .MAC. If the specified file does not exist, an error message is generated and the CSS will abort.
library volume	is the name (colon included) of the disk volume containing the libraries used by CAL MACRO/32 during CSS execution. If this parameter is omitted, the user volume is the default.
print filename	is the 1- to 8-character name of the file that will contain the list output of the CAL MACRO/32 or CAL/32 programs.

Functional Details:

If the CSS encounters an error (end of task code other then 0), an error message is generated and the CSS will abort.

If the CSS reaches a successful completion (end of task code = 0), the object module assembled by CAL/32 will be contained in a file named:

```
(macro output filename).OBJ
```

This file will be used by the next CSS routine, SYSLINK CSS.

1.2.2.3 Executing the SYSLINK CSS

The SYSLINK CSS takes the object modules assembled in the SYSMACRO CSS and links the object with the appropriate libraries to produce an operating system.

Format:

```
SYSLINK object filename,[map filename],[library volume]
                                       [user volume  ]

        ,[output volume]
        ,[user volume  ]
```

Parameters:

object filename	is the 1- to 8-character name of the file containing the CAL produced object code generated during the SYSMACRO CSS. If the specified file does not exist, an error message is generated and the CSS is aborted.
map filename	is the file descriptor of a file to which the OS map is appended. If this parameter is omitted, the CSS will append the map to a file called (cal object filename) .LST, allocating it if necessary.
library volume	is the name (colon included) of the volume where the system and driver libraries reside. If this parameter is omitted, the user volume is the default.
output volume	is the name (colon included) of the disk volume where the newly created OS will reside.

Functional Details:

If an error occurs during execution of the SYSLINK CSS (end of task code other than 0), an error message is generated and the CSS is aborted.

If this CSS reaches a successful completion, the following information is displayed:

OSMAP file = (object filename).LST or a user-specified fd

OS object file = (object filename).OBJ

OS Task file = (output volume name + object filename).OS

1.3 USING THE SYSGEN/32 PROGRAM

The Sysgen/32 program enables a user to create and/or process a sysgen configuration input file to generate macro calls. The option to process a previously generated configuration input file or interactively create and process a new configuration input file is available.

The Sysgen/32 program runs in batch and interactive environments. In a batch environment, the program processes the configuration input file without user interaction. In an interactive environment, the user can create the configuration input file directly from the command device and correct run time errors as they occur.

1.3.1 Loading and Starting the Sysgen/32 Program

The following commands are used to load and start the Sysgen/32 program.

1.3.1.1 LOAD Command

The system LOAD command loads Sysgen/32 into memory.

Format:

```
LOAD SYSGEN32 [,segsize]
```

Functional Details:

segsize — is an optional parameter that specifies the segment size increment. This increment must be large enough to accommodate processing of all the configured devices.

If the segsize is not large enough, the message:

```
LINE____ADDR____STACK OVERFLOW
TASK PAUSED
```

will be displayed. The task should then be cancelled and reloaded with a larger increment.

| START |

1.3.1.2 START Command

The system START command begins execution of the Sysgen/32 program. All parameters are optional. The INPUT and OUTPUT parameters specify the configuration input file and the macro output file, respectively. The LIST parameter specifies the list device or file. The COMMAND parameter specifies the command input device and establishes whether the Sysgen/32 program will execute in a batch or interactive environment.

Format:

START [,INPUT=fd_1][,OUTPUT=fd_2][,COMMAND=fd_3][,LIST=fd_4]

Parameters:

INPUT=	fd_1 specifies the configuration input file to be processed by the Sysgen/32 program.
OUTPUT=	fd_2 specifies the output file to which macro calls generated by Sysgen/32 will be written. The output file cannot be an existing file.
COMMAND=	fd_3 specifies the command input device. This parameter establishes whether the environment is batch or interactive. If an interactive device is specified, the environment is interactive. CON: is the default for a command device.
LIST=	fd_4 specifies the device or file to which all list output and messages generated during sysgen execution are sent. If the list parameter specifies a file, the file must already exist. PR: is the default list device.

Functional Details:

If the START command is entered with both INPUT and OUTPUT parameters specified and the command device is omitted, the Sysgen/32 program will immediately process the configuration

input file and assume a batch environment unless the input file is empty. If the specified input file is empty, the program will display the following message:

```
READY FOR CONFIGURATICN INPUT
```

The program then waits for the user to interactively input configuration input statements that will be used to create the configuration input file.

If the START command is entered without the INPUT and OUTPUT parameters, the Sysgen/32 commands described in the following sections can be used to: create a sysgen input file in a conversational mode (CONVERSATIONAL), specify the configuration input file (INPUT), specify the macro output file (OUTPUT), modify the sysgen configuration input file (EDIT), and initiate processing of the sysgen configuration input file (PROCESS). The HELP command is also available as a user aid.

1.4 SYSGEN/32 COMMANDS

The following Sysgen/32 commands are available:

- INPUT
- CUTPUT
- PROCESS
- EDIT
- CONVERSATICNAL
- HELP
- PAUSE
- END

INPUT

1.4.1 INPUT Command

The INPUT command specifies a configuration input file to be used as input to the Sysgen/32 program. This command is used if the INPUT parameter was not specified with the START command.

Format:

```
INPUT fd
```

Parameter:

fd	is the file descriptor of a configuration input file to be processed by the Sysgen/32 program.

Functional Details:

If the specified input file is empty, and the command device is an interactive device, the input file can be created either by entering configuration statements directly from the command device after the PROCESS command is entered, or conversationally. See Section 1.4.5.

1.4.2 OUTPUT Command

The OUTPUT command specifies an output file to receive the macro calls generated by Sysgen/32. This command is used if the OUTPUT parameter was not specified with the START command.

Format:

```
QUTPUT fd
```

Parameter:

fd	is the file descriptor of the file that receives the Sysgen/32-generated macro calls.

Functional Details:

If the OUTPUT command is entered with the name of an existing file, an error is generated.

| PROCESS |

1.4.3 PROCESS Command

The PROCESS command initiates processing of the sysgen configuration input file.

Format:

PROCESS

Functional Details:

The PROCESS command is not used if both a nonempty input file and an output file are specified as parameters of the START command but no command device is entered.

1.4.4 EDIT Command

The EDIT command makes the entire OS/32 Edit command repertoire available to the user. This command is available during program execution in interactive mode only.

Format:

EDIT

Functional Details:

All of the OS/32 Edit commands can be used to correct or modify the configuration input file. When the changes are made and the file is saved, the END or DONE command terminates the edit session and returns control to the Sysgen/32 program.

Example:

```
>INPUT  SYS1.SYS                  } specify input and output
>OUTPUT  SYS1.MAC                 } files
>PROCESS                          }

ILLEGAL VALUE     3280            } error encountered
READY FOR SYSGEN COMMANDS         } sysgen program enters command
                                    input mode

>EDIT                             }
READY FOR EDIT COMMANDS           }
>GET SYS1.SYS                     }
>OPT LIST=CON:                    } enter edit mode and correct
>T/3280/                          } error
2 CPU 3280                        }
>SU/3280/3230/                    }
>DONE                             }
WORKFILE = FIXD:SYS1.000
RENUMBERED INPUT FILE AVAILABLE FIXD:SYS1.SYS
>READY FOR SYSGEN COMMANDS        } resume Sysgen/32 processing
>PROCESS                          }
```

1.4.5 CONVERSATIONAL Command

The CONVERSATIONAL command initiates a sysgen prompt and user response session in an interactive environment. This prompt and response session is a user aid in creating a configuration input file.

Format:

CONVERSATIONAL

Functional Details:

The Sysgen/32 program issues interactive prompts relating to the hardware configuration and software options. The possible responses, in parentheses, and the defaults, in brackets, are displayed after each prompt where applicable. Defaults are taken if CR is depressed for all but device prompts. A response must be entered for all device prompts.

The program will create sysgen configuration statements based on the responses to the prompts. Acceptable statements will be written to the specified input file. Nonacceptable statements or responses will cause the program to generate an error message and to reissue the appropriate prompt or prompts until an acceptable response is generated.

If the CONVERSATIONAL command is entered before an input file was defined via the INPUT command or INPUT parameter of the START command, the following message is displayed:

INPUT MUST BE ENTERED

When in CONVERSATIONAL mode the user can access the Help file by entering a question mark (?) in response to a prompt. The question mark causes the Help file to display pertinent information about a configuration statement or parameter, and briefly describes its use. The program then reissues the prompt sequence for the configuration statement. After all prompts have been issued, the following message is displayed:

CONVERSATIONAL PROCESSING COMPLETE

The PROCESS command can then be entered to start processing of the newly created input file. Certain errors will not be detected during the conversational session, but will be detected in the processing phase. These errors can be corrected using the EDIT command. See Section 1.5.4.

Example:

```
 PROCESSOR MODEL (7/32,8/32,3210,3220,3230,3240,3250) [3220]
>?
 CPU:  SPECIFIES THE 32-BIT PROCESSOR MODEL.

        COMMAND FORMAT:  CPU [N][,R]


                 N IS THE MODEL NUMBER OF THE PROCESSOR.

                   THE VALUE FOR N MAY BE:
                          7/32, 8/32, 3210, 3220, 3230, 3240,
                          3250.

                 R SPECIFIES THE NUMBER OF REGISTER SETS,
                   2 OR 8.


                 THE DEFAULT VALUES FOR THE CPU COMMAND ARE
                   3220 WITH 8 REGISTER SETS.
 PROCESSOR MODEL (7/32,8/32,3210,3220,3230,3240,3250) [3220]
>CR
 NUMBER OF REGISTER SETS (2 OR 8) [8]
>CR
 O/S VERSION (8 CHAR. ALPHANUMERIC STRING) [BLANKS]
```

1.4.6 HELP Command

The HELP command accesses the Help file and displays sysgen commands and configuration statements with a brief description of each and how to use it.

Format:

HELP [{name | *}]

Parameters:

name	specifies the name of a specific sysgen statement or command to be displayed.
*	specifies that all sysgen statements and commands be displayed.

Functional Details:

If the HELP command is entered without a parameter, the following message is displayed:

```
FOR A LIST OF COMMANDS TYPE HELP *
FOR HELP ON ANY COMMAND MNEMONIC, TYPE HELP MNEMONIC
```

Example 1:

```
>HELP *
I(NPUT)          O(UTPUT)       CONV(ERSATIONAL)   ED(IT)
PA(USE)          PR(OCESS)      END                ACC(OUNTING)
B(ACKGROUND)     CL(OCK)        CM(DLEN)           CP(U)
CS(S)            DA(TE)         DEVA(DS)           DEVI(CES)
DIR(ECTORY)      DI(SCBLOCK)    DS(YS)             ENDC
ERRORR(EC)       F(LOAT)        ICC(LASS)          IL(EVEL)
INT(ERCEPT)      IT(AM)         J(OURNAL)          L(OGLEN)
MAX(TASK)        MCONF(IG)      MEMCHECK           ME(MORY)
MO(DULE)         NOSE(G)        TG(D)              QU(EUE)
P(OLL)           SP(OOL)        ST(ARTUP)          SST(ABLE)
TC(OM)           TE(MP)         VER(SION)          V(OLUME)
COOR(DINATION)   COPY
FOR HELP ON ANY OF THE ABOVE COMMAND MNEMONICS, TYPE HELP MNEMONIC
HELP*
```

Example 2:

```
>HELP ACC
 ACCOUNTING: INCLUDES ACCOUNTING SUPPORT.

       COMMAND FORMAT:  ACCCUNTING [(N)] [,NOFILE ACCOUNTING]

           N = DECIMAL VALUE FROM 2 THROUGH 32, SPECIFYING
               THE MAXIMUM NUMBER OF ACCOUNTING CLASSES.
               DEFAULT FOR N = 4.

           NO FILE ACCOUNTING SPECIFIES THAT FILE ACCOUNTING
           SUPPORT IS EXCLUDED.
```

| PAUSE |

1.4.7 PAUSE Command

The PAUSE command pauses execution of the Sysgen/32 program and returns control to the operating system.

Format:

PAUSE

1.4.8 END Command

The END command ends the Sysgen/32 program.

Format:

```
END
```

Functional Details:

An end of task code other than zero indicates that an error occurred during Sysgen/32 execution in a batch environment.

CHAPTER 2
SYSGEN/32 CONFIGURATION STATEMENTS

2.1 INTRODUCTION

Sysgen configuration statements make up the configuration input file that defines the hardware and software features of the target operating system. This chapter presents a detailed description of each configuration statement under its respective heading. The sysgen configuration statements are:

ACCOUNTING	DSYS	MEMORY
BACKGROUND	ENDC	MODULE...ENDM
CLOCK	ERRORREC	NOSEG
CMDLEN	FLOAT	QUEUE
COORDINATION	ILEVEL	ROLL
COPY...ENDCOPY	INTERCEPT	SPOOL
CPU	IOCLASS	SSTABLE
CSS	ITAM	STARTUP...ENDS
DATE	JOURNAL	TCOM
DEVADS	LOGLEN	TEMP
DEVICES...ENDD	MAXTASK	TGD
DIRECTORY	MCONFIG	VERSION
DISCBLOCK	MEMCHECK	VOLUME

Certain statements may span more than one line. A comma as the last nonblank character indicates that the statement is continued on the next line.

Any characters following an asterisk (*) are treated as comments. If an asterisk is in column 1, the entire line is treated as a comment line. Comment lines are copied to the list device.

| ACCOUNTING |

2.1.1 ACCOUNTING Statement

The ACCOUNTING statement specifies that accounting support is included in the system.

Format:

$$\underline{\text{AC}}\text{COUNTING } [=] \left[\begin{matrix} nn \\ \underline{4} \end{matrix}\right] [,\underline{\text{N}}\text{OFILEACCOUNTING}]$$

Parameters:

nn — is a decimal number from 2 through 32 specifying the maximum number of device or file classes to be supported by the accounting facility. The minimum number of classes must be 2, because indexed and contiguous files always need two classes. If this parameter is omitted, 4 is the default.

NOFILEACCOUNTING — prevents logging of accounting data when files are deleted or renamed.

Functional Details:

Each device or file class supported by the accounting facility must be defined by the IOCLASS statement. Each I/O class supported by the accounting facility occupies 12 bytes in the user task control block (TCB) and 4 bytes in the multi-terminal monitor (MTM) for each MTM user of the accounting facility. If the ACCOUNTING statement is omitted, accounting support is not included in the system.

See the IOCLASS statement or IOCLASS parameter of the device statement for file or device classes.

The NOFILEACCOUNTING option allows the user to reduce the size of the account transaction file (ATF).

2.1.2 BACKGROUND Statement

The BACKGROUND statement establishes the maximum priority and maximum amount of system space for a background task in the system.

Format:

$$\underline{B}\text{ACKGROUND } [=] \left[\begin{matrix}\text{maxpriority} \\ 16\end{matrix}\right] \left[\begin{matrix}, \text{ maxsize} \\ 9\end{matrix}\right]$$

Parameters:

maxpriority	is a decimal value from 11 through 248 specifying the highest priority at which a background task can run. If this parameter is omitted, 16 is the default.
maxsize	is a decimal value in increments of 0.25kb specifying the largest system space area in which system data structures; i.e., file control block (FCB), task queue entry (TQE), task control block (TCB), of a background task can be stored. If this parameter is omitted, 9 is the default.

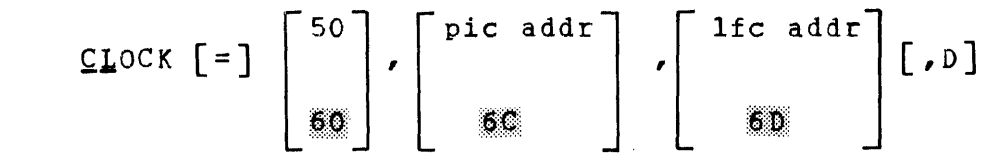
Functional Details:

If this statement is omitted, the default parameters are assumed.

2.1.3 CLOCK Statement

The CLOCK statement sets the line frequency of the clock and device addresses of both the precision interval clock (PIC) and line frequency clock (LFC) for the system. Together, these clocks are called the universal clock module.

Format:



Parameters:

50	is a hexadecimal number indicating the line frequency value. If this parameter is omitted, 60 is the default.
pic addr	is a hexadecimal number specifying the physical device address of the PIC. The user-specified address must not be greater than the maximum device address specified by the DEVADS statement. If this parameter is omitted, 6C is the default.
lfc addr	is a hexadecimal number specifying the physical device address of the LFC. The user-specified address must not be greater than the maximum device address specified by the DEVADS statement. If this parameter is omitted, 6D is the default.
D	is the alphabetic character D specifying that the date and time are to be displayed on the display panel. This parameter should be specified only if the CPU statement indicates that the target system is a Perkin-Elmer Model 7/32 or 8/32 processor.

Functional Details:

If this statement is omitted, the default parameters are assumed.

2.1.4 CMDLEN Statement

The command buffer length (CMDLEN) statement specifies the maximum length of the system command buffer or buffers if command substitution system (CSS) is supported in the system.

Format:

CMDLEN [=] [n / 80]

Parameters:

n	is a decimal number from 32 through 1024 specifying the number of bytes in the system's command buffers. If this parameter is omitted, 80 is the default.

Functional Details:

If CSS is supported, or commands are read from devices or files with record lengths greater than 80, a larger command buffer length must be specified. If CSS is supported, parameter substitution causes a small input line length to be expanded to a greater length which must be less than or equal to the system command buffer length.

If this statement is omitted, 80 is the default.

2.1.5 COORDINATION Statement

The COORDINATION statement establishes the maximum number of simultaneous data transfers allowed on the specified selector channels (SELCH). This statement must be entered if the number of SELCHs is greater than the number of simultaneous data transfers allowed in the target system.

Format:

$$\underline{\text{COOR}}\text{DINATION } [=] \left[\left\{ \underline{\text{S}}\text{ELCH} = \begin{matrix} S_1 \\ (S_1, S_2, S_n) \end{matrix} \right\}, \left\{ \underline{\text{D}}\text{EVICE} = \begin{matrix} \text{name}_1 \\ (\text{name}_1, \ldots, \text{name}_n) \end{matrix} \right\}\right], \underline{\text{T}}\text{RANSFER=n}$$

Parameters:

SELCH= S_1-S_n specifies the SELCH to be coordinated.

DEVICE= name_1-name_n specifies the devices requiring coordination.

TRANSFER= n specifies the maximum number of simultaneous transfers. If 1 is specified, the resulting extended direct memory access (EDMA) node functions in a way similar to a supernode, providing coordination only, without impact on the transfer rate. Table 2-1 provides recommended numbers of simultaneous transfers for the various Perkin-Elmer 32-bit processors.

TABLE 2-1 RECOMMENDED NUMBER OF SIMULTANEOUS DMA TRANSFERS

NUMBER OF TRANSFERS	SYSTEM
1	7/32
1 4	8/32 (with one or more nonbuffered selector channels (ESELCH)). 8/32 (with buffered selector channels (BSELCH))
4	3210, 3220, 3230 (with buffered selector channels (BSELCH))
*	3240, 3250

Functional Details:

The COORDINATION statement should be used if the number of SELCHs in a system with MSM80 or MSM300 disks or 6250bpi magnetic tape drives is greater than the number of simultaneous data transfers allowed in the system.

One COORDINATION statement must be entered for every group of SELCHs or devices requiring coordination.

COPY

2.1.6 COPY Statement

The COPY statement copies data into the macro output file. Statements are copied to the file in the format in which they are read until the ENDCOPY statement is encountered in column 1.

Format:

```
COPY
[ line1 ]
  .
  .
  .
[ linen ]
ENDCOPY
```

Parameter:

line	specifies data to be copied into the macro output file.

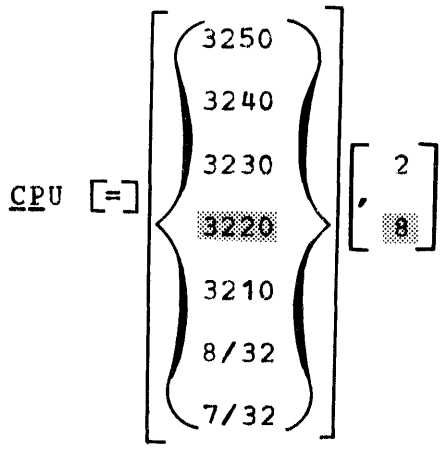
Functional Details:

The COPY statement is useful when a user wants to include user-specified macros in the generated macro file.

2.1.7 CPU Statement

The central processing unit (CPU) statement specifies the Perkin-Elmer 32-bit processor for which the system is being configured.

Format:



Parameters:

3250 3240 3230 3220 3210 8/32 7/32	specify the target system processor model number. If this parameter is omitted, 3220 is the default.
2 8	specify the number of register sets supported by the hardware. The Perkin-Elmer Model 3210, 3220, 3230, 3240, 3250, or 8/32 support 8 register sets. If this parameter is omitted for the Model 7/32 processor, 2 is the default. If this parameter is omitted for all other processors, 8 is the default.

Functional Details:

If this statement is omitted, the default parameters are assumed.

2.1.8 CSS Statement

The command substitution system (CSS) statement specifies the maximum number of nested CSS calls allowed in one routine for the target system.

Format:

CSS [=][n / 5]

Parameter:

n	is a decimal number from 1 through 249 specifying the maximum number of nested CSS calls in one routine; i.e., the number of routines that can be active at one time. If CSS is not supported, 1 must be specified. If this parameter is omitted, 5 is the default.

Functional Details:

The operating system allocates the amount of memory required for a CSS by the following equation:

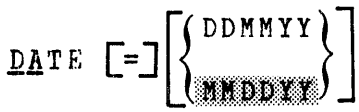
MEMORY = CMDLEN n x CSS n

If this statement is omitted, the default is 5.

2.1.9 DATE Statement

The DATE statement specifies the format in which the current date is expressed for the system.

Format:



Parameters:

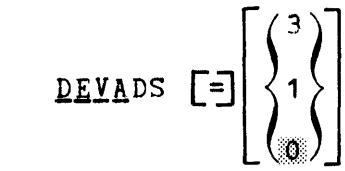
DDMMYY	is day-month-year format.
MMDDYY	is month-day-year format. If this parameter is omitted, MMDDYY is the default.

| DEVADS |

2.1.10 DEVADS Statement

The device address (DEVADS) statement specifies the maximum number of devices, maximum device address, maximum number of bytes occupied by the interrupt service pointer (ISP) table, and the starting address of the memory acccess controller (MAC) or SSTABLE in the system.

Format:



Parameters:

3 1 0	are decimal numbers specifying a table entry containing established maximum values. If this parameter is not specified, 0 is the default. The established values specified in the DEVADS statement must correspond to the hardware configuration. Table 2-2 lists the maximum values associated with each DEVADS statement.

TABLE 2-2 DEVADS STATEMENT VALUES

ENTRY NUMBER	NUMBER OF DEVICES	MAXIMUM DEVICE ADDRESS	NUMBER OF BYTES IN ISP	MAC,MAT, OR SST STARTING ADDRESS
3	1023	X'3FF'	2048	X'900'
1	511	X'1FF'	1024	X'500'
0	255	X'0FF'	512	X'300'

2.1.11 DEVICES...ENDD Statements

The DEVICES...ENDD statements are used to delimit the device descriptor statements. Every device to be configured in the target system must be defined by a device descriptor statement.

Each device descriptor statement requires three parameters, the device name specification, the device address, and the device code. These three parameters must be entered in the order described. Optional parameters describing other device details can be entered in any order.

Format:

```
DEVICES
 dev name: ,address,dcod [,CONSOLE,] [,IOCLASS=n] [,ILEVEL=n]
[,SELCH=n] [,CONTROLLER=n] [,NONSHARED] [,SPINDLE=n]
[,XDCOD=xdcod] [,EOV]   [,QUEUE=name] [,RECLEN=n] [,SIZE=n]
[,TRANSLATE=name] [,READCONTROL=n] [,WRITECONTROL=n]
[,PADCOUNT=n] [,LEADCOUNT=n] [,POLLIMIT=n] [,DUAL]
[,CLOCK={XA}]
        {XB}
        {XC}
        {XD}
.
.
.
ENDD
```

Parameters:

dev name	is a 1- to 4-character device mnemonic specifying a unique device name. The first character must be alphabetic, the remaining characters alphanumeric.
address	is a hexadecimal number specifying the physical address of a device. This number must not be greater than the maximum device address specified in the DEVADS statement. For pseudo devices, specify 0.

dcod	is a decimal number ranging from 16 through 254 specifying the device code. For pseudo devices, specify 1.
CONSOLE	identifies the device as the console device.
IOCLASS=	n is a decimal number from 0 through 31 specifying the I/O class of each individual device. This number must not be greater than the maximum number of device or file classes specified in the ACCOUNTING statement. If this parameter is omitted, the global IOCLASS is assumed.
ILEVEL=	n is a decimal number from 0 through 3 specifying the hardware interrupt level of each individual device. If this parameter is omitted, the global interrupt level (see the ILEVEL statement) is assumed for this device.
SELCH=	n is a 2-digit hexadecimal number specifying the selector channel address.
CONTROLLER=	n is a 2-digit hexadecimal number specifying the disk controller address.
NONSHARED	specifies that an existing shared-busy conflict for this device should be ignored.
SPINDLE=	n is a decimal number from 0 through 3 specifying the floppy disk spindle number.
XDCOD=	xdcod is a decimal or hexadecimal halfword used to specify additional configuration information within a device. If a hexadecimal value is specified, it must be preceded by an X: X0040
EOV	indicates that end of volume (EOV) labels on magnetic tapes be processed. If EOV is not specified, EOV labels are not supported.
QUEUE=	name is a 1- to 8-character alphanumeric string indicating the name of an alternate disk I/O scheduling routine.
RECLEN=	n specifies the physical record length of a device.
SIZE=	n specifies the page size for pseudo devices.

TRANSLATE=	name specifies a 1- to 8-character alphanumeric name of the translation table used for this device.
*READCONTROL=	n is a hexadecimal mask specifying the read control character. The value must be preceded by an X.
*WRITECONTROL=	n is a hexadecimal mask specifying the write control character. The value must be preceded by an X.
*PADCOUNT=	n is a decimal number specifying the length of a pad sequence within a unit of data.
*LEADCOUNT=	n is a decimal number specifying the number of leading synchronous characters within a unit of data.
*POLLIMIT=	n is a decimal number specifying the limit of polling retries allowed on a line.
DUAL	specifies that dual port option is in effect for MSM disks.
CLOCK=	XA specifies the A clock XB specifies the B clock XC specifies the C clock XD specifies the D clock

NOTE

The asterisk (*) denotes parameters applicable to ITAM devices only.

Functional Details:

Device codes and device addresses determine shared-busy conflicts between devices, such as fixed and removable disks in the same drive, cassettes, and TTY/KP with TTY/RP on the same device. The shared-busy conflicts can be overridden by the NONSHARED parameter. Only one channel control block (CCB) is created for disks with a shared-busy conflict.

If ILEVEL and IOCLASS statements precede a group of devices, they remain in effect until another ILEVEL or IOCLASS statement is read. The ILEVEL and IOCLASS parameters in the device statement can be used to override the global setting specified in the global ILEVEL or IOCLASS statement for a specific device.

Default values for all standard devices supported by Sysgen/32 are maintained in the Sysgen/32 Macro Library. These defaults represent driver initialization and termination routines, disk sizes, device attributes, defaults for communications devices, etc. Certain defaults can be overridden by entering the appropriate parameter in the device statements.

2.1.11.1 Coding Examples of Device Statements

The following examples show the coding of the OS/32 configuration utility program (CUP) device statements on the left, and the Sysgen/32 device statements on the right.

Examples:

```
CS/32 CUP                    SYSGEN/32 STATEMENTS
STATEMENTS


DEVICES                      DEVICES
1:F0,0                       DSC1:, C6, 51, SELCH=F0, CONTR=B6
2:B6,0                       DSC2:, C7, 50, SELCH=F0, CONTR=B6
3 DSC1:C6,51,D               MAG1, 85, 65, ILEVEL=1, SELCH=F1, CONTR=0
* DSC2:C7,50,D               CON:, 10, 39, CONSOLE, ILEVEL=2
ILEVEL 1                     ILEVEL 3
1:F1,0                       PRT:, 62, 114
2:0,0                        VDU1:, 12, 39
3 MAG1:85,65                 VDU2:, 14, 39
ILEVEL 2                     ILEVEL 1
1 CON:10,39,C                MAG2:, C5, 65, SELCH=F2, CONTR=1
ILEVEL 3                     *NOTE THAT THE CONTROLLERS FOR MAG1: and MAG2:
1 PRT:62,114                 *ARE UNIQUE.
1 VDU1:12,39                 ENDD
1 VDU2:14,39
ILEVEL 1
1:F2,0
2:0,0
3 MAG2,C5,65
ENDD
```

2.1.12 DIRECTORY Statement

The DIRECTORY statement specifies that secondary directory support is included in the system.

Format:

DIRECTORY

Functional Details:

If this statement is omitted, no secondary directory support is included. If a disk is marked on with the CDIRECTORY parameter specified in the operator MARK command, and the system is built with directory support, file search time is reduced. Marked-on disks require the following additional working storage areas:

- system space of 64 bytes for access control blocks (ACB), and
- a secondary directory buffer with a default buffer size equal to 1024 bytes. The default value can be overridden when the disk is marked on.

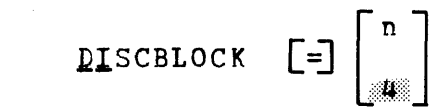
Secondary directory support occupies 2.5kb of memory. Refer to the OS/32 Application Level Programmer Reference Manual for detailed information.

```
-----------------
|   DISCBLOCK   |
-----------------
```

2.1.13 DISCBLOCK Statement

The DISCBLOCK statement specifies the maximum physical block size that can be allocated for an indexed file.

Format:



Parameters:

n	is a decimal number from 1 through 255 indicating the maximum number of 256-byte segments that can be specified for data or index blocks in an ALLOCATE command or an SVC 7. If this parameter is omitted, 4 is the default.

Functional Details:

Allocation of the physical block size occurs when the file is assigned. If no direct access devices exist in the system, omit this statement. Larger block sizes occupy more system space, but reduce physical I/O and improve system performance. Refer to the OS/32 System Level Programmer Reference Manual for the required program block size.

2.1.14 DSYS Statement

The dynamic system space (DSYS) statement specifies the default number of kilobytes (kb) of available dynamic system space. The size of system space can be adjusted by the SET SYS operator command after the system is built. The following dynamic control blocks are allocated in system space:

- Private file control block (PFCB)
- File control blocks (FCB)
- Task control blocks (TCB)
- Timer queue elements (TQE)
- Access control blocks (ACB)
- Segment description elements (SDE)
- Private segment tables (PST)

Format:

DSYS [=] [n / 25]

Parameters:

n	is a decimal number from 1 to the total number of kilobytes of memory. If n is omitted, 25kb is the default.

Functional Details:

If this statement is omitted, 25kb is the default.

ENDC

2.1.15 ENDC Statement

The ENDC statement must be the last sysgen statement specified and indicates the end of all sysgen configuration statements.

Format:

```
ENDC
```

2.1.16 ERRORREC Statement

The ERRORREC statement specifies that error recording support is included in the system.

Format:

ERRORREC [=] fd,size,period

Parameters:

fd	is the file descriptor of the default error recording file. The specified file is assigned by the system as the default error recording file.
size	is a decimal number from 1 through 32,767 specifying the maximum number of 256-byte records in the default error recording file.
period	is a decimal number from 1 through 1440 specifying the minutes that elapse between memory error recording readouts on the Models 3210, 3220, 3230, 3240, and 3250 processors only. The recommended period is 2 minutes.

Functional Details:

Error recording supports recording of:

- I/O errors for all processors
- System errors for all processors
- Memory errors for Perkin-Elmer 3200 Series

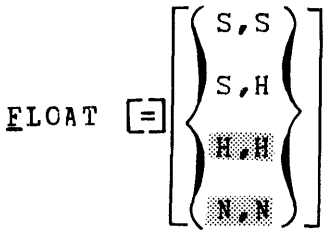
There is no significant increase in overhead cost incurred by recording I/O and system errors.

The Perkin-Elmer 3200 Series processors contain error recording memory and an optional error logger. If this statement is specified, the hardware error logger is periodically read and the data is written to the error recording file for subsequent reporting. If this statement is omitted, error recording support is not included in the system.

2.1.17 FLOAT Statement

The FLOAT statement specifies that floating point support (software or hardware) is included in the system.

Format:



Parameters:

S	indicates software floating point is supported for single precision floating point in the first parameter and for double precision floating point in the second parameter.
H	indicates hardware floating point is supported for single precision floating point in the first parameter and for double precision floating point in the second parameter.
N	indicates no floating point is supported.

Functional Details:

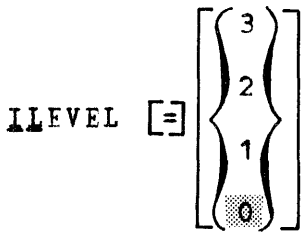
Software floating point support should be included only in systems that do not support hardware floating point. If the hardware floating point parameter is not specified for a system with hardware floating point, memory is wasted and unpredictable results occur after a power fail/restore sequence. Single precision floating point support occupies 1.9kb of memory, and double precision floating pcint support occupies 2.9kb of memory.

If the FLOAT statement is omitted, H,H is the default for the Perkin-Elmer 3200 Series processors, and N,N is the default for the 7/32 or 8/32 processors.

2.1.18 ILEVEL Statement

The ILEVEL statement specifies the hardware interrupt levels for all devices that are specified between this ILEVEL statement and another ILEVEL statement or the ENDC statement.

Format:



Parameters:

3	is a decimal number indicating the fourth and lowest interrupt level at which a device can interrupt.
2	is a decimal number indicating the third interrupt level at which a device can interrupt.
1	is a decimal number indicating the second interrupt level at which a device can interrupt.
0	is a decimal number indicating the first and highest interrupt level at which a device can interrupt. If this parameter is omitted, 0 is the default.

Functional Details:

If multiple I/O interrupt levels are not to be included in the system, omission of this statement causes all devices to be configured at the highest interrupt level, 0. A group of devices configured with the same SELCH or disk controller address must be configured at the same interrupt level. Therefore, the ILEVEL statement should directly precede the group of devices to be configured at a specific interrupt level.

The ILEVEL parameter in the device statement is used to redefine the interrupt level for a particular device without affecting the global interrupt level setting.

```
 -----------------
|    INTERCEPT    |
 -----------------
```

2.1.19 INTERCEPT Statement

The INTERCEPT statement indicates that supervisor call (SVC) interception support is to be included in the system.

Format:

INTERCEPT

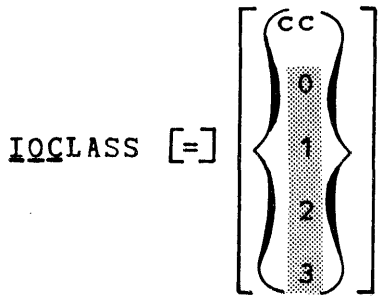
Functional Details:

If this statement is omitted, SVC interception is excluded from the operating system.

2.1.20 IOCLASS Statement

The IOCLASS statement specifies the global class setting to be associated with a particular device or group of devices used for accounting.

Format:



Parameter:

cc	is a decimal number from 0 through 31 specifying the class associated with devices or files. If this statement or the parameters are omitted, 0, 1, 2, and 3 are the default classes.

Functional Details:

(A global IOCLASS can be specified or changed by entering the IOCLASS statement immediately preceding the device or group of devices to be associated with that class.) All devices are associated with that IOCLASS statement until the next IOCLASS statement is entered.

The IOCLASS parameter in the device statement redefines the I/O class of a particular device and does not affect the global I/O class setting.

User-specified I/O classes must be within the range specified by the ACCOUNTING statement. See Section 2.1.1. Table 2-3 lists the default device and file classes.

TABLE 2-3 DEFAULT DEVICE AND FILE CLASSES

CLASS	DEFAULT
0	Logical I/O (indexed files)*
1	Physical I/O with SELCH* (contiguous files)
2	Physical I/O with multiplexor channel (VDUs)
3	Logical spooled I/O (spooled output)

*The accounting facility requires classes 0 and 1.

2.1.21 ITAM Statement

The ITAM statement indicates that communications support is to be included in the system.

Format:

ITAM

Functional Details:

Communications support consists of system modules, drivers, and device control blocks (DCBs, CCBs, etc.). The drivers are stored in either the communications driver library or extended communications driver library. The system modules are stored in the system communications library. See Chapter 3.

| JOURNAL |

2.1.22 JOURNAL Statement

The JOURNAL statement specifies the maximum number of journal entries for the system. The system journal is a list of data entries that records operating system events and is used for tracing the cause of a system failure.

Format:

JOURNAL [=] [n]
           [0]

Parameters:

n	is a decimal number from 0 through 12,999 specifying the maximum number of journal entries. The number 0 is the default.

Functional Details:

The amount of memory required for the user-specified number of journal entries is calculated as:

no. of bytes for journal = 20 x (n+8)

2.1.23 LOGLEN Statement

The log message buffer length (LOGLEN) statement specifies the maximum number of bytes of message buffer size in the system.

Format:

LOGLEN [=] [n / 72]

Parameters:

n	is a decimal number from 32 through 132 specifying the maximum number of bytes of message buffer size. If this parameter is omitted, 72 is the default.

Functional Details:

This statement sets the message buffer size for user tasks executing SVC 2 code 7 log message calls. If the length of the user-specified message is greater than the message buffer size, the right-most bytes of the message are truncated.

When a user task running under MTM issues an SVC 2 code 7 to the system console, the user buffer is truncated to LOGLEN. If the SVC 2 code 7 is directed to the user terminal, LOGLEN has no effect. If this statement is omitted, 72 is the default.

MAXTASK

2.1.24 MAXTASK Statement

The maximum tasks (MAXTASK) statement specifies the maximum number of tasks (including rolled-out tasks) that can be in the system at one time.

Format:

MAXTASK [=] [n / 32]

Parameters:

n	is a decimal number from 1 through 252 specifying the maximum number of tasks in the system at one time. If this parameter is omitted, 32 is the default.

Functional Details:

If this statement is omitted, 32 is the default.

2.1.25 MCONFIG Statement

The MCONFIG statement must be used if memory error recording is desired for a Perkin-Elmer 3200 Series processor.

Format:

```
MCONFIG  BLOCK=nn,START=xx,RANGE=yy [,INTERL={2|4|0}]
         [,SHARED={NORECORD|NVRECORD|RECORD}]
```

Parameters:

BLOCK= nn is a decimal number from 0 through 15 specifying the area of memory in megabytes (Mb) for which a particular memory controller is strapped. Blocks have to be specified in numerically ascending order starting with 0 for the lowest megabyte address. For Perkin-Elmer 3200 Series processors, 1Mb is the minimum specified amount of memory.

START= xx is a decimal number from 0 through 15 specifying the starting megabyte address of the block.

RANGE= yy is a decimal number from 0 through 16 specifying the number of megabytes in the block. For processors containing less than 1Mb, specify 1.

INTERL= 0 specifies noninterleaving of memory.
2 specifies 2-way interleaving.
4 specifies 4-way interleaving.
This parameter is optional and if omitted, 0 is the default.

SHARED= defines the memory block as part of shared memory. This parameter is optional.

NORECORD — inhibits the processor from reading the error logger for the designated block. The block configuration is not verified.

NVRECORD — specifies that the processor should read the error logger for the designated block. The block configuration is not verified. This facilitates bringing an error logger readout online in a multiprocessor configuration without destroying valid data in shared memory. If this parameter is omitted, the designated block is assumed to be in local memory.

RECORD — specifies that the processor should read the error logger for the designated block. The block configuration is verified at system startup time.

Functional Details:

As part of the system configuration process, the physical memory configuration must be defined if memory error recording is included in the system.

In multiprocessor systems with shared memory, only one processor should be designated to read the shared memory error logger. This prevents scattering of error logger recordings.

Example:

```
MCONFIG BLOCK=0,START=0,RANGE=4,INTERL=0
MCONFIG BLOCK=1,START=4,RANGE=4,INTERL=2,SHARED=NVRECORD
MCONFIG BLOCK=2,START=8,RANGE=4,INTERL=2,SHARED=NORECORD
MCONFIG BLOCK=3,START=12,RANGE=4,INTERL=4,SHARED=RECORD
```

2.1.26 MEMCHECK Statement

The memory check (MEMCHECK) statement indicates that memory diagnostics support is included in the system.

Format:

```
MEMCHECK
```

Functional Details:

The memory diagnostics program is executed at initial program load (IPL) time. If any bad or unavailable pages exist in memory (256-byte pages for Models 3210 and 3220 processors; 2048-byte pages for Models 3230, 3240, and 3250 processors), the operating system marks them as unavailable. Memory can also be tested, marked off, and marked on by the operator MEMORY command if memory diagnostics support is included.

2.1.27 MEMORY Statement

The MEMORY statement specifies the maximum number of kb of available local memory for the system. Local memory is a contiguous memory area starting at absolute address 0 and consists of the:

- operating system,
- dynamic system space,
- reentrant library segments (optional),
- task common segments (optional), and
- pure and impure segments.

Format:

$$\underline{ME}\text{MORY } [=] \left[\begin{array}{c} n \\ \hline 256 \end{array} \right]$$

Parameters:

n	is a decimal number specifying the maximum number of kb of available local memory. The number is in increments of 16 and ranges from 256 through 1024 for the Models 7/32, 8/32, 3210, and 3220 processors; 4096 for a Model 3230 processor; and 16,384 for the Models 3240 and 3250 processors. If this parameter is omitted, 256 is the default.

Functional Details:

If the operating system memory size exceeds the memory size specified by n, the error is not detected until a load module is created by OS/32 Link. The size of local memory can be changed by the operator MEMORY command. If this statement is omitted, the default is 256.

2.1.28 MODULE...ENDM Statements

The MODULE...ENDM statements substitute a user-written or user-modified system module for a Perkin-Elmer standard system module.

Format:

MODULE

[new module name$_1$
new module name$_2$
.
.
.
new module name$_n$]

ENDM

Parameters:

new module name	is a 4-character name, a period, and a 3-character variation (ffff.xxx) indicating the user-written or user-modified module to be selected. If the name (ffff) is the same as the standard module name, the variation (xxx) overrides the variation normally selected at sysgen time. However, if the name is not the same as a standard module name or USER.xxx, an error is generated.

| NOSEG |

2.1.29 NOSEG Statement

The no memory segmentation (NOSEG) statement specifies that memory segmentation support is excluded from the system.

Format:

NOSEG

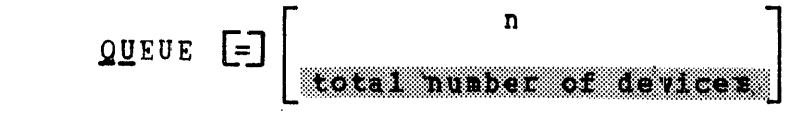
Functional Details:

When segmentation support is excluded, tasks that were previously established in pure and impure segments cannot be loaded into the system. Exclusion of segmentation support causes inefficient use of memory through the loss cf shared pure segments. If this statement is omitted, segmentation support is included.

2.1.30 QUEUE Statement

The QUEUE statement defines the maximum number of entries in the system queue used to schedule driver operation.

Format:



Parameters:

n	is a decimal number from 1 through 64,999 specifying the maximum number of entries in the system queue. If this parameter is omitted, the total number of devices in the system is the default.

Functional Details:

The minimum number of entries should be equal to the total number of devices (including nodes, channels, and controllers), because driver termination routines do not check for sufficient room on the system queue when adding entries.

If this statement is omitted, the total number of devices in the system is the default.

| ROLL |

2.1.31 ROLL Statement

The ROLL statement specifies that roll support is included in the system.

Format:

ROLL [=] [rvoln]

Parameters:

rvoln	is a 1- to 4-character volume name specifying the default roll volume. The first character of the volume name must be alphabetic and the remaining, alphanumeric. If this parameter is omitted, blanks are generated as the volume name.

Functional Details:

When roll support is specified, at least one direct access device must be included. If this statement is omitted, roll support is excluded from the system.

2.1.32 SPOOL Statement

The SPOOL statement specifies that spool support is included in the system.

Format:

SPOOL [=] [spvoln]

Parameters:

spvoln	is a 1- to 4-character volume name specifying the spool volume. The first character of the volume name must be alphabetic and the remaining, alphanumeric. If this parameter is omitted, blanks are generated as the volume name.

Functional Details:

When spool support is specified, at least one direct access device must be included. If this statement is omitted, spool support is excluded from the system.

```
-----------------
|    SSTABLE    |
-----------------
```

2.1.33 SSTABLE Statement

The SSTABLE statement specifies the maximum number of shared segment table (SST) entries to be reserved in the system.

Format:

Parameters:

n	is a decimal number from 1 through 8192 specifying the maximum number of SST entries allowed in the system. If this parameter is omitted, the default is 32.

Functional Details:

The Models 3210, 3230, and 3240 processors use an SST. Each SST entry requires 8 bytes. Space for the table is allocated in 256-byte blocks. If this statement is omitted, 32 is the default.

2.1.34 STARTUP...ENDS Statements

The STARTUP...ENDS statements define a startup CSS procedure, executed at system startup. This feature allows DISCHECK to run automatically and loads the tasks necessary to create the system environment.

Format:

```
[STARTUP]
 .
 .
 .
[ENDS   ]
```

Functional Details:

The CSS procedure is executed before the SET TIME request is issued by the system. If a SET TIME request is issued from the startup CSS, the operating system ENTER DATE AND TIME request is not made.

The CSS commands are stored in memory in packed format. This memory is not reused during system operation. A large number of startup CSS routines could affect the amount of memory available for task execution, so startup requests should be as brief as possible, making use of such commands as $TRANSFER.

The BUILD...ENDB and $BUILD...$ENDB commands are not allowed in a startup CSS procedure, but are allowed in a CSS called from a startup CSS procedure.

Example:

```
STARTUP
SE T  1/17/81,07:59:59
$J
MA DSC1:,CN,,CD=200
$T
$IFNE 0
   $J
   MA DSC1:,ON,P
   L .BG,DISCHECK,50
   T .BG
   MA DSC1:,OFF
   ST,DSC1:,CON:,NOR
   MA DSC1:,ON,,CD=200
   $T
   $IFNE 0
      $WR *** MARK OR CHECK ERROR ON DSC1: ***
      $EX
   $EN
$EN
$TR STARTUP
ENDS
```

2.1.35 TCOM Statement

The task common (TCOM) statement defines and reserves system storage for TCOM segments in global memory. Global memory (shared memory) is located outside of local memory. Local memory is defined by the operator MEMORY command.

Format:

TCOM [=] $name_1$,$address_1$,$size_1$ [/.../$name_n$,$address_n$,$size_n$]

Parameters:

name	is a TCOM segment name from 1 to 8 characters corresponding to a labeled common segment name in a user program. The first character of the segment name must be alphabetic and the remaining, alphanumeric.
address	is a hexadecimal number within the ranges specified in Table 2-4 specifying the absolute address of a TCOM segment located outside local memory. The user-specified number is rounded down to the nearest 256-byte page address.
size	is a decimal number in increments of .25kb, from .25kb to the maximum amount of global memory.

Functional Details:

Global memory is located above MTOP, the area specified in the operator MEMORY command, and is limited by the physical memory of the system. If the address specified is greater than the physical memory of the machine, the error is not displayed by Sysgen/32. All TCOM segments must be specified in order of ascending physical addresses. A maximum of 14 TCOM segments can be defined. Overlapping TCOM segments are not allowed.

TABLE 2-4 TCOM ADDRESS RANGE

CPU	ADDRESS RANGE	INCREMENT SEGMENT SIZE (KB)
7/32	1-FFF00	.256
8/32	1-FFF00	.256
3210	1-3FF800	2.048
3220	1-FFF00	.256
3230	1-FFF800	2.048
3240	1-FFF800	2.048
3250	1-FFF800	2.048

2.1.36 TEMP Statement

The temporary (TEMP) statement specifies the default volume name to be used for temporary (scratch) file support.

Format:

TEMP [=] [tvoln]

Parameters:

tvoln	is a 1- to 4-character volume name specifying the default temporary volume. The first character of the volume name must be alphabetic and the remaining, alphanumeric. If this parameter is omitted, blanks are generated as the volume name.

Functional Details:

Temporary file support is always included in the system. If this command is omitted, the default temporary volume name is set to blanks. Temporary files are allocated at assign time and deleted at close time. To exclude temporary file support, a source sysgen must be performed cn modules CMDB, CMSP, and FMS7.

2.1.37 TGD Statement

The trap-generating device (TGD) statement specifies that TGD device support is included in the system.

Format:

TGD

Functional Details:

If this statement is omitted, TGD support is excluded. See the OS/32 Application Level Programmer Reference Manual.

2.1.38 VERSION Statement

The VERSION statement specifies a user version that is associated with a particular operating system sysgen.

Format:

VERSION [=] [vvvvvvvv]

Parameters:

vvvvvvvv	is an 8-character alphanumeric string specifying the version of a particular operating system sysgen. If this parameter is omitted, blanks are generated as the version number.

Functional Details:

The 8-character version, in addition to the operating system revision and update number, is displayed on the system console at system initialization time in this format:

OS32MTrr-uu.vvvvvvvv

If this statement is omitted, blanks are generated as the version.

| VOLUME |

2.1.39 VOLUME Statement

The VOLUME statement specifies the name of the default system volume.

Format:

VOLUME [=] [voln]

Parameters:

voln	is a 1- to 4-character volume name specifying the default system volume. The first character of the volume name must be alphabetic and the remaining, alphanumeric. If this parameter is omitted, blanks are generated as the volume name.

Functional Details:

After sysgen, the operator can change the volume name through the operator VOLUME command.

If this statement is omitted, blanks are generated as the volume name.

CHAPTER 3
LIBRARIES REQUIRED FOR SYSTEM GENERATION

3.1 INTRODUCTION

The Sysgen/32 process requires standard system libraries, general purpose driver libraries to support the devices listed in Chapter 4, and system and Sysgen/32 macro libraries. These libraries are required for the macro expansion and link phases of the sysgen procedure. Other system libraries that may be required by the Sysgen/32 process are system communications libraries if communication devices are ccnfigured in the operating system, and user libraries if user-written devices are configured in the operating system.

OS/32 supports two types of system generation:

- Object-level
- Source-level

The object-level sysgen enables a user to configure an operating system tailored to specific needs by selecting driver and system modules provided in the OS/32 package. Assemblies of system modules are not required in performing an object-level sysgen.

The source-level sysgen enables a user to modify the OS/32 system modules and drivers. This procedure requires reassembling one or more system and/or driver source modules, replacing existing versions of these modules in the system or driver libraries with the user-modified modules, and executing the object-level sysgen procedure. Section 3.6 presents sample source sysgen procedures.

3.2 STANDARD LIBRARIES (OPERATING SYSTEM)

There are two standard libraries required for the Sysgen/32 process:

- The standard system library (SYS.LIB)
- The standard driver library (DRIVER.LIB)

These libraries are used in the link phase of the Sysgen/32 process and are available in both object and source versions.

3.2.1 Standard System Library (SYS.LIB)

Table 3-1 presents a description of the source sysgen options that can be included in a target system.

The source sysgen modules of SYS.LIB are listed in Table 3-2. These modules can be altered by the sysgen parameters in the sysgen parameter file. Table 3-3 is a list of the source sysgen parameters and the amount of memory the desired sysgen option occupies.

Each module has an extension number corresponding to functional variations supporting various sysgen options. Table 3-4 is a list of module variations in SYS.LIB. The standard variations provided in SYS.LIB are a subset of possible variations. A source level sysgen may be optionally performed to include or eliminate options in a specific module. A source-level sysgen may also be optionally performed to eliminate specific source-level sysgen options included in all module variations.

TABLE 3-1 SOURCE SYSGEN OPTION DEFINITIONS

OPTION	MNEMONIC	DEFINITION
Journal support	JRNL	Supports recording of normal internal system events on a circular list in memory. Used as a debugging tool for operating system development and is recommended for installations where user-written or user-modified modules are tested.
Safety check support	SAFE	Supports consistency checking within the operating system. Detected inconsistencies result in a system failure.
System debug software support	DBUG	Supports debugging of the operating system. Includes consistency checks not intended for operational systems.
Bulk command module support	BCMD	Supports bulk storage operator commands such as WRITE FILEMARK, FORWARD FILEMARK, FORWARD RECORD, BACKSPACE FILEMARK, BACKSPACE RECORD, and REWIND.
Contiguous file support	CO	Supports contiguous files on direct access devices. Requires that direct access support also be included.

TABLE 3-1 SOURCE SYSGEN OPTION DEFINITIONS (Continued)

OPTION	MNEMONIC	DEFINITION
Indexed file support	INX	Supports indexed files on direct access devices. Requires that direct access support also be included.
Direct access device support	DA	Supports direct access bulk storage devices (disks) beyond the basic I/O device level, including primary directory support, sector allocation, bitmap support, and volume mechanism support. Includes the DISPLAY FILES, DELETE, XDELETE, VOLUME, MARK operator commands.
Secondary directory support	DIR	Supports the secondary directory feature that provides an in-memory paged index to the disk directory to reduce access time for directory operations.
Spooling support	SPOL	Supports the Spooler. Requires that indexed file support and direct access file support be included.
Roll support	ROLL	Supports rolling of tasks to disks to execute more tasks than can fit into available task memory. Requires direct access support.
Temporary file support	TEMP	Supports temporary files.
Shared segmentation support	SEG	Supports use of sharable segments such as pure (reentrant) segments, run time libraries, and task commons.
Link overlay support	AOVL	Supports loading and executing overlaid tasks produced by OS/32 Link.

TABLE 3-1 SOURCE SYSGEN OPTION DEFINITIONS (Continued)

OPTION	MNEMONIC	DEFINITION
Communications support	ITAM	Supports communications devices.
Trap-generating device support	TGD	Supports the 8-line interrupt module, providing task traps in response to external interrupts.
Double precision floating point software support	DF	Supports double precision floating point in a system without the hardware to support it. Includes software emulation routines for double precision instructions.
Single precision floating point software support	SF	Supports single precision floating point in a system without the hardware to support it. Includes software emulation routines for single precision instructions.
Power fail operator intervention support	PWF	Supports operator control for power fail/restore sequence.
Time delay on power restore support	DLAY	Supports a time delay on power restore prior to enabling interrupts. This is required for configurations with multiplexor bus switches.
Seek support	SEEK	Supports C-scan seek scheduling on disk devices. Selection of a scheduling algorithm is specified in each disk device control block (DCB). Standard driver library has seek scheduling enabled for all disks except floppy. This option is required to support those disks.

TABLE 3-1 SOURCE SYSGEN OPTION DEFINITIONS (Continued)

OPTION	MNEMONIC	DEFINITION
Extended direct memory access support	EDMA	Supports coordination of multiple extended direct memory access (EDMA) devices. required if the EDMA devices exceeds the bandwidth capability of the EDMA bus. This coordination mechanism is also used for floppy disk systems where the adapter bandwidth is limited.
Memory diagnostics support	MCHK	Supports memory testing features for initial system load and at the request of particular operator commands. Finds and marks off bad memory.
Memory error recording support	MERC	Supports recording of memory errors generated by the system. Requires that general error recording is selected. Available for Models 3210, 3230, 3240, and 3250 processors only.
General error recording	GERC	Supports error recording of memory, I/O, system errors and system milestones.
Models 3210, 3220, 3230, 3240, and 3250 support	3200	Supports Models 3210, 3220, 3230, 3240, and 3250 processors.
Memory access translator Models 3210, 3230, 3240, and 3250 support	ATM	Supports MAT on Models 3210, 3230, 3240, and 3250 processors. Must be removed for Models 7/32, 8/32, and 3220 processors.
Accounting facility support	ACCT	Supports job accounting of system resources.
No file accounting	ACCF	No accounting records are generated for file renames and deletes.

TABLE 3-2 SYSTEM SOURCE MODULES AND SUPPORTED FEATURES

SOURCE MODULES		SUPPORTED FEATURES																														
FUNCTION	NAME	JRNL	SAFE	DBUG	BCMD	COO	INX	DA	DIR	SPOL	ROLL	TEMP	SEG	AOVL	ITAM	TGD	DF	SF	PWF	DLAY	SEEK	EDMA	MCHK	MERC	GERC	320	ATM	ACCT	ACCF
Console Driver	CDVR.MAC																															
Display and Bulk Command	CMDB.MAC				x			x	x	x	x	x			x																	
Command Executors	CMEX.MAC									x					x								x									
Console Monitor	CMON.MAC																															
Console and CSS Supervisor	CMSP.MAC	x										x											x									
Error Recording	ERRC.MAC																							x	x							
Accounting Facility	EXAC.MAC																													x	x	
Interrupt Handler	EXIN.MAC	x	x											x	x				x	x			x	x		x	x	x				
Input/Output	EXIO.MAC	x	x																		x	x								x		
Loader and Segment Control	EXLD.MAC			x							x		x	x									x				x					
Memory Manager	EXMY.MAC		x					x			x				x																	
Supervisor Services	EXSP.MAC	x								x																	x					

TABLE 3-2 SYSTEM SOURCE MODULES AND SUPPORTED FEATURES (Continued)

SOURCE MODULES		SUPPORTED FEATURES																													
FUNCTION	NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DIR	SPOL	ROLL	TEMP	SEG	AOVL	ITAM	TGD	DF	SF	PWF	DLAY	SEK	EDMA	MCHK	MERC	GERC	320	ATM	ACCT	ACCF
SVC 3,4,5 6,7,14	EXSV.MAC										x		x	x		x														
Timer Manager	EXTI.MAC		x												x															
Task Manager	EXTM.MAC	x	x								x		x																x	
Floating Point Traps	FLTP.MAC																x	x												
Contiguous File SVC 1 Interrupt	FMCO.MAC					x																								
Indexed File SVC 1 Interrupt	FMIN.MAC						x			x																				
SVC 7 Interrupt	FMS7.MAC					x	x	x	x	x		x			x														x	x
File Manager Utility Routine	FMUT.MAC						x	x	x		x																			
Intercept Manager	INTC.MAC INTCD2.MAC																													
Memory Diagnostics	MCHK.MAC			x																			x							
Panic Dump	DUMP.MAC																													
End of System Modules	UBOT.MAC																													
Communications Support	ITFM.MAC																													

LEGEND

x = supported source module features

Certain features supported by the system source modules might not be desired in the user operating system. Therefore, the user can change the features that a source module supports. By choosing a module whose value equals 0, support for that feature is excluded. To include support for a feature, choose a module whose value for the specified sysgen option equals 1.

Example:

SGN.SPL=1 Spooling support included

SGN.SPL=0 Spooling support excluded

Table 3-3 lists the system source modules, source sysgen parameters and the amount of memory the desired sysgen option occupies.

TABLE 3-3 DEFINITIONS OF SOURCE SYSGEN PARAMETERS

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.JRNL = 0	System journal support excluded	N/A
SGN.JRNL = 1	System journal support included	2.5 kb
SGN.SAFE = 0	Safety check support excluded	N/A
SGN.SAFE = 1	Safety check support included	1.0 kb
SGN.DBUG = 0	System debug support excluded	N/A
SGN.DBUG = 1	System debug support included	20 kb
SGN.BCMD = 0	Bulk file command support excluded	N/A
SGN.BCMD = 1	Bulk file command support included	0.5 kb
SGN.CO = 0	Contiguous file support excluded	N/A
SGN.CO = 1	Contiguous file support included	1.0 kb

TABLE 3-3 DEFINITIONS OF SOURCE SYSGEN PARAMETERS (Continued)

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.INX = 0	Indexed file support excluded	N/A
SGN.INX = 1	Indexed file support included	3.8 kb
SGN.DA = 0	Direct access support excluded (if SGN.CC+SGN.INX=0)	N/A
SGN.DA = 1	Direct access support included (if SGN.CC+SGN.INX>0)	14.5 kb
SGN.DIR = 0	Secondary directory support excluded	N/A
SGN.DIR = 1	Secondary directory support included	2.5 kb
SGN.SPOL = 0	Spooling support excluded	N/A
SGN.SPOL = 1	Spooling support included	1.25 kb
SGN.ROLL = 0	Roll-in support excluded	N/A
SGN.ROLL = 1	Roll-in support included	3.1 kb
SGN.TEMP = 0	Temporary file support excluded	N/A
SGN.TEMP = 1	Temporary file support included	0.5 kb
SGN.SEG = 0	Sharable segmentation support excluded	N/A
SGN.SEG = 1	Sharable segmentation support included	0.5 kb
SGN.AOVL = 0	Link overlay support excluded	N/A
SGN.AOVL = 1	Link overlay support included	1.75 kb
SGN.ITAM = 0	Communications support excluded	N/A
SGN.ITAM = 1	Communications support included	0.5 kb

TABLE 3-3 DEFINITIONS OF SOURCE SYSGEN PARAMETERS (Continued)

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.TGD = 0	Trap generating device support excluded	N/A
SGN.TGD = 1	Trap generating device support included	0.25 kb
SGN.DF = 0	Double precision floating point support excluded	N/A
SGN.DF = 1	Double precision floating point support included	2.9 kb
SGN.SF = 0	Single precision floating point support excluded	N/A
SGN.SF = 1	Single precision floating point support included	1.9 kb
SGN.PWF = 0	Operator intervention not required on power failure	32 bytes
SGN.PWF = 1	Operator intervention required on power failure	88 bytes
SGN.DLAY = 0	No time delay following power fail/restore	N/A
SGN.DLAY = n	Time delay following power fail/restore = n seconds	N/A
SGN.SEEK = 0	Seek scheduling support excluded	N/A
SGN.SEEK = 1	Seek scheduling support included	400 bytes
SGN.EDMA = 0	Extended direct memory access support excluded	N/A
SGN.EDMA = 1	Extended direct memory access support included	250 bytes
SGN.MCHK = 0	Memory diagnostics support excluded	N/A

TABLE 3-3 DEFINITIONS OF SOURCE SYSGEN PARAMETERS (Continued)

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.MCHK = 1	Memory diagnostics support included	3.5 kb
SGN.MERC = 0	Memory error recording support excluded	N/A
SGN.MERC = 1	Memory error recording support included	3.7 kb
SGN.GERC = 0	General error recording support excluded	N/A
SGN.GERC = 1	General error recording support included	2.5 kb
SGN.3200 = 0	Perkin-Elmer 3200 Series processors support excluded	N/A
SGN.3200 = 1	Perkin-Elmer 3200 Series processors support included	1.5 kb
SGN.MAT = 0	Models 7/32, 8/32, and 3220 memory management	N/A
SGN.MAT = 1	Models 3210, 3230, 3240, 3250 memory management	N/A
SGN.ACCT = 0	Accounting support excluded	N/A
SGN.ACCT = 1	Accounting support included	2.0 kb
SGN.ACCF = 0	Delete/rename file accounting reporting support excluded	N/A
SGN.ACCF = 1	Delete/rename file accounting reporting support included	0.25 kb

TABLE 3-4 SYSTEM OBJECT MODULES AND SYSGEN OPTIONS

SYSTEM OBJECT MODULE		OBJECT SYSGEN OPTIONS																																	
FUNCTION	VARIATION NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DIR	SPOL	ROLL	TEMP	SEG	AOVL	ITAM	TGD	DF	SF	PWF	DLAY	SEEK	EDMA	MCHK	MERC	GERC	320	ATM	ACCT	ACCF
Console Driver	CDVR.F01																																		
Display and Bulk Commands	CMDB.F25				1			1	0	1	0	1			1																				
	CMDB.F26				1			1	0	1	1	1			1																				
	CMDB.F27				1			1	1	1	0	1			1																				
	CMDB.F28				1			1	1	1	1	1			1																				
	CMDB.F31				1			1	0	0	0	1			1																				
	CMDB.F35				1			1	1	0	0	1			1																				
	CMDB.F36				1			1	1	0	1	1			1																				
	CMDB.F38				1			1	0	0	1	1			1																				
Command Executors	CMEX.F03									0					0								1												
	CMEX.F04									0					1								1												
	CMEX.F07									1					0								1												
	CMEX.F08									1					1								1												
Console Monitor	CMON.F01																																		
Console and CSS Supervisor	CMSP.F31	0										1											1												
Error Recording	ERRC.F01																							0	0										
	ERRC.F02																							0	1										
	ERRC.F03																							1	1										
Accounting	EXAC.F01																											0	0						
	EXAC.F02																											1	0						
	EXAC.F03																											1	1						
Interrupt Handler	EXIN.F11	0	0											1	0				1	5			1	1		0	0	1						
	EXIN.F12	0	0											1	1				1	5			1	1		0	0	1						
	EXIN.F13	0	0											1	0				1	5			1	1		1	1	1						
	EXIN.F14	0	0											1	1				1	5			1	1		1	1	1						
Input/ Output Supervisor	EXIO.F01	0	0																		1	1						0						
	EXIO.F02	0	0																		1	1						1						

TABLE 3-4 SYSTEM OBJECT MODULES AND SYSGEN OPTIONS (Continued)

SYSTEM OBJECT MODULE		OBJECT SYSGEN OPTIONS																														
FUNCTION	VARIATION NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DIR	SPOL	ROLL	TEMP	SEG	AOVL	ITAM	TGD	DF	SF	PWF	DLAY	SEK	EDMA	MCHK	MERC	GERC	3200	ATM	ACCT	ACCF
Loader and Segment Control	EXLD.F01			0							0		0	1									1				0		
	EXLD.F05			0							1		0	1									1				0		
	EXLD.F19			0							0		1	1									1				0		
	EXLD.F24			0							1		1	1									1				0	0	
	EXLD.F50			0							0		0	1									1				1	1	
	EXLD.F51			0							1		0	1									1				1		
	EXLD.F52			0							0		1	1									1				1		
	EXLD.F53			0						1		1	1										1				1		
Memory Manager	EXMY.F01	0						0			0				0														
	EXMY.F02	0						0			0				1														
	EXMY.F03	0						1			0				0														
	EXMY.F04	0						1			0				1														
	EXMY.F05	0						1			1				0														
	EXMY.F06	0						1			1				1														
Supervisor Services	EXSP.F07	0								1																	0		
	EXSP.F54	0								1																	1		
SVC 3,4, 5,6,9,14	EXSV.F02										0		0	1		0													
	EXSV.F06										1		0	1		0													
	EXSV.F19										0		1	1		0													
	EXSV.F20										1		1	1		0													
	EXSV.F21										1		1	1		1													
	EXSV.F22										0		0	1		1													
	EXSV.F23										1		0	1		1													
	EXSV.F37										0		1	1		1													
Timer Manager	EXTI.F01		0												0														
	EXTI.F02		0												1														
Task Manager	EXTM.F19	0	0								0		1																
	EXTM.F20	0	0								1		1																
Floating Point Traps	FLTP.F02																0	1											
	FLTP.F03																1	0											
	FLTP.F04																1	1											
Contiguous File SVC 1 Interrupt	FMCO.F03					1																							

TABLE 3-4 SYSTEM OBJECT MODULES AND SYSGEN OPTIONS (Continued)

SYSTEM OBJECT MODULE		OBJECT SYSGEN OPTIONS																												
FUNCTION	VARIATION NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DIR	SPOL	ROLL	TEMP	SEG	AOVL	ITAM	TGD	DF	SF	PWF	DLAY	SEEK	EDMA	MCHK	MERC	GERC	320	ATM	ACCT	ACCF
Indexed File SVC 1 Interrupt	FMIN.F07						1			1																				
SVC 7 Interrupt	FMS7.F02					0	0	0	0	0		0			1													1	0
	FMS7.F43					1	1	1	0	0		1			1													1	1
	FMS7.F44					1	1	1	0	1		1			1													1	1
	FMS7.F47					1	1	1	1	0		1			1													1	1
	FMS7.F48					1	1	1	1	1		1			1													1	1
File Manager Utility Routine	FMUT.F02						0	0			1																			
	FMUT.F25						1	1	0		0																			
	FMUT.F26						1	1	0		1																			
	FMUT.F27						1	1	1		0																			
	FMUT.F28						1	1	1		1																			
SVC Interception Support	INTC.F01																													
	INTC.F02																													
Memory Diagnostics	MCHK.F01			0																			0						
	MCHK.F02			0																			1						
Panic Dump	DUMP.F01																													
Communications Support	ITFM.M00																													
Patch Area	UBOT.F01																													

LEGEND

0 = feature is not supported
1 = feature is supported
5 = 5 second delay on power for restart
shading = variation

3.2.2 Standard Driver Library (DRIVER.LIB)

The standard driver library, DRIVER.LIB, is required in the link phase of the Sysgen/32 process. DRIVER.LIB is available in object and source versions. The source modules can be modified and included in the driver or user library.

3.3 STANDARD COMMUNICATIONS LIBRARIES

There are two standard communications libraries required in the link phase of the Sysgen/32 process, if communications devices are to be configured in the operating system:

- The standard communications system libraries
- The standard communications driver libraries

3.3.1 Standard Communications System Libraries

Table 3-5 presents the standard communications system libraries.

TABLE 3-5 STANDARD COMMUNICATIONS SYSTEM LIBRARIES

LIBRARY DESCRIPTION	LIBRARY NAME
Basic communications package library	ITBSYS.LIB
2780/3780 enhancement package library	ITES2780.LIB

These libraries are available in object and source versions.

3.3.2 Standard Communications Driver Libraries

Table 3-6 presents the standard communications driver libraries.

TABLE 3-6 STANDARD COMMUNICATIONS DRIVER LIBRARIES

LIBRARY DESCRIPTION	LIBRARY NAME
Basic communications package driver library	ITEDLIB.LIB
2780/3780 enhancement package driver library	ITED2780.LIB

3.4 USER DEFINED LIBRARIES

If a user written communication protocol and/or driver is to be included in the operating system, it must be included in one of the following user defined libraries:

- user defined system library
- user defined driver library

3.4.1 User Defined System Library

Table 3-7 presents the user defined system library.

TABLE 3-7 USER DEFINED SYSTEM LIBRARY

LIBRARY DESCRIPTION	LIBRARY NAME
User defined system library	USERSYS.LIB

3.4.2 User Defined Driver Library

Table 3-8 presents the user defined driver library.

TABLE 3-8 USER DEFINED DRIVER LIBRARY

LIBRARY DESCRIPTION	LIBRARY NAME
User written drivers	USERDLIB.LIB

3.5 MACRO LIBRARIES

The macro libraries presented in Table 3-9 are required in the macro expansion phase of the Sysgen/32 process. The macros that comprise the Sysgen/32 macro library are listed and explained in Table 3-10.

TABLE 3-9 MACRO LIBRARIES

LIBRARY DESCRIPTION	LIBRARY NAME
The Sysgen/32 macro library	SYSGEN32.MLB
The macro library containing system structures	SYSSTRUC.MLB
The basic communication system macro library (required only if communication support is included)	ITMS.MLB
The general driver macro library	DVRM.MLB
The system macro library	SYSMACRO.MLB

TABLE 3-10 MACROS IN SYSGEN/32 MACRO LIBRARY

MACRO CALL NAME	FUNCTION
CCBI	Generates and initializes the channel control block (CCB) for non ITAM devices.
DCBI	Creates the DCBs and initializes the DCB fields for non ITAM devices.
DCBINI	Initializes the DCB fields based on default settings maintained in the macro, and on the information input in the device statement. It calls the particular macros in SYSGEN32.MLB or macros in the other macro libraries needed to create the DCB and CCB for the specified device
DEF	Defines storage or constants, optionally repeating the define the specified number of times.
DFLIST	Defines a list and generates a label and entry based on the parameters passed.
DMT	Generates the device mnemonic table (DMT). Entries are generated using the information in the sysgen device statements.
EVNGEN	Generates device, directory and bitmap leaves; generates required nodes (Coordination, SELCH, Controller).
FLTPINIT	Generates external entries (EXTRNS) for the appropriate floating point modules depending on support specified in the FLOAT configuration statement. (The EXTRN for a user-specified module is generated by the Sysgen/32 program. Generates labels and reserves memory for the program status word (PSW) and register save areas.

TABLE 3-10 MACROS IN SYSGEN/32 MACRO LIBRARY
(Continued)

MACRO CALL NAME	FUNCTION
ITAMCCB	Generates and initializes the CCBS for ITAM devices.
ITDC1 ITDC2 ITDC3	Creates and initializes the device dependent portion of the DCB for ITAM devices.
IVTGEN	Generates the initial value table (IVT) from information entered in the configuration input file.
MMDGEN	Generates the mass storage media (MSM) or (MMD) device dependent portion of the DCB for MSM or MMD disks.
MTPI	Initializes the additional DCB fields needed for magnetic tapes
$CRDP	Contains the extended DCB structures for card reader/punches.
SLABEL	Used to create a label and an entry for the passed parameter.
SMCONFIG	Defines the memory configuration for Perkin-Elmer 3200 Series processors based on the information in the MCONFIG statement.
SPDMT	Flags virtual devices in the device mnemonic table (DMT).
SPTINIT	Defines and initializes the system pointer table (SPT); sets the panic address and system queue pointer; generates the ISPT, task control blocks (TCB), and the TCB table; generates the journal and pointer stack. Defines and initializes the system pointers and tables, and reserves memory for system structures.

TABLE 3-10 MACROS IN SYSGEN/32 MACRO LIBRARY (Continued)

MACRO CALL NAME	FUNCTION
STARTUP	Builds the command stream to run at system startup using STARTUP...ENDS statement input.
TCOMINIT	Generates and reserves memory for the global task common segments using TCOM statement input.
VMTGEN	Generates a label and reserves space for the volume mnemonic table.
$UP $REV	Used by SPTINIT macro (when generating the SPT) to update the operating system revision ID.

3.5.1 Modifying the Sysgen/32 Macro Library

The following sections detail procedures for making modifications to the Sysgen/32 macro library.

3.5.1.1 Adding Nonstandard Devices

If a nonstandard device is to be included in the operating system, it must be defined in the sysgen device statement and the Sysgen/32 macro library must be modified to recognize the device code and initialize the appropriate data structures. The library containing the user written driver for the device must be specified during the link phase of the Sysgen/32 process.

3.5.1.2 Changing Data Structures of a Supported Device

If changes are to be made to the data structures of a supported device, the appropriate macro in the Sysgen/32 macro library (SYSGEN32.MLB) must be modified to reflect the changes. No modifications are necessary if only code in the driver module is affected.

If any unresolved EXTRNS exist after all libraries have been searched, link displays a warning but attempts to build the operating system. The link map should be checked to ensure that all external references have been resolved.

3.6 SOURCE LEVEL SYSGEN PROCEDURE

To include user-written or modified source modules follow these steps:

1. Copy the source sysgen parameters from the appropriate file, SYSGEN.Mac, to a backup file using OS/32 Copy.

2. Copy the system source module library to a backup file using OS/32 Copy.

3. Change the source parameters in SYSGEN.MAC to include or exclude the desired options.

4. If the name of the modified module differs from the original module name, the PROG, ENTRY, and EQUATE statement labels must be changed to the modified module name. The $OSPROG macro can be used to change the original module name to the modified module name.

5. The following assignments must be made to expand the internal operating system macros using the CAL Macro/32 processor:

```
AL usermodule.EXP,IN,80
L  .BG,MACRO32
T  .BG
AS 1,usermodule.CAL
AS 2,usermodule.EXP
AS 3,NULL:
AS 7,SYSGEN.MAC,SRO
AS 8,SYSSTRUC.MLB,SRO
AS 9,SYSMACRO.MLB,SRO
AS 10,ITMS.MLB,SRC
ST
```

To assemble module EXSV, lu 11 must be assigned to SYSMAC32.MLB. To assemble module FMS7, lu 11 must be assigned to SYSMAC32.MLB, and lu 12 must be assigned to DVRM.MLB.

NOTE

If user-written macros are to be included in the expansion, assign lu 11 to the appropriate macro library and start MACRO32 by entering:

```
ST ,ML=(8,9,10,11)
```

When assembling a driver from the general purpose driver library, assign lu 11 to DVRM.MLB and start MACRO32 by entering:

```
ST ,ML=(8,9,10,11)
```

6. Assemble the modified source module using CAL/32 with the CROSS and SQUEZ options specified. (The SQUEZ option is required to assemble the floating point module.)

```
AL usermodule.OBJ,IN,126
L  .BG,CAL32,55
T  .BG
AS 1,usermodule.EXP
AS 2,usermodule.OBJ
AS 3,PR:
TE 5,IN,256//4
AS7,SYSGEN.MAC,SRO
ST ,CROSS,ERS,SQUEZ=99
```

7. If the name of the user-modified object module is the same as the original module name, replace the original object module in SYS.LIB with the modified module using the OS/32 Library Loader. In this example, SYSMOD.nnn is the module being replaced in SYS.LIB.

```
LO .BG,LIBLDR
TA .BG
AL newsys.LIB,IN
AS 0,NULL:
AS 1,SYS.LIB
AS 2,newsys.LIB
AS 3,CON:
AS 4,usermod.OBJ
AS 5,CON:
ST
.BG>TAB 1,3
.BG>RW 1
.BG>TAB 4,3
.BG>RW 4
.BG>DUPE 1,2 sysmod.nnn
.BG>COPY 4,2
.BG>COPY 1,0
.BG>DUPE 1,2
.BG>RW 2
.BG>TAB 2,3
.BG>END
```

8. If the original and the modified module names differ, change the PROG, ENTRY, and EQUATE statements in the module to indicate the new name and add the modified module to the system library.

```
LO .BG,LIBLDR
TA .BG
AL newsys.LIB,IN,126
AS 1,SYS.LIB
AS 2,newsys.LIB
AS 3,CON:
AS 4,usermod.OBJ
AS 5,CON:
ST
.BG>TAB 1,3
.BG>RW 1
.BG>TAB 4,3
.BG>RWD 4
.BG>DUPE 1,2
.BG>COPY 4,2
.BG>RW 2
.BG>TAB 2,3
.BG>END
```

9. Perform a sysgen using the modified system library. Include the MODULE...ENDM statements to include the modified module if the module name changed.

3.7 SOURCE LEVEL SYSGEN EXAMPLE

To change the variable time delay (SGN.DLAY) option affecting the system source module EXIN.MAC and replace the system object module EXIN.F13, follow these steps:

1. See Table 3-3 for the source module EXIN.MAC affected by the sysgen variable SGN.DLAY.

2. Copy EXIN.MAC, the affected source module, to a backup file with the new filename, NEWEXIN.MAC. The object module variation EXIN.F13 now in the system library must be changed and assembled to generate a new variation, and be replaced with the new variation.

3. Change the option variables in the SYSGEN.MAC file to:

   - SGN.ITAM = 0
   - SGN.DLAY = 7

The communications and Perkin-Elmer 3200 Series processor's sysgen variable settings generate the object module variation EXIN.F13. A value of 7 is selected for a time delay of 7 seconds. Communications support is not desired, so 0 is entered.

4. Use the EDIT commands tc change the source sysgen options in the SYSGEN.MAC file:

```
LO .BG,EDIT32
TA .BG
ST ,C=CON:
.BG>GET SYSGEN.MAC
.BG>T /SGN.ITAM/
      21   SGN.ITAM     EQU   1
.BG>CH / 1/,/ 0/
      21   SGN.ITAM     EQU   0
.BG>TYPE/SGN.DLAY/
      26   SGN.DLAY     EQU   5
.BG>CH/5/,/7/
      26   SGN.DLAY     EQU   7
.BG>SAVE NEWSGN.MAC
.BG>END
```

5. Make the following assignments to expand the internal operating system macros using the CAL Macro/32 processor:

```
LO .BG,MACRO32,20
TA .BG
AL EXIN.EXP,IN,80/4
AS 1,NEWEXIN.MAC
AS 2,EXIN.EXP
AS 3,NULL:
AS 7,NEWSGN.MAC,SRO
AS 8,SYSSTRUC.MLB,SRO
AS 9,SYSMACRO.MLB,SRC
AS 10,ITMS.MLB,SRO
ST ,ML=(7,8,9,10)
```

6. Assemble the user-modified EXIN.EXP module using CAL/32:

```
LO .BG,CAL32,55
TA .BG
AS 1,EXIN.EXP
AL EXINF13.OBJ,IN,126
AS 2,EXINF13.OBJ
AS 3,PR:
TEMP 5,IN,256//4
AS7, NEWSGN.MAC,SRO
ST ,CROSS,SQUEZ=99,ERS
```

7. The assembled EXINF13.OBJ module replaces the module EXIN.F13 in the system library. Execute these commands:

```
LO .BG,LIBLDR
TA .BG
AL NEWSYS.LIB,IN,126
AS 1,SYS.LIB
AS 2,NEWSYS.LIB
AS 3,CON:
AS 4,EXINF13.OBJ
AS 5,CON:
ST
.BG>TAB 1,3
.BG>TAB 4,3
.BG>RW 1
.BG>RW 4
.BG>DUPE 1,2 EXIN.F13
.BG>COPY 4,2
.BG>FIND 1 EXIN.F14
.BG>DUPE 1,2
.BG>RW 2
.BG>TAB 2,3
.BG>END
```

8. Perform a sysgen using the modified system library.

CHAPTER 4
STANDARD OS/32-SUPPORTED DEVICES

4.1 INTRODUCTION

OS/32-supported devices and device characteristics are described in this chapter. These characteristics must be defined in the Sysgen/32 device statements when a device is included in the operating system. Nonstandard devices supported by user-written drivers must use reserved device codes and also must be defined in the device statements to be included in the system.

4.2 OS/32-SUPPORTED LOCAL AND REMOTE DEVICES

Table 4-1 lists, by local and remote device codes, the OS/32-supported devices. Table 4-3 lists the categories (card reader/punch, local video display unit (VDU), etc.) of OS/32-supported devices and their local and remote device codes.

TABLE 4-1 DEVICE CODES FOR OS/32-SUPPORTED DEVICES

LOCAL DEVICE CODE	REMOTE DEVICE CODE	DEVICE TYPE	INTERFACE
0-15		Reserved	
16		Model 33 Teletype (TTY) keyboard/printer	CLI
17		Model 35 (TTY) keyboard/printer	CLI
18		Nonediting VDU	CLI, CLCM RS232C
19-20		Reserved	
21		Carousel 15, 30, 35, 80-character line	CLI
22		Carousel 15, 30, 35, 132-character line	CLI
23		Model 1100 VDU	CLI, CLCM
24-33		Reserved	
34	147	Nonediting VDU 2- or 8-line	RS232C, CLCM, CLI
35		Reserved	
36	147	Graphic display terminal 2- or 8-line	RS232C, CLCM

TABLE 4-1 DEVICE CODES FOR OS/32-SUPPORTED DEVICES (Continued)

LOCAL DEVICE CODE	REMOTE DEVICE CODE	DEVICE TYPE	INTERFACE
37	147	Carousel 300 2- or 8-line	RS232C, CLCM, CLI
38	147	Carousel 300 with electronic forms control 2- or 8-line	RS232C, CLCM,CLI
39		Model 550 and 1100 VDU 2- or 8-line	RS232C, CLCM,CLI
40-44		Reserved	
45		1.5Mb HPT	
46		160Mb, fixed	
47		1.5 HPT	
48		2.5Mb disk, fixed	
49		2.5Mb disk, removable	
50		5Mb disk, fixed	
51		5Mb disk, removable	
52		40Mb disk, removable	
53		67Mb disk, removable	
54		256Mb disk, removable	
55		Floppy disk	
56		68.5Mb disk, fixed	
57		1.5Mb HPT	
58		67Mb disk, fixed	
59		16Mb disk, removable	
60		16Mb disk, fixed	
61		48Mb disk, fixed	
62		80Mb disk, fixed	
63		675Mb disk, fixed	
64		800bpi magnetic tape	
65		800/1600bpi magnetic tape	
66		Intertape cassette	
67		Reserved	
68		6250/1600/800bpi STC magnetic tape	
69		6250/1600/800 BPI STC Mag tape (halfword mode)	
70		6250/1600/800 BPI TELEX Mag tape (halfword mode)	
71-79		Reserved	
80		High-speed paper tape reader/ punch	
81		Model 33 TTY reader/punch	CLI
82		Model 35 TTY reader/punch	CLI
83		Carousel 35 with paper tape reader, 80-character line	
84		Carousel 35, card reader, 132-character line	
85-95		Reserved	

TABLE 4-1 DEVICE CODES FOR OS/32-SUPPORTED DEVICES (Continued)

LOCAL DEVICE CODE	REMOTE DEVICE CODE	DEVICE TYPE	INTERFACE
96		Card reader with software translate, 029 card encoding	
97		Card reader with hardware translate, 029 card encoding	
98		Card reader with software translate, 026 card encoding	
99-103		Reserved	
104		Card reader, high speed, 029 card encoding	
105		Card reader/punch, 029 card encoding	
106		Card reader/punch with print option separate, 029 card encoding	
107-111		Reserved	
112		Low-speed line printer	
113		Medium-speed line printer	
114		High-speed line printer	
115-127		Reserved	
128		8-line interrupt module	
129		Digital multiplexor controller	
130-135		Reserved	
136		Real time analog system with internal clock	
137		Real time analog system with user-supplied external clock	
138		Mini I/O analog input	
139		Mini I/O analog output	
140		Mini I/C digital	
141-143		Reserved	
	144	Asynchronous communications line	Line Driver Only
	145	Remote line printer	
	146	SIGMA 10 terminal (communications	
18	147	Nonediting VDU (communications)	RS232C, CLCM
	148-155	Reserved	
	156	Model 1200 VDU (communications)	CLCM
	157	Model 1250 point-to-point VDU	CLCM
	158	Model 1250 multidrop VDU	CLCM
	159	Reserved	
	160	Binary synchronous communications line on 201 (DSA)	Line driver only

TABLE 4-1 DEVICE CODES FOR OS/32-SUPPORTED DEVICES (Continued)

LOCAL DEVICE CODE	REMOTE DEVICE CODE	DEVICE TYPE	INTERFACE
	161	IBM 3780 remote job entry (RJE) emulation on 201 DSA (communications)	
	162	IBM 2780 remote job entry (RJE) emulation on 201 DSA (communications)	
	163	Binary synchronous processor-to-processor link on 201 DSA (communications)	
	164-167	Reserved	
	168	Binary synchronous communications line on quad synchronous adapter (QSA)	Line driver only
	169	IBM 3780 remote job entry (RJE) emulation on QSA (communications)	
	170	IBM 2780 remote job entry (RJE) emulation on QSA (communications)	
	171	Binary synchronous processor-to-processor link on QSA (communications)	
	172-191	Reserved for ZOLC and 3270 Emulator support	
	192	DMA I/O subsystem (DIOS) (communications)	
	193-223	Reserved	
	224-239	Reserved for CAMAC access method	
	240-254	Reserved for user-written drivers	
	255	Null device	

LEGEND

CLI = Current loop interface
CLCM = Current loop communications multiplexor
RS232C = programmable asynchronous line system (PALS), programmable asynchronous single line adapter (PASLA), 2- or 8-line communications multiplexor

NOTES

1. CLI is equivalent to TTY interface.

2. Device codes 172 to 185 are not Sysgen/32-supported devices.

TABLE 4-2 CATEGORIES OF OS/32-SUPPORTED DEVICES

TYPE	DEVICE	LOCAL DEVICE CODE	REMOTE DEVICE CODE
Card reader	With software translate, 029 card encoding	96	
	With hardware translate, 029 card encoding	97	
	With software translate, 026 card encoding	98	
	Carousel 35 reader	84	
Card reader/ punch	High-speed, 029 card encoding	104	
	029 card encoding	105	
	With print option separate, 029 card encoding	106	
TTY reader/punch	Model 33 (CLI)	81	
	Model 35 (CLI)	82	
	Carousel 35 with paper tape reader, 80-character line	83	
	Carousel 35 card reader, 132-character line	84	
TTY keyboard printer	Model 33 (CLI)	16	
	Model 35 (CLI)	17	
	Nonediting VDU (CLI)	18	
	Carousel 15, 30, 35, 80-character line (CLI))	21	
	Carousel 15, 30, 35, 132-character line (CLI)	22	
	Model 1100 VDU (CLI)	23	

TABLE 4-2 CATEGORIES OF OS/32-SUPPORTED DEVICES (Continued)

TYPE	DEVICE	LOCAL DEVICE CODE	REMOTE DEVICE CODE
High-speed paper tape reader/punch	High-speed	80	
Line printer	Low-speed	112	
	Medium-speed	113	
	High-speed	114	
	Remote		145
Tape cassette	Intertape	66	
Magnetic tape	800bpi	64	
	1600/800bpi	65	
	6250/1600/800bpi	68	
	6250/1600/800 BPI STC Halfword mode	69	
	6250/1600/800 BPI TELEX Halfword mode	70	
Disks	1.5Mb, HPT	45	
	160Mb, fixed	46	
	1.5Mb HPT	47	
	2.5Mb disk, fixed	48	
	2.5Mb disk, removable	49	
	5Mb disk, fixed	50	
	5Mb disk, removable	51	
	40Mb disk, removable	52	
	67Mb disk, removable	53	
	256Mb disk, removable	54	

TABLE 4-2 CATEGORIES OF OS/32-SUPPORTED DEVICES (Continued)

TYPE	DEVICE	LOCAL DEVICE CODE	REMOTE DEVICE CODE
Disks (continued)	68.5Mb disk, fixed	56	
	1.5Mb disk, HPT	57	
	67Mb disk, fixed	58	
	16Mb disk, removable	59	
	16Mb disk, fixed	60	
	48Mb disk, fixed	61	
	80Mb disk, fixed	62	
	675Mb disk, fixed	63	
Floppy disk	Floppy disk	55	
Local VDU	Nonediting VDU (CLCM) (RS232C)	34	147
	Graphic display terminal (CLCM) (RS232C)	36	147
	Carousel 300 (CLCM) (RS232C)	37	147
	Carousel 300 with electronic forms control (CLCM) (RS232C)	38	147
	Models 550 and 1100 VDU (CLCM) (RS232C)	39	147
8-line interrupt module	8-line interrupt module	128	
Digital multiplexor	Digital multiplexor controller	129	
Conversion equipment	Real time analog system with internal clock	136	

TABLE 4-2 CATEGORIES OF OS/32-SUPPORTED DEVICES (Continued)

TYPE	DEVICE	LOCAL DEVICE CODE	REMOTE DEVICE CODE
Conversion equipment (continued)	Real time analog system with user-supplied external clock	137	
Analog I/O Controller	Mini I/C analog input	138	
	Mini I/O analog output	139	
Digital I/O Controller	Mini I/C digital	140	
Communications Devices	Asynchronous communications Line, line driver only		144
	Remote line printer		145
	SIGMA 10 terminal		146
	Nonediting VDU (CLI)	18	147
	Models 550 and 1100 VDU (CLI)	39	147
	TEC 455 editing VDU		155
	Model 1200 VDU		156
	Model 1250 point-to-point VDU		157
	Model 1250 Multidrop VDU		158
	Binary synchronous on 201 DSA, line driver only		160
	IBM 3780 RJE emulation on 201 DSA		161
	IBM 2780 RJE emulation on 201 DSA		162
	Binary synchronous processor-to-processor on 201 DSA		163

TABLE 4-2 CATEGORIES OF OS/32-SUPPORTED DEVICES (Continued)

TYPE	DEVICE	LOCAL DEVICE CODE	REMOTE DEVICE CODE
Communications devices (continued)	Binary synchronous on QSA, line driver only		168
	IBM 3780 RJE emulation on QSA		169
	IBM 2780 RJE emulation on QSA		170
	Binary synchronous processor-to-processor link on QSA		171
	DMA I/O Subsystem (DIOS)		192

4.3 DEVICES USING CURRENT LOOP INTERFACE (CLI)

Devices using CLI can be used as the console device. These devices connected to the CLI can be configured in the system:

- Carousel 15, 30, 35
- Carousel 300
- Model 33 TTY
- Model 35 TTY
- Nonediting VDU
- Model 550
- Model 1100

When the paper tape reader/punch and keyboard/printer features of the TTY and carousel devices are both supported, a shared-busy condition exists, since these devices are configured at the same address.

NOTE

If the reader/punch feature is supported by an (ASR) TTY console device, the reader/punch feature must not be assigned to a user task.

If a carousel supports paper tape, it can only support the paper tape reader feature.

Examples:

```
TTY1:,2,016,CONS    *Model 33, console device
TRP1:,2,081         *Reader/punch, same device
```

4.4 DEVICES USING STANDARD RS232C INTERFACE (PALS, PASLA, 2- or 8-LINE COMMUNICATIONS MULTIPLEXOR) OR CURRENT LOOP COMMUNICATIONS MULTIPLEXOR (CLCM)

Devices using the standard RS232C interface or CLCM can be used as the console device. The following devices connected to the standard RS232C interface or CLCM can be configured in the system:

- Nonediting VDU
- Graphic display terminal
- Carousel 300
- Carousel 300 with electronic format control (EFC)
- Model 550 (nonediting) VDU
- Model 1100 (nonediting) VDU
- Model 1200 (editing) VDU
- Model 1250 (editing) VDU

Because the editing features of Models 1200 and 1250 are not currently supported by the VDU driver, both models must be configured as nonediting VDU. Communications supports the editing features of Models 1200 and 1250.

CAUTION

Do not use Models 1200 and 1250 with the editing feature as the console device, as data written to the device can lock the keyboard.

The default strapping for PALS, PASLA, 2- and 8-line communications multiplexor, and CLCM is:

- The clocks are strapped to a baud rate between 110 and 9600. A clock is selected when the device begins an I/O operation.
- The function switches for Model 1100, 1200, and 1250 should be set for even parity. All other devices should be set for no parity.
- The interface must be strapped full duplex, disable CARR status, disable DSRDY status, and disable CL2S for nonediting VDU, graphic display terminals, and Carousel. For the Models 1100, 1200, and 1250 VDUs, the interface must be strapped full duplex, enable CARR status, enable DSRDY status, and enable CL2S status.

4.5 INTERTAPE CASSETTES

The two cassettes located in a transport are interlocked in the hardware, causing a shared-busy condition.

Example:

```
CAS1:,45,066     *Two cassettes on
CAS2:,55,066     *same transport
```

4.6 CARD READERS

These card readers can be configured in the system:

- Card reader 029 with software code translation
- Card reader 029 with hardware code translation
- Card reader 026 with software code translation

There is an additional feature of the 026 and 029 card reader drivers that can be included in the system at sysgen time. The driver can translate the Hollerith code into EBCDIC instead of ASCII code. This feature can be included by specifying the following translate tables in the device statement:

- INITRE26, which converts all 026 card reader codes directly to EBCDIC representation in memory
- INITRE29, which converts all 029 card reader codes directly to EBCDIC representation in memory

Example:

```
CR29:,04,96     *Standard card reader, software translate, 029
                 card encoding

CRHW:,04,97     *Card reader, hardware translate, 029 card
                 encoding

CR26:,04,98     *Standard card reader, software translate, 026
                 card encoding
```

4.7 CARD PUNCHES

These card punches can be configured in the system:

- High-speed 029 card encoding
- Card reader/punch (interpreting)
- Card reader/punch 029 card encoding with print option

As supplied, these devices translate 029 Hollerith code to/from ASCII. There is an additional feature of the card punch and card reader/punch that can be included in the system. Optionally, the devices can translate 026 Hollerith code to/from ASCII, 026 Hollerith code to/from EBCDIC, or 029 Hollerith code to/from EBCDIC. These features can be included by referencing the following translate tables in the device statement:

- INITPA26 or INITRA26, which converts all 026 card codes directly to ASCII representation in memory
- INITPE29 or INITRE29, which converts all 029 card codes directly to EBCDIC representation in memory
- INITPE26 or INITRE26, which converts all 026 card codes directly to EBCDIC representation in memory

Example:

```
CP:,7,104      *High-speed card punch
CRP:,8,105     *Card reader/punch
CRPS:,9,106    *Card reader/punch with print separate
```

4.8 LINE PRINTERS

These line printers can be configured in the system:

- 60-200 lines per minute (LPM) printer
- 300 LPM printer
- 600, 1000 LPM printer
- Remote line printer

NOTE

Full vertical forms control (VFC) is supported by the Perkin-Elmer local printer drivers only.

Example:

```
LPR1:,62,112     *Low-speed printer (60-200 LPM)
LPR2:,63,113     *Medium-speed printer (300 LPM)
LPR3:,72,114     *High-speed printer (600, 1000 LPM)
```

4.9 HIGH-SPEED PAPER TAPE READER/PUNCH

High-speed paper tape reader/punches can be configured in the system.

Example:

```
PRTP:,13,80     *High-speed paper tape reader/punch
```

4.10 MAGNETIC TAPE CONTROLLERS AND TAPES

Magnetic tape controllers are specified in the controller option of the device statements. A magnetic tape controller supports from one to four transports.

The device statement for the tapes must identify the tapes for each controller. Each tape requires a device statement that allows more than one tape to be active at one time. The following magnetic tapes can be configured in the system:

- 800bpi magnetic tapes
- 1600bpi magnetic tapes
- 1600/800bpi dual density magnetic tape drives
- 6250bpi magnetic tapes
- Halfword mode controller
- TELEX tape device

The 6250 tape drives may require extended direct memory access (EDMA) bandwidth coordination. The 6250 tape drives can run with gaps or in gapless mode.

Example:

```
MAG1:,85,64,CONTR=0,SELCH=F0        *Tape1 (800 bpi)
MAG2:,95,64,CONTR=0,SELCH=F0        *Tape2 (800 bpi)
MAG3:,C5,65,CONTR=1,SELCH=F0        *Tape3 (1600 bpi)
MAG4:,D5,65,CONTR=1,SELCH=F0        *Tape4 (1600 bpi)
MAG5:,80,68,SELCH=F0,CONTR=2        *Tape5 (6250 bpi)
MAG6:,90,68,SELCH=F0,CONTR=2        *Tape6 (6250 bpi)
```

4.11 DISKS

All Perkin-Elmer supported disks have one disk volume per disk drive, except for the 10Mb disk (M46-416), which is composed of two 5Mb disk volumes, and the 68.5Mb disk, which is composed of a 1.5Mb disk and a 67Mb disk.

Three algorithms are available for scheduling I/O queued to a disk: priority, first-in/first-out (FIFO) and C-SCAN (seek optimization). The C-SCAN algorithm is supplied as a default and is used to produce the highest throughput on the disk by reducing the number and range of seek operations. It includes an adjustment to prevent one task from queuing many consecutive I/Os. If a task request is queued ahead of all other requests, and the current I/O is being executed for this same task, then this request is scheduled on the next scan of the arm.

The priority and FIFO algorithms are selected by specifying the QUEUE option in the device statement. For priority scheduling, DISKQ is changed to COMQ. For FIFO, it is changed to COMFIFO. Priority schedules by calling task priority and then FIFO within each priority level. FIFO schedules without regard to priority or disk position.

A second available option is the elimination of the EDMA coordination overhead in systems that do not require EDMA coordination. The field DCB.EDMA should be left at zero. This is accomplished in the DCBINI macro in the macro library SYSGEN32.MLB by omitting EDMA=SEEKCHK.

4.11.1 Moving-Head Disks

A moving-head disk controller supports from one to four disk drives. The device statements for the disks must identify the SELCH and controller address.

The following disks can be configured in the system:

- 2.5Mb, fixed
- 2.5Mb, removable
- 5Mb, fixed } Composes a 10Mb disk
- 5Mb, removable }
- 40Mb, removable

The 10Mb disk is composed of two 5Mb disks. These two disks share the same drive, causing a shared-busy condition. Two device statements must be specified for a 10Mb disk. The shared-busy conflict is resolved by Sysgen/32 based on the device code/device address.

Example:

```
DSC1:,C6,51,SELCH=F0,CONTR=B6    *Removable
DSC2:,C7,50,SELCH=F0,CONTR=B6    *Fixed
DSC3:,D6,51,SELCH=F0,CONTR=B6    *Removable
DSC4:,D7,50,SELCH=F0,CONTR=B6    *Fixed
```

DSC1 and DSC2 have a shared-busy condition, as do DSC3 and DSC4.

4.11.2 Mass Storage Media (MSM) Disks

These disks can be configured in the system:

- MSM300 256Mb, removable
- MSM80 67Mb, removable
- MSM80 67Mb, fixed
- MSM80 HPT 1.5Mb, fixed

} Composes a 68.5Mb disk

- MSM80 HPT 68.5Mb, fixed and removable
- MSM1.5 HPT of 675, fixed
- MSM160, fixed

The 68.5Mb MSM HPT disk is composed of a 1.5Mb fixed-head disk and a MSM 67Mb fixed disk.

If the disk drive requires dual port support, the dual port option should be specified in the device statement. The driver will treat alternate channel busy conditions from a single port drive as an error condition.

I/O error recording is supported for MSM disks only. Tables 4-1 and 4-2 contain the device codes for MSM disks.

4.11.3 Direct Memory Access (DMA) Coordination Nodes

It is possible to configure DMA devices whose total bandwidth would exceed the capacity of the EDMA bus. To prevent the resultant data overruns and inefficient operation, coordination of EDMA activity can be configured by using the EDMA node. Generally, the 6250bpi, 125ips, and the MSM disks are considered for EDMA coordination. Only when present in extreme numbers on the Model 7/32 processor would the slower tapes and disks be considered for coordination.

If the number of channels is greater than the number of simultaneous data transfers allowed in the system, a DMA coordination node must be configured. However, if the number of channels is less than or equal to the number of simultaneous data transfers allowed, no coordination statements are required.

DMA coordination is specified in the COORDINATION statement.

Example:

```
DSC1:,FC,53,SELCH=F0,CONTR=FB      *67Mb (MSM80) disk
DSC2:,EC,53,SELCH=F1,CONTR=EB      *67Mb (MSM80) disk2
Mag1:,85,68,SELCH=F2,CONTR=0       *6250bpi, 125ips magnetic
                                     tape driver
COORDINATION=TRANSFER=4,SELCH=(F0,F1,F2)
```

4.11.4 Floppy Disk Subsystems

A floppy disk subsystem consists of one controller with one to four spindles. The controller is transparent to the user. All spindles share the same controller, causing a shared-busy condition. The shared-busy conflict is resolved by Sysgen/32 based on the device address configuration described in Section 2.2.11.

The device statement for the disk has a device mnemonic associated with the drive only when the disk is marked offline.

Two algorithms are available for scheduling I/O queued to a floppy disk: priority and FIFO.

The priority algorithm is selected by specifying the QUEUE option in the device statement. For priority scheduling, COMFIFO is changed to COMQ. Priority schedules by calling task priority and then FIFO within each priority level. The default algorithm is FIFO. FIFO schedules without regard to priority or disk position.

A second option available is elimination of the EDMA coordination overhead in systems that do not require EDMA coordination. The field DCB.EDMA should be left at zero. This is accomplished in the DCBINI macro in SYSGEN32.MLB by omitting EDMA=SEEKCHK.

If there is more than one floppy disk subsystem in the system, a DMA coordination node must be configured above the subsystems it controls. If a DMA coordination node is not defined, intermittent I/O errors, loss of data, or system failure can occur. Although the floppy disk is not a DMA device, it uses the same coordination methods to operate within the bandwidth limitations of the controller.

The device statement for each spindle has a:

- device mnemonic associated with the spindle, and a
- spindle number (0, 1, 2, or 3) specified in the SPINDLE option of the device statement.

Examples:

```
FLP1:C1,055,SPINDLE=0       *First floppy disk spindle
FLP2:C1,055,SPINDLE=1       *Second floppy disk spindle
FLP3:C1,055,SPINDLE=2       *Third floppy disk spindle


FLP1:C1,055,SPINDLE=0       *First spindle for subsystem1
FLP2:C1,055,SPINDLE=1       *Second spindle for subsystem1
FLP3:C1,055,SPINDLE=2       *Third spindle for subsystem1
FLPA:C2,055,SPINDLE=0       *First spindle for subsystem2
FLPB:C2,055,SPINDLE=1       *Second spindle for subsystem2
COORD DEV=(FLP1,FLP2,FLP3,FLPA,FLPB),TRANSFER=1
```

4.12 8-LINE INTERRUPT MODULE

Each 8-line interrupt module must be defined by a device statement. Trap generating device (TGD) support must be included in the system at sysgen time for an 8-line interrupt module.

Example:

```
LIN0:,20,128
LIN1:,21,128
LIN2:,22,128
LIN3:,23,128
LIN4:,24,128
LIN5:,25,128
LIN6:,26,128
LIN7:,27,128
```

4.13 SYSGENING A SYSTEM WITH A COMMUNICATIONS MULTIPLEXOR

The communication multiplexor (COMM MUX) interfaces a Perkin-Elmer processor system, via a multiplexor bus, to various device controllers. It is available in the 2-line version and the 8-line version. Each line can be strapped for one of four groups, with each group containing four program-selectable clock rates. The COMM MUX baud rate is made compatible to the device by selecting the clock that matches the desired baud rate. The selected clock is specified by the CLOCK option of the device statement. See Table 4-3.

TABLE 4-3 BAUD RATES WITHIN AN INSTALLED GROUP

STRAP OPTION	BAUD RATE	CLOCK
Group 1	50	XA
	110	XB
	1 800	XC
	2 400	XD
Group 2	75	XA
	134.5	XB
	2 000	XC
	3 600	XD
Group 3	150	XA
	600	XB
	4 800	XC
	9 600	XD
Group 4	300	XA
	1 200	XB
	7 200	XC
	19 200	XD

4.14 CONVERSION EQUIPMENT CONTROLLER

These conversion equipment controllers can be configured in the system:

- Real time analog system
- Analog input controller
- Analog output controller
- Digital I/O controller

Example:

```
RTAS:,83,136     *Real time analog system
AIC:,88,138      *Analog input controller
AOC:,98,139      *Analog output controller1
AOC2:,99,139     *Analog output controller2
DIC:,A9,140      *Digital input controller
DOC:,A8,140      *Digital output controller
```

CHAPTER 5
SAMPLE SYSGEN/32 SESSIONS

5.1 INTRODUCTION

This chapter is presented to aid the less experienced user through the initial Sysgen/32 session. It is assumed that the user has read the previous chapters (Chapter 1 in particular) in this manual before attempting to use Sysgen/32. This chapter identifies three general situations, and then presents a sample Sysgen/32 session that can be used for each situation. One of these situations should apply to a user about to use Sysgen/32 for the first time. The sample Sysgen/32 sessions presented are not the only way Sysgen/32 can be used in these situations. As the user becomes more familiar with the Sysgen/32 process, these samples need not be used. However, for the first-time user they do provide an easy to follow procedure for using Sysgen/32.

5.2 SYSGEN/32 STARTUP SITUATIONS

When the user is prepared to perform a sysgen, one of the following three situations will likely exist:

- A configuration input file has been previously created and now must be processed.
- No previously created configuration input file exists. The user wishes to create a configuration input file in the conversational mode and then process it.
- No previously created configuration input file exists. The user wishes to create a configuration input file in the interactive mode and then process it.

In each situation, the user must first load and then start the Sysgen/32 program using the system LOAD and START commands, respectively. The following three sections provide a sample Sysgen/32 session for each of the three situations described above. The user should note that these are sample Sysgen/32 sessions and the user is not required to use these procedures in every case.

5.2.1 Processing a Previously Created Configuration Input File

The following commands will load and start the Sysgen/32 program and process a previously created configuration input file:

```
*LOAD SYSGEN32
*START, INPUT=FIGUR1.SYS, OUTPUT=MACRO1.MAC, LIST=PR:
-
-SYSGEN/32 R00-00
```

When these commands are entered, the configuration input file (FIGUR1.SYS) is processed by the Sysgen/32 program in batch mode. The macro calls generated by the Sysgen/32 program are written to the output file (MACRO1.MAC). List output is written to the list file (PR:).

The user can now follow the procedures outlined in Chapter 1 for expanding the macros, assembling the expanded macros, and linking the object module to yield an operating system.

5.2.2 Creating a Configuration Input File Conversationally and Processing the Input File

The following commands will load and start the Sysgen/32 program and allow the user to create a configuration input file in the conversational mode and then process the newly created file:

```
*LOAD SYSGEN32
*START, LIST=PR:, COMMAND=CON:
-
-SYSGEN/32 R00-00
>INPUT=FIGUR2.SYS
>OUTPUT=MACRO2.MAC    <must not exist>
>CONVERSATIONAL
 .
 .
```

At this point a conversational prompt and response session begins. (Section 5.3 presents a sample conversational prompt session.) Each response entered by the user is translated into a configuration input statement and then written to the designated input file (FIGUR2.SYS). When the prompt session has completed, the user processes the input file by entering the following command:

```
 .
 .
>PROCESS
 .
 .
 .
-END OF TASK CODE=0
```

When the Sysgen/32 program has successfully completed processing the configuration input file, the output file contains the macro calls generated. The user can now follow the procedures outlined in Chapter 1 for expanding the macros, assembling the expanded macros, and linking the object module to yield an operating system.

5.2.3 Creating a Configuration Input File Interactively and Processing the Input File

The following commands will load and start the Sysgen/32 program and allow the user to create a configuration input file in an interactive mode and then process the newly created file:

```
*ALLOCATE FIBUR3.SYS,IN,80
*LOAD SYSGEN/32
*START, INPUT=FIGUR3.SYS,OUTPUT=MACRO3.MAC,LIST=PR:,COMMAND =CON:
-
-SYSGEN/32 R00-00
>PROCESS
>READY FOR CONFIGURATION INPUT
>.
 .
 .
```

At this point the user can interactively enter the required sysgen configuration statements. Chapter 2 describes the format and content of these sysgen statements. It is important to note that the specified input file (FIGUR3.SYS) must be an empty file or the interactive prompt will not appear. When the sysgen statements have been entered the following commands are entered to complete the input file and begin processing:

```
>ENDC
>READY FOR SYSGEN COMMANDS
>PROCESS
 .
 .
 .
-END OF TASK CODE=0
```

When the task has reached a successful completion the macro calls generated by the Sysgen/32 program are located in the output file MACRO3.MAC. The user can now follow the procedures outlined in Chapter 1 for expanding the macros, assembling the expanded macros, and linking the object module to yield an operating system.

5.3 CREATING A CONFIGURATION INPUT FILE

As the examples in the previous section show, Sysgen/32 allows the user to create a configuration input file in two modes:

- conversational mode, and
- interactive mode

For the less experienced user the conversational mode is ideal, since the user merely has to respond to a series of prompts supplied by the Sysgen/32 program. The user responses are translated to create configuration input statements which are written to the configuration input file. This file is then processed via the SYSGEN/32 PROCESS command.

The interactive mode requires more knowledge on the part of the user because no SYSGEN/32 prompts are issued. The user enters sysgen configuration statements interactively from the command device and therefore must know what statements to include and the format of each statement. The sections that follow provide examples of creating a configuration input file in both conversational and interactive modes.

5.3.1 Using The Conversational Mode

A conversational prompt and user response session allows the user to create a configuration input file from the command device. The responses are translated into configuration input statements and are written to the specified configuration input file. This file is specified with either the INPUT parameter of the START command or with the INPUT command. If a user response to a system prompt is not acceptable, the Sysgen/32 program generates an error message and continues issuing the prompt until an acceptable response is entered. All conversational prompts follow this general format:

```
QUESTION (POSSIBLE CHOICES) [DEFAULT CONDITION]
```

A conversational session does not end until the Sysgen/32 program has issued all of the prompts contained in the conversational file. When all of the prompts have been displayed, Sysgen/32 informs the user that the program is ready to accept Sysgen/32 commands. At this point the user specifies the name of the macro output file using the Sysgen/32 OUTPUT= command and then begins processing of the configuration input file by entering the Sysgen/32 PROCESS command. The Sysgen/32 END command terminates the session. A successful completion has been reached if an end of task code of 0 is received. The following example is a sample conversational session:

```
*LOAD SYSGEN32
*START, INPUT= FIGURE1.SYS, COMMAND=CON:
-
-SYSGEN/32 R00-00
>CONVERSATIONAL
 PROCESSOR MODEL (7/32, 8/32, 3210, 3220, 3230, 3240, 3250) [3220]
>3220
 NUMBER OF REGISTER SETS (2 OR 8) [8]
>8
 O/S VERSION (8 CHAR. ALPHANUMERIC STRING) [BLANKS]
>3220.N13
SIZE OF MEMORY IN KB (64-16384, DIVISIBLE BY 16) [256]
>CR
 DYNAMIC SYSTEM SPACE IN KB (1 TO TOP OF MEMORY) [25]
>CR
 MAX. NUMBER OF TASKS (1 TO 252) [32]
>35
 BACKGROUND MAX. PRIORITY (11 TO 248) [16]
>15
 BACKGROUND MAX. SYSTEM SPACE (0.25 KB INCREMENTS) [9]
>9
 COMMAND BUFFER LENGTH (32 TO 1024 BYTES) [80]
>CR
 LOG MESSAGE BUFFER LENGTH (32 TO 132 BYTES) [72]
>CR
 CSS LEVELS (1 TO 249) [5]
>5
 NUMBER OF QUEUE ENTRIES (10 TO 64999) [TOTAL NUMBER OF DEVICES]
>CR
 NUMBER OF JOURNAL ENTRIES (0 TO 12999) [0]
>20
 MAC/MAT ADDRESS (300, 500, 900) [X"300"]
>CR
 LINE CLOCK FREQUENCY (50 OR 60) [60]
 .
 .
 .
 ENTER STARTUP PROCEDURES (COMMANDS OR CR) [NO STARTUP PROC.]
>CR
 MEMORY DIAGNOSTIC SUPPCRT (YES OR NO) [NO]
>Y
 ERROR RECORDING SUPPORT (YES OR NO) [NO]
>CR
 TCOM SUPPORT (YES OR NC) [NO]
>Y
 ENTER TCOM NAME
>TCM1
 ENTER START ADDR OF TCOM
>10000
 ENTER TCCM SIZE (IN 0.25 KB INCREMENTS)
>.25
 COORDINATION (EDMA) SUPPORT (YES OR NO) [NO]
```

```
>Y
 ENTER DEVICES THIS GROUP
>FLP1:
>FLP2:
>FLP3:
>FLP4:
 ENTER SELECTOR CHANNELS THIS GROUP
>CR
 ENTER TRANSFER RATE
>1
 COORDINATION (EDMA) SUPPORT (YES OR NO) [NO]
>N
 MCONFIG (YES OR NO) [NO]
>Y
 BLOCK (0-15)
>0
 START (0-15)
>0
 RANGE (1-16)
>1
 INTERL (0,2,4 OR CR)
>CR
 SHARED (RECORD,NORECORD,NVRECORD OR CR)
>RECORD
 NAME OF CONSOLE DEVICE (CON:)
>CR
 NAME OF CONSOLE DEVICE (CON:)
>CON:
 TTY/RP MODEL 33 (CURRENT LOOP INTERFACE),DCOD 16:
 DEVICE NAME [TTY:]
>/
 TTY/RP MODEL 33 (CURRENT LOOP INTERFACE),DCOD 81:
 DEVICE NAME [TTY:]
>TTY1:
 DEVICE ADDRESS [002]
>002
 INTERRUPT LEVEL [0]
>0
 IOCLASS [2]
>2
 TTY/RP MODEL 33 (CURRENT LOOP INTERFACE),DCOD 81:
 DEVICE NAME [TTY:]
>TTY2:
 DEVICE ADDRESS [002]
>006
 INTERRUPT LEVEL [0]
>0
 IOCLASS [2]
>2
 TTY/KP MODEL 35 (CURRENT LOOP INTERFACE),DCOD 17:
 DEVICE NAME [TTY:]
>/
 TTY/RP MODEL 35 (CURRENT LOOP INTERFACE),DCOD 82:
 DEVICE NAME [TTY:]
```

```
>/
 NONEDITING CRT (Current LOOP INTERFACE), DCOD18:
 DEVICE NAME [TTY:]
>/
 CAROUSEL 15, 30, 35 (80 CHARACTERS, CLI), DCOD21:
 DEVICE NAME [TTY:]
>/
  .
  .
  .
CONVERSATIONAL PROCESSING COMPLETE
>OUTPUT=MACRO3.MAC
>PROCESS
>END
-END OF TASK CODE=0
```

NOTE

In a conversational session there is no default for device names and addresses. The user must enter a response to the device prompt or the program will continue to issue the same device prompt until a response is received. A slash (/) bypasses a device prompt, indicating that the device displayed is not desired in the system being configured or that no further devices of this type are to be configured in the system.

Table 5-1 describes the parameters involved in device prompts.

TABLE 5-1 DEVICE PROMPT PARAMETER DESCRIPTIONS

PARAMETER	DESCRIPTION
DEVICE NAME	Four-character mnemonic the system associates with a device
DEVICE ADDRESS	Hexadecimal number specifying the physical address of a device
INTERRUPT LEVEL	Decimal number from 0 (highest) through 3 (lowest) specifying the hardware interrupt level for device interruption
I/O CLASS	Decimal number from 0 through 31 specifying the device or file class
CLOCK A, B, C, D	Baud rate at which data can be transmitted to and from a terminal
SELECTOR CHANNEL	Two-digit hexadecimal number specifying the SEICH address
CONTROLLER	Two-digit hexadecimal number specifying the CONTROLLER address
SPINDLE NUMBER	Decimal number from 0 through 3 specifying the floppy disk spindle number
TRANSFER RATE	Number of simultaneous transfers if coordination is specified

5.3.1.1 Accessing The HELP File in Conversational Mode

To access the HELP file during a conversational session, enter a question mark (?) in response to a program prompt. Information pertinent to the last prompt issued will be displayed to the command device.

Example:

```
 BACKGROUND MAX. SYSTEM SPACE (0.25 KB INCREMENTS) [9]
>?
 BACKGROUND:ESTABLISHES BACKGROUND PRIORITY AND SYSTEM SPACE
 COMMAND FORMAT: BACKGROUND [MAXPRI] [,MAXSIZE]
                 MAXPRI=DECIMAL NUMBER FROM 11
                        THROUGH 248
                        DEFAULT=16
```

```
                    MAXSIZE=DECIMAL NUMBER, INCREMENTS OF
                            0.25 KB
                            DEFAULT=9
>CR
 BACKGROUND MAX. SYSTEM SPACE (0.25 KB INCREMENTS)  [9]
>10
```

5.3.2 A Configuration Input File Created Interactively

To create a configuration input file interactively, the user must load and start the Sysgen/32 program either with the name of an interactive device specified as the command device, or by taking the default CON:

The user may use the START command format shown in Example 3 in Section 5.2, or the user may specify only the command device in the START command and then specify the input and output files using the Sysgen/32 commands, as shown in the following example.

Example:

```
*LCAD SYSGEN/32
*START,COMMAND=CON:
-
-SYSGEN/32 R00-00
>INPUT = FIGUR1.SYS          < must be an empty file  >
>OUTPUT= MACR07.MAC          < Must not pre-exist  >
>PROCESS
 READY FCR CONFIGURATION INPUT
>
 .
 .
 .
>ENDC
*READY FOR SYSGEN/32 COMMANDS
>PROCESS
>END
-END OF TASK CODE=0
```

The user enters the sysgen configuration statements after the following message appears:

```
READY FOR CONFIGURATICN INPUT
```

The ENDC command terminates entry of configuration statements and returns the user to the Sysgen/32 command mode. The PROCESS command initiates processing of the configuration input file. When an end of task code of zero is received, the program has reached a successful completion.

5.3.2.1 Accessing the HELP File in Interactive Mode

To access the HELP file while creating a configuration input file interactively the user must exit the configuration input mode using the ENDC command. The Sysgen/32 HELP command can then be used to access the HELP file. When the HELP command is entered the following message is displayed:

```
FOR A LIST OF COMMANDS TYPE HELP*
FOR HELP ON ANY COMMAND MNEMONIC, TYPE HELP (MNEMONIC)
```

When the HELP command is entered with an asterisk (*) all Sysgen/32 commands and configuration statements are displayed. When the HELP command is entered with mnemonic of a configuration statement or Sysgen/32 command, information pertinent to that specific mnemonic is displayed.

Once the user has obtained the desired information from the HELP file the Sysgen/32 EDIT command can be used to return to creating the configuration input file. Enter EDIT, GET the input filename, and position yourself where you left off prior to using the HELP command.

Example:

```
*LOAD SYSGEN/32
*START,COMMAND=CON:
-
-SYSGEN/32 R00-00
>INPUT= FIGUR7.SYS          < empty input file  >
>OUTPUT= MACRO7.MAC        <  non existent output file  >
>PROCESS
 READY FOR CONFIGURATION INPUT
>VERSION 3220
>CPU 3220
>MEM 1024
>DSYS 150
>ENDC
>READY FOR SYSGEN COMMANDS
>HELP ACCOUNTING
     ACCOUNTING: INCLUDES ACCOUNTING SUPPORT
          COMMAND FORMAT: ACCOUNTING [ N ] [,NO FILE ACCOUNTING]
          N= Decimal Value From 2 through 32, SPECIFYING THE
             MAXIMUM NUMBER OF ACCOUNTING CLASSES
             DEFAULT FOR N=4
             NO FILE ACCOUNTING SPECIFIES THAT FILE
             ACCOUNTING SUPPORT IS EXCLUDED
>EDIT
>READY FOR EDIT COMMANDS
>GET FIGUR7.SYS
 APPEND BOTTOM
 5  ENDC
```

```
 7  -1
 4  DSYS 150
 7  INS
 4.01 ACCOUNTING 4
 .
 .
 .
DONE
>READY FOR SYSGEN COMMANDS
>PROCESS
>END
-END OF TASK CODE=0
```

5.3.3 Modifying A Configuration Input File Via EDIT/32

Regardless of how it was created, a configuration input file that contains an error or an improperly specified configuration statement can be modified using the Sysgen/32 EDIT command. The EDIT command invokes EDIT/32 and makes all of the EDIT/32 commands available to the Sysgen/32 user. After modification, the input file may then be processed via the PROCESS command.

Example:

```
*LOAD SYSGEN32
*START,INPUT= FIGUR1.SYS, COMMAND=CON:
-
-SYSGEN/32 R00-00
>EDIT                          < invokes editor >
 READY FOR EDIT COMMANDS
>GET FIGUR1.SYS                < specifies file to be edited >
>T 1-4                         < displays lines 1-4 >
1 VERSION 3220
2 CPU 3220
3 MEM 1024
4 DSYS 200
>CHANGE /200/, /150/,4         < modifies line 4 >
4 DSYS 150
>DONE                          < saves file and exits EDIT/32 >
 READY FOR SYSGEN COMMANDS
>OUTPUT= MACRO1.MAC
>PROCESS
>END
-END OF TASK CODE=0
```

APPENDIX A
COMPARISON OF SYSGEN/32 AND OS/32 CUP STATEMENT DEFAULTS

STATEMENT	CUP DEFAULT	SYSGEN DEFAULT
ACCOUNTING	4	4
BACKGROUND PRIO	16	16
BACKGROUND SIZE	9	9
CLOCK	60,6C,6D	60,6C,6D
CMDLEN	80	80
CPU	7/32	3220
REGISTERS	2	8 for all but 7/32
CSS	5	5
DATE	MMDDYY	MMDDYY
DEVADS	0	0
DIRECTORY	CFF	OFF
DISCBLOCK	4	4
DSYS	25	25
ERRCRREC	OFF	OFF
FLOAT (CPU 7/32,8/32)	N,N	N,N
FLOAT (P-E 3200 SERIES)	H,H	H,H
ILEVEL	0	0
INTERCEPT	OFF	OFF
IOCLASS	0,1,2,3	0,1,2,3
ITAM	OFF	OFF
JOURNAL	0	0
LOGLEN	72	72
MAXTASK	32	32
MCONFIG	OFF	OFF
MEMCHECK	OFF	OFF
MEMORY	128	256
LIMITS:		16384 for 3250, 3240, 3230
		4096 for 3210
		1024 for 3220, 7/32, 8,32
NOSEG	ON	ON
TGD	TGD	NOTGD
QUEUE	NO. OF DEVICES	NO. OF DEVICES
ROLL	OFF	OFF
SPOOL	OFF	OFF
SSTABLE	32	32
TEMP	BLANK	BLANK
TGD	CN	OFF
VERSION	BLANK	BLANK
VOLUME	BLANK	BLANK

APPENDIX B
SYSGEN/32 MESSAGES

ADDRESS ERROR address

Device address exceeds the maximum allowable range set in the DEVADS statement.

COMMAND NOT RECOGNIZED

An invalid command mnemonic was entered.

CONSOLE ERROR

A console device was not specified, or more than one device was specified as a console device.

COORDINATION ERROR name

Named device not recognized as a valid device.

DUPLICATE START OPTION: xxx

Start options were entered more than once.

ERRORS IN ASSEMBLY, SYSGEN ABORTED

Sysgen CSS message indicating that errors were encountered in the assembly phase.

ERRORS IN MACRO EXPANSION, SYSGEN ABORTED

Sysgen CSS message indicating that errors were encountered in the macro expansion phase.

FILE DESCRIPTOR ERROR

A device or filename entered in a command was either invalid or omitted.

```
              INPUT:
              OUTPUT:
FILE ERROR ON LIST:              [Text]
              CONVERSATIONAL:
```

Text specifies one of the following:

```
ACCOUNT ERROR
ASSIGNMENT ERROR
BUFFER ERROR
FILE DESCRIPTOR ERROR
I/O ERROR
ILLEGAL FUNCTION
INVALID LU
NAME ERROR
PRIVILEGE ERROR
PRCTECT ERROR
SIZE ERROR
SVC7 ERROR
TGD ASSIGNMENT ERROR
TYPE ERROR
VOLUME ERROR
```

An error was encountered during the allocation or assignment of the device or file identified by fd.

ILEVEL ERROR ilevel

An invalid ilevel value was issued, or an ilevel other than 0 was specified with only 2 register sets.

ILLEGAL SEPARATOR: xxx

A separator was omitted or incorrectly entered.

ILLEGAL VALUE: xxxx

The characters replacing xxxx represent the flagged illegal value.

```
              ADDRESS
ILLEGAL TCCM: NAME
              SIZE
```

TCOM address is not in global memory, TCOMs overlap, the names of two TCOMs are the same, or the name TSKCOM was specified.

INPUT FILENAME OMITTED

Sysgen CSS message indicating the name of the configuration input file was not entered as input to the Sysgen/32 CSS procedure.

INPUT FILE filename.SYS DOES NOT EXIST, SYSGEN ABORTED.

Sysgen CSS message indicating that the specified configuration input file does not exist.

INPUT MUST BE ENTERED

CONVERSATIONAL or PROCESS command was entered before an input file was specified.

INVALID ARGUMENT: argument

An illegal argument was located while processing the configuration input file.

COMMAND DEVICE ERROR

Specified device or file is syntactically incorrect or failed to assign.

INVALID COMMAND IN BATCH: CONVERSATIONAL/EDIT

The EDIT or CONVERSATIONAL command was entered in batch mode.

LIST DEVICE ERROR

Specified device or file is syntactically incorrect or failed to assign.

INVALID START OPTION: option

Program does not recognize a START command option.

```
                INPUT:
                OUTPUT:
I/O ERROR ON    LIST:     text ON fd
                COMMAND:
```

text specifies one of the following:

```
DEVICE UNAVAILABLE
END OF FILE
END OF MEDIUM
ILLEGAL OR UNASSIGNED LU
ILLEGAL FUNCTION
PARITY OR RECOVERABLE ERROR
UNRECOVERABLE ERROR
```

fd identifies the assigned file or device on which the error occurred.

LINE xxx ADDR xxxxx STACK OVERFLOW

The program does not have sufficient memory to process the input file. Reload the program with a larger segment size increment.

MACRO FILE filename.MAC DOES NOT EXIST, SYSGEN ABORTED

Sysgen CSS message output in macro expansion phase indicating that the filename of the macro output file does not exist.

MACRO LIBRARY filename.MLB NOT FOUND, SYSGEN ABORTED

Sysgen CSS message indicating a required macro library was not found.

MAX. NUMBER OF TCOMS EXCEEDED

Too many TCOMs were specified.

MISSING ARGUMENT

A required argument was omitted.

MODULE NOT INCLUDED: module name

The module identified by module name was not included in the system. There might be a combination of invalid option settings.

NO DEVICES

No devices were specified in the input file.

NO DIRECT ACCESS SUPPORT

DIRECTORY, ROLL, SPOCL, TEMP, or VOLUME statements were entered, but no disk devices were specified.

OBJECT LIB filename NOT FOUND, OS LINKING ABORTED

Sysgen CSS message indicating that a required system or driver object library was not found.

OUTPUT FILE ERROR: xxx

The output file already exists, or the fd is incorrect.

OUTPUT MUST BE ENTERED

The output file was not specified.

SEQUENCE ERROR

The statement preceeding the message was entered more than once, or a corresponding required statement was omitted.

ILEVEL or IOCLASS statement was entered after all devices were processed; i.e., after the ENDD statement was read.

SPECIFIED FILE filename DOES NOT EXIST, LINK OF OS ABORTED

Sysgen CSS message indicating that a file required in the Link procedure cannot be found.

STATEMENT NOT RECOGNIZED

A statement in the input file is not recognized by the program.

SYSGEN32 ERROR, SYSGEN32 ABORTED

An error in running the Sysgen/32 program was detected. The Sysgen procedure is aborted.

xxxx ERROR

The characters replacing xxxx specify ROLL, SPOOL, TEMP, VOLUME, MEMORY, MODULE, FLOAT, ILEVEL, ERROR RECORDING, ACCOUNTING, NAME, ADDRESS, DCOD, SELCH, OR COORDINATION.

Invalid syntax in the volume.

More than 16 pseudo devices specified (SPOOL), or spool support was requested but no pseudo devices were found.

The memory specified exceeds the allowed range for the requested CPU.

A MODULE statement was entered with a name that could not be recognized by the program, or the MODULE name was syntactically incorrect.

Invalid floating point options or combinations were entered. No single precision floating point, but hardware double precision. Or, for the Perkin-Elmer 3200 series CPUs the options were H,S or S,H.

SELCH, controller, and connected devices have different ILEVELS.

Syntax error was detected in the name field of a device statement, the same name was entered twice, or a blank device name was found.

The device address was invalid, greater than the maximum physical address specified, or not zero for spool devices. Device address was zero, indicating a spool device, but the device code was not zero or one.

Specified device code was invalid, not a number from 16 to 254, or not 0 or 1 for spool devices.

More than one device specified the same controller with different SELCH specifications.

APPENDIX C
SYSGEN/32 COMMAND AND STATEMENT SUMMARY

ACCOUNTING [=] [nn / **4**] [,NOFILEACCOUNTING]

BACKGROUND [=] [maxpriority / **16**] [, maxsize / **9**]

CLOCK [=] [50 / **60**] , [pic addr / **6C**] , [lfc addr / **6D**] [,D]

CMDLEN [=] [n / **80**]

CONVERSATIONAL

COORDINATION [=] [{ SELCH = S_1 / (S_1, S_2, S_n) , DEVICE = $name_1$ / $(name_1, \ldots, name_n)$ }] ,TRANSFER=n

COPY

[$line_1$ . . . $line_n$]

ENDCOPY

```
CPU [=][ { 3250 } ][ , { 2 } ]
       [ { 3240 } ]  [ , { 0 } ]
       [ { 3230 } ]
       [ { 3220 } ]
       [ { 3210 } ]
       [ { 8/32 } ]
       [ { 7/32 } ]

CSS [=][ { n } ]
       [ { 5 } ]

DATE [=][ { DDMMYY } ]
        [ { MMDDYY } ]

DEVADS [=][ { 3 } ]
          [ { 1 } ]
          [ { 0 } ]

DEVICES
 dev name: ,address,dcod [,CONSOLE,] [,IOCLASS=n] [,ILEVEL=n]
[,SELCH=n] [,CONTROLLER=n] [,NONSHARED] [,SPINDLE=n]
[,XDCOD=xdcod] [,EOV]   [,QUEUE=name] [,RECLEN=n] [,SIZE=n]
[,TRANSLATE=name] [,READCONTROL=n] [,WRITECONTROL=n]
[,PADCOUNT=n] [,LEADCOUNT=n] [,POLLIMIT=n] [,DUAL]
[,CLOCK={ XA }]
        { XB }
        { XC }
        { XD }
.
.
.
ENDD
```

DIRECTORY

DISCBLOCK [=] [n / **4**]

DSYS [=] [n / **25**]

EDIT

END

ENDC

ERRORREC [=] fd,size,period

FLOAT [=] [(S,S / S,H / **H,H** / **N,N**)]

HELP [(name / *)]

ILEVEL [=] [(3 / 2 / 1 / **0**)]

INPUT fd

INTERCEPT

IOCLASS [=] [{ CC / 0 / 1 / 2 / 3 }]

ITAM

JOURNAL [=] [n / 0]

LOGLEN [=] [n / 72]

MAXTASK [=] [n / 32]

MCONFIG BLOCK=nn,START=xx,RANGE=yy [,INTERL={ 2 / 4 / 8 }]
[,SHARED={ NORECORD / NVRECORD / RECORD }]

MEMCHECK

MEMORY [=] [n / 256]

MODULE

[new module name$_1$
new module name$_2$
.
.
.
new module name$_n$]

ENDM

NOSEG

OUTPUT fd

PAUSE

PROCESS

QUEUE [=] [n | total number of devices]

ROLL [=] [rvoln]

SPOOL [=] [spvoln]

SSTABLE [=] [n | 32]

START [,INPUT=fd$_1$][,OUTPUT=fd$_2$][,COMMAND=fd$_3$][,LIST=fd$_4$]

[STARTUP
.
.
.
ENDS]

TCOM [=] name$_1$,address$_1$,size$_1$ [/.../name$_n$,address$_n$,size$_n$]

TEMP [=] [tvoln]

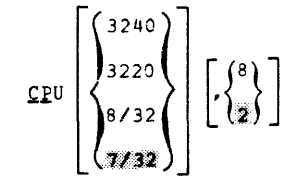
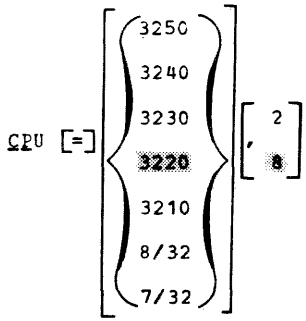
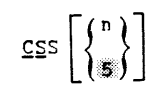
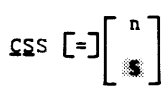
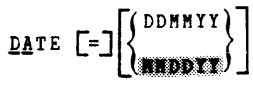
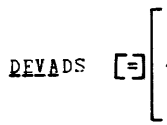
TGD

VERSION [=] [vvvvvvvv]

VOLUME [=] [voln]

APPENDIX D
SYSGEN/32 AND OS/32 CUP STATEMENT COMPARISONS

OS/32 CUP STATEMENTS	SYSGEN/32 STATEMENTS
ACCOUNTING [{nn / **K**}] [,NOFILEACCOUNTING]	ACCOUNTING [=] [**nn** / **0**] [,NOFILEACCOUNTING]
BACKGROUND [{maxpriority / **16**}] [,{maxsize / **9**}]	BACKGROUND [=] [**maxpriority** / **16**] [, **maxsize** / **9**]
CLOCK [{50 / **60**}],[{pic addr / **X'6C'**}],[{lfc addr / **X'6D'**}] [,D]	CLOCK [=] [**50** / **60**],[**pic addr** / **6C**],[**lfc addr** / **6D**] [,D]
CMDLEN [{n / **80**}]	CMDLEN [=] [**n** / **80**]
	COORDINATION [=] [{SELCH = S_1 / (S_1,S_2,S_n) / $name_1$ / $(name_1,\ldots,name_n)$}],TRANSFER=n
	COPY [$line_1$ . . . $line_n$] ENDCOPY

OS/32 CUP STATEMENTS	SYSGEN/32 STATEMENTS
	
	
	
	

OS/32 CUP STATEMENTS	SYSGEN/32 STATEMENTS
DEVICES {level | *} [dmnem]:dnum,dcod,{C | D | E | S}[,{xdcod | Xxdcod}] [,{recl | 132}] [,{size | 66}] . . . {level | *} [dmnem]:dnum,dcod,{C | D | E | S}[,{xdcod | Xxdcod}] [,{recl | 132}] [,{size | 66}] ENDD DIRECTORY DISCBLOCK {n | *} DSYS {n | 25} ENDC ERRORREC fd,size,period	DEVICES dev name: ,address,dcod [,CONSOLE,] [,IOCLASS=n] [,ILEVEL=n] [,SELCH=n] [,CONTROLLER=n] [,NONSHARED] [,SPINDLE=n] [,XDCOD=xdcod] [,EOV] [,QUEUE=name] [,RECLEN=n] [,SIZE=n] [,TRANSLATE=name] [,READCONTROL=n] [,WRITECONTROL=n] [,PADCOUNT=n] [,LEADCCUNT=n] [,POLLIMIT=n] [,DUAL] [,CLOCK={XA | XB | XC | XD}] . . . ENDD DIRECTORY DISCBLOCK [=] [n | *] DSYS [=] [n | 25] ENDC ERRORREC [=] fd,size,period

OS/32 CUP STATEMENTS	SYSGEN/32 STATEMENTS
FLOAT [S,S | S,H | H,H | H,N]	FLOAT [=] [S,S | S,H | H,H | H,N]
ILEVEL [3 | 2 | 1 | 0]	ILEVEL [=] [3 | 2 | 1 | 0]
IOCLASS [cc | 0 | 1 | 2 | 3]	INTERCEPT IOCLASS [=] [cc | 0 | 1 | 2 | 3]
ITAM	ITAM
JOURNAL [n | 0]	JOURNAL [=] [n | 0]
LOGLEN [n | 72]	LOGLEN [=] [n | 72]
MAXTASK [n | 32]	MAXTASK [=] [n | 32]

OS/32 CUP STATEMENTS	SYSGEN/32 STATEMENTS
	MCONFIG BLOCK=nn,START=xx,RANGE=yy [,INTERL={2 / 4 / 8}] [,SHARED={NORECORD / NVRECORD / RECORD}]
MEMCHECK	MEMCHECK
MEMORY [{n / 128}]	MEMORY [=] [n / 256]
MODULE new module name$_1$ [new module name$_2$ . . . new module name$_n$]	MODULE [new module name$_1$ new module name$_2$ . . . new module name$_n$]
ENDM	ENDM
NOSEG	NOSEG
NOTCD	
QUEUE [{n / total number of devices}]	QUEUE [=] [n / total number of devices]
ROLL [rvoln]	ROLL [=] [rvoln]
SPOOL [spvoln]	SPOOL [=] [spvoln]
SSTABLE [{n / 32}]	SSTABLE [=] [n / 32]

OS/32 CUP STATEMENTS	SYSGEN/32 STATEMENTS
STARTUP . . . ENDS	[STARTUP . . . ENDS]
TCOM name$_1$,address$_1$,size$_1$[/.../name$_n$,address$_n$,size$_n$]	TCOM [=] name$_1$,address$_1$,size$_1$[/.../name$_n$,address$_n$,size$_n$]
TEMP tvoln	TEMP [=] [tvoln]
	TGD
VERSION vvvvvvvv	VERSION [=] [vvvvvvvv]
VOLUME voln	VOLUME [=] [voln]

PUBLICATION COMMENT FORM

Please use this postage-paid form to make any comments, suggestions, criticisms, etc. concerning this publication.

From _____ Date _____

Title _____ Publication Title _____

Company _____ Publication Number _____

Address _____

_____

_____

FOLD FOL

Check the appropriate item.

☐ Error Page No. _____ Drawing No. _____

☐ Addition Page No. _____ Drawing No. _____

☐ Other Page No. _____ Drawing No. _____

Explanation:

FOLD FC

CUT ALONG LINE

Fold and Staple

No postage necessary if mailed in U.S.A.

STAPLE STAPLE

FOLD FOLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 22 OCEANPORT, N.J.

POSTAGE WILL BE PAID BY ADDRESSEE

PERKIN-ELMER
Computer Systems Division
2 Crescent Place
Oceanport, NJ 07757

ECH PUBLICATIONS DEPT. MS 322A

FOLD FOLD

STAPLE STAPLE