PERKIN-ELMER

OS/32
SYSTEM PLANNING
AND CONFIGURATION GUIDE

48-024 F00 R02

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PREFACE

This manual provides the system programmer or operator with the information needed to configure a 32-bit operating system according to specific needs. It describes the commands used to configure a system and includes guidelines for selecting the system generation (sysgen) parameters that produce the desired system. Both object-level and source-level sysgen procedures are described. The functions of the Configuration Utility Program (CUP), Library Loader (LIBLDR), and Link are explained in the object-level sysgen section. System module libraries and sysgen options are discussed in the source-level sysgen section. Also included is a description of the device characteristics supported by standard OS/32 drivers.

Chapter 1 is an introduction to an OS/32 sysgen. Chapter 2 details an object-level sysgen and describes CUP. All CUP commands and messages are also described. Chapter 3 details a source-level sysgen and lists source sysgen options, source sysgen parameters, and system object modules. A source-level sysgen example is also included. Chapter 4 lists the standard OS/32 devices, describes the supported features, and specifies the values required for an object-level sysgen. Appendix A contains all OS/32 supported devices and device codes. Appendix B is a summary of all CUP commands. Appendix C is a summary of CUP messages, and Appendix D is a sysgen example.

Revision F00 R02 adds two new file types: nonbuffered indexed and extendable contiguous files. This revision also adds support for a letter quality printer. An explanation is given for including SPL/32 support in the system. Device codes are included for the standard Bi-directional I/O Controller (BIOC) driver. This revision includes support for account numbers 1 through 65,535, excluding 255, which is used by MTM.

This revision applies to the OS/32 R06.2 software release.

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

CHAPTER 1
OS/32 SYSTEM GENERATION (SYSGEN)

1.1 INTRODUCTION

OS/32 is a general purpose, real-time operating system that can be configured to support a variety of hardware and software application environments. It can be configured as a multi-tasking or serial-tasking batch program development system. The capability of tailoring OS/32 to the desired user environment ensures efficient use of system resources.

OS/32 supports two types of sysgen:

● 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. Chapter 2 details the object-level sysgen procedure.

The source-level sysgen enables a user to modify the OS/32 system modules and drivers. This procedure requires reassembling one or more system source modules, replacing existing versions of these modules in the system library with user-modified modules, and executing the object-level sysgen procedure. Chapter 3 explains the source-level sysgen procedure.

1.2 SYSTEM COMPONENTS AND PACKAGING

The OS/32 package consists of a program package and documentation package. The program package contains the driver and system module libraries in both source and object format, and the utilities in object and image format. The documentation package contains the 32-bit software technical publications that describe all component programs. See the packaging document for a detailed description of the contents of the program and documentation packages.
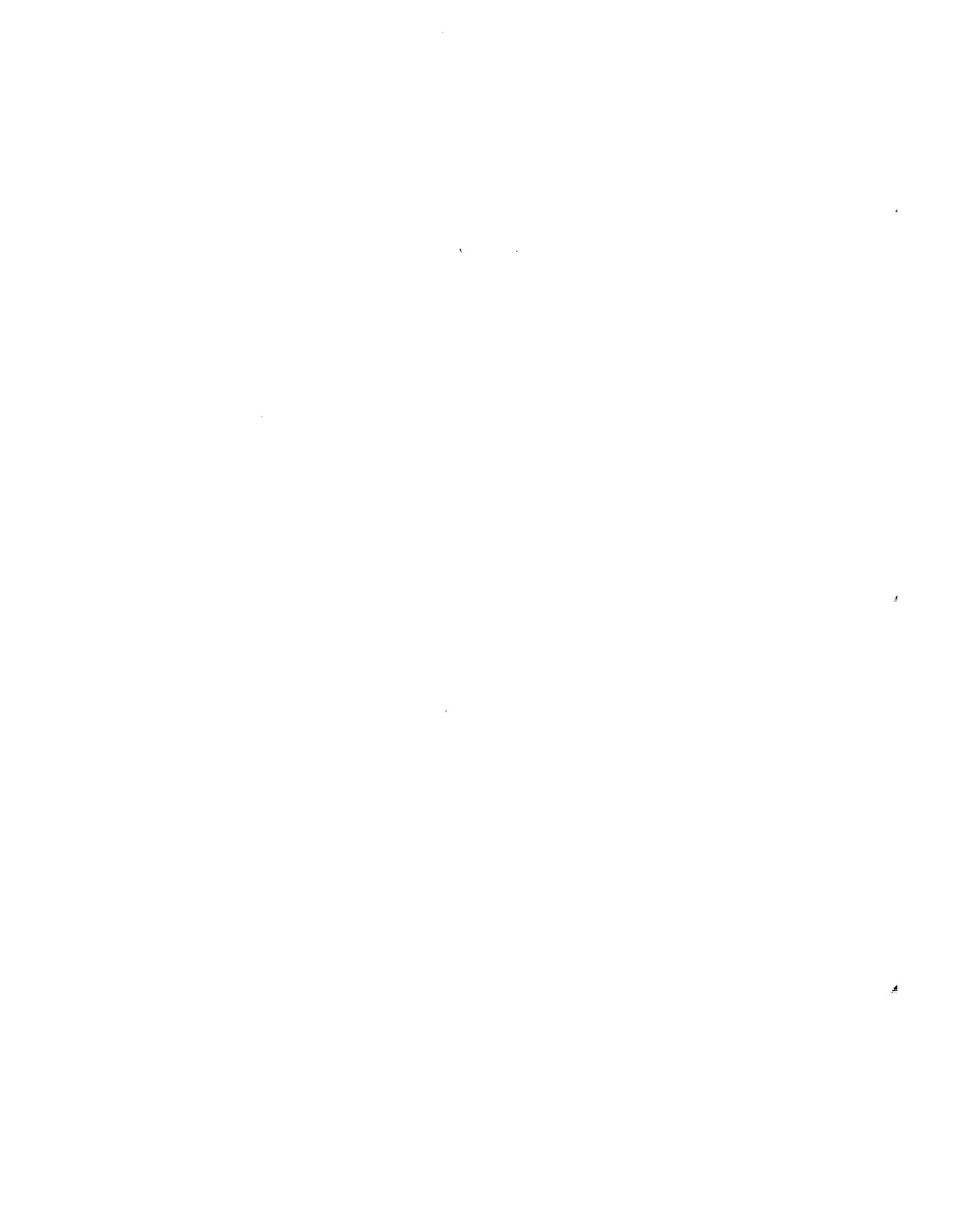
CHAPTER 2
OBJECT-LEVEL SYSTEM GENERATION (SYSGEN)

2.1 INTRODUCTION

The user must perform a sysgen to build an operating system that conforms exactly to the target hardware configuration. The OS/32 object-level sysgen procedure provides the capability of reconfiguring the operating system without reassembling operating system modules. See Figure 2-1.

An object-level sysgen is performed by:

1. building an object module by executing the OS/32 Configuration Utility Program (CUP). CUP selects from the OS/32 System and Communications Driver Libraries, the drivers and device control blocks (DCB) specified through the CUP commands. This process, accomplished through the SYSGEN1 command, produces a user-selected driver library object module with unresolved references.

2. building a system object module by executing the OS/32 Library Loader (LIBLDR). The LIBLDR links the user-selected driver library object module output by CUP with the OS/32 system and the Communications System Object Module Libraries. This process, accomplished through the SYSGEN2 command, produces a system object module with all references resolved.

3. executing OS/32 Link to change the system module from object to image format. This process, accomplished through the SYSGEN3 command, builds an image module that can be loaded into memory using the OS/32 Direct Access Bootstrap (BOOT) Loader (for the Perkin-Elmer Models 7/32 and 8/32 systems only) or the Loader Storage Unit (LSU).

2.2 SPECIFYING THE SYSTEM CONFIGURATION WITH CUP

CUP selects the drivers and DCBs from the OS/32 System and Communications Driver Libraries through the user-specified CUP commands and parameters described in this chapter.

CUP requires an input device supporting ASCII read, an input device supporting binary read, an output device supporting binary write, and if a listing is desired, an output device supporting ASCII write.

CUP input command device

OS/32 driver library

Data comm driver library

CUP

Object system module (with references unresolved)

Command and configuration listing

LIBLDR input command device

OS/32 system library

Data comm system library

LIBLDR

Link input command device

Object system module (with references resolved)

Map listing

Link

Loader storage unit (LSU)

Image system load module

OS/32 Direct Access Bootstrap Loader

Memory

Figure 2-1 Object-Level Sysgen Procedure

2.2.1 SYSGEN1 Command

The SYSGEN1 command executes CUP.

Format:

    SYSGEN1 fd,segsize increment

Parameters:

fd	is the file descriptor of the device from which CUP commands are input.
segsize increment	is a decimal number in kb specifying the amount of additional memory needed for CUP execution.

Functional Details:

The user-specified fd contains the command input. CUP automatically searches the driver libraries that correspond to the devices specified in the DEVICES...ENDD commands. Table 2-1 lists the available OS/32 System and Communications Driver Libraries.

TABLE 2-1 SYSTEM AND COMMUNICATIONS DRIVER LIBRARIES

DRIVER LIBRARIES	LIBRARY FILENAMES	SEARCH ORDER
User-written drivers and DCBs (optional)	USERDLIB.LIB	1
OS/32 Driver Library (required)	DRIVER.LIB	2
2780/3780 Enhancement Package Driver Library (optional)	ITED2780.LIB	3

TABLE 2-1 SYSTEM AND COMMUNICATIONS DRIVER
LIBRARIES (Continued)

DRIVER LIBRARIES	LIBRARY FILENAMES	SEARCH ORDER
Bit Synchronous Enhancement Package Driver Library (optional)	ITEDZDLC.LIB	4
3270 Terminal Support Package Driver Library (optional)	ITED327S.LIB	5
3270 Emulation Enhancement Package Driver Library (optional)	ITED327E.LIB	6
Basic Communications Package Driver Library (optional)	ITBDLIB.LIB	7

CUP processes these files and a user-specified sequence of CUP commands to produce the object module CUPOUT.OBJ with references unresolved. When all CUP processing is completed, a command listing and configuration description are produced. All default values are noted on the listing with an asterisk (*) in the left-hand column. CUP terminates when the ENDC command is processed and displays this message:

CONFIGURATION STATEMENT PROCESSING COMPLETE

After the user-specified drivers and DCBs are selected from the driver libraries, this message is displayed:

SET IMPURE BIAS TO iiiiii

SET PURE BIAS TO pppppp

These pure and impure bias addresses are used by the LIBLDR through the SYSGEN2 command to determine the next available locations above the highest pure and impure addresses used.

CUP occupies 30.25kb of memory in addition to that required by the operating system, and also needs an additional working storage area that varies with the configuration being built. The CUP program contains sufficient working storage for generation of most large systems. If more memory space is required, issue the SYSGEN1 command with the segsize increment parameter specified.

Example:

SYSGEN1 CR: The card reader contains a deck
                                     of CUP commands to be executed.

Messages:

***SYSGEN1:   CONFIGURED STATEMENT fd OMITTED

The fd specifying the device or file from which the CUP commands are read was omitted.

***SYSGEN1:   FILE fd NON-EXISTENT

The user-specified fd cannot be found.

***SYSGEN1:   ERRORS DETECTED BY CUP

The CUP program ended abnormally. See the configuration listing for resulting errors.

2.3   BUILDING A SYSTEM OBJECT MODULE WITH THE LIBRARY LOADER (LIBLDR)

The LIBLDR links the user-selected driver library object module output by CUP with Perkin-Elmer OS/32 System, Communications, and user-written object module libraries to produce a system object module. The LIBLDR occupies 8.5kb of memory and requires additional memory for a working storage area. The LIBLDR contains sufficient memory space for generation of most large systems. If more memory space is required, specify the segsize increment parameter in the SYSGEN2 command.

```
-------------------
|     SYSGEN2      |
-------------------
```

2.3.1 SYSGEN2 Command

The SYSGEN2 command executes the LIBLDR.

Format:

    SYSGEN2 ibias,pbias,segsize increment

Parameters:

ibias	is the starting location of impure relocatable code.
pbias	is the starting location of pure relocatable code.
segsize increment	is a decimal number in kb specifying additional memory for LIBLDR execution.

Functional Details:

A memory configuration file should be specified if memory error recording is included in the target system. See Section 2.5.14.1.

The ibias and pbias parameters output by CUP through the SYSGEN1 command are input to the LIBLDR. CUP automatically searches the system libraries corresponding to the driver libraries that were included in the system by executing the SYSGEN1 command. Table 2-2 lists the available system module libraries.

TABLE 2-2   OS/32 AND COMMUNICATIONS SYSTEM LIBRARIES

SYSTEM LIBRARIES	LIBRARY FILENAMES	SEARCH ORDER
System Support Library (required)	SYS.LIB	1
User Support Library (optional)	USERSYS.LIB	2
2780/3780 Enhancement Package System Library (optional)	ITES2780.LIB	3
Bit Synchronous Enhancement Package System Library (optional)	ITESZDLC.LIB	4
3270 Terminal Support Enhancement Package System Library (optional)	ITES327S.LIB	5
3270 Emulation Enhancement Package System Library (optional)	ITES327E.LIB	6
Basic Communications Package System Library	ITBSYS.LIB	7
Dummy End Module	UBOT.OBJ	8

The LIBLDR loads the user-selected driver modules and system modules required by EXTRNs and links them, producing the system object module (LIBLDOUT.OBJ). The LIBLDR builds two maps: one by addresses (MAP), the other by symbols (AMAP).

The system object module produced by the LIBLDR must be subsequently processed by Link to produce an image load module.

Example:

SYSGEN2 1520,1770   The impure and pure biases are
                                      1520 and 1770, as output by CUP
                                      during SYSGEN1.

Messages:

***SYSGEN2: MISSING PARAMETER (IMPURE BIAS)

    Parameter specifying impure bias, supplied by CUP during execution of the SYSGEN1 command, was omitted.

***SYSGEN2: MISSING PARAMETER (PURE BIAS)

    Parameter specifying pure bias, supplied by CUP during execution of the SYSGEN1 command, was omitted.

***SYSGEN2: FILE fd NON-EXISTENT

    The fd to which the system object module was output by CUP cannot be found.

***SYSGEN2: ERRORS DETECTED BY LIBLDR

    The LIBLDR ended abnormally. All LIBLDR messages are displayed on the console. See the OS/32 Library Loader Reference Manual.

2.4 BUILDING A SYSTEM IMAGE LOAD MODULE WITH LINK

Link converts the system object module produced by the LIBLDR from object to image format for loading via the BOOT loader or the LSU.

2.4.1 SYSGEN3 Command

The SYSGEN3 command executes Link.

Format:

    SYSGEN3 ubot adr,fd,segsize increment

Parameters:

ubot adr   is a hexadecimal number specifying the address
                    of UBOT. This field can be omitted when using
                    Link.

fd   is the file descriptor of the image module to
                    be produced by Link. For the 7/32 and 8/32
                    systems, fd is displayed as:

                        OS32nnnn.ext

                        nnnn   is 4-character alphanumeric
                                    string.

                        ext   is a 1- to 3-character hex-
                                    adecimal string.

segsize   is a   decimal   number   in   kb   specifying
increment   extra memory for Link execution.   A segment
                    size increment in the range of 150-200 should
                    be sufficient for most large scale systems.

Messages:

***SYSGEN3:   MISSING PARAMETER (OUTPUT FD)

    The fd to receive the image module generated by Link is not
    specified.

***SYSGEN3:   ERRORS DETECTED BY LINK

    Link terminated abnormally. See the OS/32 Link Reference
    Manual for a list of Link messages.

2.5 CONFIGURATION UTILITY PROGRAM (CUP) COMMANDS

The CUP commands are read from the command input device assigned to logical unit 1 (lu 1) and are printed on the list device assigned to lu 3. Each CUP command is described in the following sections. The CUP commands can be entered in any order with a few exceptions explained under the appropriate command.

If a CUP command and its parameters exceed 71 character positions, enter a character in position 72 and continue the CUP command in position 1 on the line immediately following it. Any character in position 72 is interpreted as a continuation character.

Messages:

These messages apply to all CUP commands:

CUP:MNEM-ERR   User-specified command is an invalid command.

CUP:SEQ-ERR   User-specified command is already entered.

CUP:CONT-ERR   This command line is not a continuation of the previous command line that contains a continuation character in position 72.

2.5.1 ACCOUNTING Command

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

Format:

$$\text{ACCOUNTING} \left[\begin{Bmatrix} nn \\ 4 \end{Bmatrix} \right] \left[\text{,NOFILEACCOUNTING} \right]$$

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. If this parameter is omitted, the
                      default is 4 classes. Refer to the IOCLASS
                      command. The minimum number of classes must
                      be 2 because indexed, nonbuffered indexed,
                      extendable contiguous, and contiguous files
                      must always use these classes. If the number
                      of classes specified is less than 4, then all
                      communication multiplexor devices and spool
                      devices must be explicitly given an ioclass
                      with a maximum value of 1 less than the
                      accounting parameter.

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 command. Each I/O class supported by the accounting facility occupies 12 bytes in the user's task control block (TCB) and occupies 4 bytes in the multi-terminal monitor (MTM) for each MTM user using the accounting facility. This command must precede the DEVICES...ENDD commands. If this command is omitted, no accounting support is included in the target system.

Entering the NOFILEACCOUNTING parameter allows the user to reduce the size of the accounting transaction file (ATF).

Message:

CUP:CLAS-ERR   The user-specified number is not a decimal number from 0 through 31.

2.5.2 BACKGROUND Command

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

Format:

$$\text{BACKGROUND} \left[\left\{ \begin{array}{c} \text{maxpriority} \\ 16 \end{array} \right\} \right] \left[, \left\{ \begin{array}{c} \text{maxsize} \\ 9 \end{array} \right\} \right]$$

Parameters:

maxpriority   is a decimal number 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 number in increments of 0.25kb specifying the largest system space area in which system data structures; i.e., FCB, TQE, TCB, of a background task are to be stored. See the OS/32 Application Level Programmer Reference Manual for system space requirements of tasks. If this parameter is omitted, 9 is the default.

Functional Details:

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

Messages:

CUP:BPRI-ERR   User-specified maxpriority is not a decimal number from 11 through 248.

CUP:BSZE-ERR   User-specified maxsize is not a decimal multiple of 0.25kb.

```
----------------------
|      CLOCK       |
----------------------
```

2.5.3 CLOCK Command

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

Format:

$$\text{CLOCK} \left[\left\{ \begin{matrix} 50 \\ 60 \end{matrix} \right\}\right], \left[\left\{ \begin{matrix} \text{pic addr} \\ \text{X'6C'} \end{matrix} \right\}\right], \left[\left\{ \begin{matrix} \text{lfc addr} \\ \text{X'6D'} \end{matrix} \right\}\right] \; [,D]$$

Parameters:

50   is a 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 precision interval clock. The user-specified address must not be greater than the maximum device address specified by the DEVADS command. If this parameter is omitted, X'6C' is the default.

lfc addr   is a hexadecimal number specifying the physical device address of the line frequency clock. The user-specified address must not be greater than the maximum device address specified by the DEVADS command. If this parameter is omitted, X'6D' is the default.

D   is an alphabetic character specifying that the date and time is to be displayed on the display panel. This option should be specified only if the CPU command indicates the target system is a Model 7/32 or 8/32 system.

Functional Details:

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

Messages:

CUP:CLLF-ERR   A line frequency value other than 50 or 60 is specified.

CUP:CLDN-ERR   The physical device address specified for the LFC or PIC is illegal.

CUP:CLSP-ERR   A syntax error exists in the CLOCK command.

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----------------
|     CMDLEN         |
----------------
```

2.5.4 CMDLEN Command

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

Format:

$$\text{CMDLEN} \left[\begin{Bmatrix} n \\ 80 \end{Bmatrix} \right]$$

Parameter:

n   is a decimal number from 32 through 1024
                       specifying the number of bytes in the system
                       command buffers. If this parameter or the
                       CMDLEN command 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.

Message:

CUP:LGTH-ERR   Specified command buffer length is not a
                       decimal number from 32 through 1024.

2.5.5 CPU Command

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

Format:

$$
\text{CPU}\left\{
\begin{bmatrix}
\begin{Bmatrix}
3250 \\
3240 \\
3230 \\
3220 \\
3210 \\
8/32 \\
7/32
\end{Bmatrix}
\end{bmatrix}
\left[,\begin{Bmatrix} 8 \\ 2 \end{Bmatrix}\right]
\right.
$$

Parameters:
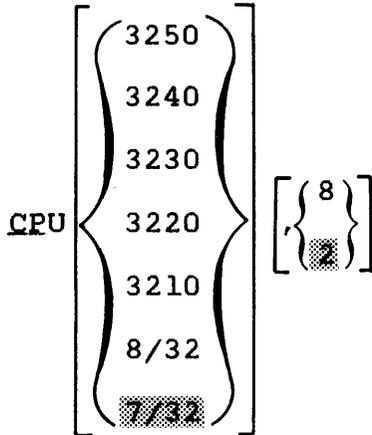
3250 3240 3230 3220 3210 8/32 7/32	are the processor model numbers specifying the target system. If this parameter is omitted, 7/32 is the default.
8 2	are decimal numbers specifying the number of register sets supported by the hardware. If the 3250, 3240, 3230, 3220, or 3210 model number is specified, 8 must be specified. If this parameter is omitted for the 7/32 or 8/32 processors, 2 is the default. If this parameter is omitted for the 3250, 3240, 3230, 3220, or 3210 processor, 8 is the default.

NOTE

If a system has eight register sets available as an option, specification of all eight register sets improves machine performance.

Functional Details:

If this command is omitted, the default parameters are assumed. The CPU command must precede the DEVICES...ENDD commands, the ILEVEL command and the ERRORREC command (if entered).

Messages:

CUP:CPU-ERR   Specified model number is not 3210, 3220, 3230, 3240, 3250, 8/32, or 7/32.

CUP:REGS-ERR   A decimal number other than 2 or 8 is specified as the number of register sets.

2.5.6 CSS Command

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

Format:

$$\underline{CSS} \quad \left[\left\{ {n \atop \blacksquare} \right\} \right]$$

Parameter:

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

Functional Details:

The amount of memory required for CSS is allocated by the operating system by this equation:

CMDLEN n x CSS n

Message:

CUP:CSS-ERR   Specified number of nested CSS calls is not a decimal number from 1 through 249.

```
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|      DATE        |
------------------
```

2.5.7 DATE Command

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

Format:

$$
\text{DATE} \left[\left\{ \begin{array}{c} \text{DDMMYY} \\ \text{MMDDYY} \end{array} \right\} \right]
$$

Parameters:

DDMMYY   is day-month-year format.

MMDDYY   is month-day-year format.

Message:

CUP:DATE-ERR   A syntax error exists in the DATE commmand.

2.5.8 DEVADS Command

The DEVADS (device address) command 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 access controller (MAC) in the target system.

Format:

$$\text{DEVADS} \begin{bmatrix} \begin{Bmatrix} 3 \\ 1 \\ 0 \end{Bmatrix} \end{bmatrix}$$

Parameters:

3
1
0
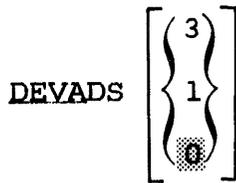
are decimal numbers specifying a table entry containing established maximum values. See Table 2-3. If this parameter or command is omitted, 0 is the default.

NOTE

The established maximum values specified in the DEVADS command must be equal to or larger than the actual hardware configuration.

If the number of devices in the DEVADS command is less than the number of devices actually configured by the hardware, the resulting operating system might crash or hang when an interrupt is received from a device whose address is above the limit specified by the DEVADS command.

TABLE 2-3 DEVADS COMMAND VALUES

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

* This figure refers to the number of device addresses the operating system supports.

Message:

CUP:DN-ERR   Specified decimal number is not 3, 1, or 0.

2.5.9 DEVICES...ENDD Commands

The DEVICES...ENDD commands specify the device level, device mnemonic, device number, device code, device flags, and extended device code. Record length and size can be specified only if a spooling pseudo output device is specified.

Format:

DEVICES

$$\begin{Bmatrix} level \\ * \end{Bmatrix} [dmnem] : dnum, dcod, \begin{Bmatrix} C \\ D \\ E \\ S \end{Bmatrix} \left[, \begin{Bmatrix} xdcod \\ Xxdcod \end{Bmatrix}\right] \left[, \begin{Bmatrix} recl \\ 132 \end{Bmatrix}\right]$$

$$\left[, \begin{Bmatrix} size \\ 66 \end{Bmatrix}\right]$$

$$\begin{Bmatrix} level \\ * \end{Bmatrix} [dmnem] : dnum, dcod, \begin{Bmatrix} C \\ D \\ E \\ S \end{Bmatrix} \left[, \begin{Bmatrix} xdcod \\ Xxdcod \end{Bmatrix}\right] \left[, \begin{Bmatrix} recl \\ 132 \end{Bmatrix}\right]$$

$$\left[, \begin{Bmatrix} size \\ 66 \end{Bmatrix}\right]$$

.
.
.

ENDD

Parameters:

level
: is a positive decimal number specifying the number of interfaces through which requests from the processor to a device must pass.

*
: is an asterisk specifying that the device is on the same level as the preceding device and, therefore, shares the same controller, channel, and device-level hardware. If one device is busy, the other device shares the device-busy condition.

dmnem	device mnemonic is a 4-character name that the system associates with the device. The first character must be alphabetic with the remaining characters alphanumeric. This parameter is not used for channels, controllers, or nodes.

dnum	device number is a hexadecimal number specifying the physical device address of a channel, controller, or device. This number must not be greater than the maximum device address specified in the DEVADS command. If channels or controllers have no device number, zero must be specified in this field.

NOTE

The appropriate device numbers are documented in the configuration sheet for system hardware.

dcod	device code is a decimal number from 16 through 254. Channels and controllers have no device codes, therefore 0 should be specified. If the spooling pseudo output device is specified in the dflag parameter, 1 or 0 can be specified in the dcod field.
C	indicates console device.
D	indicates directory device.
E	indicates DMA coordination node.
S	indicates spooling pseudo output device. See the xdcod parameter explanation for the default for pseudo output devices.
	If the spooling pseudo output device is chosen by specifying S, the extended device code (xdcod), the record length (recl), and page size (size) parameters optionally can be specified.
xdcod	extended device code is a decimal number that is used to specify additional configuration information within a single device code. The information specified in this field is unique to each device. It is used by communications devices, MSM disks, floppy disks, local VDU devices, pseudo output devices, and the BIOC driver. The xdcod of a pseudo output device must be the same as the dcod of the physical printer to be used. The xdcod default for a pseudo output device is 113.

Xxdcod   indicates a hexadecimal number used to specify
                        additional configuration information within a
                        single device code. The Xxdcod default for a
                        pseudo output device is X'71'.

recl   record length is a number from 1 through 255
                        specifying the number of printable character
                        positions in a line of data. This parameter
                        is device dependent. The value specified in
                        this field is interpreted as record length if
                        the pseudo output device is being added to the
                        target system. If record length is not
                        specified, the default is 132 characters.

                        This number can be expressed in decimal or
                        hexadecimal. If expressed in hexadecimal, the
                        1- to 4-digit number must be preceded by the
                        character X. This parameter is meaningful for
                        pseudo output devices only.

size   page size is a number from 1 through 88
                        specifying the number of printable lines on a
                        page. This parameter is device dependent.
                        The value specified in this field is
                        interpreted as page size if the pseudo output
                        device is being added to the target system.
                        If a page size is not specified, the default
                        is 66 lines per page.

                        This number can be expressed in decimal or
                        hexadecimal. If expressed in hexadecimal, the
                        1- to 4-digit number must be preceded by the
                        character X. This parameter is meaningful for
                        pseudo output devices only.

NOTE

Device statements for communications
devices are found in the System
Generation/32 (SYSGEN/32) Reference
Manual.

During execution of the SYSGEN1 command, CUP searches the driver
libraries that correspond to the devices specified in this
command.

Each device group specified in the DEVICES...ENDD command
sequence must be specified in descending flow of control shown in
the following example.

Example:
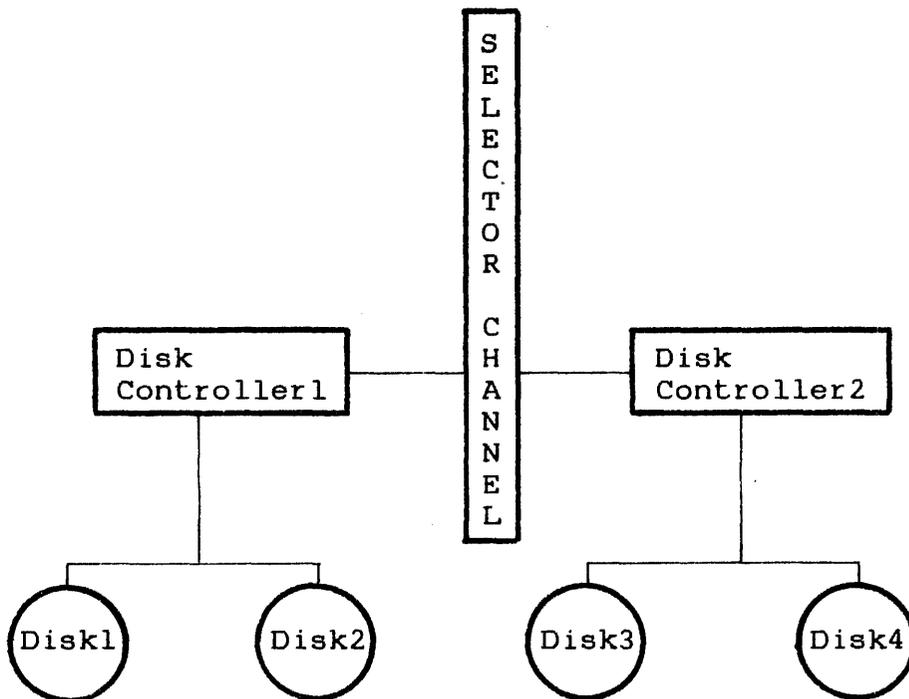
This configuration is specified through the following DEVICES...ENDD command sequence:

```
    1:F0,0                    Selector channel
    2:B6,0                    Disk controller1
    3 D1:C6,51,D              Disk1
  * D2:C7,50,D                Disk2
    2:B8,0                    Disk controller2
    3 D3:C8,51,D              Disk3
  * D4:C9,50,D                Disk4
```

The following DEVICES...ENDD command sequence is invalid:

```
    1:F0,0                    Selector channel
    2:B6,0                    Disk controller1
    2:B8,0                    Disk controller2
    3 D1:C6,51,D              Disk1
  * D2:C7,50,D                Disk2
    3 D3:C8,51,D              Disk3
  * D4:C9,50,D                Disk4
```

The general format of CUP statements for configuring full BIOC support are:

Format:

    lnnn:aa,DCOD,,Xbbbb,LN,PS

Parameters:

nnn	specifies the device mnemonic.
aa	specifies the device address.
DCOD	specifies the device code in the range 034 to 040. Device codes 034 to 039 represent the same devices as the standard Perkin-Elmer driver, and 040 represents support for a remote printer using XON-XOFF protocol.
bbbb	specifies the BIOC extended device code. This value can be either decimal or hexadecimal. If hexidecimal, it must be preceded with the letter X.

Table 2-4 describes the extended option bit settings for full BIOC support.

TABLE 2-4   EXTENDED OPTIONS BIT SETTINGS FOR
FULL BIOC SUPPORT

BIT SETTING		MEANING
DEC	HEX	
0	8000	Supports data communications extended options disconnect for write. This option will disconnect a dial-in line on signoff from MTM.
1	4000	Suppresses BREAK/ESC function. This option will Prevent actuation of a BREAK from causing an I/O error on remote printers.
2	2000	Enables CTRL-A to cause entry into baud adjust routine. This option will allow local terminals to select different baud rates.
3	1000	Suppresses write timeout if carrier is off. This option will allow a dial-in user to be welcomed by MTM's ID message at the completion of baud adjust.

BIT SETTING		MEANING
DEC	HEX	
4	0800	Supports full BIOC functions. This option will enable the full compliment of BIOC features. If this option is not selected, the ASCII read funtions will be limited to CTRL-H as a nondestructive backspace and CTRL-X as a cancel line request. In addition, CTRL-Q through CTRL-T will be stripped from the input to allow full implementation of flow control as used by some data concentrators.
5	0400	Suppresses mark off of devices at sysgen time for false sync. At system boot or hot-start, BIOC addresses every device that has been sysgened with its DCB's. If BIOC receives a false sync in response to an output command, it will mark that device 'OFF'. If a system has devices on bus switches, the power fail delay may result in these devices being marked off. If the above condition causes problems, it is advisable to suppress this feature at sysgen time.
6	0200	Supports 'CR' as termination for image read. Normally, image reads are terminated only with buffer-full or break. To use CTRL-M to terminate the read, selection of this option will enable this feature. If CTRL-M is used to terminate the read, it will not be echoed to the terminal, but it will be placed into the buffer as data.
7-15	01FF	Selects command two for choice of stop bits, data bits, parity and clock rate. (Consult interface programming manual for specific information.) If bit 7 is a one, bits 8-15 will be used as the entire command two. If bit 7 is a zero, bits 8-11 must be zero, and bits 12-15 may be A, B, C, D, or zero to select only the clock rate. When bit 7 is zero, the default defined by the DCB will be used for the other options.
	LN	Specifies terminal/printer logical length. Normally, this length is the number of characters that can be printed on one line.
	PS	Specifies terminal/printer page size. Normally this size is the number of lines that can be printed on one page.

See Section 4.3.1 for a description of the default interface |
strappings for BIOC. |

Functional Details:

If the system is being configured with 67Mb (MSM80) or 256Mb
(MSM300) disks, a direct memory access (DMA) coordination node
must be specified above the selector channel if the system's
number of channels is greater than the number of simultaneous
data transfers allowed. See Table 4-20. A DMA coordination node
is always configured at a level above the channels it controls,
device number=0, device code=0, device flag=E (indicates DMA
coordination node), and extended device code=1 or 4 (indicates
maximum number of simultaneous data transfers).

Examples:


```
1:0,0,E,1                     DMA coordination node
2:F0,0                        Selector channel1
3:FB,0                        Controller1
4 DSC1:FC,53,D                67Mb (MSM80) disk1
2:F1,0                        Selector channel2
3:EB,0                        Controller2
4 DSC2:EC,53,D                67Mb (MSM80) disk2
```


If the system is being configured with devices defined as pseudo
output devices, spooling must be supported. A maximum of 16
output spool devices can be specified. A pseudo output device is
always defined at level 1, device mnemonic=user-specified name,
device number=0, device code=1, and the device flag=S (indicates
spooling).

Examples:


```
1 PR1:0,1,S,,80,56

1 PR2:0,1,S,,132;23
```


This is an example of how to build a pseudo print device for |
OS/32 Spooler. The example cannot be used to build a pseudo |
print device for the Commercial Spooler (SPL/32). |

For more details on spooling, refer to the OS/32 Operator
Reference Manual, the OS/32 Multi-Terminal Monitor (MTM)
Reference Manual, and the Spooler (SPL/32) System Administration |
Reference Manual. |

Examples:

```
DEVICES
1 TTY:2,016,C              Model 33 ASR teletype used as
                           console device
1 CARD:4,096               Card reader
1 PRIN:62,112              200 LPM printer
1 PR:0,1,S,112             Pseudo output device for spooling
1 CAS1:45,066              Cassette1
* CAS2:55,066              Cassette2
ENDD


DEVICES
1 VDU:010,018,C            Console VDU
1 TTY1:002,016             Model 33 ASR TTY1 keyboard/printer
* TRP1:002,081             Reader/punch
1 TTY2:012,016             Model 33 ASR TTY2 keyboard/printer
* TRP2:012,081             Reader/punch
1 CARD:004,096             400 CPM card reader
1 PRIN:062,112             200 LPM printer
1 PR1:0,1,S,112            Pseudo output device
1:0F0,0                    Selector channel
2:0,0                      Controller
3 MAG1:085,064             Magnetic tape1
3 MAG2:095,064             Magnetic tape2
2:0B6,0                    Controller
3 DSC1:0C6,049,D           2.5Mb disk1
3 DSC2:0D6,049,D           2.5Mb disk2
ENDD
```

Messages:

CUP:CONS-ERR   More than one device was specified as the system console. Therefore, there is no system console device.

CUP:DCOD-ERR   The user-specified number is not a decimal number from 16 through 254, or is not 1 for a pseudo output device.

CUP:DM-ERR   A statement between the DEVICES...ENDD commands does not contain a device mnemonic, and the previous statement does not refer to a controller or channel.

CUP:DN-ERR   A statement between the DEVICES...ENDD commands contains a device number greater than the maximum physical device address specified in DEVADS command or is not zero for a pseudo output device.

CUP:DUP-ERR   A duplicate device mnemonic is specified
                     between the DEVICES...ENDD commands.

CUP:EXCS-ERR   Too many parameters are specified in a device
                     statement.

CUP:FLAG-ERR   A statement between the DEVICES...ENDD
                     commands contains a character other than C, D,
                     E, or S as the device flag.

CUP:ITAM-ERR   A statement between the DEVICES...ENDD
                     commands contains invalid communications
                     information in the xdcod field.

CUP:LDCT OR UCSI-ERR

                     In the DEVICES...ENDD commands, the SYNCS or
                     the USCI parameter is not a decimal number or
                     is not in the correct format for a hexadecimal
                     number.

CUP:LEVL-ERR   A statement between the DEVICES...ENDD
                     commands has a zero specified in the level
                     field or a level greater than the level
                     specified in the previous statement that
                     controls it.

CUP:LRCL OR PLMT-ERR

                     In the DEVICES...ENDD commands, the LRCL or
                     the PLMT parameter is not a decimal number or
                     is not in the correct format for a hexadecimal
                     number.

CUP:MFUL-ERR   The memory area specified is too small for CUP
                     to continue processing device statements.
                     Terminate CUP and reload into a larger
                     segment.

CUP:MNEM-ERR   A syntax error exists in the device mnemonic
                     field.

CUP:NCS-ERR   In the DEVICES...ENDD commands, the NCS
                     parameter is not a decimal number or is not in
                     the correct format for a hexidecimal number.

CUP:NMER-ERR   A device is incorrectly flagged as a directory
                     device.

CUP:NODA-ERR   Roll, temporary volume, spool, or directory
                      support is specified but no direct access
                      device exists in the system; a secondary
                      directory cannot be built because a directory
                      device is not defined.

CUP:NODV-ERR   The ENDD command directly follows the DEVICES
                      command, and no device statements are found.

CUP:PDCT OR SLS-ERR

                      The PADS or SLS parameter is not a decimal
                      number or is not in the form Xnnnn, where n is
                      a hexadecimal digit.

CUP:SEPR-ERR   A colon (:) is missing before, or a comma (,)
                      is missing after the device number.

CUP:SHAR-ERR   An asterisk (*) is specified in the level
                      field of a device statement but the previous
                      statement refers to a controller or selector
                      channel instead of a device.

CUP:SPCR OR IOLM-ERR

                      The SPCR or the IOLM parameter is not a
                      decimal number or is not in the correct format
                      for a hexadecimal number.

CUP:SPCW OR MRBS-ERR

                      In the DEVICES...ENDD commands, the SPCW or
                      MRBS parameter is not a decimal number or is
                      not in the correct format for a hexadecimal
                      number.

CUP:SPOL-ERR   More than 16 pseudo output devices are
                      specified; pseudo output devices are defined
                      and spooling is not supported; or a syntax
                      error exists in the command format; no direct
                      access device exists.

CUP:SRCL-ERR   indicates that the logical record length
                      specified for the output spooling device is
                      not within the valid range or is not valid.

CUP:SSA-ERR   The SSA parameter is not a decimal number or
                      is not in the correct format for a hexadecimal
                      number.

CUP:SSIZ-ERR   indicates that the size parameter specified
                      for the output spooling device is not within
                      the valid range or is not valid.

CUP:UCSO-ERR   In a device statement, the UCSO parameter is
                      not a decimal number or is not in the correct
                      format for a hexadecimal number.

CUP:XDCD-ERR   indicates that the extended device code is not
                      within the valid range or is not valid, is not
                      a decimal number, or is not in the correct
                      format for a hexadecimal number.

CUP:XLATE-ERR   The XLATE parameter in the DEVICES...ENDD
                      commands statement contains a label error.

```
------------------
|    DIRECTORY    |
------------------
```

2.5.10 DIRECTORY Command

The DIRECTORY command specifies that secondary directory support
is to be included in the target system.

Format:

DIRECTORY

Functional Details:

If this command is omitted, secondary directory support is not
included.   If a disk is marked on with the CDIRECTORY parameter
specified in the MARK operator command after the system is built
with directory support, file search time is reduced. These
marked-on disks require additional working storage areas:

- 64 bytes in system space for access control blocks (ACP), 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 Operator Reference Manual and the OS/32 Application
Level Programmer Reference Manual for detailed information.

Message:

CUP:NODA-ERR   Since the DEVICES...ENDD commands do   not
                      define   a   directory   device, a secondary
                      directory cannot be built.

2.5.11 DISCBLOCK Command

The DISCBLOCK command specifies the maximum physical block size that can be allocated for the data or index blocks for an indexed file, a nonbuffered indexed file, or an extendable contiguous file on the target system.

Format:

$$\text{DISCBLOCK} \left[\left\{ \begin{array}{c} n \\ 4 \end{array} \right\} \right]$$

Parameter:

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

Functional Details:

Allocation of the physical block size occurs when the file is assigned. If direct access devices do not exist in the system, omit this command. Larger block sizes occupy more system space, reduce physical I/O, and improve system performance.

NOTE

Refer to the appropriate manual for the required program block size.

Message:

CUP:BLK-ERR   User-specified number is not a decimal number from 1 through 255.

```
------------------
|    DSYS         |
------------------
```

2.5.12 DSYS Command

The DSYS (dynamic system space) command 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. These 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:

$$\underline{DS}YS \begin{bmatrix} \begin{Bmatrix} n \\ 25 \end{Bmatrix} \end{bmatrix}$$

Parameter:

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

Functional Details:

The amount of memory (in bytes) required for the dynamic control
blocks listed above is found in Table 2-5.

TABLE 2-5 MEMORY REQUIREMENTS FOR DYNAMIC CONTROL BLOCKS

CONTROL BLOCKS	MEMORY (BYTES)
FCB	
contiguous	276
indexed	396+(blocking factor x 512) +(index blocking factor x 256)
nonbuffered indexed and extendable contiguous	396+(index blocking factor x 256)
PFCB	148
TCB	648
lu table	(4 x no of logical units)
lu table of flags	(4 x no of logical units)
overlay save area	76
roll save area	76
SP floating point registers	32
I/O counters for accounting	(12 x no of classes)
DP floating point registers	64
input/output block (IOB)	(64 x no of IOBs)
TQE	24
ACB	64 + secondary directory blocksize
SDE	56
PST	136 for Models 7/32, 8/32, and 3220 (size of program rounded to nearest 64k/64)*8+8 for Models 3210, 3230, 3240, and 3250

Message:

CUP:DSYS-ERR   The user-specified number is not a decimal number from 1 to the total number of kilobytes of memory in the system.

```
-------------------
|      ENDC       |
-------------------
```

2.5.13 ENDC Command

The ENDC command must be the last CUP command specified and indicates the end of all CUP commands.

Format:

ENDC

2.5.14 ERRORREC Command

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

Format:

ERRORREC fd,size,period

Parameters:

fd   is the file descriptor of the default error recording volume and file. The fd is assigned by the system as the default error recording file. It is recommended that the filename be SYSERROR.LOG and that it be assigned to the default system volume.

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 number of minutes that elapse between memory error recording readouts on Models 3210, 3220, 3230, 3240, and 3250 processors only. The recommended period is two minutes.

Functional Details:

Error recording supports recording of:

● I/O errors for all processors

● System errors for all processors

● Memory errors for Models 3210, 3220, 3230, 3240, and 3250 processors

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

The Models 3210, 3220, 3230, 3240, and 3250 processors contain error correcting memory and an optional error logger. If this command is specified, a program periodically reads the hardware error logger and writes the data to a file for subsequent reporting.

This command must precede the DEVICES...ENDD commands. The CPU command must precede this command.

Messages:

CUP:ERFD-ERR   User-specified fd is invalid.

CUP:ERSZ-ERR   User-specified number for error recording size is not a number from 1 through 32,767.

CUP:ERPD-ERR   User-specified number for error recording period is not a number from 1 through 1440.

2.5.14.1 Configuring Memory

As part of the system configuration process, the physical memory configuration must be defined if memory error recording is included in the target system. To do this, the following steps should be taken:

1. Create a CAL source module containing the MCONFIG statements which describe the way memory is configured. A separate MCONFIG macro call must be entered for every block in memory being defined.

2. Save the source file to the filename MCONFIG.MAC.

3. Specify a predefined CSS procedure named MCONFIG.CSS. This CSS procedure will process the source file, MCONFIG.MAC, using CAL Macro and CAL to generate the object module, MCONFIG.OBJ. The object module, MCONFIG.OBJ, will automatically be loaded by SYSGEN2.

Format:

NAME	OPERATION	OPERANDS
	MCONFIG	BLOCK=nn,START=xx,RANGE=yy, $\left[\text{INTERL}=\left\{\begin{matrix}0\\2\\4\end{matrix}\right\}\right]\left[,\text{SHARED}=\left\{\begin{matrix}\text{NORECORD}\\\text{NVRECORD}\\\text{RECORD}\end{matrix}\right\}\right]$

Operands:

BLOCK=   nn is a decimal number from 0 through 15 specifying the area of memory (in megabytes) for which a particular memory controller is strapped. Blocks are allocated in numerically ascending order starting with BLOCK 0 for the lowest megabyte address. Fractional megabytes should be rounded up to the next full megabyte.

START=   xx is a decimal number from 0 through 15 specifying the starting Mb address of the block. Fractional megabytes should be rounded up to the next full megabyte.

RANGE=   yy is a decimal number from 1 through 16 specifying the number of megabytes in the block. For processors containing less than one megabyte, 1 should be specified.

INTERL=   0 specifies non-interleaving of memory.
          2 specifies 2-way interleaving.
          4 specifies 4-way interleaving.

          If this parameter is omitted, 0 is the default.

SHARED=   defines the memory block as part of shared memory.

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

          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 processor 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.

During macro expansion, the keyword parameters are tested. A message is generated if a parameter is missing, is not in the valid range, or if the sum of START + RANGE exceeds 16Mb.

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

Messages:

The macro processor generates the following messages:

BLOCK ERROR | indicates that the block is not in range 0 through 15 or it was previously defined.

START ERROR | indicates that the specified starting address of a block is not in range 0 through 15 or it was previously defined.

RANGE ERROR | indicates that the specified number of megabytes in a block is not in the range 1 through 16, or the value specified in the START parameter plus the value specified in the RANGE parameter exceeds 16.

INTERLEAVE ERROR | indicates that the number specified in the INTERL parameter was not 0, 2, or 4.

SHARED ERROR | indicates an invalid parameter option was specified.

END-OF-TASK 0 | An end of task code of 0 indicates that no errors or warnings were detected.

END-OF-TASK 2 | An end of task code of 2 indicates the macro processor detected an error.

END-OF-TASK 4 | An end of task code of 4 indicates the macro detected a configuration specification error.

Example:

```
*EDIT
>APPEND
        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
        END
>SAVE   MCONFIG.MAC
>END
```

2.5.15 FLOAT Command

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

Format:

$$\text{FLOAT} \begin{bmatrix} \begin{Bmatrix} \text{S,S} \\ \text{S,H} \\ \text{H,H} \\ \text{N,N} \end{Bmatrix} \end{bmatrix}$$

Parameters:

S   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   hardware floating point is supported for single precision floating point in the first parameter and for double precision floating point in the second parameter. If both parameters are omitted or this command is omitted for the Models 3210, 3220, 3230, 3240, or 3250 processor, H is the default.

N   no floating point is supported. If both parameters are omitted or this command is omitted for the Model 7/32 or 8/32 processor, N is the default.

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 following a power fail/restore sequence. Single precision floating point support occupies 1.9kb of memory, and double precision floating point support occupies 2.9kb of memory.

Message:

CUP:FLTP-ERR   The combination of parameters specified in the FLOAT command is invalid.

```
----------------
|     ILEVEL      |
----------------
```

2.5.16   ILEVEL Command

The ILEVEL command specifies the hardware interrupt level for all
devices following the ILEVEL command up to another ILEVEL command
or the ENDD command. The ILEVEL command must be specified within
the DEVICES...ENDD command sequence, and the CPU command must
precede the DEVICES...ENDD command statement.

Format:

$$\text{ILEVEL} \left[\begin{Bmatrix} 3 \\ 2 \\ 1 \\ 0 \end{Bmatrix} \right]$$

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 or command is omitted, 0 is the default.

Functional Details:

If multiple I/O interrupt levels are not to be included in the
target system, omission of this parameter or the ILEVEL command
causes all devices to be configured at the highest interrupt
level, ILEVEL 0.   A group of devices; e.g., selector channel,
disk controller, disk1, and disk2, must be configured at the same
interrupt level. Therefore, the ILEVEL command must be placed

directly preceding the group of devices to be configured at a specific interrupt level. This command is only valid for a processor with 8 register sets.

Examples:

```
DEVICES
1:F0,0                      Selector channel
2:B6,0                      Disk controller
3 DSC1:C6,51,D              Disk1
* DSC2:C7,50,D              Disk2
ILEVEL 1
1:F1,0                      Selector channel
2:0,0                       Magnetic tape controller
3 MAG1:85,65                Magnetic tape drive
ILEVEL 2
1 CON:10,39,C               Model 1100 system console
ILEVEL 3
1 PRT:62,114                Line printer
1 VDU1:12,39                Model 1100 terminal
1 VDU2:14,39                Model 1100 terminal
ILEVEL 1
1:F2,0,0                    Selector channel
2:0,0                       Magnetic tape controller
3 MAG2:C5,65                Magnetic tape drive
ENDD
```

Messages:

CUP:CTRL-ERR	An ILEVEL command was placed between a selector channel and a controller.
CUP:ILVL-ERR	An ILEVL operand error, or the operand was greater than 3.
CUP:ILVL8-ERR	An ILEVL command was specified when the register set was not equal to 8.
CUP:LEVL-ERR	A statement within the DEVICES...ENDD commands has a level greater than the level specified for the device that controls it.

```
------------------
|     IOCLASS     |
------------------
```

2.5.17 IOCLASS Command

Tha IOCLASS command specifies and defines the class associated with a particular device or file or group of devices or files used for accounting.

Format:

$$\text{IOCLASS} \left[\begin{Bmatrix} cc \\ 0 \\ 1 \\ 2 \\ 3 \end{Bmatrix} \right]$$
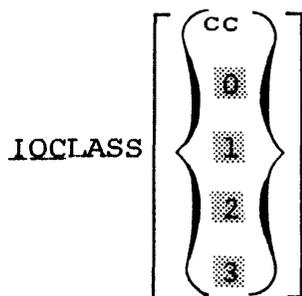
Parameter:

cc

is a decimal number from 0 through 31 specifying the class associated with devices or files. If this command is omitted or parameters are omitted, the default classes are 0, 1, 2, and 3. Classes 0 and 1 are required for the accounting facility because indexed and contiguous files always use classes 0 and 1. See Table 2-6.

Functional Details:

This command must be specified between the DEVICES...ENDD commands and immediately preceding each device or group of devices to be associated with that class. All devices are associated with that class until another IOCLASS command occurs. The IOCLASS command can also be used to redefine the default classes. The user-specified classes must be within the range specified by the ACCOUNTING command which must precede the DEVICES...ENDD commands. All device classes are stored in the DCB or FCB.

TABLE 2-6 DEFAULT DEVICE AND FILE CLASSES

CLASS	MEANING
0	Indexed and nonbuffered indexed files
1	Contiguous and extendable contiguous files channel (contiguous files)
2*	Physical I/O with multiplexor channel (VDUs)
3*	Logical spooled I/O (spooled output)

Two classes are required for the accounting facility.

* These default values must be explicitly changed by an IOCLASS command if the default parameter value is greater than the parameter value of the ACCOUNTING command.

Message:

CLAS-ERR   The user-specified number is not a decimal number from 0 through 31 or is greater than the number specified by the ACCOUNTING command.

```
--------------------
|      ITAM        |
--------------------
```

2.5.18 ITAM Command

The ITAM command indicates that data communications support is to be included in the target system.

Format:

ITAM

Functional Details:

Basic data communications consists of system modules, drivers, and DCBs. The drivers and DCBs must be included during an object-level sysgen procedure. The drivers and DCBs are stored in either the Basic Communications Driver Library or Extended Communications Driver Library. The system modules must be stored in the Communications System Module Library. See the appropriate Data Communications manuals.

Message:

CUP:ITAM-ERR   Both the ITAM and the NOITAM commands were specified.

2.5.19 JOURNAL Command

The JOURNAL command specifies the maximum number of journal entries for the target system after a source sysgen has been performed with SGN.JRNL equal to one. The system journal is a list of data entries that records operating system events. The journal is used for tracing the cause of a system failure.

Format:

$$\text{JOURNAL} \left[\begin{Bmatrix} n \\ 0 \end{Bmatrix} \right]$$

Parameter:

n   is a decimal number from 0 through 12,999 specifying the maximum number of journal entries. If n or this command is omitted, 0 is the default.

Functional Details:

This command should be specified only if journal support was included as a source sysgen option. See Chapter 3. If journal support is not included in the target system, this command should be omitted or the number 0 should be specified. The amount of memory required for the user-specified number of journal entries is calculated by CUP as:

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

Message:

CUP:JRNL-ERR   The user-specified number is not a decimal number from 0 through 12,999.

```
------------------
|     LOGLEN      |
------------------
```

2.5.20 LOGLEN Command

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

Format:

$$\text{LOGLEN} \quad \left[\left\{ \begin{array}{c} n \\ 72 \end{array} \right\} \right]$$

Parameter:

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

Functional Details:

This command sets the message buffer size fcr 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 rightmost bytes of the message are truncated.

When a user task running under MTM issues an SVC 2 code 7 directed 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.

Message:

CUP:LGTH-ERR   The user-specified number is not a decimal number from 32 through 132.

2.5.21 MAXTASK Command

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

Format:

$$\text{MAXTASK} \left[\left\{ \begin{array}{c} n \\ 32 \end{array} \right\} \right]$$

Parameter:

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

Message:

CUP:MAXT-ERR   The user-specified number is not a decimal
                              number from 1 through 252.

```
----------------------
|     MEMCHECK      |
----------------------
```

2.5.22 MEMCHECK Command

The MEMCHECK (memory check) command indicates that memory diagnostics support is included in the target 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 Model 3220, 2048-byte pages for Models 3210, 3230, 3240, and 3250), the operating system marks them as unavailable. Memory can also be tested, marked off, and marked on by the MEMORY operator command if memory diagnostics support is included. See the OS/32 Operator Reference Manual.

If memory diagnostics support is included in the target system, this message is displayed on the CUP command listing device:

MEMORY DIAGNOSTICS INCLUDED

2.5.23 MEMORY Command

The MEMORY command specifies the maximum number of kilobytes (kb) of available local memory for the target system. Local memory is a contiguous memory area starting at absolute address 0 and contains the:

● operating system,

● dynamic system space,

● reentrant library segments (optional),

● task common segments (optional),

● pure segments, and

● impure segments.

Format:

$$\text{MEMORY} \begin{bmatrix} \begin{Bmatrix} n \\ 128 \end{Bmatrix} \end{bmatrix}$$

Parameter:

n is a decimal number specifying the maximum number of kilobytes of available local memory. The number is in increments of 16 and ranges from 128 through 1024, or 4096 for a Model 3210 processor, and 16,384 for Models 3230, 3240 or 3250 processor. If n or this command is omitted, 128 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 Link. The size of local memory can be changed by the MEMORY operator command. See the OS/32 Operator Reference Manual.

Message:

| CUP:MEM-ERR   User-specified local memory size is not a decimal number from 128 through 1024 (4096 for Model 3210, 16,384 for Models 3230, 3240 or 3250) or is not a multiple of 16.

2.5.24 MODULE...ENDM Commands

The MODULE...ENDM commands substitute a user-written or user-modified system module for a Perkin-Elmer supplied system module. These commands also select a user-written system module with a new module name after a source sysgen has been performed. See Chapter 3 for the source sysgen procedure.

Format:

MODULE

new module name$_1$

$$\left[\begin{array}{c} \text{new module name}_2 \\ . \\ . \\ . \\ \text{new module name}_n \end{array} \right]$$

ENDM

Parameter:

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 by CUP. However, if the name is not the same as a standard module name, the form USER.xxx is used, and a message is displayed.

Functional Details:

To include SVC interception in an operating system, the SVC interception module (INTC.F02) must be included in the MODULE...ENDM commands.

Example:

    MO

        INTC.F02

    ENDM

Pseudo devices can be created via SVC interception. However, these pseudo devices cannot be used with the Spooler. See the OS/32 System Level Programmer Reference Manual.

To include internal reader support in an operating system, the IREADER module (CMIR.F02) must be included in the MODULE...ENDM commands.

Example:

    MO
        CMIR.F02
    ENDM

Message:

CUP:MOD-ERR   The user-specified module name in the MODULE...ENDM commands is invalid or does not exist.

2.5.25 NOSEG Command

The NOSEG (no memory segmentation) command specifies that memory segmentation support is excluded from the target 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 of sharing pure segments. If this command is omitted, segmentation support is included.

```
-------------------
|      NOTGD       |
-------------------
```

2.5.26 NOTGD Command

The NOTGD (no trap generating device) command specifies that trap generating device support is excluded from the target system.

Format:

NOTGD

Functional Details:

Systems that do not have trap generating devices should exclude this support from the target system. If this command is omitted, trap generating device support is included.

2.5.27 QUEUE Command

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

Format:

$$\text{QUEUE}\;\left[\left\{\begin{array}{c} n \\ \text{total number of devices} \end{array}\right\}\right]$$
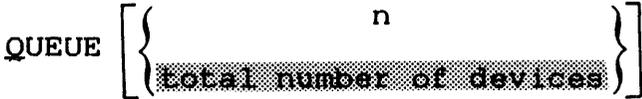
Parameter:

n   is a decimal number from 1 through 64,999
specifying the maximum number of entries in
the system queue.   If this parameter   or
command 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) defined
in   the   DEVICES...ENDD commands because driver termination
routines do not check for sufficient room on the system queue
when adding entries.

Message:

CUP:QUEU-ERR   The user-specified number is not a number from
1 through 64,999.

```
-------------------
|      ROLL       |
-------------------
```

2.5.28 ROLL Command

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

Format:

| ROLL [rvoln]

Parameter:

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, a message is displayed.

Functional Details:

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

Message:

CUP:ROLL-ERR   Roll support is specified but no direct access
                     support is included. Roll volume name is
                     missing.

| To eliminate this search time, enter the SPOOL command
| immediately followed by a semicolon and optional user comments
| telling the program to include SPL/32 spool support in the
| system.

Example:

| SPOOL; user comments

The displayed configuration message will not list the default
spool volume.

For information on the SPL/32 Program, see the Spooler/32
(SPL/32) System Administration Reference Manual.

Message:

CUP:SPOL-ERR   Spool support is specified but no direct
                      access support is included. Spool volume name
                      is missing.

| COMMERCIAL SPOOL   A system message notifying the user that
| SUPPORT   SPL/32 support is included in the system.

2.5.30 SSTABLE Command

The SSTABLE command specifies the maximum number of shared segment table entries to be reserved in the target system.

Format:

$$\text{SSTABLE} \quad \left[\left\{ \begin{matrix} n \\ 32 \end{matrix} \right\} \right]$$

Parameter:

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

Functional Details:

The Models 3210, 3230, 3240, and 3250 processors are the only users of a shared segment table. Each shared segment table entry requires 8 bytes. Space for the table is allocated in 256-byte blocks, which is equivalent to 32 entries.

Message:

CUP:SST-ERR   The number specified is not from 1 through 8192.

```
-------------------
| STARTUP...ENDS  |
-------------------
```

2.5.31 STARTUP...ENDS Commands

The STARTUP...ENDS commands define a startup CSS procedure,
executed upon system startup. The intended use of this feature
is to allow automatic running of DISCHECK and loading 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 command 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 quantity of startup CSS routines could affect the amount of
memory available for task execution. Therefore, keep startup
commands as brief as possible, making use of such commands as
$TRANSFER.

BUILD...ENDB and $BUILD...$ENDB are not allowed in a startup CSS
procedure.

Examples:

```
STARTUP
SE T  1/17/81,07:59:59
$JOB
MA DSC1:,ON,,CD=200
$TERMJOB
$IFNE 0
    $J
    MA DSC1:,ON,P
    L .BG,DISCHECK,50
    T .BG
    MA DSC1:,OFF
    ST,DSC1:,CON:,READ
    MA DSC1:,ON,,CD=200
    $T
    $IFNE 0
        $WR *** MARK OR CHECK ERROR ON DSC1: ***
        $EX
    $EN
$EN
$TR STARTUP
ENDS
```

```
------------------
|     TCOM        |
------------------
```

2.5.32 TCOM Command

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

Format:

    TCOM name₁ ,address₁ ,size₁ [/.../nameₙ ,addressₙ ,sizeₙ]

Parameters:

name	is an 8-character task common segment name 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 from 1 through FFF00 (3FF800 for Models 7/32, 8/32, 3210 and 3220, FFF800 for Models 3230, 3240, and 3250) specifying the absolute address of a task common 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 (machine top) and is limited by the physical memory of the target system. If the address specified is greater than the physical memory of the machine, the error is not displayed by CUP. All task common segments must be specified in order of ascending physical address. A maximum of 14 task common segments can be defined. Overlapping task common segments are not allowed.

Messages:

CUP:TADR-ERR   The user-specified address is not located in global memory, or the specified size and address is greater than absolute address X'FFF00' (3FF800 for 3210, X'FFF800' for Models 3230, 3240, and 3250).

NOTE

The CUP:TADR-ERR error is not detected until all CUP commands are processed. It is the user's responsibility to find the erroneous commands.

CUP:TSIZ-ERR   The user-specified address and size caused task common segments to overlap.

CUP:TSYN-ERR   A syntax error exists in the name field.

CUP:TSEP-ERR   An invalid separator exists in the TCOM command.

CUP:TDEC-ERR   The user-specified number for size is not a decimal number in increments of 0.25kb.

CUP:THEX-ERR   The user-specified number for address is not a valid hexadecimal number.

CUP:TNUM-ERR   More than 14 task common segments are defined.

```
-------------------
|      TEMP        |
-------------------
```

2.5.33 TEMP Command

The TEMP (temporary) command specifies the default volume name of
the temporary volume.

Format:

    TEMP tvoln

Parameter:

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,   a   message   is
                        displayed.

Functional Details:

If this command is omittted, the default temporary volume name is
set to blanks. Temporary files are allocated at assign time and
deleted at close time. When temporary file support is specified,
at least one direct access device must be included. To exclude
temporary file support, a source sysgen must be performed for
modules CMDB, CMSP, and FMS7.

Messages:

CUP:NODA-ERR   No directory device exists in the system.

CUP:VOL-ERR   A syntax error exists in the volume name
                        field.

CUP:TEMP-ERR   No volume name was specified.

2.5.34 VERSION Command

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

Format:

    VERSION vvvvvvvv

Parameter:

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

Functional Details:

The 8-character version number 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

Message:

CUP:VERN-ERR   A syntax error exists in the version field of the VERSION command.

```
----------------
|     VOLUME        |
----------------
```

2.5.35 VOLUME Command

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

Format:

    VOLUME voln

Parameter:

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 or command is omitted, blanks
                    are generated as the volume name.

Functional Details:

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

Message:

CUP:VOL-ERR   A syntax error exists in the volume name
                    field; volume name is omitted.

CHAPTER 3
SOURCE-LEVEL SYSTEM GENERATION (SYSGEN)

3.1   INTRODUCTION

The user must perform a source-level sysgen to include
user-modified or user-written system modules used in building the
target system. The source-level sysgen procedure reconfigures
OS/32 by assembling new and modified system modules and loads
them into the system module library. An object-level sysgen is
then peformed. A source-level sysgen is required only for
systems with a limited amount of memory, nonstandard devices, or
desired options not available in the object sysgen level.

NOTE

It is not recommended that the user make
source modifications to the OS/32 Source
System Modules except for maintenance.

The OS/32 System Module Library is supplied in both source and
object formats. The source sysgen modules are listed in Table
3-2. These modules can be altered by the sysgen parameters in
the sysgen parameter file (SYSGEN.MAC). See Table 3-3 for 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. See Table 3-4 for
a list of module variations in the system object module library
(SYS.LIB). The standard variations provided in SYS.LIB are a
subset of possible variations. A source-level sysgen optionally
can be performed to include or eliminate options in a specific
module. A source-level sysgen also optionally can be performed
to eliminate specific source-level sysgen options included in all
module variations.

In an object-level sysgen, the parameters selected by the user
for each CUP command determine the functional variation for each
module.

3.2   SOURCE SYSGEN OPTIONAL FEATURES

Table 3-1 gives a brief explanation of the CUP sysgen options
that can be included in the target system.

TABLE 3-1 SOURCE SYSGEN OPTIONS DEFINITIONS

SOURCE SYSGEN OPTIONS		
OPTION	MNEMONIC	DEFINITION
Journal support	JRNL	Supports the recording of normal internal system events on a circular list in memory. This feature is 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 crash.
System debug software support	DBUG	Supports debugging of the operating system. It 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 file types on direct access devices.
Indexed file Support	INX	Supports indexed, nonbuffered indexed, and extendable contiguous file types on direct access devices.
Direct access device support	DA	Supports direct access bulk storage devices (disks) beyond the basic I/O device level. This includes primary directory support, sector allocation, bitmap support, and volume mechanism support. It also includes the following operator commands: DISPLAY FILES, VOLUME, MARK.

TABLE 3-1 SOURCE SYSGEN OPTIONS DEFINITIONS (Continued)

SOURCE SYSGEN OPTIONS		
OPTION	MNEMONIC	DEFINITION
Secondary directory support	DIR	Supports the secondary directory feature that provides an in-memory paged index into the disk directory to reduce access time for directory operations. Requires direct access support.
Spooling support	SPOL	Supports the Spooler.
SPL/32 support	SPL32	Supports SPL/32. SPOL and SPL32 are mutually exclusive.
Roll support	ROLL	Supports tasks rolling to disks to execute more tasks than can fit into available task memory.
Temporary file support	TEMP	Supports temporary files. Requires direct access support.
Shared segmentation support	SEG	Supports the 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. Requires direct access support.
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. It includes software emulation routines for double precision instructions.

TABLE 3-1   SOURCE SYSGEN OPTIONS DEFINITIONS (Continued)

SOURCE SYSGEN OPTIONS		
OPTION	MNEMONIC	DEFINITION
Single precision floating point software support	SF	Supports single precision floating point in a system without the hardware to support it. 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. The selection of a scheduling algorithm is specified in each disk DCB. The standard driver library has seek scheduling enabled for all discs (except floppy). Therefore, this option is required to support those disks. Requires direct access support.
Extended direct memory access support	EDMA	Supports coordination of multiple extended direct memory access (EDMA) devices and is required when the net capability of the EDMA devices exceeds the bandwidth capibility of the EDMA bus. This coordination mechanism is also used for floppy disk systems where the adapter bandwidth is limited. Requires direct access support.

TABLE 3-1   SOURCE SYSGEN OPTIONS DEFINITIONS (Continued)

SOURCE SYSGEN OPTIONS		
OPTION	MNEMONIC	DEFINITION
Memory diagnostics support	MCHK	Supports memory testing features for initial system load and at the request of particular operator commands. The feature finds bad memory and marks it off.
Memory error recording support	MERC	Supports recording of memory errors generated by the system. This option requires that general error recording is selected. This option is available for the Perkin-Elmer Series 3200 processors.
General error recording	GERC	Supports the error recording of memory, I/O, and system errors and system milestones.
3210, 3220, 3230, 3240 3250 support	3200	Supports the Perkin-Elmer Series 3200 processors.
Memory address translator (MAT) 3210, 3230, 3240, and 3250 support	ATM	Supports operation of MAT on the Models 3210, 3230, 3240, and 3250 systems. It must be removed for Models 7/32, 8/32, and 3220 systems.
Accounting facility support	ACCT	Supports job accounting of system resources. Requires direct access support.
No file accounting	ACCF	No accounting records are generated for renaming and deleting files. Requires accounting support. Requires direct access support.

TABLE 3-2   SOURCE SYSGEN MODULES AND SYSGEN OPTIONS

FUNCTION	NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DIR	SPL32	SPOL	ROLL	TEMP	SEG	AOVL	ITAM	TGD	DF	SF	PWF	DLAY	SEEK	EDMA	MCHK	MERC	GERC	3200	ATM	ACCT	ACCF	IRDR
System pointer table	EXEC.MAC																														
Console driver	CDVR.MAC																														
Display and Bulk commands	CMDB.MAC			x	x			x	x	x	x	x	x			x															
Command executors	CMEX.MAC									x	x						x								x						
Internal reader	CMIR.MAC																														x
Console monitor	CMON.MAC																														
Console and CSS supervisor	CMSP.MAC	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	x		
Input/ output	EXIO.MAC	x	x																			x	x						x			
Loader and segment control	EXLD.MAC											x			x	x						x				x						
Memory manager	EXMY.MAC		x					x				x			x																	
Supervisor services	EXSP.MAC	x										x													x							

TABLE 3-2   SOURCE SYSGEN MODULES AND SYSGEN OPTIONS (Continued)

```
| SOURCE SYSGEN MODULES    |                           SOURCE SYSGEN OPTIONS
|-------------------------------------------------------------------------------------------------------------------
|                          |J |S |D |B |C |I |D |D |S |S |R |T |S |A |I |T |D |S |P |D |S |E |M |M |G |3 |A |A |A |I |
|                          |R |A |B |C |O |N |A |I |P |P |O |E |E |O |T |G |F |F |W |L |E |D |C |E |E |2 |T |C |C |R |
| FUNCTION    |  NAME      |N |F |U |M |  |X |  |I |R |L |O |L |E |G |V |A |D |  |  |  |F |A |E |M |H |R |R |0 |M |C |C |D |
|             |            |L |E |G |D |  |  |  |  |R |32|L |L |P |  |L |M |  |  |  |  |Y |K |A |K |C |C |0 |  |T |F |R |
|=====================================================================================================================
| SVC 3,4,5   |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6,7,14      | EXSV.MAC   |  |  |  |  |  |  |  |  |  |  |x |  |x |x |  |x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
| Timer       |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| manager     | EXTI.MAC   |  |x |  |  |  |  |  |  |  |  |  |  |  |  |  |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 |  |  |x |x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  x
|---------------------------------------------------------------------------------------------------------------------
| Nonbuffered |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| file SVC1   |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| interrupt   | FMNB.MAC   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
| SVC 7       |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| interrupt   | FMS7.MAC   |  |  |x |  |x |x |x |x |  |x |  |x |  |  |x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |x |x |  |
|---------------------------------------------------------------------------------------------------------------------
| File        |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Manager     |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Utility     |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| routine     | FMUT.MAC   |  |  |x |  |  |x |x |x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
| Intercept   | INTC.MAC   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| manager     | INTD.MAC   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
| Memory      |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| diagnostics | MCHK.MAC   |  |  |x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |x |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
| Panic       |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dump        | DUMP.MAC   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
| End of      |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| system      |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| modules     | UBOT.MAC   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------
```

TABLE 3-2 SOURCE SYSGEN MODULES AND SYSGEN OPTIONS (Continued)

SOURCE SYSGEN MODULES		SOURCE SYSGEN OPTIONS																													
FUNCTION	NAME	J R N L	S A F E	D B U G	B C M D	C O	I N X	D A	D I R	S P L 32	S P O L	R O L L	T E M P	S E G	A O V L	I T A M	T G D	D F	S F	P W F Y	D L A K	S E E A	E D M K	M C H C	M E R C	G E R O	3 2 O	A T M T	A C C F	A C C R	I R D R
Communications support	ITFM.MAC																														

LEGEND

x = source sysgen option supported

TABLE 3-3 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	2.5kb
SGN.SAFE = 0	Safety check support excluded	N/A
SGN.SAFE = 1	Safety check support included	1.0kb
SGN.DBUG = 0	System debug support excluded	N/A
SGN.DBUG = 1	System debug support included	20b
SGN.BCMD = 0	Bulk file command support excluded	N/A
SGN.BCMD = 1	Bulk file command support included	0.5kb
SGN.CO = 0	Contiguous file support excluded	N/A
SGN.CO = 1	Contiguous file support included	1.0kb
SGN.INX = 0	Indexed and nonbuffered file support excluded	N/A
SGN.INX = 1	Indexed and nonbuffered file support included	3.8kb
SGN.DIR = 0	Secondary directory support excluded	N/A
SGN.DIR = 1	Secondary directory support included	2.5kb
SGN.SPOL = 0	Spooling support excluded	N/A
SGN.SPOL = 1	Spooling support included	1.25kb
SGN.SPL32 = 0	Commercial spooler not supported	N/A

TABLE 3-3   SOURCE SYSGEN PARAMETERS (Continued)

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.SPL32 = 1	Commercial spooler supported	1.25kb
SGN.ROLL = 0	Roll in support excluded	N/A
SGN.ROLL = 1	Roll in support included	3.1kb
SGN.TEMP = 0	Temporary file support excluded	N/A
SGN.TEMP = 1	Temporary file support included	0.5kb
SGN.SEG = 0	Sharable segmentation support excluded	N/A
SGN.SEG = 1	Sharable segmentation support included	0.5kb
SGN.AOVL = 0	Link overlay support excluded	N/A
SGN.AOVL = 1	Link overlay support included	1.75kb
SGN.ITAM = 0	Communications support excluded	N/A
SGN.ITAM = 1	Communications support included	0.5kb
SGN.TGD = 0	Trap generating device support excluded	N/A
SGN.TGD = 1	Trap generating device support included	0.25kb
SGN.DF = 0	Double precision floating point support excluded	N/A
SGN.DF = 1	Double precision floating point support included	2.9kb
SGN.SF = 0	Single precision floating point support excluded	N/A
SGN.SF = 1	Single precision floating point support included	1.9kb
SGN.PWF = 0	Operator intervention not required on power failure	32

TABLE 3-3   SOURCE SYSGEN PARAMETERS (Continued)

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.PWF = 1	Operator intervention required on power failure	88
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	400b
SGN.EDMA = 0	Extended direct memory access support excluded	N/A
SGN.EDMA = 1	Extended direct memory access support included	250b
SGN.MCHK = 0	Memory diagnostics support excluded	N/A
SGN.MCHK = 1	Memory diagnostics support included	3.5kb
SGN.MERC = 0	Memory error recording support excluded	N/A
SGN.MERC = 1	Memory error recording support included	3.7kb
SGN.GERC = 0	General error recording support excluded	N/A
SGN.GERC = 1	General error recording support included	2.5kb
SGN.3200 = 0	Models 3210, 3220, 3230, 3240, 3250 support excluded	N/A
SGN.3200 = 1	Models 3210, 3220, 3230, 3240, 3250 support included	1.5kb
SGN.ATM = 0	7/32, 8/32, 3220 memory management	N/A

TABLE 3-3 SOURCE SYSGEN PARAMETERS (Continued)

SYSGEN PARAMETERS	DEFINITION	APPROXIMATE MEMORY REQUIRED
SGN.ATM = 1	Models 3210, 3230, 3240, 3250 memory management	N/A
SGN.ACCT = 0	Accounting support excluded	N/A
SGN.ACCT = 1	Accounting support included	2.0kb
SGN.ACCF = 0	Delete/rename file accounting reporting support excluded	N/A
SGN.ACCF = 1	Delete/rename file accounting reporting support included	0.25kb
SGN.IRDR = 0	Internal reader (SVC2 Code 14) support excluded	N/A
SGN.IRDR = 1	Internal reader (SVC2 Code 14) support included	1.5kb

TABLE 3-4   SYSTEM OBJECT MODULES AND SYSGEN OPTIONS

FUNCTION	VARIATION NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DIR	SPL32	SPOLL	ROLLP	TEMG	SEG	AOVL	ITAM	TGD	DF	SF	PWFY	DLAK	SEDEM	EDCEM	MCEH	MERK	GERC	320	ATMCT	ACCCF	ACCF	IRDR
SYSTEM OBJECT MODULE													**OBJECT SYSGEN OPTIONS**																		
Console Driver	CDVR.F01																														
Display and Bulk Commands	CMDB.F31			0	1	0	0	0								1															
	CMDB.F32			0	1	1	1	1	0	0	1	1	1			1															
	CMDB.F33			0	1	1	1	1	1	1	1	1	1			1															
Command Executors	CMEX.F33									1	1					1							1								
Internal Reader	CMIR.F01																														0
	CMIR.F02																														1
Console Monitor	CMON.F01																														
Console and CSS Supervisor	CMSP.F33	0																			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.F51	0	0	0										1	1					1	5			1	0	0	0	1			
	EXIN.F53	0	0	0										1	1					1	5			1	1	1	1	1			

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

FUNCTION	VARIATION NAME	JRNL	SAFE	DBUG	BCMD	CO	INX	DA	DI	SPL32	SPOL	ROLL	TEM	SEG	AOVL	ITAM	TGFD	DF	SF	PWF	DLAY	SEEK	EDMA	MCHK	MERC	GERC	3200	ATM	ACCT	ACCF	IRDR
Input/Output Supervisor	EXIO.FO1	0	0																		1	1							0		
	EXIO.FO2	0	0																		1	1							1		
Loader and Segment Control	EXLD.F50											0		1	1										1				0		
	EXLD.F51											1		1	1										1				0		
	EXLD.F52											0		1	1										1				1		
	EXLD.F53											1		1	1										1				1		
Memory Manager	EXMY.F52		0				1	1	1			0			1																
	EXMY.F53		0				1	1	1			1				1															
Supervisor Services	EXSP.F51	0										1																	0		
	EXSP.F53	0										1																	1		
SVC 3,4, 5,6,9,14	EXSV.FO1								0			0				1			1												
	EXSV.F52								1			0				1	1		1												
	EXSV.F53								1			0				1	1		1												
Timer Manager	EXTI.FO1		0												0														0		
	EXTI.FO2		0												1														0		
Task Manager	EXTM.F52	0	0									0				1														1	
	EXTM.F53	0	0									1				1														1	
Floating Point Traps	FLTP.FO2																	0	1												
	FLTP.FO3																	1	0												
	FLTP.FO4																	1	1												
Contiguous File SVC 1 Interrupt	FMCO.F33						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	SPL32	SPOLL	ROLL	TEMP	SEGL	AOVL	ITAM	TGD	DFF	SFF	PWF	DLAY	SEEK	EDMA	MCHK	MERC	GERC	3200	ATM	ACCT	ACCF	IRDR
Indexed File SVC 1 Interrupt	FMIN.F33			0			1			1	1																				
Nonbuffered File SVC 1 Interrupt	FMNB.F33																														
SVC 7 Interrupt	FMS7.F31			0		0	0	0																							
	FMS7.F33			0		1	1	1	1		1		1			1													1	1	
	FMS7.F34			0		1	1	1	1		0		1			1													1	1	
File Manager Utility	FMUT.F31			0		0	0																								
	FMUT.F32			0			1	1	0																						
	FMUT.F33			0			1	1	1																						
SVC Interception Support	INTC.F01																														
	INTC.F02																														
Memory Diagnostics	MCHK.F01			0																						0					
	MCHK.F02			0																						1					
Panic Dump	DUMP.F01																														

LEGEND

0 = sysgen option not supported
1 = sysgen option supported
5 = Five-second delay on power restore
Shading = variation

3.3 SOURCE-LEVEL SYSGEN PROCEDURE

Follow these steps to perform a source-level sysgen:

1. Copy the source sysgen parameters from the SYSGEN.MAC file to a backup file using the OS/32 Copy Utility.

2. Copy the OS/32 System Source Module Library to a backup file using the OS/32 Copy Utility.

3. Change the source sysgen parameters in the file SYSGEN.MAC to either include or exclude the desired options. All parameters that are used by a module must be checked for the desired value. See Table 3-3.

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's 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 macro processor:

```
AL  usermodule.EXP,IN,80
L   .BG,MACRO32,20
T   .BG
AS  1,usermodule.CAL
AS  2,usermodule.EXP
AS  3,NULL:
AS  8,SYSSTRUC.MLB,SRO
AS  9,SYSMACRO.MLB,SRO
AS  10,ITMS.MLB,SRO
ST
```

To assemble module EXSV, lu11 must be assigned to SYSMAC32.MLB. To assemble module FMS7, lu11 must be assigned to SYSMAC32.MLB, and lu12 must be assigned to DVRM.MLB.

If user-written macros are to be included in the expansion, assign lu11 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 lull to DVRM.MLB and start MACRO32 by entering:

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

6. Assemble the user-modified source module using CAL32 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
AS 7,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 the system library (SYS.LIB) with the modified object module using the OS/32 Library Loader:

```
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
```

In this example, sysmod.nnn is the module being replaced, in SYS.LIB.

If the original and modified module names differ, change the PROG, ENTRY, and EQUATE statements in the module to indicate the new name and add the modified object module to the system library (SYS.LIB) after the EXEC module:

```
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          (UBOT.F01 is not a part of
.BG>COPY  4,2           SYS.LIB)
.BG>RW  2
.BG>TAB  2,3
.BG>END
```

8. Perform an object-level sysgen using the modified system library. Include the MODULE...ENDM commands to include the the modified module if the module name has been changed.

3.4 SOURCE-LEVEL SYSGEN EXAMPLE

The following example illustrates the change of the source option sysgen variable time delay (SGN.DLAY). This change only affects the source module EXIN.MAC and replaces the system object module EXIN.F13.

1. See Table 3-2 for the source module affected by the sysgen variable SGN.DLAY, which is module EXIN.MAC. The system object module EXIN.F13 is the desired variation for this example.

2. Copy the affected source module EXIN.MAC to a backup file with the new filename NEWEXIN.MAC.

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

    - SGN.ITAM = 0

    - SGN.DLAY = 7

The ITAM and 3200 sysgen variable settings generate the object module variation EXIN.F13. A value of 7 is selected for a time delay of 7 seconds, which could be set to any value without affecting the object module variation generated. Communications support is not desired, and the 3210, 3220, 3230, 3240, and 3250 support is included.

The object module variation EXIN.F13, currently in the system library, must be updated with the appropriate changes, assembled generating a new variation, and replaced with the new variation.

4. These instructions change the source sysgen variables in the SYSGEN.MAC file through OS/32 Edit:

```
        LO .BG,EDIT32
        T .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. The following assignments must be made to expand the internal operating system macros using the Macro 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 8,SYSSTRUC.MLB,SRO
        AS 9,SYSMACRO.MLB,SRO
        AS 10,ITMS.MLB,SRO
        ST ,ML=(8,9,10)
```

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

```
    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
    AS 7,NEWSGN.MAC,SRO
    START ,CROSS,SQUEZ=99,ERS
```

7. The assembled EXINF13.OBJ module replaces the module EXIN.F13 in the system library. These commands must be executed:

```
    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 an object-level sysgen using the modified system library.

CHAPTER 4
STANDARD OS/32 DEVICES

4.1 INTRODUCTION

All devices and device characteristics supported by the OS/32 drivers are described in this chapter. These characteristics should be used in the device statements for the DEVICES...ENDD commands when a particular device is included in the target system at object sysgen time. Nonstandard devices supported by user-written drivers that are included in the target system must also be defined by a device statement for the DEVICES...ENDD commands, and must use a nonstandard device code.

4.1.1 Drivers Processed by the Configuration Utility Program (CUP)

CUP includes into the target system the appropriate device control block (DCB) identified by the device code specified in a particular device statement. Then, the driver for that device is included by an EXTRN in the DCB. Since CUP includes the DCB before the driver, the DCB and driver must be written and stored in the driver library in that order. If a user-written driver is included, a device code reserved for user-written drivers must be specified. See Appendix A for a list of the currently supported device codes. If an end of file (EOF) condition exists and all drivers are not included, CUP switches to the next library and continues to search. After searching is complete, an ENDVOL message is displayed on the system console and CUP is paused. If the remaining drivers are stored on another file, logical unit (lu) 4 must be assigned to that file, and CUP can be continued. When all drivers and references to drivers are resolved, CUP processing terminates.

4.2 DEVICES USING CURRENT LOOP INTERFACE

Devices using the current loop interface should be configured on a multiplexor channel and can be used as the console device. These devices connected to the current loop interface can be configured in the target system:

- Carousel 15

- Carousel 30

- Carousel 35

- Model 33 Teletype (TTY)

- Model 35 TTY

- Nonediting video display unit (VDU)

- Model 550

| - Model 550B

- 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. When these features are specified in a device
statement, they must be in consecutive order, with an asterisk
(*) in the level field of the second statement. If these device
statements are not specified in this order, interference between
the reader/punch and keyboard/printer can cause loss of data.

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.

The memory requirements for these device drivers, DCBs, and
channel command blocks (CCB) are listed in Table 4-1.

TABLE 4-1 MEMORY REQUIREMENTS FOR DEVICES USING
CURRENT LOOP INTERFACE

DEVICE TYPE	MEMORY (BYTES)	
	DRIVER	DCB/CCB
TTY keyboard/printer	1320	168
TTY paper tape reader/punch	1920	160
Local VDU	1424	200

The device codes for devices using current loop interface are listed in Table 4-2.

TABLE 4-2 DEVICE CODES FOR DEVICES USING CURRENT
LOOP INTERFACE

DEVICE	DEVICE CODES		
	KEYBOARD/ PRINTER	READER/ PUNCH	READER
Carousel 15 (80 charac) (132 charac)	021 022	N/A N/A	N/A N/A
Carousel 30 (80 charac) (132 charac)	021 022	N/A N/A	N/A N/A
Carousel 35 (80 charac) (132 charac)	021 022	N/A N/A	83 84
Model 33 TTY	016	081	N/A
Model 35 TTY	017	082	N/A
Nonediting VDU	018	N/A	N/A
Model 550 (nonediting)	023	N/A	N/A
Model 550B (nonediting)	023	N/A	N/A
Model 1100 (nonediting)	023	N/A	N/A

Examples:

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

4.3 DEVICES USING THE 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 should be configured at level 1 on the multiplexor channel and can be used as the console device. These devices connected to the standard RS232C interface or CLCM can be configured in the target system:

- Nonediting VDU

- Graphic display terminal

- Carousel 300

- Carousel 300 with electronic format control (EFC)

- Model 550 (nonediting)

- Model 550B (nonediting)

- Model 1100 (nonediting)

- Model 1200 (editing)

- Model 1250 (editing)

- Model 1251 (editing)

- SIGMA 10 terminal

- Letter quality printer

- Remote line printer

- BIOC driver

Because the editing features of Models 1200, 1250, and 1251 are not currently supported by the OS/32 VDU driver, these models must be configured as nonediting VDUs. Communications supports the editing features of Models 1200, 1250, and 1251.

CAUTION

DO NOT USE THE MODELS 1200, 1250, OR 1251
WITH THE EDITING FEATURE AS THE CONSOLE
DEVICE BECAUSE DATA WRITTEN TO THE DEVICE
CAN LOCK THE KEYBOARD.

The defaults for PALS, PASLA, 2- and 8-line communications multiplexor, and CLCM strapping are:

● 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 Models 550, 550B, 1100, 1200, 1250, and 1251 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 VDUs, graphic display terminals, and carousels. For the Models 550, 550B, 1100, 1200, 1250, and 1251, VDU, the interface must be strapped full duplex, enable CARR status, enable DSRDY status, and enable CL2S status.

4.3.1 Default Interface Strapping for BIOC Drivers

BIOC is tailored to work with MTM and supports local and dial-in lines. BIOC works with devices connected to PALS, PASLA, 2- or 8-line communications multiplexor (COMM MUX) interfaces. Devices using the standard RS232C interface should be configured at level 1 on the multiplexor channel and can be used as the console device.

The default interface strappings are:

● The clocks are strapped to baud rates between 50 and 19,200. A clock is selected when the device begins an I/O operation. The initial clock is selectable by the CUP statement but can be changed through the use of the auto baud adjust feature.

● The function switches for a Model 1100 and 1200 machines should be set for even parity (device code 039). All other devices should be set for no parity (device codes 034 - 038 and 040).

● The interface must be strapped full duplex. In most local applications, null modem CARR, DSRDY and CL2S status lines should be disabled. For Models 1100 and 1200 CRTs and dial-in applications, CARR, DSRDY and CL2S are usually enabled.

● For dial-in applications, a modem cable should be used. BIOC uses the CARR status to detect a disconnection for dial-in lines. When CARR drops, BIOC returns 5 consecutive I/O errors to insure that the user is terminated from an active MTM environment. If this response is not desired, CARR status should be disabled. After the 5 errors have been returned, BIOC places itself into the null write mode to mask an MTM problem. This mode will be removed within 15 seconds of a read request or when connection is made by dial-in.

- Enabling CL2S status will prevent writes from proceeding if a port is not connected. The time out status that would result from this condition will usually result in loss of the data being written; i.e., the MTM ID message. For this reason, BIOC allows a user to selectively suppress write timeouts if CARR status is also absent. This is typically used on dial-in lines to display the MTM ID message upon completion of the auto baud adjust. A typical CUP statement for a dial-in line is:

        1 PHN1:20,34,,X980B,132,66

A typical sysgen statement for a dial-in line is:

        PHN1:,20,34,XDC=X080D

X980B selects support of disconnect for MTM signoff and disabling of write timeout to preserve the MTM ID message. Full BIOC features are enabled, and clock B is selected and clock B is selected 4 on 8-line mux). A record length of 132 and page size 66 is chosen in case remote users are using printers. Selection of write timeout suppress will not allow MTM to terminate with a simple QUIESCE command because MTM waits for timeouts that will never arrive. Therefore, to prevent write timeouts, MTM must be brought down through a series of TERMINATE and REMOVE commands that can be sent through a CSS.

The memory requirements for these device drivers, DCBs, and CCBs are listed in Table 4-3.

TABLE 4-3 MEMORY REQUIREMENTS FOR DEVICES USING THE STANDARD RS232C INTERFACE (PALS, PALSA, 2- or 8-LINE COMMUNICATIONS MULTIPLEXOR) OR CURRENT LOOP COMMUNICATIONS MULTIPLEXOR (CLCM)

DEVICE	MEMORY (BYTES)	
	DRIVER	DCB/CCB
TTY keyboard/printer	1320	168
TTY paper tape reader/punch	1920	160
Local VDU	1424	200

The device codes for devices using the standard RS232C interface
are listed in Table 4-4. Please refer to the OS/32 Asynchronous
Communications Reference Manual for the configuration of remote
device codes.

TABLE 4-4   DEVICE CODES FOR DEVICES USING
THE STANDARD RS232C INTERFACE
(PALS, PALSA, 2- or 8-LINE
COMMUNICATIONS MULTIPLEXOR) OR
CURRENT LOOP COMMUNICATIONS
MULTIPLEXOR (CLCM)

	DEVICE CODE	
DEVICE	LOCAL	REMOTE
Nonediting VDU	034	147
Graphic display terminal	036	147
Carousel 300	037	147
Carousel 300 (with EFC)	038	147
Model 550	039	147
Model 550B	039	147
Model 1100	039	147
Model 1200 (editing)	–	156

Model 1250 (editing)
    Point-to-point
    Multidrop
	
	–
	–
		
		157
		158

Model 1251 (editing)
    Point-to-point
    Multidrop
	
	–
	–
		
		157
		158

SIGMA 10 terminal	–	146
Remote line printer (ITAM) and letter quality printer	–	145
Remote line printer (BIOC)		40

Device codes 34 and 36 through 40 can be used to invoke the BIOC driver that supports vertical forms control (VFC). The BIOC driver can be used for local or dial-in applications.

The extended device code (xdcod or Xxdcod) optionally can be used to specify clock speed select. To specify clock speed the following values are used:

```
XA   A-clock
XB   B-clock
XC   C-clock
XD   D-clock
```

Examples:

```
CT30:   30,39,,XD       D clock, but not full BIOC support
CT32:   32,39,,X280D    full BIOC support and D clock
```

4.4 INTERTAPE CASSETTES

Intertape cassettes should be configured at level 1 on the multiplexor channel. The two cassettes located in a transport are interlocked in the hardware causing a shared-busy condition to exist. When these device statements are specified, they must be consecutive with an asterisk in the level field of the second statement. If these device statements are not specified in this order, loss of data or system failure can occur.

NOTE

The flags field should not be used for these devices.

The memory requirements for the intertape cassette driver, DCB, and CCB are listed in Table 4-5.

TABLE 4-5   INTERTAPE CASSETTE MEMORY
REQUIREMENTS

	MEMORY (BYTES)	
DEVICE TYPES	DRIVER	DCB/CCB
Intertape cassette	1088	160

The device code for intertape cassettes is listed in Table 4-6.

TABLE 4-6   INTERTAPE CASSETTE DEVICE
CODE

```
-----------------------------------------
|         DEVICE        | DEVICE CODE |
|=======================================|
| Intertape cassette    | 066         |
-----------------------------------------
```

Example:

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

4.5   CARD READERS

Card readers should be configured at level 1 on the multiplexor
channel.   These card readers can be configured in the target
system:

● Card reader 029 with software code translation

● Card reader 029 with hardware code translation

● Card reader 026 with software code translation

NOTE

The   flags   field   should not be used for
these devices.

There is an additional feature of the 026 and 029 card reader
drivers that can be included in the target system at the
source-sysgen level. The driver can translate the Hollerith code
into EBCDIC instead of ASCII code. This feature can be included
by changing the reference to the translate table in the DCB to:

● 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

The memory requirements for the card reader drivers, DCBs, and CCBs are listed in Table 4-7.

TABLE 4-7 CARD READER MEMORY
REQUIREMENTS

| DEVICE TYPE | MEMORY (BYTES) | |
	DRIVER	DCB/CCB
Card reader with hardware translate	880	160
Card reader without hardware translate	1136	160

The device codes for card readers are listed in Table 4-8.

TABLE 4-8 CARD READER DEVICE CODES

DEVICE	DEVICE CODES
Carousel 35 card reader/ punch	084
Card reader, software code translation (029)	096
Card reader, hardware code translation (029)	097
Card reader, software code translation (026)	098

Examples:

```
1 CR29:04,96              Standard card reader,  no hard-
                            ware translate,  029 card en-
                            coding
1 CRHW:04,97              Card   reader,   with   hardware
                            translate, 029 card encoding
1 CR26:04,98              Standard card reader,  no hard-
                            ware translate,  026 card en-
                            coding
```

4.6 CARD PUNCHES

Card punches should be configured at level 1 on the multiplexor
channel.   These card readers can be configured in the target
system:

- High speed card punch

- Card reader/punch (interpreting)

- Card reader/punch (with print option)

NOTE

The flags field should not be used for
these devices.

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 target
system at the source-sysgen level. 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 changing the reference to the
translate table in the DCB to:

- 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

The memory requirements for card reader drivers, DCBs, and CCBs
are listed in Table 4-9.

TABLE 4-9   CARD PUNCH MEMORY
REQUIREMENTS

DEVICE TYPE	MEMORY (BYTES)	
	DRIVER	DCB/CCB
Card punch	1624	172
Card reader/punch	1880	172

The device codes for card punches are listed in Table 4-10.

TABLE 4-10   CARD PUNCH DEVICE CODES

DEVICE	DEVICE CODE

High speed card punch
    100-125 CPM
    noninterpreting
	104

Card reader/punch
    45-75 CPM punch
    200 CPM reader
    interpreting
	105

Card reader/punch
    45-75 CPM punch
    200 CPM reader
    print option separate
	106

Examples:

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

4.7 LINE PRINTERS

Line printers should be configured at level 1 on the multiplexor
channel.   These line printers can be configured in the target
system:

- 60-200 LPM printer

- 300 LPM printer

- 600, 1000 LPM printer

- Remote line printer

- Letter quality printer

NOTE

The flags field should not be used with
these devices.

The memory requirements for the line printer driver, DCB, and CCB
are listed in Table 4-11.

TABLE 4-11   LINE PRINTER MEMORY
REQUIREMENTS

	MEMORY (BYTES)	
DEVICE	DRIVER	DCB/CCB
Line printer	2384	424

The device codes for these devices are listed in Table 4-12.

TABLE 4-12 LINE PRINTER DEVICE CODES

DEVICE	CONTROLLER	DEVICE CODE
60-200 LPM printer	M46-203	112
60-200,300,600 LPM printer	M46-233	113
600, 1000 LPM printer	M46-206	114
Remote line printer (ITAM) and letter quality printer	Asynchronous line interface	145
Remote line printer	(BIOC)	40

The line printer driver will support a horizontal tab expansion feature that will expand tab characters (Control I) to the appropriate number of spaces. Tab stops are defined to be every eighth column; i.e., 9, 17, 25, etc.

This feature is enabled via extended device code X1 for device codes 112, 113, or 114 only. All other line priner drivers will output the horizontal tab character unmodified.

For information on remote line printer configuration, refer to the System Generation/32 (SYSGEN/32) Reference Manual.

Examples:

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

4.8 HIGH SPEED PAPER TAPE READER/PUNCH

The high speed paper tape reader/punch should be configured at level 1 on the multiplexor channel.

NOTE

> The flags field should not be used with this device.

The memory requirements for the high speed paper tape reader/punch driver, DCB, and CCB are listed in Table 4-13.

TABLE 4-13   HIGH SPEED PAPER TAPE
              READER/PUNCH MEMORY
              REQUIREMENTS

DEVICE TYPE	MEMORY (BYTES)	
	DRIVER	DCB/CCB
High speed paper tape reader/punch	1080	160

The device code for this device is listed in Table 4-14.

TABLE 4-14   HIGH SPEED PAPER TAPE
              READER/PUNCH DEVICE
              CODE

DEVICE	DEVICE CODE
High speed paper tape reader/punch	080

Example:

   1 PTRP:13,80   High speed paper tape
                                       reader/punch

4.9 SELECTOR CHANNEL (SELCH)

The selector channel should be configured at least one level less
than the devices or controllers it controls. The device
statements for those devices and controllers must immediately
follow the SELCH device statement. The next device statement
with a level equal to that specified for the SELCH indicates the
end of that SELCH's control.

A SELCH has no device mnemonic but has a device number. A SELCH
must have its device code set to 0.

Example:

```
1:0F0,0                         Selector channel
```

4.9.1 Magnetic Tape Controllers and Tapes

Magnetic tape controllers, located between the selector channel and tape transports, should always be configured at least one level greater than the selector channel, and one level less than the tapes it controls. A magnetic tape controller supports from one to four transports. The device statement for the tapes must immediately follow the controller device statement. Each tape requires a device statement that allows more than one tape to be active at one time. These magnetic tapes can be configured in the target system:

- 800 bpi magnetic tapes

- 1600 bpi magnetic tapes

- 1600/800 bpi dual density magnetic tape drives

| - 6250 bpi magnetic tapes - special systems controller (STC)

| - 6250 bpi magnetic tapes - halfword mode controller (STC)

- 6250 bpi magnetic tapes - Telex tape device

The controller device statement must have its device code and device number set to 0, and has no device mnemonic.

<div align="center">

NOTE

The flags field should not be used with the tape controller or tape device statements.

</div>

The 6250 tape drives can require EDMA bandwidth coordination. The data rates are listed in Table 4-15.

**TABLE 4-15 DATA RATES FOR 6250
DRIVES**

INCHES PER SECOND (IPS)	KILOBYTES PER SECOND
75	468.75
125	791.25

The memory requirements for the magnetic tape driver, DCB, and CCB are listed in Table 4-16.

**TABLE 4-16 MAGNETIC TAPE MEMORY
REQUIREMENTS**

DEVICE TYPE	MEMORY (BYTES)	
	DRIVER	DCB/CCB
800 and 1600 bpi 9-track magnetic tape	3128	280
6250 bpi 9-track magnetic tape	3648	384

The device codes for magnetic tape devices are listed in Table 4-17.

TABLE 4-17 MAGNETIC TAPE DEVICE CODES

DEVICE	DEVICE CODE
800 bpi	064
1600 bpi	065
1600/800 bpi	065
6250/1600/800 bpi STC with special systems controller	068
6250/1600/800 bpi STC with halfword mode controller	069
6250/1600/800 bpi Telex tape with standard controller	070

Examples:

```
1:F0,0                  Selector channel
2:0,0                   Controller 1
3 MAG1:85,64            Tape1 (800 bpi)
3 MAG2:95,64            Tape2 (800 bpi)
2:0,0                   Controller2
3 MAG3:C5,65            Tape3 (1600 bpi)
3 MAG4:D5,65            Tape4 (1600 bpi)
2:0,0                   Controller3
3 MAG5:80,68            Tape5 (6250 bpi)
3 MAG6:90,68            Tape6 (6250 bpi)
```

4.9.2 Disks

Disk controllers should be configured at least one level greater than the selector channel, and one level less than the disks it controls. A moving-head disk controller supports from one to four disk drives. The device statement for the controller must immediately follow the selector channel device statement, and the device statements for the disks must immediately follow the controller device statement. Each disk requires a separate device statement.

The device statement for the controller has no device mnemonic, and must have its device code set to 0. The device statement for the disk has its flag field equal to D, and its device mnemonic associated with the drive.

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, FIFO (first-in/first-out), and C-SCAN (seek optimization). The C-SCAN algorithm is supplied as a default. It 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 would be 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 altering the DCB source and reassembling. The field QSR= in the DCB macro specifies the algorithm. 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 first-in/first-out without regard to priority or disk position.

A second option available upon reassembly of the DCB 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 DCB macro by omitting 'EDMA=SEEKCHK'. See the SYSMACRO.MLB library.

4.9.2.1 Moving-Head Disks

These disks can be configured in the target system:

● 2.5Mb fixed disk

● 2.5Mb removable disk

● 5Mb fixed disk

                                    Composes a 10Mb disk

● 5Mb removable disk

● 40Mb removable disk

The 10Mb disk is composed of two 5Mb disks. These two disks share the same drive causing a shared-busy condition to exist. Therefore, two device statements must be specified for a 10Mb disk, with an asterisk in the level field of the second statement. If the device statements are not specified in this order, positioning errors on either volume can cause loss of data or system failure. Table 4-18 lists the disk memory requirements.

TABLE 4-18   MOVING-HEAD DISK MEMORY REQUIREMENTS

	MEMORY (BYTES)	
DEVICE TYPE	DRIVER	DCB/CCB
2.5Mb disk	1590	1020
5Mb disk	1590	1020
40Mb disk	1590	1020

The device codes for moving-head disks are listed in Table 4-19.

TABLE 4-19   DEVICE CODES FOR MOVING-HEAD DISKS

DEVICE	DEVICE CODE
2.5Mb fixed disk	048
2.5Mb removable disk	049
5Mb fixed disk	050
5Mb removable disk	051
40Mb removable disk	052

Examples:

1:F0,0	Selector channel
2:B6,0	Controller
3 DSC1:C6,51,D	Removable platter
* DSC2:C7,50,D	Fixed platter
3 DSC3:D6,51,D	Removable platter
* DSC4:D7,50,D	Fixed platter

4.9.2.2 Mass Storage Media (MSM) Disks

These disks can be configured in the target system:

- 256Mb removable disk

- 256Mb fixed disk

- 67Mb removable disk

- 67Mb fixed disk ⎫
                   ⎬   Compose a 68.5Mb disk
- 1.5Mb HPT disk ⎭

- HPT 68.5Mb fixed disk

- 16Mb removable

- 16Mb fixed

- 48Mb fixed

- 80Mb fixed

- 1.5Mb HPT fixed

- 160Mb fixed

- 675Mb fixed

The 68.5Mb disk is composed of a 1.5Mb HPT disk and a 67Mb fixed disk. The two portions must be configured as sharing a single device level, thus sharing the device busy condition. Indicate this by an asterisk(*) in the level field of the second device statement.

If the disk drive requires dual port support, the extended device code field should be set to XFF. 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. The memory requirements for MSM disks are listed in Table 4-20. Table 4-21 shows device codes for MSM disks.

TABLE 4-20   MASS STORAGE MEDIA (MSM)
             MEMORY REQUIREMENTS

	MEMORY (BYTES)	
DEVICE TYPE	DRIVER	DCB/CCB
All MSM	2416	1060

TABLE 4-21 DEVICE CODES FOR MASS STORAGE MEDIA (MSM)

DEVICE CODE	DEVICE TYPE	SECTORS / TRACK	TRACKS / CYL	CYLINDERS ON DISC	MAINTENANCE CYLINDERS	RELATED DEVICES
44	256MB FIXED	64	19	1022	-	-
45	1.5MB HPT	64	10	9.6	-	46
46	160MB FIXED	64	10	821	2	45
47	1.5MB HPT	64	40	2.4	-	63
53	67MB REMOVABLE	64	5	823	-	-
54	256MB REMOVABLE	64	19	823	-	-
56	68.5MB FIXED	64	5	836.2	3	-
57	1.5MB HPT	64	5	19.2	-	58
58	67MB FIXED	64	5	820	3	57
59	16MB REMOVABLE	64	1	823	-	60,61,62
60	16MB FIXED	64	1	821	2	59
61	48MB FIXED	64	3	821	2	59
62	80MB FIXED	64	5	821	2	59
63	675MB FIXED	64	40	821	2	47

Examples:

```
1:F0,0                      Selector channel
2:FB,0                      Disk controller FB
3 DSC1:FC,53,D              67Mb disk
3 DSC2:FD,53,D              67Mb disk
3 DSC3:FE,58,D              disk, fixed
* DSC4:FE,57,D              1.5Mb, HPT
3 DSC5:FF,56,D              68.5Mb disk, fixed
1:F1,0                      Selector channel F1
2 EB,0                      Disk controller EB
3 DSC6:EC,54,D              256Mb disk, removable
3 DSC7:ED,54,D              256Mb disk, removable
```

4.9.3 DMA Coordination Nodes

It is possible to configure DMA devices whose total bandwidth would exceed the capacity of the EDMA bus. This could result in data overruns and inefficient operation. To prevent this, 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 7/32 would the slower tapes and disks be considered for coordination. Table 4-22 lists the recommended number of simultaneous DMA transfers.

TABLE 4-22   RECOMMENDED NUMBER OF
SIMULTANEOUS DMA
TRANSFERS

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

NOTE

The recommended number of simultaneous DMA transfers for these machines depends upon the number of direct memory access interface (DMAI) boards present in the system. Each DMAI board can support up to four simultaneous transfers. Therefore, the recommended number of transfers for a Model 3240 or 3250 system with one DMAI board would be four, the recommended number of transfers for a Model 3240 or 3250 system with two DMAI boards would be eight, and the recommended number of transfers for a Model 3240 or 3250 system with four DMAI boards would be sixteen.

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

The device statement for a DMA coordination node must have:

- no device mnemonic,

- its device number and device code set to 0,

- its flag field equal to E, and

- the extended device code field indicating the number of transfers.

Examples:

```
1:0,0,E,1                    Coordination node
2:FO,0                       Selector channel1
3:FB,0                       Disk controller1
4 DSC1:FC,53,D               67Mb (MSM80) disk
2:F1,0                       Selector channel2
3:EB,0                       Disk controller2
4 DSC2:EC,53,D               67Mb (MSM80) disk2
2:F2,0                       Selector channel3
3:0,0                        Magnetic tape controller
4 MAG1:85,68                 6250bpi,125ips  magnetic tape
                               drive
```

4.9.4 Floppy Disk Subsystems

Floppy disk subsystems should be configured at level 1 on the multiplexor channel. A floppy disk subsystem consists of one controller with one to four spindles. The controller is transparent to the user and does not require a device statement. All spindles share the same controller, causing a shared-busy condition. Therefore, device statements for floppy disk spindles must be specified with 1 in the level field for the first spindle, and an asterisk in the level fields of the device statements for the remaining spindles. If the device statements are not specified in this order, loss of data or system failure can occur.

The device statement for the disk has its flag field equal to D, and its device mnemonic associated with the drive instead of the volume 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 altering the DCB source and reassembling. The field QSR= in the DCB macro specifies the algorithm. 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 upon reassembly of the DCB 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 DCB macro by omitting 'EDMA=SEEKCHK'. See the SYSMACRO.LIB library.

If there is more than one floppy disk subsystem in the target 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 its:

● device mnemonic associated with the spindle instead of the volume,

● flags field equal to D, and

● extended device code equal to the spindle number (0, 1, 2, or 3).

The memory requirements for the floppy disk driver, DCB, and CCB are listed in Table 4-23.

TABLE 4-23 FLOPPY DISK MEMORY REQUIREMENTS

	MEMORY (BYTES)	
DEVICE TYPE	DRIVER	DCB/CCB
Floppy disk	848	1020

The device code for floppy disks is listed in Table 4-24.

TABLE 4-24 FLOPPY DISK DEVICE
CODE

DEVICE	DEVICE CODE
========	=============
Floppy disk	055

Examples:

```
1 FLP1:C1,055,D,0          First floppy disk spindle
* FLP2:C1,055,D,1          Second floppy disk spindle
* FLP3:C1,055,D,2          Third floppy disk spindle
1:0,0,E,1                  Coordination node
2 FLP1:C1,055,D,0          First spindle for subsystem1
* FLP2:C1,055,D,1          Second spindle for subsystem1
* FLP3:C1,055,D,2          Third spindle for subsystem1
2 FLPA:C2,055,D,0          First spindle for subsystem2
* FLPB:C2,055,D,1          Second spindle for subsystem2
```

4.10 8-LINE INTERRUPT MODULE

An 8-line interrupt module should be configured at level 1 on the multiplexor channel. Each line must be defined by a device statement. Trap generating device support must be included in the target system at the object-sysgen level for an 8-line interrupt module. Table 4-25 lists the 8-line interrupt module memory requirements.

NOTE

The flags field should not be used for this device.

TABLE 4-25 8-LINE INTERRUPT MODULE
MEMORY REQUIREMENTS

	MEMORY (BYTES)	
DEVICE TYPE	DRIVER	DCB/CCB
=============	========	=========
8-line interrupt module	160	160

The device code for an 8-line interrupt module is listed in Table 4-26.

TABLE 4-26   8-LINE INTERRUPT MODULE
DEVICE CODE

```
 ------------------------------------------------
|           DEVICE          | DEVICE CODE |
|===========================================|
| 8-line interrupt module | 128            |
 ------------------------------------------------
```

Examples:

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

4.11   DIGITAL MULTIPLEXOR CONTROLLER

The digital multiplexor controller should be configured on the multiplexor channel. Digital multiplexor controller memory requirements are shown in Table 4-27.

NOTE

The flags field should not be used for this device.

TABLE 4-27   DIGITAL MULTIPLEXOR CONTROLLER
MEMORY REQUIREMENTS

```
 -------------------------------------------------
|                          |   MEMORY (BYTES)  |
|                          |--------------------|
|       DEVICE TYPE        | DRIVER | DCB/CCB |
|=========================================|
| Digital multiplexor      | 322    | 160     |
| controller               |        |         |
 -------------------------------------------------
```

The device code for this device is listed in Table 4-28.

TABLE 4-28 DIGITAL MULTIPLEXOR
CONTROLLER DEVICE
CODE

DEVICE	DEVICE CODE
========	=============
Digital multiplexor controller	129

Example:

```
1 DMC:4B,129
```

4.12 SYSGENING A SYSTEM WITH A COMMUNICATIONS MULTIPLEXOR

The communications multiplexor provides an interface between a multiplexor bus or selector channel. It is available in two versions: 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 baud rates. The communication multiplexor baud rate is made compatible to the device baud rate by selecting the clock that matches the desired baud rate. The selected clock is placed in the extended device code (xdcod) field of the device statement. Program selectable baud rates for installed groups are shown in Table 4-29.

TABLE 4-29   BAUD RATES WITHIN
A GROUP

STRAP OPTION	BAUD RATE	CLOCK
Group 1	50	XA
	110	XB
	1800	XC
	2400	XD
Group 2	75	XA
	134.5	XB
	2000	XC
	3600	XD
Group 3	150	XA
	600	XB
	4800	XC
	9600	XD
Group 4	300	XA
	1200	XB
	7200	XC
	19200	XD

* For more information on the communication multi-plexor refer to the 2-Line and 8-Line Communications Multiplexor Programming Manual.

4.13   CONVERSION EQUIPMENT CONTROLLER

The conversion equipment controller should be configured at level 1 on the multiplexor channel. Conversion equipment controller memory requirements are listed in Table 4-30. These conversion equipment controllers can be configured in the target system:

● Real-time analog system

● Analog input controller

● Analog output controller

● Digital I/O controller

NOTE

The flags field should not be used for this device.

TABLE 4-30   CONVERSION EQUIPMENT CONTROLLER
MEMORY REQUIREMENTS

DEVICE TYPE	MEMORY (BYTES)	
	DRIVER	DCB/CCB
Real time analog system	716	160
Analog input controller	306	100
Analog output controller	82	132
Digital I/O controller	604	160

The device code for the conversion equipment controller is listed
in Table 4-31.

TABLE 4-31   CONVERSION EQUIPMENT CONTROLLER
DEVICE CODES

DEVICE	DEVICE CODE
Conversion equipment controller with internal clock	136
Conversion equipment controller with user-supplied clock	137
Analog Input	138
Analog Output	139
Digital I/O	140

Examples:

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

Refer to the OS/32 Mini I/O System User Manual.

APPENDIX A
OS/32 SUPPORTED DEVICES AND DEVICE CODES

DEVICE CODE (DECIMAL)	DEVICE TYPE
0-15	Reserved
16	Model 33 Teletype Keyboard/Printer (CLI)
17	Model 35 Teletype Keyboard/Printer (CLI)
18	Nonediting VDU (CLI)
19-20	Reserved
21	Perkin-Elmer Carousel 15, 30, 35, 80 character line (CLI)
22	Perkin-Elmer Carousel 15, 30, 35, 132 character line (CLI)
23	Models 550, 550B, 1100 VDU (CLI)
24-33	Reserved
34	Nonediting VDU (RS232C, PALS, PASLA, 2- or 8-line communications multiplexor interface, or current loop communications multiplexor)
35	Reserved
36	Graphic display terminal (RS232C, PALS, PASLA, 2- or 8-line communications multiplexor interface, or current loop communications multiplexor)
37	Carousel 300 (RS232C, PALS, PASLA, 2- or 8-line communications multiplexor interface, or current loop communications multiplexor)
38	Carousel 300 with electronic format control (RS232C, PALS, PASLA, 2- or 8-line communications multiplexor interface, or current loop communications multiplexor)
39	Models 550, 550B, and 1100 VDU (RS232C, PALS, PASLA, 2- or 8-line communications multiplexor interface, current loop communications multiplexor)
40	Remote line printer driver (BIOC)
41-43	Reserved
44	256Mb disk, fixed
45	1.5Mb HPT
46	160Mb disk, fixed
47	1.5Mb disk, HPT
48	2.5Mb disk, fixed
49	2.5Mb disk, removable
50	5Mb disk, fixed

DEVICE CODE (DECIMAL)	DEVICE TYPE
===	===
51	5Mb disk, removable
52	40Mb disk, removable
53	67Mb disk, removable
54	256Mb disk, removable
55	Floppy disk
56	68.5Mb fixed
57	1.5Mb HPT
58	67Mb disk, fixed
59	16Mb, removable
60	16Mb disk, fixed
61	48Mb disk, fixed
62	80Mb disk, fixed
63	675Mb, fixed
64	800 bpi magnetic tape
65	800/1600 bpi dual density or 1600 bpi single density magnetic tape drive
66	Intertape cassette
67	7-track tape
68	6250 bpi STC tape drive with special systems controller
69	6250 bpi STC tape drive with standard controller
70	6250 bpi Telex tape drive with standard controller
71-79	Reserved
80	High speed paper tape reader/punch
81	Model 33 Teletype reader/punch (CLI)
82	Model 35 Teletype reader/punch (CLI)
83	Carousel 35 with paper tape reader, 132-character line
84	Carousel 35 card reader/punch, 132-character
85-95	Reserved
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 punch, high speed, 029 card encoding
105	Card reader/punch, 029 card encoding
106	Card reader/punch with print option separate, 029 encoding
107-111	Reserved
112	Low speed line printer, M46-202 controller
113	Medium speed line printer, M46-233 controller
114	High speed line printer, M46-206 controller

DEVICE CODE (DECIMAL)	DEVICE TYPE
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 digital I/O module
141-143	Reserved
144	Asynchronous communications line, line driver only
145	Remote line printer (ITAM), asynchronous and letter quality printer
146	SIGMA 10 Terminal (communications)
147	Nonediting VDU (communications)
148-155	Reserved
156	Model 1200 VDU (communications)
157	Models 1250, 1251 point to point VDU
158	Model 1250, 1251 multidrop VDU
159	Reserved
160	Binary synchronous communications line on 201 DSA, line driver only (communications)
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 QSA, line driver only (communications)
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)
172-175	Reserved
176	ZBID line driver, half duplex only (communications)
177	ZBID line driver, simplex only (communications)

DEVICE CODE (DECIMAL)	DEVICE TYPE
178-191	Reserved
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

NOTES

1. Current Loop Interface is equivalent to TTY interface.

2. SVC 7 fetch attributes, a pseudo device printer, is not sysgened. See the OS/32 Mini I/O System User Manual.

3. Device code 145 now supports the remote line printer (ITAM) and the letter quality printer.

4. Device codes 34 and 36 through 40 can be utilized to invoke the BIOC driver and can be used for either local or dial-in applications. The BIOC driver supports vertical forms control (VFC). See Section 4.3.1 for typical CUP statements for configuring a dial-in and a local BIOC driver in the system.

APPENDIX B
CUP COMMAND SUMMARY

ACCOUNTING $\left[\begin{Bmatrix} nn \\ 4 \end{Bmatrix}\right]$ $\left[\underline{,N}OFILEACCOUNTING\right]$

BACKGROUND $\left[\begin{Bmatrix} maxpriority \\ 16 \end{Bmatrix}\right]$ $\left[,\begin{Bmatrix} maxsize \\ 9 \end{Bmatrix}\right]$

CLOCK $\left[\begin{Bmatrix} 50 \\ 60 \end{Bmatrix}\right]$, $\left[\begin{Bmatrix} pic\ addr \\ X'6C' \end{Bmatrix}\right]$, $\left[\begin{Bmatrix} lfc\ addr \\ X'6D' \end{Bmatrix}\right]$ $[,D]$

CMDLEN $\left[\begin{Bmatrix} n \\ 80 \end{Bmatrix}\right]$

CPU $\left[\begin{Bmatrix} 3250 \\ 3240 \\ 3230 \\ 3220 \\ 3210 \\ 8/32 \\ 7/32 \end{Bmatrix}\right]$ $\left[,\begin{Bmatrix} 8 \\ 2 \end{Bmatrix}\right]$

CSS $\left[\begin{Bmatrix} n \\ 5 \end{Bmatrix}\right]$

DATE $\left[\begin{Bmatrix} DDMMYY \\ MMDDYY \end{Bmatrix}\right]$

$$\text{\underline{DEV}ADS} \left[\begin{Bmatrix} 3 \\ 1 \\ 0 \end{Bmatrix} \right]$$

$$\text{\underline{D}EVICES}$$

$$\begin{Bmatrix} \text{level} \\ * \end{Bmatrix} \left[\text{dmnem}\right] : \text{dnum,dcod,} \begin{Bmatrix} C \\ D \\ E \\ S \end{Bmatrix} \left[, \begin{Bmatrix} \text{xdcod} \\ \text{Xxdcod} \end{Bmatrix} \right] \left[, \begin{Bmatrix} \text{recl} \\ 132 \end{Bmatrix} \right]$$

$$\left[, \begin{Bmatrix} \text{size} \\ 66 \end{Bmatrix} \right]$$

$$\begin{Bmatrix} \text{level} \\ * \end{Bmatrix} \left[\text{dmnem}\right] : \text{dnum,dcod,} \begin{Bmatrix} C \\ D \\ E \\ S \end{Bmatrix} \left[, \begin{Bmatrix} \text{xdcod} \\ \text{Xxdcod} \end{Bmatrix} \right] \left[, \begin{Bmatrix} \text{recl} \\ 132 \end{Bmatrix} \right]$$

$$\left[, \begin{Bmatrix} \text{size} \\ 66 \end{Bmatrix} \right]$$

$$\vdots$$

ENDD

$$\text{\underline{DI}RECTORY}$$

$$\text{\underline{D}ISCBLOCK} \left[\begin{Bmatrix} n \\ 4 \end{Bmatrix} \right]$$

$$\text{\underline{D}SYS} \left[\begin{Bmatrix} n \\ 25 \end{Bmatrix} \right]$$

ENDC

ERRORREC fd,size,period

FLOAT $\begin{bmatrix} \begin{Bmatrix} S,S \\ S,H \\ H,H \\ N,N \end{Bmatrix} \end{bmatrix}$

ILEVEL $\begin{bmatrix} \begin{Bmatrix} 3 \\ 2 \\ 1 \\ 0 \end{Bmatrix} \end{bmatrix}$

IOCLASS $\begin{bmatrix} \begin{Bmatrix} cc \\ 0 \\ 1 \\ 2 \\ 3 \end{Bmatrix} \end{bmatrix}$

ITAM

JOURNAL $\begin{bmatrix} \begin{Bmatrix} n \\ 0 \end{Bmatrix} \end{bmatrix}$

LOGLEN $\begin{bmatrix} \begin{Bmatrix} n \\ 72 \end{Bmatrix} \end{bmatrix}$

MAXTASK $\begin{bmatrix} \begin{Bmatrix} n \\ 32 \end{Bmatrix} \end{bmatrix}$

MEMCHECK

MEMORY $\begin{bmatrix} \begin{Bmatrix} n \\ 128 \end{Bmatrix} \end{bmatrix}$

MODULE

$$\begin{bmatrix} \text{new module name}_1 \\ \text{new module name}_2 \\ . \\ . \\ . \\ \text{new module name}_n \end{bmatrix}$$

ENDM

NOSEG

NOTGD

QUEUE $\left[\begin{Bmatrix} n \\ \text{total number of devices} \end{Bmatrix}\right]$

| ROLL [rvoln]

| SPOOL [spvoln]

| SPOOL

SSTABLE $\left[\begin{Bmatrix} n \\ 32 \end{Bmatrix}\right]$

STARTUP
.
.
.
ENDS

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

TEMP tvoln

VERSION vvvvvvvv

VOLUME voln

APPENDIX C
MESSAGE SUMMARY

CUP:BLK-ERR   User-specified maximum block size is not a decimal number from 1 through 255.

CUP:BPRI-ERR   User-specified maxpriority is not a decimal number from 11 through 248.

CUP:BSZE-ERR   User-specified maxsize for the BACKGROUND command is not a decimal multiple of 0.25kb.

CUP:CKSM-ERR   A checksum error occurred while processing the driver library.

CUP:CLAS-ERR   The user-specified number is not a decimal number from 0 through 31 or is greater than the number specified in the ACCOUNTING command.

CUP:CLDN-ERR   The physical device address specified for the LFC or PIC is illegal.

CUP:CLLF-ERR   A line frequency value other than 50 or 60 is specified.

CUP:CLSP-ERR   A syntax error exists in the CLOCK command.

CUP:COMMERCIAL SPOOL SUPPORT

                   A system message notifying the user that commercial spool support was invoked and is the spooler in use on the system.

CUP:CONS-ERR   More than one device is specified as the console device. Therefore, there is no system console device.

CUP:CONT-ERR   This command line is not a continuation of the previous command line that contains a continuation character in position 72.

CUP:CPU-ERR   Specified model number is not 3210, 3220, 3230, 3240, 3250, 8/32, or 7/32.

CUP:CSS-ERR   User-specified number of nested CSS calls is not a decimal number from 1 through 249.

CUP:CTRL-ERR	An ILEVEL command was placed between a selector channel and controller.
CUP:DATE-ERR	A syntax error exists in the DATE command.
CUP:DCOD-ERR	User-specified number is not a decimal number from 16 through 254 or is not 1 for a pseudo output device.
CUP:DM-ERR	A statement within the DEVICES...ENDD commands does not contain a device mnemonic, and the previous statement does not refer to a controller or channel.
CUP:DN-ERR	User-specified table entry number is not 3, 1, or 0 in DEVADS statement. A statement within the DEVICES...ENDD commands contains a device number greater than the maximum physical device address specified in the DEVADS command, or is not a 0 for a pseudo output device.
CUP:DSYS-ERR	User-specified dynamic system space number is not a decimal number from 1 to the total number of kilobytes of memory in the system.
CUP:DUP-ERR	A duplicate device mnemonic was specified in the device statement.
CUP:ERFD-ERR	User-specified fd for error recording is invalid.
CUP:ERPD-ERR	User-specified number for error recording period is not a number from 1 through 1440.
CUP:ERSZ-ERR	User-specified number for error recording size is not a number from 1 through 32,767.
CUP:EXCS-ERR	Too many parameters were specified in the device statement.
CUP:FLAG-ERR	A statement within the DEVICES...ENDD commands contains a character other than C, D, E, or S as the device flag.
CUP:FLTP-ERR	The combination of parameters specified in the FLOAT command is invalid.
CUP:FRMT-ERR	The driver library contains illegal loader items.
CUP:ILVL-ERR	An ILEVL operand error, or the operand was greater than 3.

CUP:ILVL8-ERR   An ILEVEL command was specified when the register set was not equal to 8.

CUP:I/O-ERR xx fd   The SVC 1 status code xx indicates the type of I/O error that occurred in the specified fd.

CUP:ITAM-ERR   A statement within the DEVICES...ENDD commands contains invalid communications information in the xdcod field.

CUP:ITFM-ERR   Both the ITAM and the NOITFM commands were specified.

CUP:JRNL-ERR   User-specified journal entry number is not a decimal number from 0 through 12,999.

CUP:LDCT OR UCSI-ERR

In a device statement the SYNCS or the USCI parameter was not a decimal number, or was not in the form Xnnnn, where n is a hexadecimal number.

CUP:LEVL-ERR   A statement within the DEVICES...ENDD commands has a zero specified in the level field or a level greater than the level specified in the previous statement which controls it.

CUP:LGTH-ERR   User-specified command buffer length or log message buffer length is not a decimal number from 32 through 1024.

CUP:LRCL OR PLMT-ERR

In a device statement, the LRCL or the PLMT parameter was not a decimal number or was not in the form Xnnnn, where n is a hexadecimal number.

CUP:LSEQ-ERR   Sequence error exists in driver library; driver library was not rewound before starting CUP.

CUP:MAXT-ERR   User-specified maximum task number is not a decimal number from 1 through 252.

CUP:MEM-ERR   User-specified local memory size is not a decimal number from 128 through 1,024 (4,096 for 3230, 16,384 for 3240) or is not a multiple of 16.

CUP:MERR-ERR   The ERRORREC command was specified without the Model 3210, 3220, 3230, 3240, or 3250 system support.

CUP:MFUL-ERR	The memory area specified is too small for CUP to continue processing device statements. Terminate CUP and reload into a larger segment.
CUP:MNEM-ERR	Command is an invalid command or the device mnemonic in the DEVICES...ENDD commands is invalid. A device is incorrectly flagged as a directory device.
CUP:MOD-ERR	User-specified module name in the MODULE...ENDM commands is invalid or does not exist.
CUP:NMER-ERR	A device is incorrectly flagged as a directory device.
CUP NCS-ERR	In a device statement, the NCS parameter was not a decimal number or was not in the form Xnnnn, where n is a hexadecimal number.
CUP:NODA-ERR	Roll, temporary volume, spool, or directory support is specified but no direct access device exists in the system; a secondary directory cannot be built because a directory device is not defined.
CUP:NODV-ERR	The ENDD command directly follows the DEVICES command, and no device statements are found.
CUP:NTRY-ERR	A user-written driver library contains incorrect linkages or more than one entry statement.
CUP:PDCT OR SLS-ERR	
	In a device statement, the PADS or the SLS parameter is not a decimal number or is not in the form Xnnnn, where n is a hexadecimal digit.
CUP:QUEU-ERR	User-specified number is not a decimal number from 1 through 64,999.
CUP:REGS-ERR	A decimal number other than 2 or 8 is specified as the number of register sets.
CUP:ROLL-ERR	Roll support is specified but no direct access support is included; roll volume name is incorrect or missing; maximum number of tasks in the system is greater than 252.
CUP:SEPR-ERR	A colon (:) is missing before, or a comma (,) is missing after the device number.

CUP:SEQ-ERR   Command is already entered.

CUP:SHAR-ERR   An asterisk (*) is specified in the level
                             field of a device statement but the previous
                             statement refers to a controller or selector
                             channel instead of a device.

CUP:SPCR OR IOLM-ERR

                             In a device statement, the SPCHARR or the
                             IOLMT parameter is not a decimal number or is
                             not in the form Xnnnn, where n is a
                             hexadecimal digit.

CUP:SPCW or MRBS-ERR

                             In a device statement, the SPCW or MRBS
                             parameter is not a decimal number or is not in
                             the form Xnnnn, where n is a hexadecimal
                             number.

CUP:SPOL-ERR   More than 16 pseudo output devices are
                             specified; pseudo output devices are defined
                             and spooling is not supported; a syntax error
                             exists in the command format.

                             Spool support is specified but no direct
                             access support is included. Spool volume name
                             is incorrect or missing.

CUP:SRCL-ERR   The logical record length specified for the
                             output spooling device is not in the valid
                             range or is not valid.

CUP:SSA-ERR   In a device statement, the SSA parameter is
                             not a decimal number, or is not in the form
                             Xnnnn, where n is a hexadecimal digit.

CUP:SSIZ-ERR   The size parameter specified for the output
                             spooling device is not in the valid range or
                             is not valid.

CUP:SST-ERR   The number specified is not from 1 through
                             8;192.

CUP:TADR-ERR   User-specified address is not located in
                             global memory, or the specified size and
                             address are greater than absolute address
                             X'FFFFFF' in TCOM statement.

CUP:TDEC-ERR   User-specified number for TCOM size is not a
                             decimal number in increments of 0.25kb.

CUP:TEMP-ERR   A syntax error exists in the volume name field
                             of the TEMP command.

CUP:THEX-ERR	User-specified number for TCOM address is not a valid hexadecimal address.
CUP:TNUM-ERR	More than 14 task common segments are defined.
CUP:TRNC-ERR	User driver library was incorrectly built.
CUP:TSEP-ERR	An invalid separator exists in the TCOM command.
CUP:TSIZ-ERR	User-specified address and size caused task common segments to overlap.
CUP:TSYN-ERR	A syntax error exists in the name field of a TCOM command.
CUP:UCSO-ERR	In a device statement, the UCSO parameter is not a decimal number or is not in the form Xnnnn, where n is a hexadecimal number.
CUP:VERN-ERR	A syntax error exists in the version field of the VERSION command.
CUP:VOL-ERR	A syntax error exists in the volume name field of a VOLUME command.
CUP:XDCD-ERR	The extended device code specified is not in the valid range or is not valid, is not a decimal number, or is not in the form Xnnnn, where n is a hexadecimal number.
CUP:XLATE-ERR	In a device statement, the XLATE parameter has a label error.

APPENDIX D
SYSTEM GENERATION (SYSGEN) EXAMPLE

```
*SYSGEN1 OS3240.CUP
*.BG:CUP32 05-1
*.BG:CONFIGURATION STATEMENT PROCESSING COMPLETE
*.BG:SET IMPURE BIAS TO       3320
*.BG:SET PURE   BIAS TO       1778
*.BG:END OF TASK CODE=    0
*
*
*
*
*
*
*SYSGEN2 3320,1778,50
*.BG: LIBLDR 03-02
*.BG: EOF
*.BG: EOF
*.BG: EOF
*.BG: EOF
*.BG: EOF
*.BG: EOF
*.BG: EOF
*.BG: EOF
*.BG: LIBLDR 03-02
*.BG:END OF TASK CODE=    0
*
*
*
*
*
*
*SYSGEN3 22118,OS3240.925
*.BG:TET32 R03-05
*.BG:END OF TASK CODE=    0
```

```
VERSION 3240                              *VERSION
CPU      3240                             *PE 3240
MEM      2048                             *2048KB
DSYS     200                              *200KB DYNAMIC SYSTEM SPACE
MEMCHECK                                  *MEMORY TESTING
DEVADS       0                            *255 DIVICES MAXIMUM
CLOCK 60,6C,60                            *CLOCK ADDRESS
FLOAT H,H                                 *FLOATING POINT --> SP=H, DP=H
BACKGROUND 129,200                        *MAX .BG PRIORITY & SYS SPACE
DIRECTORY                                 *SECONDARY DIRECTORY SUPPORT
V        FIX0                             *DEFAULT SYSTEM VOLUME
SPOOL    FIX0                             *DEVAULT SPOOL VOLUME
TEMP     FIX0                             *DEFAULT TEMPORARY VOLUME
ROLL     FIX0                             *DEFAULT ROLL VOLUME
ERRORREC FIX0:ERROR.LOG,100,10            *ERROR LOG FILE AND INTREVAL
DISCBLOCK  32                             *MAXIMUM DISC BLOCK SIZE
LOGLEN     120                            *MAXIMUM LOG MESSAGE BUFFER LEN
CMDLEN     120                            *MAXIMUM COMMAND BUFFER LENGTH
CSS        10                             *MAXIMUM CSS NESTING DEPTH
ACCOUNTING  9                             *MAXIMUM NO. OF ACCOUNT CLASSES
ITAM                                      *ITAM SUPPORT
DEVICES                                   *                        IOCL  IL
ILEVEL   0                                *INTERRUPT LEVEL 0
1 CON:10,39,C,X0                          *SYSTEM CONSOLE            2    0
IOCLASS 7                                 *ACCOUNTING CLASS 7
1 CT12:12,39                              *FOX-1100                  7    0
1 CT30:30,39                              *FOX-1100                  7    0
1 IT32:32,156,,X00200,80,,,3              *ITAM OWL-1200             7    0
1 D118:18,147,,X0810,80,X8181,X0408,8     *ITAM DIAL-UP LINE         7    0
ILEVEL   3                                *INTERRUPT LEVEL 3
IOCLASS 8                                 *ACCOUNTING CLASS 8
1 PRT:62,114                              *600-1000LPM PRINTER       8    3
IOCLASS 3                                 *ACCOUNTING CLASS 3
1 PR:0,0,S                                *PSEUDO PRINTER            3
ILEVEL   2                                *INTERRUPT LEVEL 2
1:F0,0                                    *BSELCH
2:0,0                                     *800-BPI TAPE CONTROLLER
IOCLASS 6                                 *ACCOUNTING CLASS 6
3 MAG1:85,64                              *800-BPI MAG TAPE          6    2
3 MAG2:95,64                              *800-BPI MAG TAPE          6    2
IOCLASS 5                                 *ACCOUNTING CLASS 5
2:B6,0                                    *10 MB DISC CONTROLLER
3 DSC1:C6,51,0                            *10 MB DISC (REMOVABLE)    5    2
* DSC2:C7,50,0                            *10 MB DISC (FIXED)        5    2
IOCLASS 4                                 *ACCOUNTING CLASS 4
ILEVEL   1                                *INTERRUPT LEVEL 1
1:FA,0                                    *BSELCH
2:EB,0                                    *67 MB DISC CONTROLLER
3 D67A:EC,53,0                            *67 MB DISC                4    1
ENDD
ENDC
```

```
CONFIGURATION SUMMARY
 MEMORY SIZE =  2048KB
 MAXIMUM DEVICE ADDRESS =  FF
 DEFAULT VOLUME NAME   IS  'FIXD'
 DEFAULT ROLL   VOLUME IS  'FIXD'
 DEFAULT TEMP   VOLUME IS  'FIXD'
 DEFAULT SPOOL  VOLUME IS  'FIXD'
 MAXIMUM BLOCK SIZE FOR FILES =  32 SECTORS
 CSS INCLUDED
 MAXIMUM CSS LEVELS          =  10
 COMMAND BUFFER LENGTH       =  120
 LOG MESSAGE BUFFER LENGTH =  120
 CONSOLE   DEVICE: CON  AT   10
 DIRECTORY DEVICE: DSC1 AT   C6
 DIRECTORY DEVICE: DSC2 AT   C7
 DIRECTORY DEVICE: D67A AT   EC
 ACCOUNTING SUPPORT INCLUDED
 MEMORY DIAGNOSTICS INCLUDED
 ERROR RECORDING INCLUDED
SET IMPURE BIAS TO       3320
SET PURE   BIAS TO       1778
```

PROGRAMS:

NAME	IMPURE	PURE	ABS	NAME	IMPURE	PURE	ABS
EXIN.F14	00BB58	001918	000000	CLEANUP	008366		000030
DCB03900	003860		000400	DCB03901	0038E8		000438
DCB03902	003970		000470	INITCRT	0039F8		0004A8
DCB05000	003E80		000750	DCB05100	0041D0		000770
INITMHD	004520		000790	DCB05300	004A48		000890
INITMSM	004E30		0008B0	DCB06400	005590		0009C8
DCB06401	005620		0009E8	INITMAG	0056B0		000A08
DCB11400	005CB8		000AE0	INITLPTR	005D48		000B00
DCB14700	005FA0		000BD0	DCB15600	0060B0		000C58
INITDASY	0061C8		000CE0	EXEC.F01	008948	001778	
EXTI.F02	00ACA8	001908		ITAM.M01	0201A8	001688	
L2UC.XLT	021BF8	001BA8		DMT	003320		
EVT	0033B0			IVTBL	003838		
INITCRTX	003C68			INITSUBS	005E78		
INITMASY	0068D0			INITMOWL	006C90		
TLBTAB	00836C			EXIO.F02	008950		
EXTM.F20	0090D0			EXSV.F21	000798		
EXMY.F06	00F3E0			EXSP.F54	010028		
EXLD.F53	010D18			FMS7.F48	012C70		
FMUT.F28	014EE0			FMCO.F03	016010		
FMIN.F07	0167E8			CMSP.F31	0174D0		
CMEX.F08	0185F8			CMDB.F28	01AB78		
CMON.F01	01D780			CDVR.F01	01E040		
MCHK.F01	01E5F0			ERRC.F02	01F090		
FMEF.F02	01FD30			EXAC.F02	01FD40		
IIFM.M01	0214B8			IOH.XASY	021AA0		
ASYNCTOP	021BC0			UBOT.F01	022010		

ENTRY-POINTS:

Addr	Name	Addr	Name	Addr	Name	Addr	Name	Addr	Name
000000	JRNLBKS	000000	SCTT	000000	SCTH	000060	SPT	000000	ISPTAB
000720	ICRTHASH	000726	ICRTCR	000734	ICRTBS	000CE0	ASYNCPB	000F3A	ARENDB
000F40	AREOT	000F74	ARSTAT	0012E2	AWENDB	0012EC	AWEOT	001306	AWSTAT
00153A	ASPCHAR	001576	SPCNODO	001592	ASPECBS	0015FE	AARO	00160E	ASPCLD
001648	ASYN.XLT	00165C	AA.BS.06	00166A	AA.BA.5F	00167E	AA.CR.0D	0016AA	AA.ETX
0016B4	AA.EOT	0016BE	AA.HASH	001778	SPT.INIT	00177E	SPT.CRSH	001780	SPT.FLV
001784	SPT.LLV	001788	SPT.MLBL	00178A	SPT.CTSP	00178C	SPT.CSLV	001790	SPT.CSBF
001794	SPT.CHBK	001796	SPT.ISPT	001798	SPT.CTOP	00179C	SPT.UTOP	0017A0	SPT.UBOT
0017A4	SPT.PMEM	0017A8	SPT.MTOP	0017AC	SPT.OSID	0017B4	SPT.IVI	0017B8	SPT.TTAB
0017BC	SPT.MTM	0017B0	SPT.NTCB	0017BE	SPT.60	0017C0	SPT.DMI	0017C4	SPT.VMT
0017C8	SPT.SVOL	0017CC	SPT.SPVL	0017D0	SPT.RVOL	0017D4	SPT.TVOL	0017D8	SPT.SWOD
0017DC	SPT.JRNL	0017E0	SPT.FREQ	0017E2	SPT.PIC	0017E4	SPT.LFC	0017E6	SPT.CPU
0017E8	SPT.SOPT	0017EC	SPT.VERN	0017F4	SPT.CLSS	0017F8	SPT.SSTE	0017FA	SPT.SSTS
0017FC	SPT.ADCK	001800	SPT.ADK1	001814	SPT.MNTH	001814	SPT.DATE	001816	SPT.DAY
001818	SPT.YEAR	00181A	SPT.TSL	00181C	SPT.TIME	001820	SPT.DTHD	001824	SPT.TQHD
001828	SPT.IQHD	00182C	SPT.RTLS	001830	SPT.TCMS	001834	SPT.SCTH	001838	SPT.SCTT
00183C	SPT.USUP	001840	SPT.PANC	001844	SPT.PSV	00184C	SPT.RSV	001850	SPT.TSV
001854	SPT.AFSV	00186C	SPT.SCL	001870	SPT.FLST	001874	SPT.FSYP	00187C	SPT.RTCB
001880	SPT.RDCB	001884	SPT.SPCT	001888	SPT.EDMA	00188C	SPT.EMHD	001890	SPT.EMTL
001894	SPT.CTCB	001898	SPT.UTOW	00189C	SPT.RSOW	0018A0	SPT.ESOW	0018A4	SPT.MCOW
0018A8	SPT.EFOW	0018AC	SPT.DFOW	0018B0	SPT.RSON	0018B4	SPT.RSOF	0018B8	SPT.RLIO
0018C0	SPT.VALU	0018C4	SPT.HLDA	0018C8	SPT.HLDB	0018CC	SPT.PAGE	0018D0	SPT.SCLP
0018D4	SPT.ADDM	0018D8	SPT.OFFM	0018DC	SPT.PAGM	0018E0	SPT.SEGM	0018E4	SPT.CPID
0018E8	SPT.CPIE	0018EC	SPT.MISS	0018F0	SPT.ERBL	001908	ISRPIC	00190E	ISRLFC
001914	III	001916	ITAMTIMC	0018B8	SVC15PB	003078	MMASREG	003280	REGBIAS
003320	DMT	003328	DMT00000	003330	DMT00001	003338	DMT00002	003340	DMT00003
003348	DMT00004	003350	DMT00005	003358	DMT00006	003360	DMT00009	003368	DMT00010
003370	DMT00012	003378	DMT00013	003380	DMT00016	003390	VMT	0033B0	EVT
0033B0	NODE0000	0033D8	NODE0001	003400	NODE0002	003428	NODE0003	003450	NODE0004
003478	NODE0005	0034A0	NODE0009	0034C8	NODE0010	0034F0	NODE0012	003518	NODE0016
003540	DMLV	003568	TIMELV	003590	PWLV	0035B8	PICLV	0035E0	SLICELV

003608	LOADLV	003630	CBUFLV	003658	ERRORLV	003680	NODE0025	0036A8	NODE0026
0036D0	NODE0027	0036F8	NODE0028	003720	NODE0029	003748	NODE0030	003770	NODE0007
003798	NODE0008	0037C0	NODE0011	0037E8	NODE0014	003810	NODE0015	003838	IVTBL
003860	DCB03900	0038E8	DCB03901	003970	DCB03902	0039F8	INITCRT	003B60	TERMCRT
003BFC	CRT.IOH	003C68	INITCRTX	003E80	DCB05000	004100	DCB05100	004520	INITMHD
004520	$INITMHD	004702	TERMMHD	004A48	DCB05300	004E30	INITMSM	004E30	$INITMSM
0050EE	TERMMSM	005590	DCB06400	005620	DCB06401	0056B0	INITMAG	005840	CMDMAG
0059E0	TERMMAG	005CB8	DCB11400	005D48	INITLPIR	005E32	TERMLPIR	005E78	ISRTOUT
005E76	INITSUBS	005EB4	ISRLEAVE	005E8A	WRTSELRD	005EAE	WRTSELWT	005EC8	RDSELCH
005EEC	ENDSCAN	005F24	MAXLNGTH	005F34	SETISP	005F48	SETISPS	005F4E	DIREXIT
005F5C	GETBUFF	005F68	SETBUFF	005F84	CARRIAGE	005FA0	DCB14700	006060	DCB15600
00610A	INITDASY	0061E0	ITASYCMD	0064BA	TERMDASY	0064D0	ITAS.AA	006630	ASC.ASCT
006954	INITMASY	006954	INITITYC	006BDC	CLOSMASY	006E4C	INITMOWL	007B90	CLOSMOWL
007C88	CLEANUP	007C88	PTRSTACK	007CBC	CMDBUFFS	0082EE	LGMBUFF	008368	TCBTAB
00836C	SPT.STCB	0088E8	ERC.BLST	0088FC	SU	008940	INITCMD	008948	EXEC.F01
008950	EXIO.F02	008958	SVC1	008A54	SV1DDF	008C10	COMIOH	008C50	SVC1WRIT
008C50	SVC1READ	008C90	SVC1FSR	008C90	SVC1FFM	008C90	SVC1BSR	008C90	SVC1BFM
008C90	SVC1REW	008C90	SVC1REW	008CE2	SVC1WAIT	009064	SVC1TEST	008DB2	SVC1HALT
008E08	H1NCON	008F30	H1EEXIT	008F48	SVC1EXIT	008FB2	SVC1NOOP	008FC8	SV1FCER
009004	SVC1NINA	0090DA	SVC1INA	009014	SVC11A	00901C	SVC1NIA	009030	DCB25500
0090B0	NULLIOH	0090F0	BAREIOH	0093B6	IOSETCC	0093CA	SUS	0093F8	SUS.TIME
00940C	SUS.TSL	009416	SUS.EX	009420	SUS.SLV	009434	CTR231	009438	SUS.MLV
009494	DIRDONE	0094B2	EVRTE	0094BC	IODONE	0094BC	IODONE2	0094D0	IODCOM
009510	IODCOM2	00951C	GETIOB	009554	RELIOB	009574	COMU	0095A0	COMFIFO
0095BC	PRTYQ	009630	DISKQ	00971A	SEEKCHK	0097B8	LEAFG	069798	LFIFO
0097BA	LEAFCON	009832	NFIFO	00989E	NLIFO	0098B8	EDMAQCON	0099B2	EVQCON
0099B8	EVCON	009AAE	EVDIS	009BAC	IODGST	009BF4	IODGST2	009BFC	IODTWT
009C36	IODTWT2	009C3C	NSEVREL	009C84	EVREL	009C84	COMDIS	009D5A	EVMOD
009D6C	TOITAMIO	009D80	EXTM.F20	009D88	SV9.ATU1	009D6E	SV9.ATU	009D92	SV9.ASQ1
009D98	SV9.ASQ	009ECU	SV9.TSWN	009EC6	SV9.TSW2	009EC6	SV9.STSW	009F76	TMDISP
00A072	TMRRSAIN	00A084	RINQUE	00A118	RINDQUE	00A188	TMRDISP	00A302	TMRU.MAC
00A748	TMNSOUT	00A776	TMSTART	00A7D0	TMSTART2	00A7FC	TMSTOPW	00A802	TMSTOP
00A86C	TMRSAIN	00A88E	TMRSIN1	00A88E	TMRSIN	00A976	TMRSARS	00A998	TMRSRSA
00A9F4	TMRSOUT	00AAU2	TMRSOTNS	00AA46	TMRSAOUT	00AAB6	TMSLICE	00AAD6	TMREMW
00AB68	TMCHN	00AC0C	TMUCHN	00ACA8	EXTI.FU2	00ACB0	SVC2.8	00AD38	SVC2.9
00ADD4	SVC2.10	00ADD8	SVC2.11	00ADEE	SVC2.23	00B1AE	GETUREG	00B32E	TICAN
00B334	TICAN1	00B432	TIFXTCHN	00B642	PICESR	00B75E	TIMESR	00B7D4	ITAMCNT
00BABC	CPU.TIME	00BAC4	TM.FREQ	00BAC5	TM30DAYS	00BAC7	TM.FEB	00BADA	ITAMFREQ
00BADC	ITM.FREQ	00BADE	TOCHON	00BB04	TOCHOFF	00BB58	EXIN.F14	00BB60	FLIHPPA
00BC1C	IIH	00BC90	MEMFLTRS	00BCD0	MEMFAULT	00BCE2	ISHRS	00BDUA	ISH
00C9EE	PWESR	00CB88	SQS2DISP	00CBA0	DISP2SUS	00CBEC	SYSINIT	00D4EA	CRSH.MSG
00D504	CTR162	00D558	PANIC	00D714	EREGS	00D754	XREGS	00D798	EXSV.F21
00D7A0	SVC3	00D7B0	SV3.TERM	00D842	COMEOT	00DCA8	DISPPSW	00DCC2	SVC9
00DD48	SVC14	00DD74	SVC4	00DE34	SV4.NEXT	00DE4E	SV4.ERR3	00DEC0	SVC5
00E088	SV6ERCD	00E0AC	SV6ERTB	00E1AC	SVC6	00E77E	SUBCKRPT	00E780	SUBRPORT
00E7DE	SUBRPTNS	00E7E8	MTMRPTNS	00EC2C	SETUTOP	00EC80	SETDELAY	00EF86	SVC10
00F3E0	EXMY.F06	00F3E8	SVC2.2	00F498	SVC2.3	00F4D6	SVC2.20	00F4E4	SVC2.21
00F518	GETTQE	00F536	RELTQE	00F568	GETFCB	00F600	RELEFCB	00F67E	GETMEM
00F99A	RELMEM	00FA52	GETTCB	00FA7E	RELTCB	00FA82	RELTCB1	00FA8C	GETSDE
00FA9C	RELSDE	00FAA4	GETSTSYP	00FAAE	GETSYP	00FBE4	RELSYP	00FCBE	ROGIBLE
00FE8A	ROSCAN	00FF48	ROLIST	00FF70	ROSIZE	00FFBE	ROSSEL	00FFC8	ROERMSG
00FFD8	ROERTYPE	00FFE8	ROERNAME	010004	ROERSTYP	010007	ROERMSGE	010008	SEGTYPE
010028	EXSP.F54	010030	SVC2	010086	TERM	01088E	TERM1	0108F8	CANEOJ
010A3C	EXECRSCC	010A58	UNPACK	010ACC	JOURNAL	010B22	TIMEOUT	010B7C	ADCHK
010B88	ADCHK1	010BCC	ADCHKNS	010BDC	ADCHKNS1	010C68	DE.ADCHK	010D18	EXLD.F53
010D20	LOAD.SRF	010D72	LOADIMG	010E3A	LOADTASK	012094	TCBLOOK	012096	TCBLOOK2
0120CE	SEG.ADD	012204	SEG.RMV	012358	SEG.SCAN	012568	SEG.ROLL	012650	SEG.USE
012658	SEG.DIS	012670	ROLLIN	012878	RELPST	012924	LOADSEG	012C58	PSWSAV
012C70	FMS7.F48	012C78	SVC7	012CA6	SV7.CMU	012F60	OPN.BDSK	012FCE	OPEN.DEV
013098	OPD.NRJE	014384	CLO.BLK	014768	RESET.RW	014768	RESET	014AF8	WAITRS
014E48	ERR.02	014E86	ERR.0B	014EE0	FMUT.F28	014EE8	APCHECK	014EF2	APCHK8.0
014FCC	APCHK8.1	014FCC	APCHECK1	014FD8	APCHECK2	014FE2	APCHK8.2	015044	DATE.DIR
01506E	GETSECTR	01527A	RELEB	0152F0	FDCHECK	015322	ALP1NUM	01532A	ALPCK
015332	ALPNUMCK	01533E	CHARCHK	015362	TRASPCK	015374	LUCHECK	015390	MEFLOOK
015396	DIRLOOK	0153AA	DIR.SCAN	0156F0	FETCHACT	0156F4	FETACTB	01571E	GETD
015782	DMTLOOK	0157B4	VMTLOOK	0157BE	ALLOD	0159C4	FMGR.IO	015B50	PUTD

015B6E PUTB	015B94 FMGROUT1	015B96 FMGROUT	015BC6 SET.LRCL	015BF8 CHN.WAIT
015C14 MOVE	015E30 MOVE1	015E46 MOVENULL	015E84 ALLOCS	015F86 RELES
016010 FMCO.F03	016018 CNTGIOH	0167E8 FMIN.F07	0167F0 INDXIOH	01691C INDEX
016B3E CMD.IN	017062 INX.ZBUF	017090 INX.READ	0170E4 INX.FORL	017108 INX.POSN
017238 INX.CINX	01725A RESET.IN	0174D0 CMSP.F31	0174D8 CMDP.UDL	0175E0 CMDP.GO
0177F4 CMDNEXT	0178EE CSKIPA	01791E CSSTST	017A4A CMDEMPTY	017C86 FORMERR
017C90 PARMERR	017CB0 IOERR	017CB8 CMDERROR	017D20 ERR.COM	017D24 ERR.COM1
017D2C ERR.ASGN	017D5A TIMERR	017D78 SETLU	017DA8 CHECKCSL	017DD2 COMMACK
017DDA COMMACK1	017DE6 SCANNER	017DF6 TERMCHK	017E02 MNMFIND	017E86 CSSCLOSE
017EA4 MSGLOG	017F06 PREPRO	018084 BLANKBUF	018098 CMDWGB	01809A CMDWGBX
0180A2 CMDWRITE	0180F0 CMDERMV	01810A CMDTYMV	0181FC CMDRDBLK	01826B CSLWPB
018274 SV1ERTB	0182C4 IOEMSG	01854C CSLTSK	018550 CSSTSK	018556 TESTPRT
01856C GENBUFF	018571 GENBUF05	018572 GENBUF06	018573 GENBUF07	018574 GENBUF08
018575 GENBUF09	018576 GENBUF10	018577 GENBUF11	018578 GENBUF12	018579 GENBUF13
01857A GENBUF14	01857B GENBUF15	01857C GENBUF16	01857D GENBUF17	01857E GENBUF18
01857F GENBUF19	018580 GENBUF20	018581 GENBUF21	018582 GENBUF22	018583 GENBUF23
018584 GENBUF24	018585 GENBUF25	018586 GENBUF26	018587 GENBUF27	018588 GENBUF28
018589 GENBUF29	01858A GENBUF30	01858B GENBUF31	01858C GENBUF32	01858D GENBUF33
01858E GENBUF34	01858F GENBUF35	018590 GENBUF36	018591 GENBUF37	018592 GENBUF38
018593 GENBUF39	018594 GENBUF40	018595 GENBUF41	018596 GENBUF42	018597 GENBUF43
018598 GENBUF44	018599 GENBUF45	01859A GENBUF46	01859B GENBUF47	01859C GENBUF48
01859D GENBUF49	01859E GENBUF50	01859F GENBUF51	0185A0 GENBUF52	0185A1 GENBUF53
0185A2 GENBUF54	0185A3 GENBUF55	0185A4 GENBUF56	0185A5 GENBUF57	0185A6 GENBUF58
0185A7 GENBUF59	0185A8 GENBUF60	0185A9 GENBUF61	0185AA GENBUF62	0185AB GENBUF63
0185AC GENBUF64	0185AD GENBUF65	0185AE GENBUF66	0185AF GENBUF67	0185B0 GENBUF68
0185B1 GENBUF69	0185F8 CMEX.F06	018600 CONTINUE	018606 TASKERR	018698 START
018720 CANCEL	018762 BIAS	0187E2 WRITE	0187EA NOPRERR	018862 READ
01898C SEQERR	018A30 MEMORY	018BDA MEMERR	018E98 OPTIONS	018F66 SET
019216 TASK	019678 PAUSE	0196C2 CMCLOSE	019796 CMRENAME	01986E REPROTEC
0198D6 ASSIGN	0198FC LUERROR	01992A FDERROR	019A74 ASGNERR	019B62 CMDASGN1
019B80 CMDCLOSE	019B8A MARK	019CF0 SEND	019D1E .SPL	019D34 .MTM
019F88 BUILD	019FA8 $BUILD	019FB2 BUILDDSP	019FE6 $JOB	01A01C $SKIP
01A048 $EXIT	01A07A $CLEAR	01A08B $TERMJOB	01A0E8 $TRANS	01A128 $IFG
01A134 $IFL	01A140 $IFE	01A14C $IFNG	01A158 $IFNL	01A164 $IFNE
01A170 $IFNULL	01A168 $IFNNULL	01A19E $IFX	01A1C8 $IFNX	01A216 $ELSE
01A248 $ENDC	01A26C $WRITE	01A2BE $COPY	01A2CA $NOCOPY	01A5B8 SPT.UTCB
01A5BC CMDBGT	01A5C0 CMDBIAS	01A5C4 CMDACCNT	01A5C6 CMDBGTRC	01A5C8 BUILDFLG
01A5CA CSSLEVEL	01A5CC CSSLIST	01A5CE CSSSKIP	01A5D0 IFLVL	01A5D2 JOBFLAG
01A5D4 JOBSKIP	01A5D6 LOGFLAG	01A5D8 PROMODE	01A5DA LOADER	01AA0C REMOVE
01AAE8 TCOM	01AB40 ERRORC	01AB78 CMDB.F28	01AB80 DSPFHD	01AB82 TEMPFILE
01B332 DISPLAY	01B4F8 LUTST	01BA00 DISPFD	01BA98 CHECK.ID	01BA9C CHECKID
01BAEC SVC7PBLK	01BD9A WFILE	01BDA2 FFILE	01BDAA FORREC	01BDB2 BFILE
01BDBA BACREC	01BDC2 REWIND	01C010 MOFFBLK	01C118 MONBLK	01C980 VOLUME
01CBA8 XDELETE	01CBAE CMDELETE	01CC46 ALLOCATE	01D5B8 DISPIND1	01D5BA DISPIND2
01D5C4 DIRFN	01D5CC DIREXT	01D67C SECTORBF	01D780 CMON.F01	01D788 CMSP.UDL
01D824 COMMAND	01DF2C CMDP.TCB	01DF01 ATTN.P	01E040 CDVR.F01	01E048 SVC2.7
01E0CC EXMSINCP	01E0DE CIOINCPT	01E162 EXECMSG	01E2A0 CDSV27	01E2D4 CDEXTM
01E2E8 CDESV3	01E306 CDFUTA	01E322 CDFUTB	01E332 CDEXMY	01E36E CDEXIN
01E3C4 CONDVR	01E52C DCBCMD	01E5AC IOHCDVR	01E5F0 MCHK.F01	01E5F8 MEMCHK
01E6E4 MEMCHKER	01EAC4 MKONMEM	01E8EC MKOFMEM	01ED6A LONGCHEK	01EE3E INITMTST
01EEE8 CHKTAD	01F088 MERBUFA	01F08C MERBUFS	01F090 ERRC.F02	01F098 MERD.STA
01F09A MERD.CNF	01F09C ERCD.STA	01F0A4 MERD.CUR	01F0FC MERD.BUF	01F0FC ERCD.LST
01F332 ERC.GINI	01F37C MER.INIT	01F3CA MER.RSCH	01F3D2 MER.SCHD	01F3DE MER.STRT
01F3FE MER.REST	01F42A ERC.PERD	01F4F6 ERC.DISP	01F62E ERC.LOG	01F8E8 MER.LOG
01FA06 ERC.MENT	01FA20 ERC.ENTR	01FB24 ERC.TRE2	01FB4A ERC.TREN	01FD30 FMEF.F02
01FD38 SVC8	01FD38 SVC7T08	01FD40 EXAC.F02	01FD48 TMCPUOFF	01FDD8 TMCPUON
01FE04 TCPU.TIM	01FE0C TCPU.TCB	01FE10 TCPU.TYP	01FE18 HOLDTIME	01FE48 ACUMTIME
01FEB0 ACT.BMSG	01FFA2 ACT.SMSG	01FFE0 SVC2.24	01FFF6 SVC2.25	020038 SV4.ENAC
020092 SV4.RDAC	020156 SV4.RMAW	0201BC ITEMTLF	0201C0 EMT.FREQ	0201C4 SVC15
0201C4 ITAM.M01	02034A IT.HALT1	020398 HALTITAM	0203A6 IT.HALT	0203EE CANITAM
020428 TOUTITAM	020454 ICMDINT	0204D8 ITAM.DU	0204F0 ITGETM02	02050C CMTERM
020636 CMEXIT	020658 IT..STOP	0206F4 ISSEXEC	020850 ITXFRISR	0208F2 ITFC
02090A ITNXTCMD	020928 ITSETREA	020932 ITSRABS	020936 ITSRABS1	020960 ITISSTOP
02097A ITISKILL	0209B0 ITIS.DU	0209B8 ITIS.CKS	0209C0 ITAMNULL	0209DC IEXAMIN
020ADA ITAMMODE	020AE0 ITMODCOM	020B24 ITDOCR	020B2A ITDOCW	020B30 ITMOCR
020B36 ITMOCW	020B3C ITAOC	020B42 ITDISC	020B54 ITSYCT	020B54 ITLDCT

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020B5A ITSPCR        020B62 ITSPCW        020B68 ITIMV1        020B68 ITITV         020B6E ITOTV
020BEA BAD.ADD       020BF6 ITIMLINK      020C46 ITIMUNLK      020C78 ITISTOTC      020C96 ITISPOTC
020D0A ITGETDAT      020D46 ITGETBUF      021136 ITISCRSH      021274 RAWCHKR       02127E RAPCHKR
02128D ITLSCL2S      0212B6 ITNOCL2S      0212BE ITLSDSK       0212C4 ITNODSK       0212CC ITLSCAR
0212D2 ITNOCAR       0212DA ITOVFL        0212E8 ITPARERR      0212F6 ITISSTAT      021312 ITWR.RD
021380 ITBTCHK       021390 ITCONCHK      021464 ISR.JRNL      021468 IT.ADCK       02146E IT.ADCK1
021482 IT.ADCK3      021488 IT.DADK       021492 IT.DADK1      0214D0 IT.DADK3      0214B8 ITFM.MO1
021514 IT.ALLOC      021534 IT.DELET      021548 IT.OPEN       021592 OPN.SVCF      02159E OPN.SVC1
0215C4 ITO.DNS       02160C ITO.AOC       021720 IT.ORJE       021730 IT.CLOSE      02174A IT.CHKPT
021762 CKPT.MON      021772 IT.FETCH      02177C FTCH.DCB      021798 ITDLUNOP      02179A RERR.01
0217A2 ERR.01        0217A8 RERR.04       0217B0 ERR.04        0217B6 RERR.06       0217BE ERR.06
0217C4 RERR.07       0217CC ERR.07        0217D2 RERR.08       0217DA ERR.08        0217DE RERR.09
0217E6 ERR.09        0217EA RERR.0A       0217F2 ERR.0A        0217FE IT.FMXIT      021812 CLOS.RST
0218A8 LCBLOOK       0218E0 LCBFILL       02195C UCTLOOK       021994 WAIT          021994 IT..WAIT
0219DA WAITRSI       021A44 GETFMH        021A78 GETCPH        021AA0 IOH.XASY      021BD4 ASYNCTOP
021C0C L2UC.XLT      021E0C SESC.XLT      022010 UBOT.FU1      022018 UBOT.0        022118 UBOT
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COMMON-BLOCKS:

UNDEFINED:

PROGRAMS:

NAME	IMPURE	PURE	ABS	NAME	IMPURE	PURE	ABS
ASYNCTOP	021BC0			CDVR.F01	01E040		
CLEANUP	008366		000030	CMDB.F28	01AB78		
CMEX.F08	0185F8			CMON.F01	01D780		
CMSP.F31	0174D0			DCB03900	003860		000400
DCB03901	0038E8		000438	DCB03902	003970		0C0470
DCB05000	003E80		000750	DCB05100	0041D0		000770
DCB05300	004A48		000890	DCB06400	005590		0009C8
DCB06401	005620		0009E8	DCB11400	005CB8		0C0AE0
DCB14700	005FA0		000BD0	DCB15600	0060B0		000C58
DMT	003320			ERRC.F02	01F090		
EVT	0033B0			EXAC.F02	01FD40		
EXEC.F01	008946	001778		EXIN.F14	008B58	001918	000000
EXIO.F02	008950			EXLD.F53	010D18		
EXMY.F06	00F3E0			EXSP.F54	010028		
EXSV.F21	00D798			EXTI.F02	00ACA8	001908	
EXTM.F20	009D80			FMCO.F03	016010		
FMEF.F02	01FD30			FMIN.F07	0167E8		
FMS7.F48	012C70			FMUT.F28	014EE0		
INITCRT	0039F8		0004A8	INITCRTX	003C68		
INITDASY	0061C8		000CE0	INITLPTR	005D48		000B00
INITMAG	0056B0		000A08	INITMASY	0068D0		
INITMHD	004520		000790	INITMOWL	006C90		
INITMSM	004E30		0008B0	INITSUBS	005E78		
IOH.XASY	021AA0			ITAM.M01	0201A8	001B88	
IIFM.M01	0214B8			IVTBL	003838		
L2UC.XLT	021BF8	001BA8		MCHK.F01	01E5F0		
TLBTAB	00836C			UBOT.F01	022010		

ENTRY-POINTS:

019FA8	$BUILD	01A07A	$CLEAR	01A2BE	$COPY	01A216	$ELSE	01A248	$ENDC
01A048	$EXIT	01A140	$IFE	01A128	$IFG	01A134	$IFL	01A164	$IFNE
01A14C	$IFNG	01A158	$IFNL	01A188	$IFNNULL	01A170	$IFNULL	01A1C8	$IFNX
01A19E	$IFX	004520	$INITMHD	004E30	$INITMSM	019FE6	$JOB	01A2CA	$NOCOPY
01A01C	$SKIP	01A0B6	$TERMJOB	01A0E8	$TRANS	01A26C	$WRITE	019D34	.MTM
019D1E	.SPL	00166A	AA.BA.5F	00165C	AA.BS.08	01FEB0	AA.CR.0D	001684	AA.EOT
0016AA	AA.ETX	0016BE	AA.HASH	0015FE	AARO	01FEB0	ACT.BMSG	01FFA2	ACT.SMSG
01FE48	ACUMTIME	010B7C	ADCHK	010B88	ADCHK1	010BCC	ADCHKNS	010BDC	ADCHKNS1
01CC46	ALLOCATE	015E84	ALLOCS	0157BE	ALLOD	015322	ALP1NUM	01532A	ALPCK
015332	ALPNUMCK	014EE8	APCHECK	014FCC	APCHECK1	014FD8	APCHECK2	014EF2	APCHK8.0
014FCC	APCHK8.1	014FE2	APCHK8.2	000F3A	ARENDB	000F40	AREOT	000F74	ARSTAT
0066D0	ASC.ASCT	019A74	ASGNERR	00153A	ASPCHAR	00160E	ASPCLU	001592	ASPECBS
0198D6	ASSIGN	001648	ASYN.XLT	000CE0	ASYNCPB	021BD4	ASYNCTOP	01DFD1	ATTN.P
0012E2	AWENDB	0012EC	AWEOT	001306	AWSTAT	01BDBA	BACREC	020BEA	BAD.ADD
0090F0	BAREIOH	01BDB2	BFILE	018762	BIAS	018084	BLANKBUF	019F88	BUILD
019FB2	BUILDDSP	01A5C8	BUILDFLG	018720	CANCEL	0108F8	CANEOJ	0203EE	CANITAM
005F84	CARRIAGE	003630	CBUFLV	01E2E8	CDESV3	01E36E	CDEXIN	01E332	CDEXMY
01E2D4	CDEXTM	01E306	CDFUTA	01E322	CDFUTB	01E2A0	CDSV27	01E040	CDVR.F01
01533E	CHARCHK	01BA98	CHECK.ID	017DA8	CHECKCSL	01BA9C	CHECKID	01EEB8	CHKTAD
015BF8	CHN.WAIT	01E0DE	CIOINCPT	021762	CKPT.NON	007C88	CLEANUP	014384	CLO.BLK
021812	CLOS.RST	006BDC	CLOSMASY	007B90	CLOSMOWL	0196C2	CMCLOSE	016B3E	CMD.IN
01A5C4	CMDACCNT	019B62	CMDASGN1	01AB78	CMDB.F28	01A5BC	CMDBGT	01A5C6	CMDBGTRC
01A5C0	CMDBIAS	007CBC	CMDBUFFS	019B80	CMDCLOSE	01CBAE	CMDELETE	017A4A	CMDEMPTY
0180F0	CMDERMV	017CB8	CMDERROR	005840	CMDMAG	0177F4	CMDNEXT	0175E0	CMDP.GO
01DF2C	CMDP.TCB	01740B	CMDP.UDL	0181FC	CMDRDBLK	01810A	CMDTYMV	018098	CMDWGB
01809A	CMDWGBX	0180A2	CMDWRITE	0185F8	CMEX.F08	020636	CMEXIT	01D780	CMON.F01
019796	CMRENAME	0174D0	CMSP.F31	01D788	CMSP.UDL	02050C	CMTERM	016018	CNTGIOH
009C84	COMDIS	00D842	COMEOT	0095A0	COMFIFO	006C10	COMIOH	017DD2	COMMACK
017DDA	COMMACK1	01D824	COMMAND	009574	COMQ	01E3C4	CONDVR	018600	CONTINUE
00BABC	CPU.TIME	000D4EA	CRSH.MSG	003BFC	CRT.IOH	0178EE	CSKIPA	01854C	CSLTSK
018268	CSLWPB	017E86	CSSCLOSE	01A5CA	CSSLEVEL	01A5CC	CSSLIST	01A5CE	CSSSKIP

018550 CSSTSK	01791E CSSTST	000504 CTR162	009434 CTR231	015044 DATE.DIR
003860 DCB03900	0038E8 DCB03901	003970 DCB03902	003E80 DCB05000	0041D0 DCB05100
004A48 DCB05300	005590 DCB06400	005620 DCB06401	005CB8 DCB11400	005FA0 DCB14700
0060B0 DCB15600	009030 DCB25500	01E52C DCBCMD	02195C DCTLOOK	010C68 DE.ADCHK
0153AA DIR.SCAN	009494 DIRDONE	005F4E DIREXIT	01D5CC DIREXT	01D5C4 DIRFN
015396 DIRLOOK	009630 DISKQ	00C8A0 DISP2SQS	01BA00 DISPFD	01D5B8 DISPIND1
01D5BA DISPIND2	018332 DISPLAY	00DCA6 DISPPSW	003540 DMLV	003320 DMT
003328 DMT00000	003330 DMT00001	003338 DMT00002	003340 DMT00003	003348 DMT00004
003350 DMT00005	003358 DMT00006	003360 DMT00009	003368 DMT00010	003370 DMT00012
003378 DMT00013	003380 DMT00016	015782 DMTLOOK	01AB80 DSPFHD	0098B8 EDMAQCON
0201C0 EMT.FREQ	005EEC ENDSCAN	0088E8 ERC.BLST	01F4F6 ERC.DISP	01FA20 ERC.ENTR
01F332 ERC.GINI	01F62E ERC.LOG	01FA06 ERC.MENT	01F42A ERC.PERD	01FB24 ERC.TRE2
01FB4A ERC.TREN	01F0FC ERCD.LST	01F09C ERCD.STA	000714 EREGS	0217A2 ERR.01
014E48 ERR.02	0217B0 ERR.04	0217BE ERR.06	0217CC ERR.07	0217DA ERR.08
0217E6 ERR.09	0217F2 ERR.0A	014E86 ERR.0B	017D2C ERR.ASGN	017D20 ERR.COM
017D24 ERR.COM1	01F090 ERRC.F02	01AB40 ERRORC	003658 ERRORLV	0099B8 EVCON
009AAE EVDIS	009D5A EVMOD	0099B2 EVQCON	009C3C EVREL	0094B2 EVRTE
0033B0 EVT	01FD40 EXAC.F02	008948 EXEC.F01	01E162 EXECMSG	010A3C EXECRSCC
00BB58 EXIN.F14	008950 EXIO.F02	010D18 EXLD.F53	01E0CC EXMSINCP	00F3E0 EXMY.F06
010028 EXSP.F54	000798 EXSV.F21	00ACA8 EXTI.F02	009D80 EXTM.F20	0152F0 FDCHECK
01992A FDERROR	0156F4 FETACT8	0156F0 FETCHACT	01BDA2 FFILE	00BB60 FLIHPPA
016010 FMCO.F03	01FD30 FMEF.F02	0159C4 FMGR.IO	015896 FMGROUT	015894 FMGROUT1
0167E8 FMIN.F07	012C70 FMS7.F48	014EE0 FMUT.F28	017C88 FORMERR	01BDAA FORREC
02177C FTCH.DCB	018571 GENBUF05	018572 GENBUF06	018573 GENBUF07	018574 GENBUF08
018575 GENBUF09	018576 GENBUF10	018577 GENBUF11	018578 GENBUF12	018579 GENBUF13
01857A GENBUF14	01857B GENBUF15	01857C GENBUF16	01857D GENBUF17	01857E GENBUF18
01857F GENBUF19	018580 GENBUF20	018581 GENBUF21	018582 GENBUF23	018583 GENBUF23
018584 GENBUF24	018585 GENBUF25	018586 GENBUF26	018587 GENBUF27	018588 GENBUF28
018589 GENBUF29	01858A GENBUF30	01858B GENBUF31	01858C GENBUF32	01858D GENBUF33
01858E GENBUF34	01858F GENBUF35	018590 GENBUF36	018591 GENBUF37	018592 GENBUF38
018593 GENBUF39	018594 GENBUF40	018595 GENBUF41	018596 GENBUF42	018597 GENBUF43
018598 GENBUF44	018599 GENBUF45	01859A GENBUF46	01859B GENBUF47	01859C GENBUF48
01859D GENBUF49	01859E GENBUF50	01859F GENBUF51	0185A0 GENBUF52	0185A1 GENBUF53
0185A2 GENBUF54	0185A3 GENBUF55	0185A4 GENBUF56	0185A5 GENBUF57	0185A6 GENBUF58
0185A7 GENBUF59	0185A8 GENBUF60	0185A9 GENBUF61	0185AA GENBUF62	0185AB GENBUF63
0185AC GENBUF64	0185AD GENBUF65	0185AE GENBUF66	0185AF GENBUF67	0185B0 GENBUF68
0185B1 GENBUF69	01856C GENBUFF	005F5C GETBUFF	021A78 GETCPH	01571E GETD
00F568 GETFCB	021A44 GETFMH	00951C GETIOB	00F67E GETMEM	00FA8C GETSDE
01506E GETSECTR	00FAA4 GETSTSYP	00FAAE GETSYP	00FA52 GETTCB	00F518 GETTQE
00B1AE GETUREG	008F30 H1EEXIT	008E08 H1NCON	020398 HALTITAM	01FE18 HOLDTIME
020454 ICMDINT	000734 ICRTBS	000726 ICRTCR	000720 ICRTHASH	0209DC IEXAMIN
01A5D0 IFLVL	00BC1C IIH	001914 III	01691C INDEX	0167F0 INDXIOH
008940 INITCMD	0039F8 INITCRT	003C68 INITCRTX	0061DA INITDASY	006954 INITIIYC
005D48 INITLPTR	0056B0 INITMAG	006954 INITMASY	004520 INITMHD	006E4C INITMOWL
004E30 INITMSM	01EE3E INITMTST	005E78 INITSUBS	017238 INX.CINX	0170E4 INX.FORL
017108 INX.PCSN	017090 INX.ZBUF	017062 INX.ZBUF	009400 IODCOM	009510 IODCOM2
009BAC IODGST	009BF4 IODGST2	0094BC IODONE	0094BC IODONE2	009BFC IODTWT
009C36 IODTWT2	0182C4 IOEMSG	017CB0 IOERR	021AA0 IOH.XASY	01E5AC IOHCDVR
0093B6 IOSETCC	00BD0A ISH	00BCE2 ISHRS	000000 ISPTAB	021464 ISR.JRNL
005E84 ISRLEAVE	0019DE ISRLFC	001908 ISRPIC	005E78 ISRTOUT	0206F4 ISSEXEC
020658 IT..STOP	021994 IT..WAIT	021468 IT.ADCK	02146E IT.ADCK1	021482 IT.ADCK3
021514 IT.ALLOC	02174A IT.CHKPT	021730 IT.CLOSE	021488 IT.DADK	021492 IT.DADK1
021480 IT.DADK3	021534 IT.DELET	021772 IT.FETCH	0217FE IT.FMXIT	0203A6 IT.HALT
02034A IT.HALT1	021548 IT.OPEN	021720 IT.ORJE	0204D8 ITAM.DU	0201C4 ITAM.M01
00B7D4 ITAMCNT	00BADA ITAMFREQ	020ADA ITAMMODE	0209C0 ITAMNULL	001916 ITAMTIMC
020B3C ITAOC	006400 ITAS.AA	0061E0 ITASYCMD	021380 ITBTCHK	021390 ITCONCHK
020B42 ITDISC	021798 ITDLUNOP	020B24 ITDOCR	020B2A ITDOCW	0201BC ITEMTLF
020BF2 ITFC	021488 ITFM.M01	020D46 ITGETBUF	020D0A ITGETDAT	0204F0 ITGETMO2
020BF6 ITIMLINK	020C46 ITIMUNLK	020B68 ITIMV1	0209B8 ITIS.CRS	0209D0 ITIS.DU
021136 ITISCRSH	02097A ITISKILL	020C96 ITISPOTC	0212F6 ITISSTAT	020960 ITISSTOP
020C78 ITISTOTC	020B68 ITITV	020B54 ITLDCT	0212CC ITLSCAR	0212B0 ITLSCL2S
0212BE ITLSDSR	00BADC ITM.FREQ	020B30 ITMOCR	020B36 ITMOCW	020AE0 ITMODCOM
0212D2 ITNOCAR	0212B6 ITNOCL2S	0212C4 ITNODSR	02090A ITNXTCMD	02160C ITO.AOC
0215C4 ITO.DWS	020B6E ITOTV	0212DA ITOVFL	0212E8 ITPARERR	020928 ITSETREA
020B5A ITSPCR	020B62 ITSPCW	020932 ITSRABS	020936 ITSRABS1	020B54 ITSYCT
021312 ITWR.RD	020B50 ITXFRISR	003838 IVTBL	01A502 JOBFLAG	01A5D4 JOBSKIP

010ACC JOURNAL	000000 JRNLBKS	021C0C L2UC.XLT	0218E0 LCBFILL	0218A8 LCBLOOK
0097BA LEAFCON	009788 LEAFQ	009798 LFIFO	0082EE LGMBUFF	010020 LOAD.SRF
01A5DA LOADER	010D72 LOADIMG	003608 LOADLV	012924 LOADSEG	010E3A LOADTASK
01A5D6 LOGFLAG	01ED8A LONGCHEK	015374 LUCHECK	0198FC LUERROR	01B4F6 LUTST
019B8A MARK	005F24 MAXLNGTH	01E5F0 MCHK.F01	015390 MEFLOOK	01E5F8 MEMCHK
01E6E4 MEMCHKER	018BDA MEMERR	00BCD0 MEMFAULT	00BC90 MEMFLTRS	018A30 MEMORY
01F37C MER.INIT	01F8E8 MER.LOG	01F3FE MER.REST	01F3CA MER.RSCH	01F302 MER.SCHD
01F3DE MER.STRT	01F088 MERBUFA	01F08C MERBUFS	01F0FC MERD.BUF	01F09A MERD.CNF
01F0A4 MERD.CUR	01F098 MERD.STA	01EBEC MKOFMEM	01EAC4 MKONMEM	003078 MMASREG
017E02 MNMFIND	01C010 MOFFBLK	01C118 MONBLK	015C14 MOVE	015E30 MOVE1
015E46 MOVENULL	017EA4 MSGLOG	00E7E8 MIMRPTNS	009832 NFIFO	00989E NLIFO
0033B0 NODE0000	0033D8 NODE0001	003400 NODE0002	003428 NODE0003	003450 NODE0004
003478 NODE0005	003770 NODE0007	003798 NODE0008	0034A0 NODE0009	0034C8 NODE0010
0037C0 NODE0011	0034F0 NODE0012	0037E8 NODE0014	003810 NODE0015	003518 NODE0016
003680 NODE0025	0036A8 NODE0026	0036D0 NODE0027	0036F8 NODE0028	003720 NODE0029
003748 NODE0030	0187EA NOPKERR	009C3C NSEVREL	0090B0 NULLIOH	013098 OPD.NRJE
012FCE OPEN.DEV	012F60 OPN.BDSK	02159E OPN.SVC1	021592 OPN.SVCF	018E98 OPTIONS
00D558 PANIC	017C90 PARMERR	019678 PAUSE	00B642 PICESR	0035B8 PICLV
017F06 PREPRO	01A5D8 PROMODE	0095BC PRTYQ	012C58 PSWSAV	007C68 PTRSTACK
015B6E PUTB	015B50 PUTD	00C9EE PWESR	003590 PWLV	02127E RAPCHKR
021274 RAWCHKR	005EC8 RDSELCH	018882 READ	003280 REGBIAS	01527A RELEB
00F600 RELEFCB	015F86 RELES	009554 RELIOB	00F99A RELMEM	012878 RELPST
00FA9C RELSDE	00FBE4 RELSYP	00FA7E RELTCB	00FA82 RELTCB1	00F536 RELTQE
01AA0C REMOVE	01986E REPROTEC	02179A RERR.01	0217A8 RERR.04	0217B6 RERR.06
0217C4 RERR.07	0217D2 RERR.08	0217DE RERR.09	0217EA RERR.0A	014768 RESET
01725A RESET.IN	014768 RESET.RW	01BDC2 REWIND	00A118 RINQUEUE	00A084 RINQUE
00FFC8 ROERMSG	010007 ROERMSGE	00FFE6 ROERNAME	010004 ROERSTYP	00FFD8 ROERTYPE
00FCBE ROGIBLE	00FF48 ROLIST	012670 ROLLIN	00FE8A ROSCAN	00FF70 ROSIZE
00FFBE ROSSEL	017DE6 SCANNER	000000 SCTH	000000 SCTT	01D67C SECTORBF
00971A SEEKCHK	0120CE SEG.ADD	012658 SEG.DIS	012204 SEG.RMV	012568 SEG.ROLL
012358 SEG.SCAN	012650 SEG.USE	010008 SEGTYPE	019CF0 SEND	0189BC SEQERR
021E0C SESC.XLT	018F66 SET	015BC6 SET.LRCL	005F68 SETBUFF	00EC60 SETDELAY
005F34 SETISP	005F48 SETISPS	017D78 SETLU	00EC2C SETUTOP	0035E0 SLICELV
001576 SPCNODO	000060 SPT	0017BE SPT.60	0017FC SPT.ADCK	0018D4 SPT.ADDM
001800 SPT.ADK1	001854 SPT.AFSV	001794 SPT.CHBK	0017F4 SPT.CLSS	0018E4 SPT.CPID
0018E8 SPT.CPIE	0017E6 SPT.CPU	00177E SPT.CRSH	001790 SPT.CSBF	00178C SPT.CSLV
001894 SPT.CTCB	001798 SPT.CTOP	00178A SPT.CTSP	001814 SPT.DATE	001816 SPT.DAY
0018AC SPT.DFOW	0017C0 SPT.DMT	001820 SPT.DTHD	001888 SPT.EDMA	0018A8 SPT.EFOW
00188C SPT.EMHD	001890 SPT.EMTL	0018F0 SPT.ERBL	0018A0 SPT.ESOW	0018C4 SPT.HLDA
001780 SPT.FLV	0017E0 SPT.FREQ	001874 SPT.FSYP	0017B4 SPT.IVI	0018C8 SPT.HLDB
001778 SPT.INIT	001828 SPT.IQHD	001796 SPT.ISPT	0017B4 SPT.IVI	0017DC SPT.JRNL
0017E4 SPT.LFC	001784 SPT.LLV	0018A4 SPT.MCOW	0018EC SPT.MISS	001788 SPT.MLBL
001814 SPT.MNTH	0017BC SPT.MTM	0017A8 SPT.MTOP	0017B0 SPT.NTCB	0018D8 SPT.OFFM
0017AC SPT.OSID	00183C SPT.OSUF	0018CC SPT.PAGE	0018DC SPT.PAGM	001840 SPT.PANC
0017E2 SPT.PIC	0017A4 SPT.PMEM	001844 SPT.PSV	0018B8 SPT.RLIO	0018B8 SPT.RLIO
0018B4 SPT.RSOF	0018B0 SPT.RSON	00189C SPT.RSOW	00184C SPT.RSV	00187C SPT.RTCB
00182C SPT.RTLS	0017D0 SPT.RVOL	00186C SPT.SCL	0018D0 SPT.SCLP	001834 SPT.SCTH
001838 SPT.SCTT	0018E0 SPT.SEGM	0017D8 SPT.SNOD	0017E8 SPT.SOPT	001884 SPT.SPCT
0017CC SPT.SPVL	0017F8 SPT.SSTE	0017FA SPT.SSTS	00836C SPT.STCB	0017C8 SPT.SVOL
001830 SPT.TCMS	00181C SPT.TIME	001824 SPT.TQHD	00181A SPT.TSL	001850 SPT.TSV
0017B8 SPT.TTAB	0017D4 SPT.TVOL	0017A0 SPT.UBOT	01A5B8 SPT.UTOP	00179C SPT.UTOP
001898 SPT.UTOW	0018C0 SPT.VALU	0017EC SPT.VERN	0017C4 SPT.VMT	001818 SPT.YEAR
0088FC SG	0093CA SQS	009416 SQS.EX	009438 SQS.MLV	009420 SQS.SLV
0093F8 SQS.TIME	00940C SQS.TSL	00CB88 SQS2DISP	018698 START	00E77E SUBCKRPT
00E780 SUBRPORT	00E7DE SUBRPTNS	008A54 SV1DDF	018274 SV1ERTB	008FC8 SV1FCER
00D7B0 SV3.TERM	020038 SV4.ENAC	00DE4E SV4.ERR3	00DE34 SV4.NEXT	020092 SV4.RDAC
020156 SV4.RMAW	00E088 SV6ERCD	00E0AC SV6ERTB	009098 SV9.ASQ	009D92 SV9.ASQ1
009D92 SV9.ASQ1	009D8E SV9.ATQ	009D88 SV9.ATQ1	009EC6 SV9.STSW	009EC6 SV9.TSW2
009EC0 SV9.TSWN	008958 SVC1	00EF86 SVC10	000D48 SVC14	0201C4 SVC15
001B88 SVC15PB	008C90 SVC1BFM	008C90 SVC1BSK	008F48 SVC1EXIT	008C90 SVC1FFM
008C90 SVC1FSR	008DB2 SVC1HALT	009014 SVC11A	00900A SVC1INA	00901C SVC1NIA
009004 SVC1NINA	008FB2 SVC1NOOP	008C50 SVC1READ	008C90 SVC1REW	008D64 SVC1TEST
008CE2 SVC1WAIT	008C90 SVC1WFM	008C50 SVC1WRIT	010030 SVC2	00ADD4 SVC2.10
00ADD8 SVC2.11	00F3E8 SVC2.2	00F4D6 SVC2.20	00F4E4 SVC2.21	00ADEE SVC2.23
01FFE0 SVC2.24	01FFF6 SVC2.25	00F498 SVC2.3	01E048 SVC2.7	00ACB0 SVC2.8
00AD38 SVC2.9	00D7A0 SVC3	000D74 SVC4	00DEC0 SVC5	00E1AC SVC6

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012C78 SVC7          018AEC SVC7PBLK     01FD38 SVC7TO8      01FD38 SVC8          00DCC2 SVC9
00CBEC SYSINIT       019216 TASK         018606 TASKERR      012094 TCBLOOK       012098 TCBLOOK2
008368 TCBTAB        01AAEB TCOM         01FE0C TCPU.TCB      01FE04 TCPU.TIM      01FE10 TCPU.TYP
01AB82 TEMPFILE      010888 TERM         01088E TERM1         0170F6 TERMCHK       003B60 TERMCRT
0064BA TERMDASY      005E32 TERMLPTR     0059E0 TERMMAG       004702 TERMMHD       0050EE TERMMSM
018556 TESTPRT       00B32E TICAN        00B334 TICAN1        00B432 TIFXTCHN      003568 TIMELV
010B22 TIMEOUT       01705A TIMERR       00B75E TIMESR        00BAC7 TM.FEB        00BAC4 TM.FREQ
00BAC5 TM30DAYS      00AB68 TMCHN        01FD48 TMCPUOFF      01FDD8 TMCPUON       009F76 TMDISP
00A748 TMNSOUT       00A302 TMRD.MAC     00A188 TMRDISP       00AAD6 TMREMW        00A072 TMRRSAIN
00A86C TMRSAIN       00AA46 TMRSAOUT     00A976 TMRSARS       00A88E TMRSIN        00A88E TMRSIN1
00AA02 TMRSOTNS      00A9F4 TMRSOUT      00A998 TMRSRSA       00AAB6 TMSLICE       00A776 TMSTART
00A7D0 TMSTART2      00AB02 TMSTOP       00A7FC TMSTOPW       00ACOC TMUCHN        00BB04 TUCHOFF
00BADE TUCHON        009D6C TO1TAMIO     020428 TOUTITAM      015362 TRASPCK       022118 UBOT
022018 UBOT.0        022010 UBOT.F01     010A58 UNPACK        003390 VMT           0157B4 VMTLOOK
01C980 VOLUME        021994 WAIT         014AF8 WAITRS        0219DA WAITRS1       01BD9A WFILE
0187E2 WRITE         005E8A WRTSELRD     005EAE WRTSELWT      01CBA8 XDELETE       00D754 XREGS


     COMMON-BLOCKS:


     UNDEFINED:



     TET32 R03-05
     OS32MT TASK-ESTABLISHMENT LOAD MAP
     DATE:09/25/79    TIME:13:04:20.
     JOB:
     **** CTOP=0221FE     UTOP=022118     MIN CORE SIZE= 136.50K   ****



     PROGRAM SEGMENTS:

         SEG  TYPE    NAME      SIZE
           0  IMPU              136.50K
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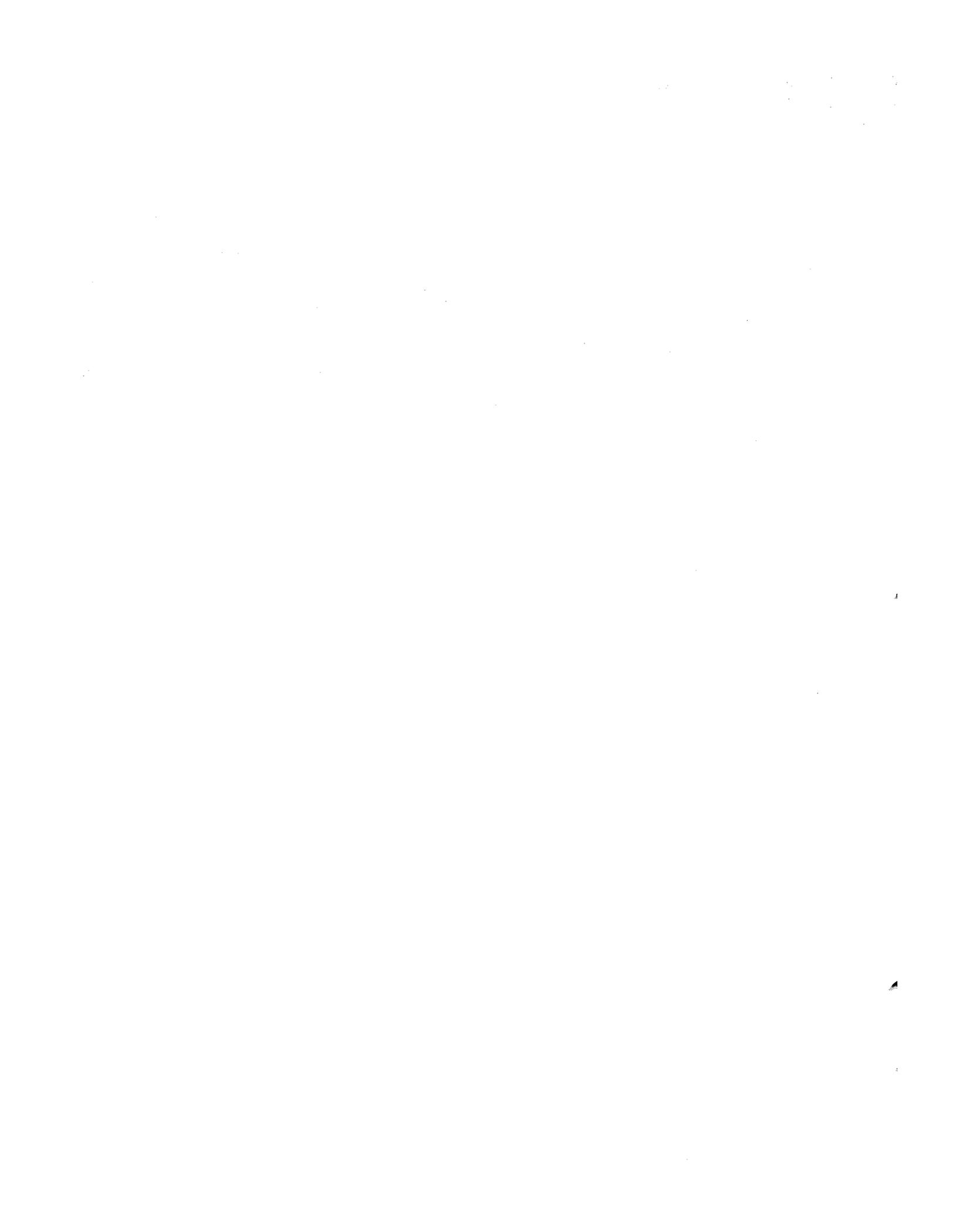
PERKIN-ELMER

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6.   What additions or deletions would you suggest? _____

_____

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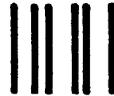
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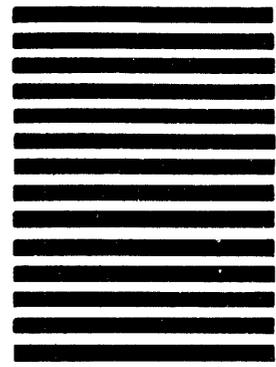
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