digital

sgen-dos
utility program
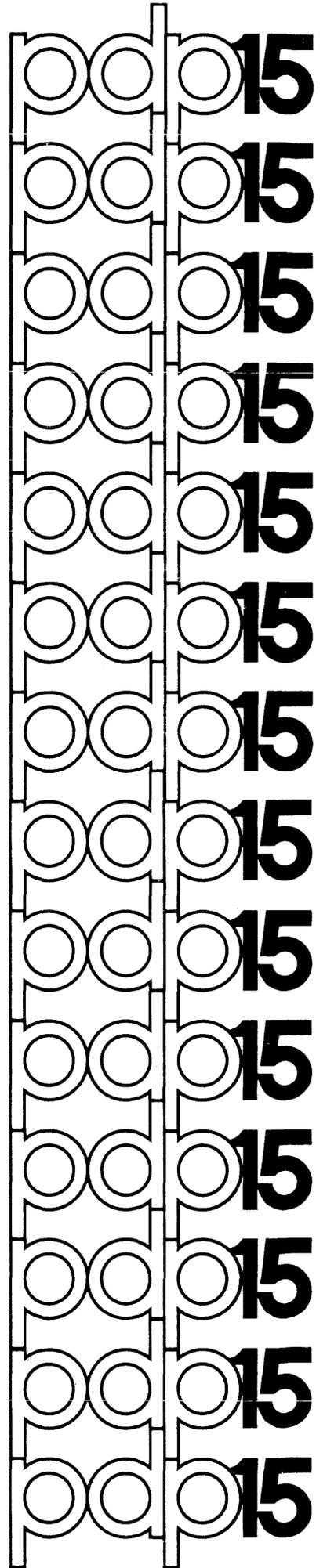
pdp 15
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SGEN - DOS Utility Program

PREFACE

This manual describes the DOS-15 System Generator Utility Program,
DOSGEN, and gives other information needed by the System Manager
for installation and maintenance of the DOS-15 system.

In the preparation of this manual, it was assumed that the reader
is familiar with the Disk Operating System (DOS-15), including its
Monitor, and the several Utility Programs -- especially PIP, PATCH,
and UPDATE. The DOS SOFTWARE SYSTEM, USER'S MANUAL (DEC-15-MRDB-D)
describes the general operating procedures for DOS-15.

PDP-15 UTILITY PROGRAMS MANUAL,(DEC-15-YWZB-D)

The PDP-15 Utility Programs manual is comprised of a set of individual
manuals, each of which describes the operation and use of a PDP-15
Utility program. The set of manuals which make up the Utility
Programs manual are listed in an Applications Guide located on the
following page; the Guide also lists the order number of each manual
and indicates the currently available monitor systems under which the
program will operate.

Individual utility manuals may be ordered by referencing the titles
and order numbers specified in the Applications Guide. A complete
set of utility manuals may be obtained by ordering "PDP-15 Utility
Programs Manual, DEC-15-YWZB-D".

APPLICATION GUIDE

PDP-15 UTILITY PROGRAM MANUALS

PDP-15 Utility Program Manuals and the Application of Each

Title	Manual Order Number (DEC-15-YWZB_)	Applies to Monitor:		
		DOS	ADV	B/F
DDT Utility Program	DN1	√	√	√
CHAIN & EXECUTE Utility Program	DN2	√	√	√
SGEN ADVANCED Monitor	DN3		√	
MTDUMP Utility Program	DN4	√	√	
PATCH Utility Program	DN5	√	√	√
EDIT Utility Program	DN6	√	√	√
UPDATE Utility Program	DN7	√	√	√
LINKING LOADER	DN8	√	√	√
PIP ADVANCED Monitor	DN9		√	√
SRCCOM Utility Program	DN11	√	√	√
SGEN DOS Monitor	DN12	√		
PIP DOS Monitor	DN13	√		
Disk SAVE/RESTORE Programs	DN14	√	√	√

DOSGEN

INTRODUCTION

Sections one and two of this manual describe DOSGEN and its use.
Section three describes the general sequence of operations to be
followed when using DOSGEN. It is recommended that the user read
the entire manual before installing DOS-15.

CONTENTS

DOSGEN VlA

1.1 Context

The DOS System Generator, DOSGEN VlA, allows the system manager to
modify an existing DOS system to suit the needs of a particular in-
stallation. DOSGEN does not create a system, but modifies an exist-
ing one. The DOS disk restore DECtapes or magtape that Digital Equip-
ment Corporation distributes will produce a working Disk Operating
System when restored to the disk via the DOSSAV program[1]. The system
manager may initiate a system generation operation in order to tailor
this basic system to his own needs by issuing the following series of
commands to the DOS Monitor:

```
      MICLOG SYS   Required System Manager Password for the basic system
  or  A  DK -14    (for system generation on RF DECdisk)     Required AS-
      A  DP -14    (for system generation on RP Disk Pack)   SIGN statement
      SGEN         Load command for DOSGEN
```

When DOSGEN is loaded it automatically starts an interactive SGEN pro-
cedure. Once system generation is complete, the system manager should
save the changed system via the DOSSAV program. He should always re-
tain at least two copies of the system: the original tape(s) from DEC,
and a copy of the new system.

Should the system manager wish to do a subsequent system generation, he
should type the same command series given above, substituting the Master
Identification Code which he supplied during the last system genera-
tion.

1.2 Organization

DOSGEN is a single, core-image system program with no overlays. When
loaded into core DOSGEN tests to ensure that the system owner is cur-
rently logged in and that the "A" handler of the RF DECdisk or RP Disk
Pack is assigned to .DAT-14. DOSGEN will exit if these requirements
are not met. DOSGEN then types out its name, version number, and the
device and unit number on which the new system will reside.

---

[1]Appendix A   describes the DOSSAV program.

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DOSGEN then proceeds with eight sequentially presented sets of questions that can modify three basic areas of the system: (1) system parameters, (2) I/O, and (3) system programs. The eight sets of questions are identified by the letters A through H. Each set is started by a key question that describes the drift of the questions in that particular set. Key questions start at the left margin, questions within a set are tabbed one stop (8 spaces) to the right.

The user can save time by refusing to consider questions in a particular set involving an area not to be modified. He can do this by responding to the key question of any set with a Carriage Return, which effects the acceptance of a set of default answers. This means that the parameters covered by the rejected set will remain as in the previous system.

DOSGEN provides restart points which coincide with the beginning of each set of questions. In general, a CTRL P from the keyboard at any point before the end of the current set of questions will cause a return to the start of the current set of questions, and the deletion of all answers previously supplied for the current set. Before the user terminates a particular set, therefore, he should check all answers for that set. If he later finds a mistake after a set is completed, he will have to abort the operation and go through another complete system generation to correct the error. A CTRL C at any time before the end of Section H will terminate the system generation, leaving the old system unchanged.

1.3 Answers to DOSGEN Questions

1.3.1 Teleprinter Command Mode

To save time, DOSGEN supplies a default answer with each question in parentheses. The default answer always shows how the previous system looked or in some way indicates no change is required. A Carriage RETURN response indicates the user accepts the default answer. In the illustration of each question where the default may be more than one, this manual will indicate the possibility with brackets ({}) Thus:

$$API \ \left\{ \begin{matrix} (Y) \\ (N) \end{matrix} \right\}$$

Y and N are one-character answers for many of the Yes/No, On/Off class of questions. They are self-explanatory. In the case of some questions, however, a third one-character choice is required. In such questions, the third choice implies "Yes, but ask me questions about the details of the subject." For example, Section B, which concerns devices and device handlers, first asks about each device, deferring questions about its handlers until necessary. Thus, the question:

PR? ($)

asks whether the user wants the Paper Tape Reader. "N" says "NO, delete the Paper Tape Reader and all of its handlers and skips from the system." Response "$" or Carriage Return says, "YES, keep the Paper Tape Reader and all its handlers and skips as they are." Response "Y" says, "YES, keep the Paper Tape Reader, but ask me questions about its handlers and skips." ALT MODE alone will be echoed "$", and substitutes for "$". For the Y/N/$ type of question, which accepts a one-character answer, a left arrow will imply the default and give a visible answer on the printout. (Carriage RETURN is not a printing character.)

Some questions allow multiple answers; for example, "SKIP MNEMONICS IN ORDER" (paragraph 2.4.2). In such instances, the user may type several answers on one line, separating each answer with a comma.

Other answers will be explained in the relevant parts of paragraph 2.

1.3.2 DOSGEN Batching Command Mode

Like other system programs, DOSGEN may be used in the DOS Batching Command Mode. In fact, some features have been added which make batching processing easier. These features are required for the following reason: For those answers whose defaults are specified in parentheses, DOSGEN reads teleprinter input in Image Alphanumeric Mode. Hence, it does not require a Carriage RETURN to complete a .READ. System considerations, however, require that Batching Mode tapes or decks be in

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IOPS ASCII. This means that each line of input must be terminated by
a Carriage RETURN. Since lines containing one Carriage RETURN only
cannot be generated by the Editor, the default answer must always be
specified by a left arrow (←). One-character answers in teleprinter
mode have their Batching Mode equivalents as follows:

Teleprinter	Batching
Y	Y **)**
N	N **)**
$	$ **)**
Carriage RETURN or Left-arrow (←)	← **)**

All of the above types of answers go with questions where the default
is specified in parentheses. In any case where the default is not
specified in parentheses (i.e., no default, or one in brackets), the
user should have **xx..x)** in the batching command string.

1.4 Error Messages

DOSGEN checks all answers for syntax and acceptability to the DOS soft-
ware. It also does some limited checking for acceptability within the
current hardware configuration. Whenever DOSGEN finds a wrong answer,
it types an error message two tabs to the right of the left hand margin
(16 spaces in). DOSGEN does not check for multiple errors; any answers
that follow an erroneous answer on the same line are not processed, and
must be retyped.

1.5 Operation

When DOSGEN starts operation, it saves an image of the three parameter
blocks from the system device plus the Storage Allocation Table. These
blocks contain the old image of the three system information blocks:
SGNBLK, SYSBLK and COMBLK. SGNBLK contains information about the de-
fault settings of key .SCOM registers, the .DAT and .UFDT, plus an
ordered skip chain, the names of all the handlers, and certain informa-
tion about the devices that the system knows about. Together, SYSBLK
and COMBLK occupy two contiguous blocks on the system device. They
describe the system programs. Figure 1-1, SGNBLK, and Figure 1-2,
SYSBLK and COMBLK, illustrate the contents of these information blocks.

Location	Value	Description
Ø	ØØØnnn	Pointer to first free entry in SGNBLK
1	ØØØØ15	Number of miscellaneous parameters
2	ØØØnnn	Size of.DAT plus size of .UFDT = (number of positive .DAT slots + 16)*2. (Initial value is 2Ø positive .DAT slots.)
3	ØØØnnn	Number of skips in Skip Chain
4	{Ø413ØØ / Ø42ØØØ}	System device code (RPØ2=2Ø, RF15=15)
5	nnnnnn	Original contents of .SCOM+4
6	nnnnnn	Original contents of .SCOM+2Ø
7	nnnnnn	Number of words per buffer (.SCOM+27
1Ø	nnnnnn	Default number of buffers (.SCOM+26)
11	.SIXBT	Monitor Identification Code
12	nnnnnn	Information on VT and CTRL X (.SCOM+33)
13	ØØØØØn	Default files protection code (.SCOM+54)
14	ØØnnnn	Size of the Resident Monitor Patch Area
15	7777nn	Minus the number of clock ticks in a second (-74 for 6Ø hz, -62 for 5Ø hz)
16 · · 53	ØØØnnn ⎫ ⎬ ØØØnnn ⎭	Device assignments for the .DAT (made by handler numbers). (Termination at 53 assumes 2Ø positive slots.)
54 · · 111	.SIXBT ⎫ ⎬ .SIXBT ⎭	UIC assignments for the .UFDT. (Termination at 111 assumes 2Ø positive slots.)
112 · · 137	nnnnnn ⎫ ⎬ nnnnnn ⎭	Skip Chain Table (Negative skips in one's complement.) (Termination at 137 assumes 22 skips in chain.)
14Ø · · · · · · · · · · · · · · · · · · 312	.SIXBT · · .SIXBT .SIXBT · .SIXBT ØØØØØ3 nnnnnn nnnnnn nnnnnn .SIXBT ØØØØØ1 nnnnnn · · ·	The last part of the SGNBLK is the Device Handler-Skip IOT Table. Each entry starts with the .SIXBT representations of all handlers for a particular device. (First two characters equal device code, for all handlers.) Zeroes in the first six bits of a word indicates the end of the handler names, and says that the rest of the word contains the number of skips for this entry's device. The skip IOT's follow immediately. As above, one's complement skips indicate negative skips. Note, however, the confusing fact that a one's complement of a skip IOT is a positive number. Thus, 7Ønnnn complemented is Ø7nnnn. SGNBLK ends at 312, in the DOS-15 system distributed by Digital Equipment Corporation.

Figure 1-1

SGNBLK

	Word #	Value	Description
	Ø	ØØØnnn	Pointer to first free word after SYSBLK
	.		(There is one set of seven words/core image program.)
	7N+1	.SIXBT	Name of System Program or overlay
	7N+2	.SIXBT	
S	7N+3	nnnnnn	Number of first block on system device occupied by this program or overlay
Y	7N+4	ØØØØnn	Number of blocks occupied by this program or overlay
S	7N+5	addres	Thirteen-bit first address for this program or overlay
B	7N+6	Ønnnnn	Program size
L	7N+7	addres	Thirteen-bit starting address for this program or overlay
K	.	.	.

(free area)

	Word #	Value	Description
	4ØØ	ØØØØ1Ø	Number of words in this entry (in this case, 1Ø)
	4Ø1	.SIXBT	Name of this system program (left-justified and zero-filled)
	4Ø2 p	.SIXBT	
	4Ø3	.SIXBT	Name of an overlay (left-justified and zero-filled) -- overlays are optional
	4Ø4 r	.SIXBT	
C	4Ø5 o	ØØØØØ2	Number of buffers required by this system program (Bits Ø-6=Ø means the end of any overlay names. This is why program and overlay names must be left-justified.)
O	g		
M	1		
B	4Ø6	.DAT&777	Active .DAT slot
L	4Ø7	.DAT&777	Active .DAT slot (Note: 777777 for a .DAT slot means all positive .DAT slots.)
K	41Ø	ØØØØØ5	Number of words for this entry (in this case, 5)
	p		
	411 r	.SIXBT	Name of this system program
	412	.SIXBT	
	413 o	ØØØØØ1	Number of buffers required by this program (Note that this program has no overlays.)
	g		
	414 2	.DAT&777	.DAT slot for this program
	.	.	.
	777	ØØØ4ØØ	Pointer to first word in COMBLK (equals count from first word in SYSBLK). The two contiguous blocks on the system device that hold SYSBLK and COMBLK are treated by the system as one large block. In this case, COMBLK happens to start at location 4ØØ of the two blocks combined.

Figure 1-2

SYSBLK and COMBLK

Appendix D contains listings of these information blocks, as supplied by DEC.

Most of DOSGEN's operations consist of building new images of SGNBLK, COMBLK and SYSBLK and the Storage Allocation Table. On completion of the last set of questions (the "H" set), DOSGEN disallows commands from the teleprinter, writes out the new system block images, and deletes any discarded handlers from the IOS User File Directory. (Up to that point, the current system had remained unchanged.) It is up to the user to insert added handlers and system programs. Handlers may be added via PIP. PATCH may be used to add core-image system programs for which DOSGEN has allocated space.

2. DETAILED DESCRIPTION OF OPERATION

This section describes the options available to the DOSGEN user, and explains some of the planning necessary for determining an optimum configuration for a particular installation. Each first order (two-digit) paragraph denotes a new set of questions, each second order (three-digit) paragraph presents an individual question and a description of its meaning and use.

2.1 A. ALTER SYSTEM PARAMETERS?   (N)

The "A" section defines those system parameters that do not fall under I/O or system program categories. Some are default parameters which may be modified by commands to the Nonresident Monitor. Others may only be modified by DOSGEN. Figure 2-1, Section A Questions, illustrates this section.

2.1.1 API? $\left\{ \begin{array}{c} (Y) \\ (N) \end{array} \right\}$

This asks whether API is available on the system, and whether the user wishes the default to be API on or off. A "Y" response makes "API ON" the default condition. An "N" answer makes "API OFF" the default. The Nonresident Monitor's API ON/OFF command can change the state of API temporarily.

2.1.2 33TTY $\left\{ \begin{array}{c} (Y) \\ (N) \end{array} \right\}$

This asks which keyboard (KSR-33 or KSR-35) is usually available for command inputs. The Resident Monitor's teleprinter handler handles

```
DOSGEN V1A

          SYSTEM UPDATE ON DK0

A. ALTER SYSTEM PARAMETERS? (N) Y

          API? (N) Y

          33 TTY? (N) N

          MIC[SYS] ABC

          DEFAULT # BUFFERS[3] 4

          # WORDS/BUFFER[500] 525

          EXTRA 4K? (N) N

          DEFAULT FILES PROTECTION CODE[2] 1

          RESIDENT PATCH AREA SIZE[0] 2500

          PAGE MODE SYSTEM? (N) Y

          60 CPS? (Y) Y
```

FIGURE 2-1

both machines with no modification. It simply needs to know which con-
sole it is talking to. An "N" response makes the Model 35 keyboard the
default machine. A "Y" response makes Model 33 the default. The Non-
resident Monitor's 33TTY command can change the default temporarily.

2.1.3 MIC [mic]

This question prints the current Master Identification Code (MIC) in
square brackets. A Carriage Return entry retains the old MIC. If the
user wishes to change the current MIC, he should type exactly three
printing characters, followed by a Carriage Return. If possible, the
user should avoid MIC codes that equal User Identification Codes (UIC's)
current to the system. In particular, he must avoid the following
UIC's: ???, PAG, BNK, IOS, CTP and SCR. DOSGEN will not accept non-
printing characters as part of an MIC.

2.1.4 DEFAULT # BUFFERS[n]

This command requests a default number of buffers to be allocated for
user programs and non-core image system programs. The number in
square brackets is the old number. If the user wishes to retain the
old default number, he should type a Carriage Return. DOSGEN accepts
any set of 6 or fewer octal digits followed by a Carriage Return as
the octal number. The Master Tapes which Digital Equipment Corporation
distributes indicate three (3) as a default number. The user must
consider the trade off of the available core in his installation
(systems with little memory might need a smaller number of buffers)
versus the convenience of a large number of buffers.

This parameter does not affect core-image system programs, which al-
ways get as many buffers as they need. Users whose programs need a
different number of buffers may use the BUFFS Nonresident Monitor com-
mand to allocate the exact number of buffers needed.

2.1.5 # WORDS/BUFFER [nnn]

This requests the number of words per buffer, and prints the old
number (in octal) in square brackets. A decision regarding an effi-
cient size for the buffers requires some knowledge of the disk handlers,
which use them. The handlers break buffers from the pool into three
parts: (1) File Information (about 40_8 words), (2) the Block List --
addresses of pre-allocated blocks (between 4 and 374_8 addresses, in-
clusive), and (3) the data buffer (400_8 words). Thus, buffers must
be at least 444_8 words long.

The disk handlers will not use extra words in buffers longer than 1034_8.
This, therefore, may be an upper limit on buffer size, unless other
programs need more space in their buffers. The larger the Block List
-- that is, the larger the buffer -- the faster will be output. Smaller
Block Lists may give more efficient allocation of disk space, and will
certainly save core.

Any number typed will be interpreted as an octal number.

2.1.6 EXTRA 4K? $\{ \begin{smallmatrix} (Y) \\ (N) \end{smallmatrix} \}$

For systems with an odd number of memory pages, a "Y" answer will allow
the loaders to use the highest page in memory. For systems with no
extra 4K page, the user should type "N".

2.1.7 DEFAULT FILES PROTECTION CODE [n]

This requests the default file protection code, and prints the old
code in square brackets. The possible codes and their meanings are:

Code = 1   Unprotected, with the exception that the file
            may not be deleted and the number of blocks
            may not change, if the directory is protected.

Code = 2   Write protected, if directory protected.

Code = 3   Read/Write protected, if directory protected.

DOSGEN will accept any one-digit octal number, but the numbers $\emptyset$, 4, 5,
6, and 7 are meaningless in this system.

The default protection code for User File Directories is always 1,
protected, and may not be changed by DOSGEN.

If users wish to temporarily change the default protection they may
use the Nonresident Monitor Command PROTECT.

2.1.8 RESIDENT PATCH AREA SIZE [nnn]

This requests the Resident Monitor's Patch area size and prints the
old number in square brackets. The Resident Monitor's Patch Area is a
number of reserved registers (no bigger than 4700_8) located just above
the Resident Monitor. The System Loader will not refresh it, except
on Bootstrap loads, restarts, and any of the QFILE GET commands. The
area may be used for patching the system or for communication among
several programs in different core loads.

DOSGEN will interpret any number typed as an octal number. The digits
8 and 9, therefore, will not be accepted.

2.1.9   PAGE MODE SYSTEM? $\left\{\begin{matrix}(Y)\\(N)\end{matrix}\right\}$

This requests the default addressing mode. A "Y" response makes page
addressing the default mode. An "N" response makes bank the default.
Users may temporarily change the mode via the PAGE ON/OFF or BANK
ON/OFF Nonresident Monitor commands.

2.1.10   6∅ CPS? $\left\{\begin{matrix}(Y)\\(N)\end{matrix}\right\}$

This requests the line frequency at the installation. Installations
with 6∅hz line frequency require a "Y" answer; those with 5∅hz require
an "N" response.

2.2   B.   ALTER I/O DEVICES OR HANDLERS? (N)

This set of questions allows the user to delete or retain devices and
all their handlers, and allows a third option of retaining the refer-
ence to the device, and then retaining, deleting or adding handlers
and skips for a particular device. The printout given in Figure 2-2
illustrates the use of this section.

Section B refers to all devices currently in the system by a two-
character device code. The device codes for those device handlers
included in the Master Tapes supplied by the Digital Equipment Corpora-
tion are:

        CD   Card Reader (CR03B or CR15)
        PR   Paper Tape Reader (PC15)
        PP   Paper Tape Punch (PC15)
        DT   DECtape (TC15 DECtape Control)
        DK   RF15 Disk Control
        DP   RP15 Disk Pack Control
        LK   LK35 Keyboard
        LP   Line Printer (either LP15C or LP15F)
        MT   MAGtape
        VP   VP Point Plotting Display
        VT   VT15 Graphic Display Console
        VW   Writing Tablet

(TT, which means teleprinter, is not included in this set of questions,
because DOS uses the teleprinter as a console command device.)

The device handler names used in Section B are printed as three-character
names. In reality, handler names are four characters long, but this

```
B. ALTER I/O DEVICES OR HANDLERS? (N) Y

        DELETE DISCARDED HANDLERS? (Y) Y

        TO BE KEPT:

        PR? ($) $
        PP? ($) $
        DT? ($) $
        DK? ($) Y

        DKB? (Y) Y

        DKC? (Y) N

        NEW HANDLERS:

        >DKD

        >DKF

        >

        DSSF=707001? (Y) Y

        NEW SKIPS:

        >

        DP? ($) N

        MT? ($) N

        LP? ($) $
        CD? ($) N

        VP? ($) $
        VT? ($) N

        VW? ($) N

        LK? ($) N
```

FIGURE 2-2

section truncates the last character, a period (.). The first two characters must be the two-character device code for the handler's device. The third character must be alphabetic.

DOSGEN starts this set of questions by asking whether the user wishes to delete discarded handlers from IOS. Deletion saves space on the system device.

DOSGEN then begins asking key questions for each device currently on the system:

XX? ($)   (where XX stands for any device code)

If the user answers with a Carriage Return or "$", DOSGEN retains the device and all its skips and handlers as they were in the previous system. If the user answers "N", DOSGEN deletes all information about that device and its handlers, and all its skips from the Skip Chain. (Deletion of handlers from the handler UFD, IOS, does not occur until the termination of Section H.)

If the user answers "Y", DOSGEN will ask specific questions about the handlers and skips for the device in question:

2.2.1 XXX? (Y)
                        (where XXX stands for any handler name)

DOSGEN asks this question for each handler the device has in IOS. A "Y" response retains the handler; an "N" response deletes it.

   NOTE: DOSGEN does not allow the user to delete the "A"
          handler for the system device (DKA. or DPA.).

2.2.2 NEW HANDLERS:

When DOSGEN has asked a question for each of the device's handlers currently in IOS, it asks whether the user wishes to add any new handlers. It makes no sense to "add" a handler name which has just been deleted. If the user wishes to change a handler, he may use PIP to transfer a new one to IOS. PIP will automatically delete the old one if the user transfers a new one with the same name. New handler names should follow the rules outlined in paragraph 2.2. Whenever the user has no more handlers to add, he should simply type a Carriage Return.

Adding handler names only makes them "logically" present. The user must call PIP to transfer the handlers to the IOS UFD, in order to make handlers physically present. DOSGEN warns the user about missing handlers at the end of Section C. File names for handlers in IOS must have the same name as the handler global and a "BIN" extension (e.g., DKA.BIN).

2.2.3 (Old skips)

Presumably, the user changes old skips only in the case where they were incorrectly inserted. In any case, after the user has indicated he has no more handlers to add for the current device, DOSGEN prints the skips for this device that are in SGNBLK (whether or not these skips are in the skip chain). DOSGEN prints skips in the following format:

        devskp = nnnnnn? (Y)

A Carriage RETURN or "Y" accepts the old skip; an "N" deletes the skip.

2.2.4 NEW SKIPS:

When DOSGEN has exhausted the skips for the current device as they were in the old system, it requests any new skips. New skips should be typed in the following format:

        devskp = nnnnnn

where devskp has no more than six characters, and nnnnnn starts with octal 7Ø. DOSGEN rejects all other formats and repeats the ">" symbol which requests another skip.

When the user types a Carriage RETURN after the ">", DOSGEN proceeds to the next device. Negative skips (that is, those which skip on "OFF", not "ON") should be preceded by a minus sign (-), to indicate that they are negative:

        devskp = -nnnnnn

2.3 C. ADD NEW DEVICE? (N)

When DOSGEN has finished with Section B, it asks whether the user wishes to add a new device. Section C differs from other sections in that restarts (CTRL P) only delete information added for the current device.

That is, if the user adds devices AA, BB, and CC, but types CTRL P during the CC operation, DOSGEN will return to a point just after the completion of the BB device insertion.

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When the user has no more devices to add -- that is, when he answers
the key question with an "N" or Carriage Return, DOSGEN will remind
him of all the handlers he has added to the system, but which are not
yet present in IOS. He can add them later, via PIP. The printout of
Figure 2-3 illustrates the use of this Section.

2.3.1 DEVICE CODE [ ]

Here, the user may type any two alphameric characters that DOSGEN can-
not interpret as an octal number. It is recommended, however, that
the user give only alphabetic characters, as any numerals might be con-
fused with a unit number. DOSGEN will not accept any input other than
two alphameric characters. There is no default for this question --
that is, DOSGEN assumes that, if the user answered the Section C ques-
tion with a "Y", then he has a device code to add. DOSGEN makes no
assumption about which device it is.

2.3.2 NEW HANDLERS:

Here, the user should add all the handlers he will use for the new de-
vice. The names should follow the rules for handler names outlined in
paragraph 2.2 with the exception that the user must not type the final
period (.).

The new skips for the device should follow the format outlined in
Paragraph 2.2.4. DOSGEN adds all new skips to the end of the Skip
Chain. The user may change the order of the Skip Chain in Section D.

When the user has no more skips to add, DOSGEN repeats the key question
for Section C,

        ADD NEW DEVICE?   (N)

If the user has another new device, he may add it now.

2.4 D. CHANGE SKIP CHAIN?   (N)

When the user has responded to the key question for Section C with an
"N" or a Carriage Return, DOSGEN proceeds to Section D, which allows
the user to change the Skip Chain order and delete skips. The user may
not add any skips in this section. The printout of Figure 2-4 illus-
trates the user of this Section.

15

```
C. ADD NEW DEVICE? (N) Y

        DEVICE CODE[ ] AD

        NEW HANDLERS:

        >ADA

        >

        NEW SKIPS:

        >705432
                    ("705432" ISN'T SYMBOL)
        >ADSKP=705432

        >ADON=705332

        >ADOFF=702345

        >


C. ADD NEW DEVICE? (N) N

        MISSING HANDLERS:
        DKD.
        DKF.
        ADA.
```

FIGURE 2-3

D. CHANGE SKIP CHAIN? (N) Y

       DISPLAY SKIP CHAIN? (Y) ←

       DEFAULT SKIP CHAIN ORDER:
       SPFAL
       DTDF
       DSSF
       DPSJ
       MTSF
       SPDI
       WTSK
       SDDF
       RCSF
       RCSD
       CLSF
       LSDF
       RSF
       PSF
       KSF
       SPKF
       TSF
       DTEF
       DPSE
       MPSNE
       MPSK
       SPE
       ADOFF
       ADON
       ADSKP

      (continued at right)

SKIP MNEMONICS IN ORDER:

>ADSKP

>$SPFAL

>$DTDF

>ADON

>$DSSF

>$DPSJ

>ADOFF

>$MTSF

>$SPDI

>$WTSK

>$SDDF

>$RCSF

>$RCSD

>$CLSF

>$LSDF

>$RSF

>$PSF

>$KSF

>$SPKF

>$TSF

>$DTEF

>$DPSE

>$MPSNE

>$MPSK

>$SPE

>$

FIGURE 2-4

2.4.1 DISPLAY SKIP CHAIN? (Y)

In most instances, the user will wish to see all skip mnemonics and
acronyms in the old system, plus those he has just added. If he
answers "Y" or Carriage Return, DOSGEN types: DEFAULT SKIP CHAIN
ORDER, followed by the old Skip Chain with new skips at the end.

2.4.2 SKIP MNEMONICS IN ORDER:

Users have two basic options for this part: (1) accept the whole chain
as is, or retype the entire chain, in a new order. The user may type
a single Carriage RETURN in response to the "SKIP MNEMONICS IN ORDER:"
question, and obtain the old chain order, with any new skips at the
end of the chain. If he types any mnemonic, however, he must account
for all of the skips. When the user responds to DOSGEN's request for
the next skip (>) with an ALT MODE, DOSGEN types "$" and the first
skip in the old chain that has not already been selected. When the
user responds to the ">" with a Carriage RETURN, DOSGEN deletes all
unlisted skips, freezes the new order, and continues on to Section F.

Two warnings are in order: (1) Negative skips should be at the end of
the chain. Illegal interrupts may otherwise occur when the peripheral
device is down. (No standard DOS devices have negative skips.)
(2) Beware of changing the relative order of the chain, as supplied
by DEC. For instance, the clock interrupt must come before the printer.

2.5 E. ALTER DEVICE PARAMETERS? (N)

2.5.1 7 CHANNEL MAGTAPE $\{^{(Y)}_{(N)}\}$

The user should choose the proper default. "N" gives 9-channel.

2.5.2 LINE PRINTER SIZE (8Ø, 12Ø, OR 132) [nnn]

Acceptable responses to this question are 8Ø, 12Ø, or 132, or a Carriage
Return. A Carriage Return will retain the old line size, printed in
square brackets.

2.5.3 VT ON: $\{^{(Y)}_{(N)}\}$

This requests the default setting for the CTRL X option. A "Y" makes
VT ON the default. An "N" makes VT OFF the default. DOSGEN does not
ask this question or the next one if the VT is not on the system.

2.5.4 HALF ON? $\{^{(Y)}_{(N)}\}$

This requests the default setting for the half-screen setting for the
CTRL X option. An "N" response makes HALF OFF the default. A "Y"
response makes HALF ON the default.

```
E. ALTER DEVICE PARAMETERS? (N) Y

      7 CHANNEL MAGTAPE? (Y) N

      LINE PRINTER LINE SIZE(80,120, OR 132)[80] 120

      VT ON? (N) ←

      HALF ON? (N) Y
```

FIGURE 2.5

```
F. ALTER .DAT SLOTS? (N) Y

          # OF POSITIVE .DAT SLOTS[20] 15

          DISPLAY .DAT SLOTS? (Y) Y

          .DAT    DEVICE   UIC
          -15     DKA      UIC
          -14     DKA      UIC
          -13     DKA      UIC
          -12     TTA      UIC
          -11     DKA      UIC
          -10     TTA      UIC
          -7      DKL      SYS
          -6      DKA      UIC
          -5      NONE     UIC
          -4      DKA      UIC
          -3      TTA      UIC
          -2      TTA      UIC
          -1      DKA      SYS
          1       DKA      UIC
          2       DKA      UIC
          3       DKA      UIC
          4       TTA      UIC
          5       PRA      UIC
          6       PPA      UIC
          7       DTA1     UIC
          10      DTA2     UIC
          11      NONE     UIC
          12      NONE     UIC
          13      NONE     UIC
          14      NONE     UIC
          15      NONE     UIC

          NEW ASSIGNMENTS:

          >A AD 11,12,13,14,15

          >A <ABC> 1/CDE\\\<CDE> 2

          >
```

FIGURE 2-6

2.6 F. ALTER .DAT SLOTS? (N)

This section allows the user to alter the number of .DAT slots, which
is a permanent change to the system (until the next System Generation),
and to make the default assignments to both the .DAT slots and the
.UFDT slots. The operator may temporarily change the assignments via
the ASSIGN (A) command to the Nonresident Monitor. (See Figure 2-6.)

2.6.1 # OF POSITIVE .DAT SLOTS [nn]

This asks the number of positive .DAT slots for the new system, and
indicates the old number in square brackets. The number of negative
.DAT slots is fixed at fifteen (15). DOSGEN will accept any octal
number from 1 to 77, inclusive. Each .DAT slot adds two registers to
the size of the Resident Monitor and two parameters to SGNBLK -- one
for the .DAT slot entry, and one for the .UFDT entry. Users with a
great deal of core should still be careful about too many .DAT slots.
That might cause SGNBLK overflow and an abort from the system genera-
tion. Further, OTS users must reassemble FIOPS and .FLTB in order to
use more than 20_8 .DAT slots. See Appendix C.

2.6.2 DISPLAY .DAT SLOTS (Y)

If the user wishes to change any assignments, he may request their
current assignments by answering "Y" or Carriage Return. This has the
effect of a REQUEST command to the Nonresident Monitor.

2.6.3 NEW ASSIGNMENTS:

The user may make new default assignments to the .DAT and/or .UFDT by
using the same ASSIGN (A) commands he would use to the Nonresident
Monitor. When the user has no more new assignments, he should type
Carriage Return when DOSGEN types a new angle bracket (>). UIC in a
.UFDT slot means the UIC currently logged in will be given to that
.UFDT slot. SYS in a .UFDT slot means either BNK or PAG will be
assigned to that slot by the loaders (depending on the addressing mode
of the load). Any other three letters will be retained unless
changed via an ASSIGN command.

2.7 G. CHANGE SYS FILES? (N)

With the exception of the first question, which refers to the size of
the ↑QAREA, this section refers to the core-image system programs cur-
rently listed in SYSBLK and COMBLK. This section allows no additions.
The printout given in Figure 2-7 illustrates the use of this section.

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```
G. CHANGE SYS FILES? (N) Y

        ↑Q  AREA SIZE(NONE,16K,20K,24K,28K,32K)[32K] 16K

        TO BE KEPT:

        DOS15? ($) $
        EDIT? ($) N

        EDITVP? ($) $
        EDITVT? ($) N

        PIP? ($) $
        MACRO? ($) $
        CHAIN? ($) $
        F4? ($) $
        DUMP? ($) $
        DTCOPY? ($) $
        PATCH? ($) $
        UPDATE? ($) $
        SRCCOM? ($) N

        8TRAN? ($) N

        89TRAN? ($) N

        MTDUMP? ($) N

        QFILE? ($) $
        SGEN? ($) $
        TKB? ($) $
```

FIGURE 2-7

2.7.1 ↑Q AREA SIZE (NONE,16K,2ØK,24K,28K,32K) [nn]

DOSGEN does not ask this question for Disk Pack systems -- they always receive 32K.

This question allows the DECdisk user to set the ↑Q AREA size. Users with an RF disk system device may wish to delete the ↑Q AREA. In that case, they should type NONE, in response to this question. The Resident Monitor will not allow dumps to a ↑Q AREA on the RF disk that is smaller than the current core size, or to a nenexistent area. The user should therefore avoid having an area which is smaller than his core size -- it would simply waste space. "K)" must follow the numbers 16, 2Ø, 24, 28, or 32.

Should the user need to make the ↑Q AREA larger, DOSGEN must try to find enough contiguous free blocks to hold the new one. If this proves impossible, special steps may need to be taken. Refer to paragraph 2.7.2.2 for those steps.

2.7.2 TO BE KEPT:
       syspro? ($)

After the ↑Q AREA size has been defined, DOSGEN asks questions about each core-image system program currently on the system, in the order that it finds them in COMBLK. A response of "$" or Carriage Return instructs DOSGEN to retain all information about the last-named system program. A response of "Y" instructs DOSGEN to retain the program's name in SYSBLK and COMBLK, but implies that the user wishes to change some of the information about the program, as listed in SYSBLK and COMBLK. An "N" will delete the program from the system. DOSGEN will not allow DOS15 to be deleted.

2.7.2.1 ovrlay (Y)   (where 'ovrlay" is the name of any cur-
                               rently listed overlay)
If the user responds to a system program name with a "Y", DOSGEN first lists each of the program's overlays, if any. These are Yes/No answers.

A "Y" or Carriage Return response retains that overlay, and an "N" response deletes it.

2.7.2.2 OVERLAY NAME []

If the user wishes to add any overlays to the current system program,
he should type the names at this point. DOSGEN will reject names which
are more than six characters long, or are the same as any Nonresident
Monitor or PATCH command. If the named overlay is already listed in
SYSBLK, DOSGEN will request the next overlay. If not, DOSGEN will re-
quest:

        # OF BLOCKS []

The user should type the number of blocks the new system program will
occupy. If the number is legal, DOSGEN tests whether there are as
many contiguous free blocks on the system device as are necessary
to hold the new overlay. DOSGEN starts testing at block Ø of the
system device, and stops as soon as it finds enough blocks. DOSGEN
then updates its image of the Storage Allocation Table (SAT) to
indicate that those blocks are occupied.

Note that when disk space is tight, and the user wishes to add several
system programs and overlays, DOSGEN may not allocate disk space effi-
ciently. In an extreme case, the user may need to first transfer the
BNK and PAG UFD's (or even all of IOS, except the system device's "A"
handler) off the disk via PIP, and then do one pass through DOSGEN to
delete all unwanted system programs. Then the user must do enough suc-
ceeding passes to ensure that system programs are added in order of
size, with the largest first. Finally, the user should transfer the
BNK and PAG UFD's back, via PIP. This allows the UFD files, which
need not be in contiguous blocks, to use up the noncontiguous blocks.

Ordinarily, the procedure outlined in Chapter 3 should be sufficient
to free all necessary disk space. NOTE: New overlays or system pro-
grams must run in Bank Mode. Use CHAIN for Page Mode programs.

2.7.2.3 BUFFS [nn]

This question indicates the number of buffers previously allocated
for this system program, and asks whether the user wishes to change
the number. DOSGEN does not check whether the number of buffers al-
located is compatible with the program. That is the user's responsi-
bility.

2.7.2.4 .DAT SLOT nn?   (Y)

After the user has indicated the number of buffers for this program,
DOSGEN asks him to check the .DAT slots required. It first lists the
old ones. If the user types Y or Carriage Return, DOSGEN retains the
listed .DAT slot. An "N" deletes the listed .DAT slot.

2.7.2.5 .DAT SLOTS

After checking the old .DAT slots, the user should add any new ones
the program needs. The .DAT slots added must be legal, as determined
in Section F. All positive .DAT slots may be obtained by typing
"ALL ". If the user has added an overlay, he should add any .DAT slots
needed by the overlay but not listed by DOSGEN for the system program.

2.8 H. ADD SYS PROG?   (N)

This section allows users to add the names of new core-image system
programs and their overlays to SYSBLK and COMBLK. Restarts in this
section delete only the current system program, just as they do for
new devices, Section C.

The printout given in Figure 2-8 illustrates the use of this section.

2.8.1 PROG NAME []

Names must conform to the rules for system program names outlined in
paragraph 2.7.2.2. There is no default for this question.

2.8.2 # OF BLOCKS []

This question works just like that for overlays, described in paragraph
2.7.2.2. There is no default for this question.

2.8.3 OVERLAY NAME []

Any overlay names must conform to the rules for system program names
outlined in Paragraph 2.7.2.2. If the overlay name is not already
listed in SYSBLK, DOSGEN requests:

        # OF BLOCKS []

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```
H. ADD SYS PROG? (N) Y

        PROG NAME[ ] ADMON

        # OF BLOCKS[ ] 7

        OVERLAY NAME[ ] ADMON1

        # OF BLOCKS[ ] 3

        OVERLAY NAME[ ]

        BUFFS[0] 4
C
        .DAT SLOTS:

        >11,12,13,14,15

        >


H. ADD SYS PROG? (N) N


                MODIFYING SYSTEM(↑P,↑C IGNORED)

        DELETED HANDLERS:
        DKC.
        DPA.
        DPB.
        DPC.
        MTA.
        MTC.
        MTF.
        CDB.
        VTA.
        VWA.
        LKA.
                SGEN COMPLETE
```

FIGURE 2-8

2.8.4 BUFFS [∅]

The user should enter the octal number of buffers needed for the new
system program.

2.8.5 .DAT SLOTS:

The user should list the octal numbers of all .DAT slots needed by the
new system program, or any of its overlays. The response "ALL)" obtains
all positive .DAT slots.

After the user has entered all necessary .DAT slots, he should type a
Carriage Return in response to the ">" symbol typed by DOSGEN. This
returns him to the start of Section H.

If the user types Carriage Return or "N" to the key question for
Section H, DOSGEN disallows CTRL P or CTRL C, modifies the system,
and returns to the monitor. At this point, the user must do a
Bootstrap restart, in order to bring in the modified system.

3. DOSGEN AND ITS CONTEXT

3.1 Building DOS-15 for the First Time

Digital Equipment Corporation supplies DOS-15 on disk restore tapes --
either one 7- or 9-track magnetic tape, or two DECtapes. In addition,
users with optional Floating Point Hardware should obtain a tape with
the Floating Point FORTRAN and Object Time Systems to accommodate that
option. The disk restore tape(s) should be copied onto the system
device via the DOSSAV program. Appendix A describes DOSSAV operation.

After the completion of a DOSSAV run from the DEC restore tapes to the
system device (disk), the disk will contain:

1. A working DOS-15 system
2. Completed images of three system information blocks:
     SGNBLK, SYSBLK, and COMBLK.
3. Core-image files of the following system programs:
     DOS15, the Nonresident Monitor
     RESMON, the Resident Monitor.
     .SYSLD, the System Loader
     EDIT
     EDITVP

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EDITVT

PIP

QFILE

MACRO

CREF, MACRO's overlay for pass three

CHAIN

F4, the FORTRAN program for PDP-15 machines without
     floating point hardware

DUMP

DTCOPY

PATCH

UPDATE

SRCCOM

8TRAN

89TRAN

MTDUMP

DOSGEN

TKB, the task builder for PDP-15 RSX

The DOS-15 User's Manual, DEC-15-MRDA-D, gives brief descrip-
tions of all these system programs, except TKB, the RSX Task
Builder.   See DEC-15-GRQA-D for information on TKB.

4.   Relocatable binary files in the IOS UFD. These files are
     handlers for the following devices:
      RF15 DECdisk Control
      RP15 Disk Pack Control
      PC15 High-Speed Paper Tape Reader and Punch Control
      VP15 Point Plotting Display
      VT15 Graphic Display Processor
      TC59 Magnetic Tape Control
      LP15C and LP15F Line Printers
      LK35 Keyboard
      TC15 DECtape Control
      CRØ3B Card Reader Control
      VWØ1 Writing Tablet

     Appendix B contains a listing of IOS, as supplied by the
     Digital Equipment Corporation.

5.   Relocatable binary files in the BNK and PAG UFD's. These
     files are the relocatable system programs: EXECUTE, .LOAD,
     FOCAL, and DDT, plus .LIBR, the system library. They load in
     Bank and Page Mode systems, respectively. Appendix B con-
     tains a listing of the BNK and PAG UFD's as supplied by DEC.

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6. Several source and binary files in the PER UFD. These files
    are for optional peripherals not included in the majority of
    the systems DOS-15 will serve, and for PDP-9 owners who wish
    to use DOS-15. Appendix C lists the PER UFD, as supplied by
    DEC, and describes the use of the routines contained in PER.
7. A 32K CTRL Q Area.
8. SCR, the default UFD. SCR will be empty.

The above-mentioned files and information blocks will fit on the
smallest system device supported by DOS-15, a single-platter RF15
DECdisk. Part of the system generation process is designed to free
the system device blocks occupied by unneeded handlers and system
programs. This is especially important on one- or two-platter DECdisk
systems to which the user intends to add his own system programs. The
following procedure will free up disk storage and set up a new system
in an orderly fashion:

                              NOTE
              The user should be logged in under the Monitor
              Identification Code for all the following
              operations.

3.1.1 Preliminary DOSGEN Run

Call DOSGEN, set up the correct system parameters, and delete all un-
desired device handlers and system programs. Do not add any new
handlers or programs. If a DECdisk system, and the computer's main
memory holds less than 32K words, reduce the CTRL Q Area.

3.1.2 One Mode Addressing

Users who intend to have a Bank or Page mode system only should delete
the appropriate UFD:

          $PIP
          >N {DK} {<PAG>} (K))
              {DP} {<BNK>}

3.1.3 FORTRAN Considerations

The user should next consider the system's FORTRAN capabilities. PDP-9
users should call PATCH, and replace F4 supplied with the system with
the binary file, F4X9, supplied in the PER UFD:

          $A (DK) <PER>-10)
             (DP)
          $PATCH)
          >F4)
          >READR F4X9)
          >EXIT)   28

PDP-15 users whose systems have the Floating Point Hardware should re-
place the system libraries in BNK and PAG with the libraries found in
the extra FORTRAN Floating Point Tape.   Before doing so, however,
the system manager should consider whether FOCAL will be used at the
installation.   If so, he must make an Execute file out of FOCAL.
(FOCAL has not been modified to take advantage of Floating Point Hard-
ware, and uses non-Floating Point OTS routines.)   If the user has his
own FOCAL routines, he should add them to FNEW (see Appendix C).

```
        $PAGE ON or OFF, as desired
        $A   SYS  -4/(assign desired output UIC)
        $CHAIN
           .
           .
        >FOCAL ALT MODE
           .
        >ALT MODE
           .
        >FOCAL ALT MODE
           .
        >ALT MODE ALT MODE
```

Then the system manager should replace the standard library with the
Floating Point Library:

```
        $PIP

      >T {<DK>} {BNK .LIBR BIN←DT1 BLIBRF BIN}
         {<DP>} {PAG .LIBR BIN←DT1 PLIBRF BIN}
```

Users with PDP-15 Floating Point Hardware should then replace the
FORTRAN supplied as a system program with the one from the Floating
Point Tape:

```
        $A DT1 -10)
        $PATCH)
        >F4)
        >READR FPF4X)
        >EXIT)
```

3.14 Graphics

When the proper FORTRAN routines have been installed, the user with a
VT15 Graphics Display Processor should add the Graphics routines in
the PER UFD to the system libraries in BNK and PAG:

```
      $A {DK} PER  -10/{DK}{<PAG>} -14,-15)
         {DP}      {DP}{<BNK>}

      $UPDATE )
      >US←)
      >I ROTATE)
      >I CIRCLE)
      >I VTPRIM)
      >I DYLDR)
      >I TRACK)
      >I LTORPB)
      >C)
```

3.1.5 VP15 Point Plotting Display

The user with a VP15 Point Plotting Display should add the following
routines to the libraries:

$$\$A \begin{Bmatrix} DK \\ DP \end{Bmatrix}<PER> \ -1\emptyset/\begin{Bmatrix} DK \\ DP \end{Bmatrix} \begin{Bmatrix} <PAG> \\ <BNK> \end{Bmatrix} -14, \ -15)$$

```
$UPDATE)
>US←)
>I VECTOR)
>I FORT)
>I NUVAL)
>C)
```

3.1.6 Source Files in PER

The user should next decide whether he needs any of the source files
supplied in PER. If so, he should assemble them via MACRO-15.
Appendix C describes the assembly parameters relevant to all the
source files in PER. Appendix C will also describe where in the system
the assembled files should be inserted.

3.1.7 Second DOSGEN Run

The user should run through DOSGEN, to add any devices and system
programs needed for the system.

3.1.8 PATCH

The user should call PATCH, to add any system programs for which
DOSGEN has reserved space.

3.1.9 PIP

The user should call PIP, and transfer to IOS any handlers added to
the system. * The user should then save the PER UFD on a tape, for
future reference, and delete the PER UFD from the system.

3.1.10 Copy the System

Finally, the user should make at least one copy of the new system,
via the DOSSAV program.

---

* Once device handlers have been transferred to IOS, they must be
renamed, if necessary, to the names assigned in Sections B and C.
The PIP "R" command will rename files.

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3.2 Using DOSGEN After the First Time

The system manager may call DOSGEN at any time, in order to modify
the system. Changes in system parameters, and deletion of devices,
device handlers or system programs require no advance preparation.
Addition of core-image system programs, however, may require some
preliminary work with PIP.

Core image system programs must occupy contiguous blocks on the system
device. In a running system, it is quite possible for there to be
sufficient free blocks to accept a new core image file, but no set of
contiguous, free blocks. In such an instance, the user will have to
transfer files from any of the UFD's on the system device to another
mass storage medium, and then run DOSGEN. After the DOSGEN run,
PATCH can add the system files, and PIP can bring back the transferred
UFD's. UFD's need not have contiguous disk storage.

APPENDIX A

DOSSAV Operating Instructions

DOSSAV is the save/restore system for DOS-15. It resides on a paper
tape, which must be HRM loaded at 3772Ø (restart 345ØØ).

It saves and restores to/from DECdisk, Disk Packs, DECtape and Magtape.
A DECdisk system can be saved on and restored from DECtape, Magtape
and Disk Pack. A Disk Pack system can use DECtape and Magtape.

Once loaded, it asks for all necessary information, such as input and
output devices, unit numbers and, in the case of Magtape, parity and
density.

GENERAL INSTRUCTION:

The user must type Carriage Return after all entries, including the
character typed to restart after errors.

A.   Restoring Systems

The following examples illustrate how to put the systems distributed
by Digital on DECtape or Magtape onto a DECdisk or Disk Pack. The user
responses are underlined.

            1. To restore a DECdisk system from DECtape (on Unit 1)
                    DOSSAV Vnn
                    INPUT DEVICE?   DT)
                    UNIT NO?   1)
                    OUTPUT DEVICE?   DK)
                    DATE CREATED: 28-SEP-71   /Note that if DK is typed no
                                                   /unit number is requested.
                    TAPE DONE.   MOUNT ANOTHER   /At this point, mount tape 2 and
                                                   /type any character on the key-
                                                   /board followed by a Carriage
                                                   /RETURN.

2. To restore a DECdisk system from Magtape (on Unit Ø):

```
DOSSAV Vnn
INPUT DEVICE?   MT )
UNIT NO?   Ø )
TRACK (7 OR 9)?   7 )
DENSITY (2,5,8)?   8 )
PARITY (E OR O)?   O )
OUTPUT DEVICE:   DK )
DATE CREATED:   28-SEP-71
```

NOTE

All DOS-15 System Restore Magtapes distributed
by Digital are 8ØØ BPI, odd parity.

3. To restore a Disk Pack system from DECtape (on Unit 1):

```
DOSSAV Vnn
INPUT DEVICE?   DT )
UNIT NO?   1 )
OUTPUT DEVICE?   DP )
UNIT NO?   Ø )
DATE CREATED:   28-SEP-71
TAPE DONE, MOUNT ANOTHER
```
                                    At this point, mount Tape 2 and
                                    type any character on the tele-
                                    printer followed by a Carriage
                                    RETURN.

4. To restore a Disk Pack:

```
DOSSAV Vnn
INPUT DEVICE?   MT )
UNIT NO?   1 )
TRACK (7 OR 9)?   7 )
DENSITY (2,5,8)?   8 )
PARITY (  OR O)?   O )
OUTPUT DEVICE?   DP )
UNIT NO?   Ø )
DATE CREATED:   28-SEP-71
```

It is possible to restore a software system to the DECdisk which was
created for a machine smaller (different number of DECdisk platters)
than the one being restored to. DOSSAV does all the necessary adjust-
ments of the SAT's[1]. Therefore, the restore tapes issued by Digital
for a 1 platter system can be restored to any system. Note that this
should only be done with the master tape(s) which have block 1775_8
free. That block is needed during the restore for 5 or more DECdisk
platters. Note that it is not possible to restore a software system
which is larger than the hardware. (For example, one cannot restore
a 3-platter system onto a 1-platter configuration.

---

[1] SAT's: Storage Allocation Tables - i.e., bit maps.

B. Saving Systems

Once the user has tailored the system to his specific configuration, he will want to save that system for future restorations. To do that, simply reverse the procedure above. To illustrate, consider Example 1 above and the changes necessary to it to create a restore tape.

    To save a DECdisk system to DECtape (on Unit 1):
```
    DOSSAV Vnn
    INPUT DEVICE?  DK)
    OUTPUT DEVICE?  DT )
    UNIT NO.?  1)
    TAPE DONE.  MOUNT ANOTHER
```
        At this point, mount another tape and type any character on the keyboard followed by a Carriage RETURN.

Note that DOSSAV allows for as many DECtapes and Magtapes as are necessary to hold the system.

C. Error Conditions and Messages

Recoverable errors during command string decoding: If a question is answered incorrectly, DOSSAV outputs an appropriate error message and then repeats the question. These error messages are:

ILLEGAL DEVICE	An illegal device mnemonic was typed (something other than DP, DK, DT or MT) or an illegal combination of devices was typed (i.e., input= DT and output = MT).
BAD TRACK	Something other than 7 or 9 was typed.
BAD DENSITY	Something other than 2 (200), 5 (556), or 8 (800) was typed.
BAD PARITY	Something other than E(even) or O (odd) was typed.

Recoverable errors during operations: If it is possible to recover from an error, DOSSAV will attempt to do it. The error message will be output to the console. After the problem has been corrected, any character on the keyboard followed by a Carriage RETURN will resume operation.

TAPE NOT READY	The DECtape or Magtape unit is off line or not write enabled.
DISK NOT READY	DECdisk is write locked.
DISK PACK NOT READY	The Disk Pack unit is not ready.

Unrecoverable errors: Primarily hardware errors, from which DOSSAV cannot recover. After the error message has been output, DOSSAV restarts. DOSSAV retries five times on parity error, before issuing an unrecoverable error message.

DECTAPE ERROR

MAGTAPE ERROR

DISK ERROR

DISK PACK ERROR

ATTEMPT TO RESTORE SYSTEM TO WRONG DISK	To protect users who have access to both a DECdisk and a disk pack and who may have several sets of restore tapes, all restore tapes are created with the mnemonic of the disk type in the first SAT. DOSSAV then checks this code against the output device code. If they differ, this message is output.
BLK 1775 OCCUPIED. NO 2ND SAT CREATED	A DECdisk system created for 4 or fewer platters is restored to a machine with 5 or more platters and block 1775 is already used. Therefore, no second SAT is created. A Master Tape was not used to make the restore.

D. Tape Structure

The restore tapes are structured as follows: The first SAT of the system is the first block put on the tape. This SAT, which is never restored to the disk, has 2 words modified: word 2 contains the creation date (taken from .SCOM+47) and word 376 contains the device mnemonic (.SIXBT, right justified). All the occupied blocks referenced by this SAT are then put sequentially on the tape. The second SAT, if there is one, is then put on, and so on. This structure enables use of Magtape, which is a sequential only device.

E. DOSSAV Restrictions

1. It is not possible to save or restore Magtapes with even parity.
2. DOSSAV fails when two DECtapes are on line with the same unit number. It is necessary to restart under such circumstances.
3. Error checking and recovery is minimal.

```
    15-OCT-71
DIRECTORY LISTING   (BNK)
  2012 FREE BLKS
     5 USER FILES
   100 USER BLKS
EXECUT BIN        3   24-SEP-71
.LIBR  BIN      106   24-SEP-71
.LOAD  BIN       11   06-OCT-71
FOCAL  BIN       23   24-SEP-71
ODT    BIN       13   24-SEP-71



    15-OCT-71
DIRECTORY LISTING   (PAG)
  2012 FREE BLKS
     5 USER FILES
   160 USER BLKS
EXECUT BIN        3   24-SEP-71
.LIBR  BIN      106   24-SEP-71
.LOAD  BIN       11   06-OCT-71
FOCAL  BIN       23   24-SEP-71
ODT    BIN       13   24-SEP-71



    15-OCT-71
MFD DIRECTORY LISTING
  2012 FREE BLKS
    65 USER FILES
  1054 USER BLKS
BNK       54(1)      5     160
PAG      302(1)      5     160
IOS      277(1)     31     221
SCR      NON(0)      0       0
PER       53(1)     21     271
```

The following is a listing of the PER UFD:

```
        28-SEP-71
     DIRECTORY LISTING   (PER)
        15 FREE BLKS
        21 USER FILES
       271 USER BLKS
     DOSBCD 003       37  28-SEP-71
     CD.DOS 012       52  28-SEP-71
     FNEW   004       16  28-SEP-71
     LPA.15 042       31  28-SEP-71
     OVLDR  BIN        2  28-SEP-71
     TRACK  BIN        2  28-SEP-71
     VTPRIM BIN        7  28-SEP-71
     ROTATE BIN        2  28-SEP-71
     NUVAL  BIN        1  28-SEP-71
     FORT   BIN        1  28-SEP-71
     VECTOR BIN        3  28-SEP-71
     CIRCLE BIN        2  28-SEP-71
     LPA.09 BIN        3  28-SEP-71
     F4X9   BIN       52  28-SEP-71
     VPA.S  BIN        4  28-SEP-71
     LP.647 BIN        3  28-SEP-71
     LTORPR BIN        1  28-SEP-71
```

PER contains four source files:

```
    DOSBCD 003
    CD.DOS 004
    FNEW   004
    LPA.15 042
```

Those installations which have their own FOCAL routines may want to
use EDIT's GET command to add their sources for FNEW. If these
sources substitute for others already present, EDIT can delete the
old routines. Once FNEW is completed, MACRO will produce FNEW BIN.
Then, the following commands to UPDATE will delete the old FNEW, and
insert the new one:

Table C-1, Assembly Parameters for Handler Sources in PER UFD, shows the assembly parameters that will produce all the possible variations of binary files. Note that once assembled, programs put in the IOS UFD must be renamed. For example, the binary produced from assembling LPA.15 Ø42 is LPS.15 BIN. When this program is put in the IOS UFD, it must be renamed to LPA.   BIN.

TABLE C-1

ASSEMBLY PARAMETERS

Binary Produced	Source Name	Assembly Parameters
LPA. (form feed on .INIT's, .CLOSES's & every 57_{10} lines)	LPA.15 Ø42	none
LPA. (form feed on .INIT & every 57_{10} lines)	LPA.15 Ø42	NOFF=1
LPA. (tab stop=8)	LP.647 ØØ2	none
LPA. (tab stop=1Ø)	LP.647 ØØ2	TAB1Ø=Ø
CDB. (CRO3B,Ø29 mode)	CD.DOS Ø12	none
CDB. (CRO3B,Ø26 mode)	CD.DOS Ø12	DECØ26=Ø
CDB. (CR15,Ø29 mode)	CD.DOS Ø12	CR15=Ø
CDB. (CR15,Ø26 mode)	CD.DOS Ø12	CR15=Ø DECØ26=Ø
CDB. (CRO1E,CRO2B, Ø29 mode)	CD.DOS Ø12	NOTGDI=Ø
CDB. (CRO1E,CRO2B, 026 mode)	CD.DOS Ø12	NOTGDI=Ø DECØ26=Ø
BCDB. (CRØ3B,Ø29 mode)	DOSBCD ØØ3	none
BCDB. (CRØ3B,Ø26 mode)	DOSBCD 003	DECØ26=Ø
BCDB. (CRØ1E,CRØ2B, Ø29 mode)	DOSBCD ØØ3	NOTGDY=Ø
BCDB. (CRØ1E,CRØ2B, Ø26 mode)	DOSBCD ØØ3	NOTGDI=Ø DECØ26=Ø

Any number of positive .DAT slots over 20_8 requires reassembly of FIOPS and .FLTB. These sources may be purchased from Digital Equipment Corporation under the following order number: DEC-15-SRDA-U11. Assembly parameter for .FLTB is: FLTBSZ=n$\leq 77_8$. Assembly parameter for FIOPS is: STTBSZ=n$\leq 77_8$.

SYSBLK 010   SYSBLK DOS15

                .TITLE SYSBLK DOS15
        /
        /COPYRIGHT 1971, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS.
        /
        /EDIT #010   9-22-71
        /
        /   SYSBLK (SYSTEM BLOCKS #34 AND 35(8)) CONTAINS THE PARAMETERS FOR
        /LOADING ALL THE CORE IMAGE FILES (SYS FILES) ON THE DOS15
        /SYSTEM EXCEPT FOR THE DATA FILES SGNBLK(#36)
        /AND SYSBLK. SYSBLK IS PART OF THE SYSTEM LOADER AND NON-RESIDENT MONITOR AND
        /STARTS AT LOCATION 16100(8). THE ORDER OF ENTRIES IN SYSBLK IS
        /UNIMPORTANT EXCEPT FOR THE FIRST 3 PERMANENT ENTRIES. THIS TABLE IS USED BY
        /PATCH, SGEN, THE SYSTEM LOADER, AND THE NON-RESIDENT MONITOR.
        /THIS TABLE IS MODIFIED WHEN
        /NECESSARY BY SGEN AND PATCH. THE FIRST WORD OF SYSBLK CONTAINS
        /THE UNRELOCATED ADDRESS OF THE FIRST FREE WORD OF SYSBLK. THE
        /ENTRIES CONSIST OF 7 WORDS. THE FOLLOWING
        /DESCRIPTION APPLIES TO ALL 7 WORD ENTRIES:
        /   WD1,WD2   .SIXBT 'NAME'
        /   WD3   FIRST BLOCK # (FB)
        /   WD4   # OF BLOCKS OCCUPIED (NB)
        /   WD5   FIRST ADDRESS (FA) (13 BITS)
        /   WD6   PROGRAM SIZE (PS) (HIGHEST ADDRESS - FA+1)
        /   WD7   START ADDRESS (SA) (13 BITS)
        /
                .ABS
00000   .LOC   0
00000   000242 SYSBLK END   /POINTER TO FIRST FREE WORD OF SYSBLK
                .EJECT

```
                      /
                      /       THE FOLLOWING THREE ENTRIES ARE FIXED IN SYSBLK AND CAN NEVER
                      /BE DELETED.  THEY REPRESENT THE BASIC SYS FILE CUSPS TO RUN THE
                      /SYSTEM AND THE CONTROL Q AREA.
                      /
00001    220523       SE1     .SIXBT   'RESMON'
00002    151716
00003    000000               0
00004    000040               40
00005    000100               100
00006    017400               17400
00007    000000               0
00010    562331       SE2     .SIXBT   ',SYSLD'
00011    231404
00012    000040               40
00013    000013               13
00014    011000               11000
00015    005100               5100
00016    011000               11000
00017    362101       SE3     .SIXBT   '+QAREA'
00020    220501
                              .IFUND   RP02
00021    000101               101
                              .ENDC
                              .IFDEF   RP02
                              117030
                              .ENDC
00022    000200               200
00023    000005               5
00024    077773               77773
00025    000000               0
                              .EJECT
```

```
                                   /          THIS ENTRY BEGINS THE DELETEABLE CORE IMAGE CUSPS
                                   /
       00026      050411           SE5        .SIXBT  'EDIT'
       00027      240000
       00030      000317                      317
       00031      000015                      15
       00032      011135                      11135
       00033      006007                      6007
       00034      011404                      11404
                                   /
       00035      050411           SE6        .SIXBT  'EDITVP'
       00036      242620
       00037      000334                      334
       00040      000017                      17
       00041      010121                      10121
       00042      006755                      6755          .
       00043      010402                      10402
       00044      050411           SE7        .SIXBT  'EDITVT'
       00045      242624
       00046      000353                      353
       00047      000017                      17
       00050      010130                      10130
       00051      006773                      6773
       00052      010406                      10406
       00053      201120           SE10       .SIXBT  'PIP@'
       00054      000000
       00055      000372                      372
       00056      000035                      35
       00057      001343                      1343
       00060      016274                      16274
       00061      001506                      1506
       00062      210611           SE11       .SIXBT  'QFILE'
       00063      140500
       00064      000427                      427
       00065      000002                      2
       00066      017041                      17041
       00067      000437                      437
       00070      017045                      17045
                                   /
       00071      150103           SE12       .SIXBT  'MACRO'
       00072      221700
       00073      000431                      431
       00074      000033                      33
       00075      002630                      2630
       00076      015005                      15005
       00077      002630                      2630
```

```
00100    132205     SE13     .SIXBT   'CREF'
00101    060000
00102    000464              464
00103    000005              5
00104    015550              15550
00105    002007              2007
00106    015551              15551
                    /
00107    031001     SE14     .SIXBT   'CHAIN'
00110    111600
00111    000471              471
00112    000021              21
00113    007240              7240
00114    010377              10377
00115    007240              7240
                    /
00116    066400     SE15     .SIXBT   'F4@@'
00117    000000
00120    000512              512
00121    000035              35
00122    002061              2061
00123    015556              15556
00124    002206              2206
                    /
00125    042515     SE16     .SIXBT   'DUMP'
00126    200000
00127    000547              547
00130    000005              5
00131    015300              15300
00132    002337              2337
00133    015300              15300
                    /
00134    042403     SE17     .SIXBT   'DTCOPY'
00135    172031
00136    000554              554
00137    000003              3
00140    016662              16662
00141    000755              755
00142    016701              16701
                    /
00143    200124     SE20     .SIXBT   'PATCH'
00144    031000
00145    000557              557
00146    000010              10
00147    012700              12700
00150    003463              3463
00151    012700              12700
                             .EJECT
```

```
00152    252004       SE21     .SIXBT   'UPDATE'
00153    012405
00154    000567                567
00155    000013                13
00156    012370                12370
00157    005247                5247
00160    012371                12371
                      /
00161    232203       SE22     .SIXBT   'SRCCOM'
00162    031715
00163    000602                602
00164    000013                13
00165    012647                12647
00166    004770                4770
00167    012752                12752
00170    702422       SE23     .SIXBT   '8TRAN'
00171    011600
00172    000615                615
00173    000011                11
00174    013607                13607
00175    004032                4030
00176    013671                13671
00177    707124       SE24     .SIXBT   '89TRAN'
00200    220116
00201    000626                626
00202    000011                11
00203    013562                13562
00204    004055                4055
00205    013644                13644
00206    152404       SE25     .SIXBT   'MTDUMP'
00207    251520
00210    000637                637
00211    000012                12
00212    013167                13167
00213    004450                4450
00214    013260                13260
                      /
00215    230705       SE26     .SIXBT   'SGEN'
00216    160000
00217    000651                651
00220    000022                22
00221    005545                5545
00222    010356                10356
00223    005610                5610
00224    241302       SE27     .SIXBT   'TKB@'
00225    000000
```

```
00226    000706                      706
00227    000021                      21
00230    007573                      7573
00231    010044                      10044
00232    007750                      7750
00233    241723          SE30     ,SIXBT   'DOS15'
00234    616500
00235    000727                      727
00236    000035                      35
00237    000677                      677
00240    015201                      15201
00241    001276                      1276
         000242          END=,
```

```
                        .TITLE  COMBLK DOS15
            /
            /
            /       COMBLK CONTAINS INFORMATION THE SYSTEM LOADER, THE
            /NON-RESIDENT MONITOR, AND SYSTEM GENERATOR NEED TO REMEMBER
            /ABOUT CURRENT SYS FILE CUSPS.
            /THE LAST LOCATION IN SYSBLK CONTAINS THE
            /UNRELOCATED ADDRESS OF THE FIRST ENTRY IN COMBLK.  THE
            /REMAINDER OF COMBLK CONSISTS OF VARIABLE LENGTH ENTRIES ASSOCIATED
            /WITH SYS FILE CUSPS (CORE IMAGE SYSTEM PROGRAM FILES).  EACH
            /ENTRY IS OF THE FOLLOWING FORM!
            /       (1) THE FIRST WORD IS AN OFFSET NUMBER INDICATING THE
            /           NUMBER OF WORDS IN THE ENTRY INCLUDING THE OFFSET
            /           WORD.
            /       (2) THE NEXT TWO WORDS CONTAIN THE NAME OF THE CUSP IN .SIXBT
            /           IF THE NAME IS LESS THAN SIX CHARACTERS IN LENGTH, THE
            /           TRAILING CHARACTER POSITIONS ARE ZEROED.  THE FIRST
            /           CHARACTER POSITION MUST BE NON-ZERO.
            /       (3) IF THERE ARE ANY OVERLAY SEGMENTS, THEIR TWO WORD NAMES
            /           ARE ENTERED AFTER THE FIRST NAME ABOVE (2).
            /       (4) WHEN A WORD HAS 0'S IN BIT POSITIONS 0-5, AND IT
            /           IS RIGHT AFTER THE CUSP NAME OR AN OVERLAY NAME,
            /           IT TERMINATES THE LIST OF SEGMENT NAMES.  THE REMAINDER
            /           OF THIS WORD CONTAINS THE DEFAULT VALUE FOR THE 'FILES'
            /           COMMAND FOR THE CUSP.
            /       (5) THE REMAINDER OF THE COMBLK ENTRY CONTAINS THE ACTIVE
            /           .DAT SLOT NUMBERS FOR THE CUSP WITH BITS 0-8 ZEROED
            /           (EXCEPT THAT -1 INDICATES THAT ALL POSITIVE .DAT SLOTS
            /           ARE TO BE LOADED).
            /
            /THE SYSTEM GENERATOR ADDS CUSPS TO COMBLK BY MAKING THEM THE NEW
            /FIRST ENTRY.  IN THIS WAY SYSBLK AND COMBLK BUILD TOWARD THE CENTER.
            /
00600                   .LOC    600
            /
00600 000005   E1       E3-E1
00601 041723            .SIXBT  'DOS15'
00602 616500
00603 000001            1
00604 000766            -128777
                        .EJECT
```

```
00605    000007     E3        E4-E3
00606    050411               .SIXBT    'EDIT'
00607    240000
00610    000002               2             /# OF BUFFERS REQ FOR EDIT,
00611    000763               -15&777
00612    000764               -14&777
00613    000770               -10&777
                    /
00614    000010     E4        E4A-E4
00615    050411               .SIXBT    'EDITVP'
00616    242620
00617    000002               2             /# OF BUFFERS REQ FOR EDITVP,
00620    000763               -15&777
00621    000764               -14&777
00622    000770               -10&777
00623    000010               10
                    /
00624    000007     E4A       E5-,
00625    050411               .SIXBT    'EDITVT'
00626    242624
00627    000002               2
00630    000763               -15&777
00631    000764               -14&777
00632    000770               -10&777
                    /
00633    000005     E5        E6-E5
00634    201120               .SIXBT    'PIP@'
00635    000000
00636    000004               4             /# OF BUFFERS REQ FOR PIP,
00637    777777               -1            /ALL POSITIVE ,DAT SLOTS
                    /
00640    000013     E6        E7-E6
00641    150103               .SIXBT    'MACRO'
00642    221700
00643    032205               .SIXBT    'CREF'
00644    060000
00645    000003               3
00646    000764               -14&777
00647    000765               -13&777
00650    000766               -12&777
00651    000767               -11&777
00652    000770               -10&777
```

```
00653    000010      E7     E8-E7
00654    031001             .SIXBT  'CHAIN'
00655    111600
00656    000003             3
00657    000772             -6&777
00660    000773             -5&777
00661    000774             -4&777
00662    000777             -1&777
00663    000007      E8     E9-E8
00664    066400             .SIXBT  'F4@@'
00665    000000
00666    000003             3
00667    000765             -13&777
00670    000766             -12&777
00671    000767             -11&777
                     /
00672    000006      E9     E10-E9
00673    042515             .SIXBT  'DUMP'
00674    200000
00675    000002             2
00676    000764             -14&777
00677    000766             -12&777
                     /
00700    000006      E10    E11-E10
00701    042403             .SIXBT  'DTCOPY'
00702    172031
00703    000002             2
00704    000763             -15&777
00705    000764             -14&777
                     /
00706    000006      E11    E12-E11
00707    200124             .SIXBT  'PATCH'
00710    031000
00711    000002             2
00712    000764             -14&777
00713    000770             -10&777
```

```
00714    000010    E12      E13-E12
00715    252004             .SIXBT   'UPDATE'
00716    012405
00717    000004             4
00720    000763             -15&777
00721    000764             -14&777
00722    000766             -12&777
00723    000770             -10&777
                   /
00724    000007    E13      E13A-E13
00725    232203             .SIXBT   'SRCCOM'
00726    031715
00727    000003             3
00730    000763             -15&777
00731    000764             -14&777
00732    000766             -12&777
00733    000006    E13A     E13B-,
00734    702422             .SIXBT   '8TRAN'
00735    011600
00736    000002             2
00737    000763             -15&777
00740    000764             -14&777
00741    000006    E13B     E13C-,
00742    707124             .SIXBT   '89TRAN'
00743    220116
00744    000002             2
00745    000763             -15&777
00746    000764             -14&777
00747    000006    E13C     E13D-,
00750    152404             .SIXBT   'MTDUMP'
00751    251520
00752    000002             2
00753    000001             1
00754    000003             3
00755    000005    E13D     E14-,
00756    210611             .SIXBT   'QFILE'
00757    140500
00760    000001             1
00761    000764             -14&777
```

```
                            /
00762      000005       E14       E15-E14
00763      230705                 .SIXBT  'SGEN'
00764      160000
00765      000001                 1
00766      000764                 -14&777
00767      000010       E15       E16-.
00770      241302                 .SIXBT  'TKB@'
00771      000000
00772      000003                 3
00773      000772                 -6&777
00774      000773                 -5&777
00775      000774                 -4&777
00776      000777                 -1&777
           000777       E16=.
00777      000600       COMBLK E1                      /POINTER TO THE FIRST ENTRY IN COMBLK
           000000                 .END
                SIZE=01000        NO ERROR LINES
```

```
                   .TITLE   SGNBLK DOS15
          /
          /COPYRIGHT 1971, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS,
          /
          /EDIT #008        9-22-71
          /
          /       SGNBLK (SYSTEM BLOCK #36(8)) CONTAINS ALL THE SYSTEM PARAMETERS
          /NOT ASSOCIATED DIRECTLY WITH SYS FILE CUSPS,  THE BULK OF SGNBLK
          /IS CONCERNED WITH I/O (.DAT SLOTS,.UFD SLOTS, SKIP CHAIN ORDER, HANDLERS,
          /SKIP IOT NUMBERS AND MNEMONICS),  THE FIRST FEW REGISTERS OF SGNBLK
          /HOLD SUCH IMPORTANT SYSTEM PARAMETERS AS THE SYSTEM DEVICE,
          / .SCOM+4 CONTENTS, ETC,  SGNBLK IS PART OF THE
          /SYSTEM LOADER AND NON-RESIDENT MONITOR AND STARTS AT LOCATION
          /17100(8),  THE FIRST
          /WORD IN SGNBLK POINTS TO THE UNRELOCATED ADDRESS OF THE FIRST FREE
          /WORD IN THE BLOCK,  THE NEXT ENTRY IS AN OFFSET WORD INDICATING
          /THE TOTAL LENGTH (INCLUDING ITSELF) OF THE MISCELLANEOUS
          /SYSTEM PARAMETER TABLE TO FOLLOW,  THIS TABLE INCLUDES THE SIZE OF
          /THE .DAT SLOT TABLE AND THE SIZE OF THE SKIP CHAIN TABLE,  THE END
          /OF THE HANDLER AND SKIP IOT TABLE IS THE FIRST FREE ENTRY OF THE BLOCK,
          /
                   .ABS
00000              .LOC     0
00000    000313    SGNBLK   .SIZE            /POINTER TO FIRST FREE ENTRY IN SGNBLK
```

```
                              .IFDEF   RP02
                      SYSDEV=17
                              .ENDC
                              .IFUND   RP02
           000014       SYSDEV=14
                              .ENDC
                      /
                      /BASIC SYSTEM PARAMETERS
                      /
00001      000015     NOPAR    SGNDAT=.           /NUMBER OF MISCELLANEOUS PARAMETERS
00002      000074     NODAT    SGNSKP=SGNDAT      /(NUMBER OF POSITIVE .DAT SLOTS + 16)*2
                                                  /EQUALS SIZE OF .DAT SLOT TABLE AND .UFD TABLE
00003      000026     NOSKP    SGNTAB=SGNSKP      /NUMBER OF SKIPS IN THE SKIP CHAIN
           000004     SDEV1=.                     /SYSTEM DEVICE CODE
                              .IFDEF   RP02
                              .SIXBT   /DP/
                              .ENDC
                              .IFUND   RP02
00004      041300             .SIXBT   /DK/
                              .ENDC
00005      300500     SCOM4    300500             /ORIGINAL CONTENTS OF .SCOM+4
00006      000000     SCOM20   0                  /ORIGINAL CONTENTS OF .SCOM+20
00007      000500     X1       500                /NUMBER OF DATA REGISTERS PER OPEN FILE ON MASS
                                                  /STORAGE (.SCOM+27)
00010      000003     FILES    3                  /DEFAULT NUMBER OF FILES TO BE OPEN AT SAME TIME (.SCOM+26)
                                                  /FOR USE WITH THE LINKING LOADER AND EXECUTE
00011      233123     MIC      .SIXBT   'SYS'         /THE MONITOR IDENTIFICATION CODE
00012      000000     SCOM33   0                      /+X INFORMATION (.SCOM+33)
00013      000002     PROTCT   2                      /DEFAULT PROTECTION CODE FOR FILES (.SCOM+54)
                                                  / 1      READ/WRITE (WITH RANDOM ACCESS)
                                                  / 2      READ/NO WRITE
                                                  / 3      NO READ/NO WRITE
00014      000000     PCHSZ    0                  /SIZE OF THE RESIDENT MONITOR PATCH AREA
00015      777704     CLKCON   -74                /-# OF TICKS IN A SECOND (-74 FOR
                                                  /60 CPS AND -62 FOR 50 CPS)
                      /
```

D-13

```
                          .TITLE   .DAT SLOTS TABLE
                       /
                       /        THIS .DAT SLOT TABLE CORRESPONDS TO THE LEGAL RANGE
                       /OF .DAT SLOTS WITH THE MAXIMUM NEGATIVE .DAT SLOT SET TO -15 AND
                       /THE MAXIMUM POSITIVE .DAT SLOT SET TO A SYSTEM PARAMETER NOT TO
                       /EXCEED 77(8).   THE .DAT SLOTS ARE IN THE SAME FORM AS BEFORE.   THE
                       /UNIT NUMBER IS IN BITS 0-2 AND THE NUMBER OF THE HANDLER RIGHT
                       /JUSTIFIED IN BITS 3-18.   THE HANDLER NUMBER FOR THE FIRST HANDLER IN
                       /THE DEVICE HANDLER-SKIP IOT TABLE IS 0 (FOR THE PSEUDO-HANDLER NON).
                       /TTA IS 1 ETC.   THE CONSTANT 100000 INDICATES A FIXED OR ILLEGAL
                       /.DAT SLOT. THESE SLOTS ARE NOT SET BY SGEN.
                       /
00016   000014         SGNDAT   SYSDEV              /-15
00017   000014                  SYSDEV              /-14
00020   000014                  SYSDEV              /-13
00021   000001                  1                   /-12
00022   000014                  SYSDEV              /-11
00023   000001                  1                   /-10
00024   100000                  100000              /-7
00025   000014                  SYSDEV              /-6
00026   000000                  0                   /-5
00027   000014                  SYSDEV              /-4
00030   100000                  100000              /-3
00031   100000                  100000              /-2
00032   000014                  SYSDEV              /-1
00033   100000                  100000              /0
00034   000014                  SYSDEV              /1
00035   000014                  SYSDEV              /2
00036   000014                  SYSDEV              /3
00037   000001                  1                   /4
00040   000002                  2                   /5
00041   000004                  4                   /6
00042   100007                  100007              /7
00043   200007                  200007              /10
00044   000000                  0                   /11
00045   000000                  0                   /12
00046   000000                  0                   /13
00047   000000                  0                   /14
00050   000000                  0                   /15
00051   000000                  0                   /16
00052   000000                  0                   /17
00053   000000                  0                   /20
```

```
                        .TITLE  .UFD TABLE
              /
              /        .UFD TABLE IS IN 1 TO 1 CORRESPONDENCE WITH THE  .DAT SLOT
              /TABLE.  AN ENTRY OF .SIXBT 'UIC' INDICATES THAT THE LOGIN
              /UIC IS TO BE SUBSTITUTED FOR THE NAME UIC IN THE TABLE.  OTHERWISE
              /THE CONTENTS OF EACH LOCATION WILL BE THE .SIXBT REPRESENTATION OF
              /THE CORRESPONDING .UFD SLOT.
              /
00054  251103  SGNUFD  .SIXBT  'UIC'              /-15
00055  251103          .SIXBT  'UIC'              /-14
00056  251103          .SIXBT  'UIC'              /-13
00057  251103          .SIXBT  'UIC'              /-12
00060  251103          .SIXBT  'UIC'              /-11
00061  251103          .SIXBT  'UIC'              /-10
00062  233123          .SIXBT  'SYS'              /-7
00063  251103          .SIXBT  'UIC'              /-6
00064  251103          .SIXBT  'UIC'              /-5
00065  251103          .SIXBT  'UIC'              /-4
00066  251103          .SIXBT  'UIC'              /-3
00067  251103          .SIXBT  'UIC'              /-2
00070  233123          .SIXBT  'SYS'              /-1
00071  233123          .SIXBT  'SYS'              /0 MIC
00072  251103          .SIXBT  'UIC'              /1
00073  251103          .SIXBT  'UIC'              /2
00074  251103          .SIXBT  'UIC'              /3
00075  251103          .SIXBT  'UIC'              /4
00076  251103          .SIXBT  'UIC'              /5
00077  251103          .SIXBT  'UIC'              /6
00100  251103          .SIXBT  'UIC'              /7
00101  251103          .SIXBT  'UIC'              /10
00102  251103          .SIXBT  'UIC'              /11
00103  251103          .SIXBT  'UIC'              /12
00104  251103          .SIXBT  'UIC'              /13
00105  251103          .SIXBT  'UIC'              /14
00106  251103          .SIXBT  'UIC'              /15
00107  251103          .SIXBT  'UIC'              /16
00110  251103          .SIXBT  'UIC'              /17
00111  251103          .SIXBT  'UIC'              /20
```

```
                        .TITLE  SKIP CHAIN TABLE
                /
                /       THE SKIP CHAIN TABLE LISTS THE SYSTEM SKIP IOTS IN ORDER
                /   A NEGATIVE SKIP APPEARS IN THE TABLE IN 1'S COMPLEMENT(POSITIVE).
                /NOT ALL THE SKIPS IN THE HANDLER-SKIP IOT TABLE NEED TO BE INCLUDED IN
                /THIS TABLE.   THE DONE COMMAND IN SGEN CAN BE USED TO TERMINATE
                /THE SKIP CHAIN BUILDING AT ANY SIZE.   THIS EFFECTIVELY DELETES THE
                /REMAINING, UNLISTED SKIPS FROM THE SKIP CHAIN.
                /
00112   703201  SGNSKP  703201  /SPFAL
00113   707601          707601  /DTDF
                        .IFUND  RB09
00114   707001          707001  /DSSF
                        .ENDC
                        .IFDEF  RB09
                        707121  /DSSF
                        .ENDC
00115   706341          706341  /DPSJ
00116   707341          707341  /MTSF
00117   703121          703121  /SPDI
00120   703261          703261  /WTSK
00121   700521          700521  /SDDF
00122   706701          706701  /RCSF
00123   706721          706721  /RCSD
00124   706501          706501  /LSDF
00125   700001          700001  /CLSF
00126   700101          700101  /RSF
00127   700201          700201  /PSF
00130   700301          700301  /KSF
00131   704101          704101  /SPKF
00132   700401          700401  /TSF
00133   707561          707561  /DTEF
00134   706361          706361  /DPSE
00135   701741          701741  /MPSNE
00136   701701          701701  /MPSK
00137   702701          702701  /SPE
```

```
                        .TITLE   DEVICE HANDLER-SKIP IOT TABLE
                /
                /       THE DEVICE HANDLER-SKIP IOT TABLE CONTAINS ALL THE HANDLER NAMES
                /AND SKIP IOT NUMBERS AND MNEMONICS FOR EACH I/O DEVICE KNOWN TO THE
                /SYSTEM,  EVERY DEVICE HAS AN ENTRY IN THE TABLE.  A HANDLER
                /NAME MUST BE EXACTLY 3 CHARACTERS IN LENGTH WITH THE LAST CHARACTER
                /NOT AN OCTAL DIGIT.  THE DEVICE CODE FOR A DEVICE IS EXACTLY 2
                /CHARACTERS.  THE FIRST 2 CHARACTERS OF EACH HANDLER NAME FOR A
                /DEVICE MUST BE THE DEVICE CODE.  THIS FACT IS ESSENTIAL FOR UNDERSTAND-
                /ING THE FORMAT OF A DEVICE ENTRY, SINCE THE DEVICE CODE IS NEVER
                /STORED AS SUCH IN AN ENTRY, BUT IS INFERRED FROM THE DEVICE HANDLER
                /NAMES.  THE TYPICAL ENTRY FOR A DEVICE IS THE FOLLOWING:
                /       (1) THE FIRST WORDS OF AN ENTRY CONTAIN THE HANDLER NAMES
                /           FOR A DEVICE IN .SIXBT.  EACH HANDLER NAME IS DIFFERENT.
                /           A 3 CHARACTER HANDLER NAME IN .SIXBT NEATLY FITS INTO
                /           1 COMPUTER WORD.  THE END OF THE LIST IS DETERMINED
                /           BY A WORD WITH 0'S IN BITS 0-5 (FIRST CHARACTER POSITION).
                /       (2) THE WORD THAT TERMINATED (1) CONTAINS THE NUMBER OF SKIP
                /           IOTS FOR THE DEVICE.  FOR EACH SKIP IOT 3 WORDS ARE IN THE
                /           TABLE.  THE FOLLOWING IS A REPRESENTATION OF THESE 3 WORDS:
                /               (A) THE FIRST 2 WORDS ARE THE SKIP MNEMONIC USED FOR
                /                   REFERRING TO THE SKIP SYMBOLICLY IN .SIXBT WITH
                /                   TRAILING CHARACTER POSITIONS CONTAINING 0'S.  THE
                /                   SKIP MNEMONIC MUST NOT EXCEED 6 CHARACTERS.
                /               (B) THE LAST WORD ABOUT THE SKIP IS THE ACTUAL MACHINE
                /                   INSTRUCTION NUMBER FOR THE SKIP IOT.  IF THE
                /                   SKIP IS NEGATIVE THIS NUMBER WILL BE 1'S COMPLEMENT
                /                   OF THE ACTUAL MACHINE INSTRUCTION (POSITIVE).
                /THE NEXT DEVICE ENTRY FOLLOWS THE LAST SKIP FOR THE PREVIOUS DEVICE.
                /A HANDLER MAY BE ENTERED WITHOUT ANY SKIPS, BUT NO DEVICES MAY BE
                /ENTERED WITHOUT AT LEAST ONE HANDLER NAME.
                /
00140   161716  SGNTAB  .SIXBT   'NON'            /DEV 0 HAND. 0
00141   000005          5                        /5 SKIPS
00142   031423          .SIXBT   'CLSF'          /CLOCK DONE
00143   060000
00144   700001          700001
00145   152023          .SIXBT   'MPSNE'         /NON-EXISTENT MEMORY REFERENCE
00146   160500
00147   701741          701741
00150   152023          .SIXBT   'MPSK'          /MEMORY PROTECT VIOLATION
00151   130000
00152   701701          701701
```

```
00153   232005                  .SIXBT  'SPE@'          /MEMORY PARITY ERROR
00154   000000
00155   702701                  702701
00156   232006                  .SIXBT  'SPFAL'         /POWER FAIL
00157   011400
00160   703201                  703201

00161   242401          DEV1    .SIXBT  'TTA'           /DEV1 HAND,1
00162   000002                  2                       /2 SKIPS
00163   132306                  .SIXBT  'KSF@'          /KEYBOARD DONE
00164   000000
00165   700301                  700301
00166   242306                  .SIXBT  'TSF@'          /TELEPRINTER DONE
00167   000000
00170   700401                  700401
00171   202201          DEV2    .SIXBT  'PRA'           /DEV2 HAND,2
00172   202202                  .SIXBT  'PRB'           /HAND,3
00173   000001                  1                       /1 SKIP
00174   222306                  .SIXBT  'RSF@'          /READER DONE
00175   000000
00176   700101                  700101
00177   202001          DEV3    .SIXBT  'PPA'           /HAND,4
00200   202002                  .SIXBT  'PPB'           /HAND,5
00201   202003                  .SIXBT  'PPC'           /HAND,6
00202   000001                  1                       /1 SKIP
00203   202306                  .SIXBT  'PSF@'          /PUNCH DONE
00204   000000
00205   700201                  700201
00206   042401          DEV4    .SIXBT  'DTA'           /HAND,7
00207   042403                  .SIXBT  'DTC'           /HAND,10
00210   042404                  .SIXBT  'DTD'           /HAND,11
00211   042405                  .SIXBT  'DTE'           /HAND,12
00212   042406                  .SIXBT  'DTF'           /HAND,13
00213   000002                  2
00214   042404                  .SIXBT  'DTDF'          /DECTAPE DONE
00215   060000
00216   707601                  707601
00217   042405                  .SIXBT  'DTEF'          /DECTAPE ERROR
00220   060000
00221   707561                  707561
```

```
00222    041301      DEV5    .SIXBT  'DKA'       /HAND,14
00223    041302              .SIXBT  'DKB'       /HAND,15
00224    041303              .SIXBT  'DKC'       /HAND,16
00225    000001              1                   /1 SKIP
00226    042323              .SIXBT  'DSSF'      /DISK DONE
00227    060000

                             .IFUND  RB09
00230    707001              707001
                             .ENDC
                             .IFDEF  RB09
                             707121
                             .ENDC

00231    042001      DEV6    .SIXBT  'DPA'       /HAND, 17
00232    042002              .SIXBT  'DPB'       /HAND, 20
00233    042003              .SIXBT  'DPC'       /HAND, 21
00234    000002              2
00235    042023              .SIXBT  'DPSJ'      /DISK DONE
00236    120000
00237    706341              706341
00240    042023              .SIXBT  'DPSE'      /DISK ERROR
00241    050000
00242    706361              706361
00243    152401      DEV7    .SIXBT  'MTA'       /HAND, 22
00244    152403              .SIXBT  'MTC'       /HAND, 23
00245    152406              .SIXBT  'MTF'       /HAND,24
00246    000001              1                   /1 SKIP
00247    152423              .SIXBT  'MTSF'      /MAGNETIC TAPE DONE ON ERROR
00250    060000
00251    707341              707341
00252    142001      DEV10   .SIXBT  'LPA'       /HAND,25
00253    000001              1                   /1 SKIP
00254    142304              .SIXBT  'LSDF'      /LINE PRINTER DONE
00255    060000
00256    706501              706501
```

```
00257    030402    DEV11    ,SIXBT    'CDB'              /HAND,26
00260    000002             2                            /2 SKIPS
00261    220323             ,SIXBT    'RCSF'             /CARD READER
00262    060000
00263    706701             706701
00264    220323             ,SIXBT    'RCSD'
00265    040000
00266    706721             706721
00267    262001    DEV12    ,SIXBT    'VPA'              /HAND,27
00270    000001             1                            /1 SKIP
00271    230404             ,SIXBT    'SDDF'             /DISPLAY
00272    060000
00273    700521             700521
00274    262401    DEV13    ,SIXBT    'VTA'              /HAND, 30) VT SCOPE DISPLAY
00275    000001             1                            /1 SKIP; LIGHT PEN)PUSH BUTTON;
00276    232004             ,SIXBT    'SPDI'   /INTERNAL AND EXTERNAL STOP
00277    110000
00300    703121             703121                       /OR EDGE VIOLATION ON VT
00301    262701    DEV14    ,SIXBT    'VWA'              /HAND, 31; WRITING TABLET
00302    000001             1                            /1 SKIP
00303    272423             ,SIXBT    'WTSK'   /PEN CONTACT WITH TABLET
00304    130000
00305    703261             703261
00306    141301    DEV15    ,SIXBT    'LKA'              /HAND 32; VT KEYBOARD LK35
00307    000001             1                            /1 SKIP
00310    232013             ,SIXBT    'SPKF'             /LK35 KEYBOARD DONE
00311    060000
00312    704101             704101
```

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