HP 3000 Computer System

MPE IV System Tables

Reference Manual

HEWLETT PACKARD

19447 PRUNERIDGE AVE., CUPERTINO, CALIFORNIA 95014

Part No. 32002-90003
Product No. 32002C

Printed in U.S.A. 4/81

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PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The date on the title page and back cover of the manual changes only when a new edition is published. When an edition is reprinted, all the prior updates to the edition are incorporated. No information is incorporated into a reprinting unless it appears as a prior update. The edition does not change.

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First Edition. . . . . Jan 1979
Second Edition . . . . . Apr 1981

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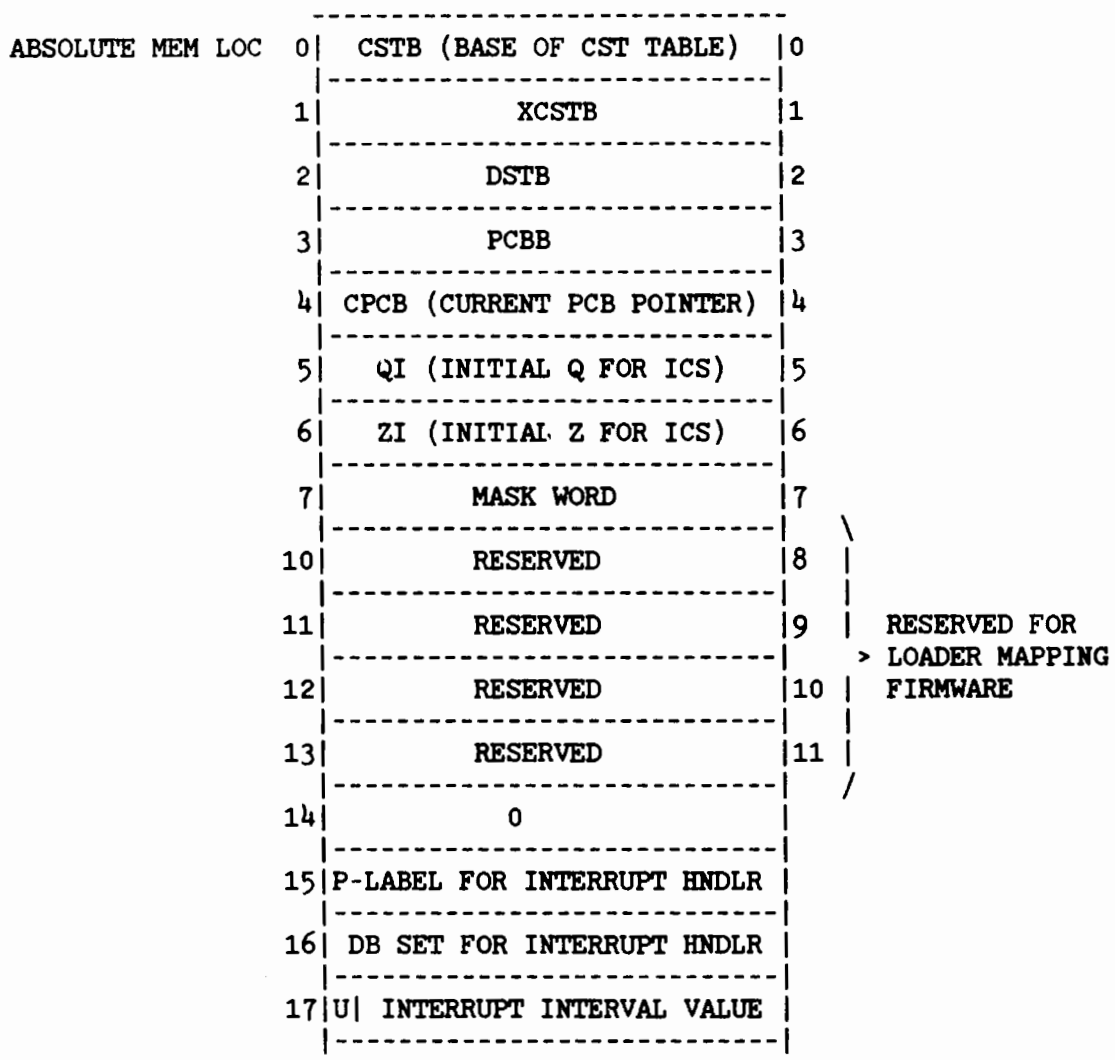
CHAPTER 1 MEMORY LAYOUT

FIXED LOW MEMORY (SERIES II/III)



U: set if clock interface has been used since coldload

NOTE: ALL POINTERS ARE ABSOLUTE ADDRESSES.

FIXED LOW MEMORY (SERIES 30/33)

%		DEC
0	CSTB (BASE OF CST TABLE)**	0
1	XCSTB (BASE OF CSTX TABLE)**	1
2	DSTB (BASE OF DST TABLE)**	2
3	PCBB (BASE OF PCB TABLE)**	3
4	CPCB (CURRENT PCB POINTER)**	4
5	QI (INITIAL Q FOR ICS)**	5
6	ZI (INITIAL Z FOR ICS)**	6
7	SYSTEM INTERRUPT MASK WORD**	7
10	DBBANK (FOR INITIAL'S STACK)*	10
		8
11	DB (FOR INITIAL'S STACK)*	9
12	CHANPROG (BUFF FOR DISC)*	10
13		11
14	SDTYPE (USED BY BOOTSTRAP-SYS DISC)*	12
15		13
16	SPEEDCODE (CODE FOR CONSOLE SPEED)*	14
17	TERMCHANPROG (BUFF FOR CONSOLE)*	15
20	TAPECHANPROG (BUFF FOR TAPE)*	16
21	LR (INTERRUPT INTERVAL)+	17
22	TEMPLR (TEMP STOREAGE OF LIMIT REG)+	18
23	PCLC (PROCESS CLOCK LAST COUNT)**	19
24	PCHI (PROCESS TIME - MSW)**	20

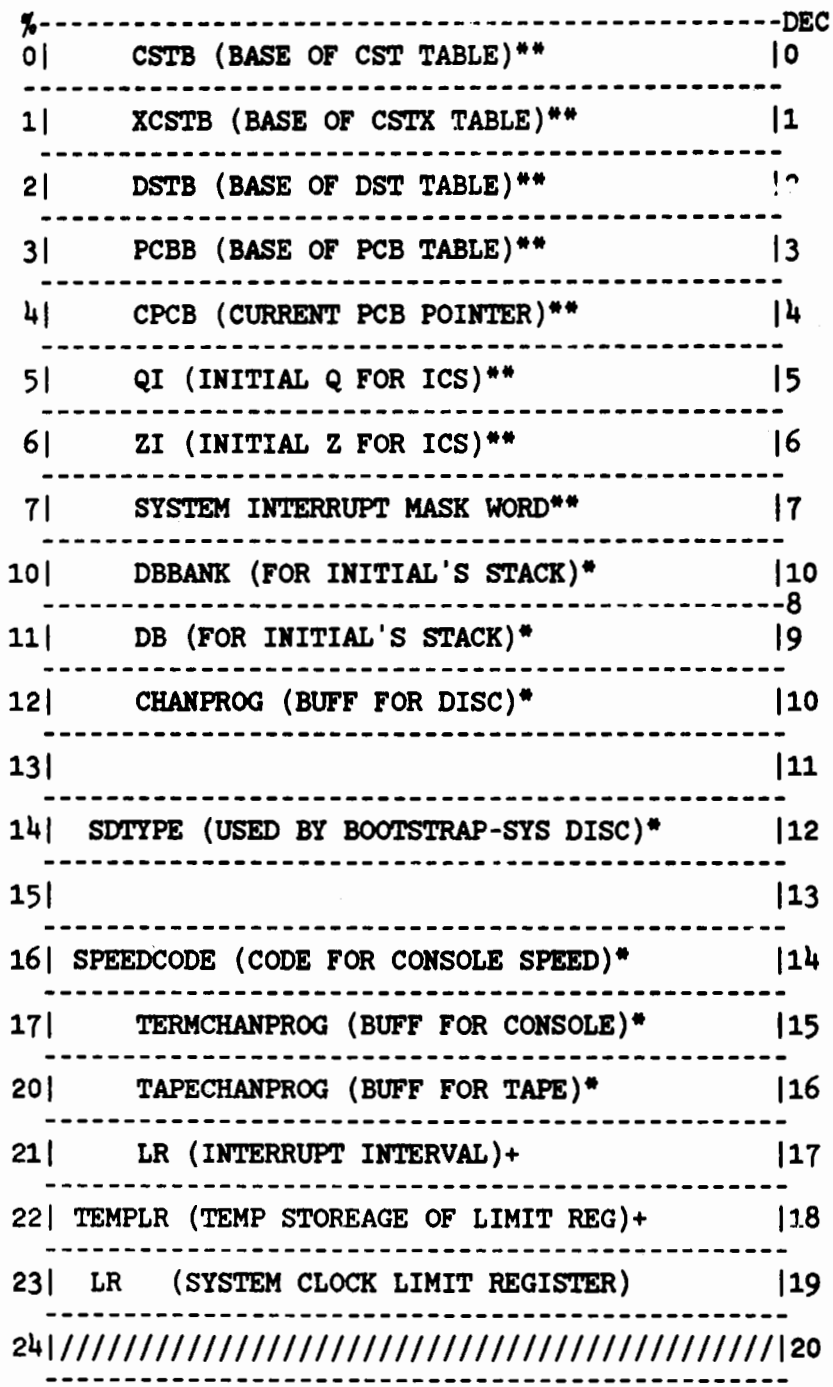
FIXED LOW MEMORY (SERIES 30/33) (CONT)

25	PCLO (PROCESS TIME - LSW)**	21
26	SCST (SYSTEM CLOCK STATUS)**	22
27	SCLC (SYSTEM CLOCK LAST COUNT)**	23
30		24
31-37	TEMP'CPVA (TEMPORARY CPVA)*	25-31

NOTE: ALL POINTERS ARE ABSOLUTE ADDRESSES.

LEGEND: ** NEEDED BY FIRMWARE AND/OR BY SYSTEM, ALWAYS
* NEEDED DURING INITIAL
+ NEEDED BY MPE, SET UP BY INITIAL OR PROGENITOR.

FIXED LOW MEMORY (SERIES 44)



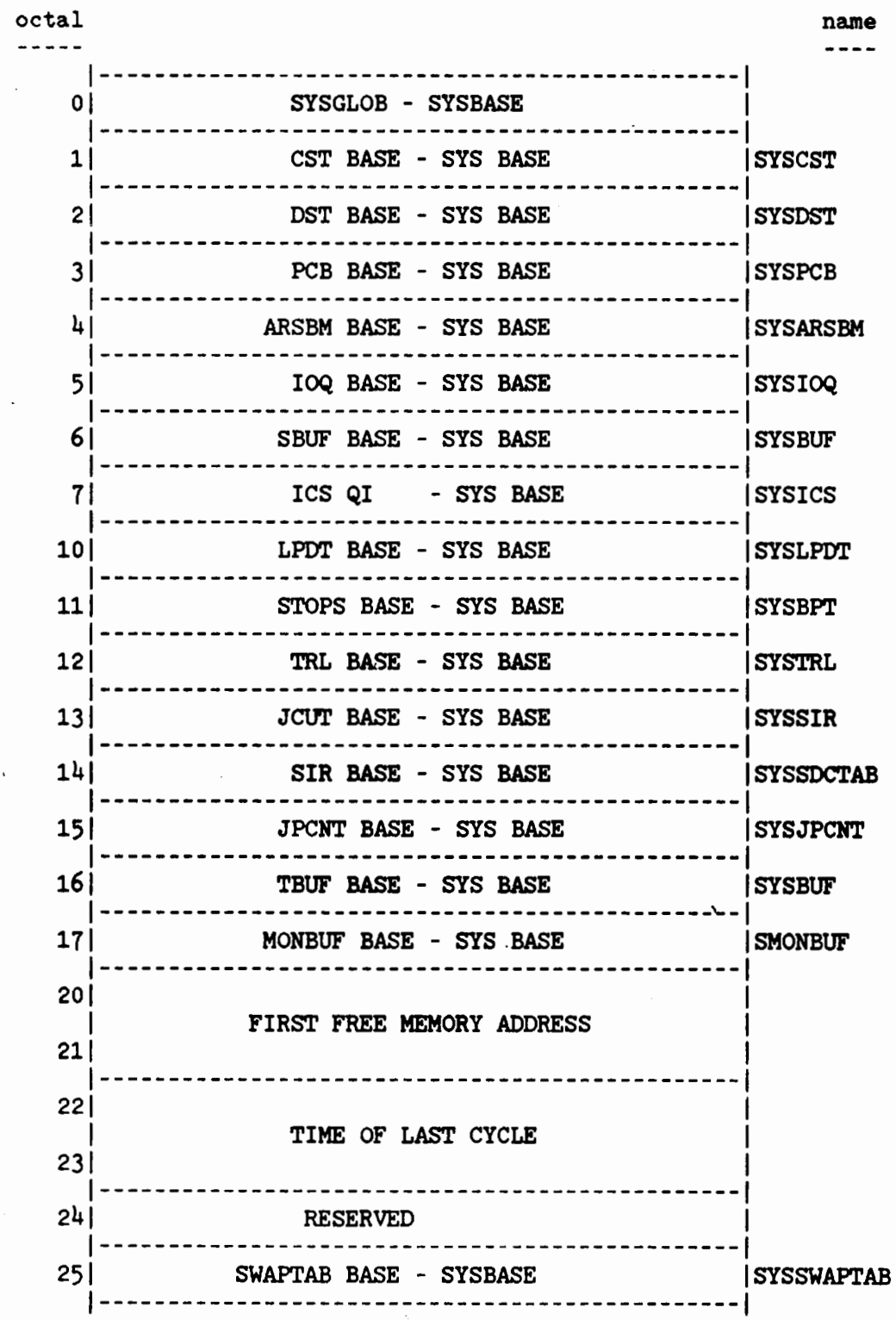
FIXED LOW MEMORY (SERIES 44) (CONT)

25	TR (TIME SINCE LAST SOFT TIMER INTERRUPT)	21
26	SCST (SYSTEM CLOCK STATUS)**	22
27	SCLC (SYSTEM CLOCK LAST COUNT)**	23
30		24
31-37	TEMP'CPVA (TEMPORARY CPVA)*	25-31

NOTE: ALL POINTERS ARE ABSOLUTE ADDRESSES.

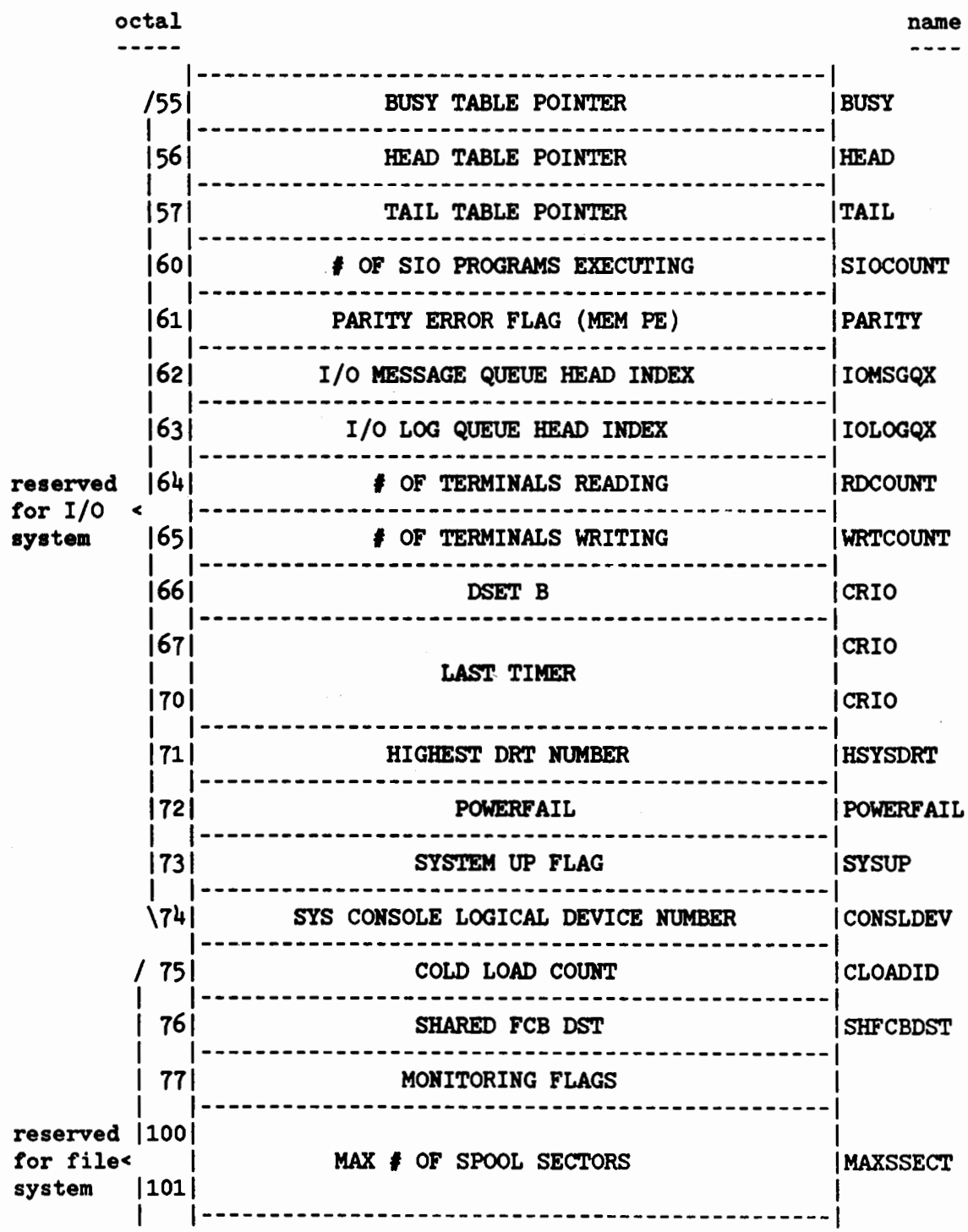
LEGEND: ** NEEDED BY FIRMWARE AND/OR BY SYSTEM, ALWAYS
* NEEDED DURING INITIAL
+ NEEDED BY MPE, SET UP BY INITIAL OR PROGENITOR.

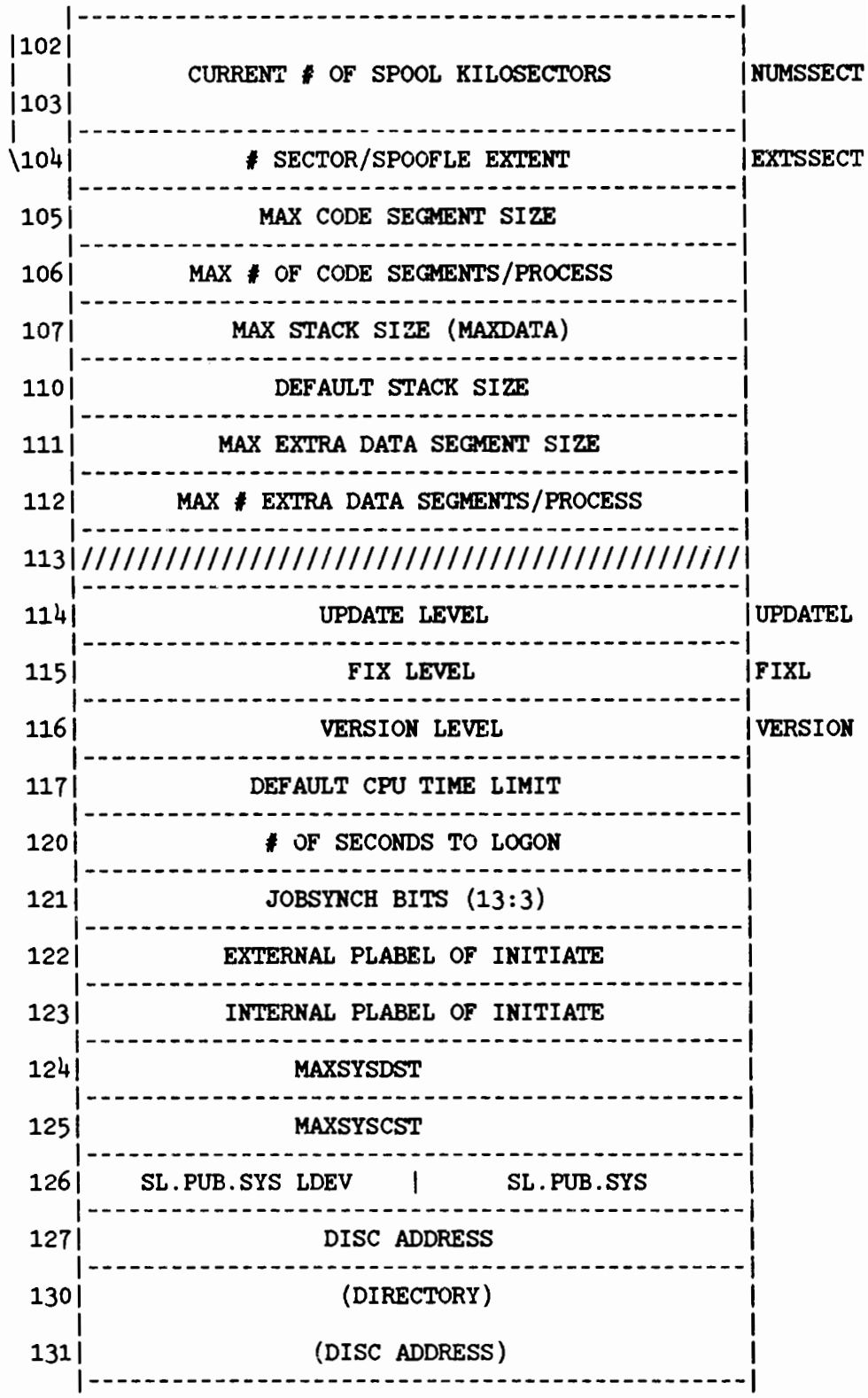
SYSTEM GLOBAL AREA



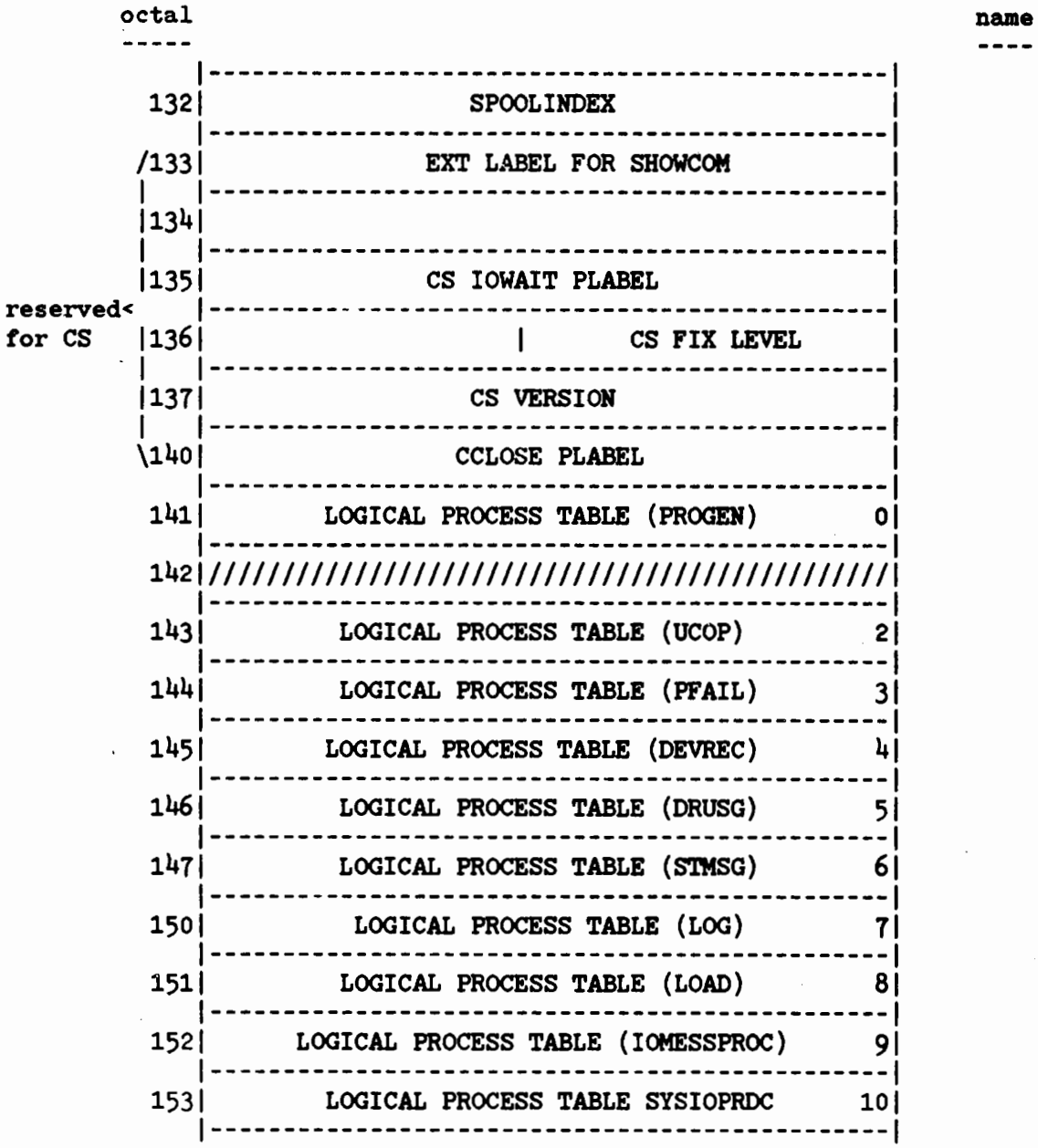
26	VDSMTAB BASE- SYSBASE	VDSMTAB
27		
30	CURRENT CST BLOCK INDEX	CSTBX
31	DISCREQTAB BASE - SYS BASE	SYSDISCREQTAB
32	DISPLACEMENT TO CODE =@CST(0)-@DST(0)	DFC
33	DISPLACEMENT TO SHARABLE = @CST(LAST)-@DST(0)	DFS
34	Global Class Enable Mask	GCLASSENMASKP
35	ABS ADDRESS (SYSDIT(8))	SYSDIT8
36	Statistics Gathering XDS Bank	STATGATHXDSBANK
37	Statistics Gathering XDS base	STATGATHXDSBASE
40	RESERVED FOR INITIAL (VDSENTRY)	
41	RESERVED FOR INITIAL (VDSMAP)	
42	SRTTAB BASE - SYS BASE	SRTTAB
43	SPECQ HEAD - SYS BASE	SYSSPECQHEAD
44	ARL BASE - SYS BASE	SYSARLD
45	# PAGES IN LARGEST CURRENTLY AVAILABLE REGION	SYSMAXAVAILREG
46	MAKE OVERLAY CANDIDATE INFORMATION	MOCINFO
47	NUMBER OF MEMORY BANKS CONFIGURED -1	SYSNBANKS
50	SCHEDULER TO AWAKE MESSAGE	SCHEDTOAWAKEMSG
51	POINTER TO CSTBLK TABLE	CSTXBLOCKPOINTER
52	AWAKE TO SCHEDULER MESSAGE	AWAKETOSCHEDMSG
53	WAIT TO SCHEDULER MESSAGE	
54	CURRENT ACTIVITY'S PRIORITY	CURACTPRI

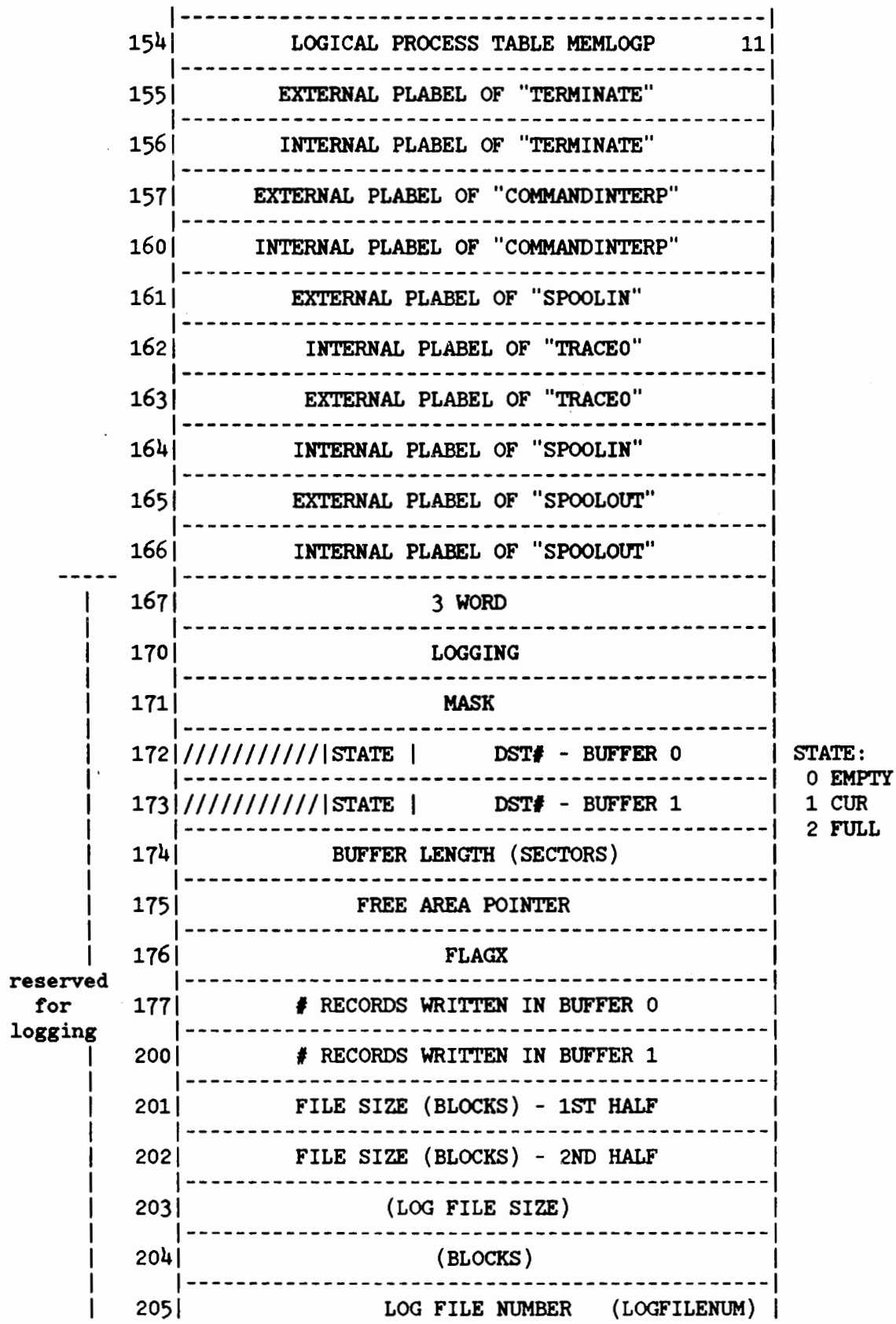
SYSTEM GLOBAL AREA (cont)




102
CURRENT # OF SPOOL KILOSECTORS
NUMSSECT
103
104
SECTOR/SPOOFLE EXTENT
EXTSSECT
105
MAX CODE SEGMENT SIZE
106
MAX # OF CODE SEGMENTS/PROCESS
107
MAX STACK SIZE (MAXDATA)
110
DEFAULT STACK SIZE
111
MAX EXTRA DATA SEGMENT SIZE
112
MAX # EXTRA DATA SEGMENTS/PROCESS
113
114
UPDATE LEVEL
UPDATEL
115
FIX LEVEL
FIXL
116
VERSION LEVEL
VERSION
117
DEFAULT CPU TIME LIMIT
120
OF SECONDS TO LOGON
121
JOBSYNCH BITS (13:3)
122
EXTERNAL PLABEL OF INITIATE
123
INTERNAL PLABEL OF INITIATE
124
MAXSYSDST
125
MAXSYSCST
126
SL.PUB.SYS LDEV
SL.PUB.SYS
127
DISC ADDRESS
130
(DIRECTORY)
131
(DISC ADDRESS)

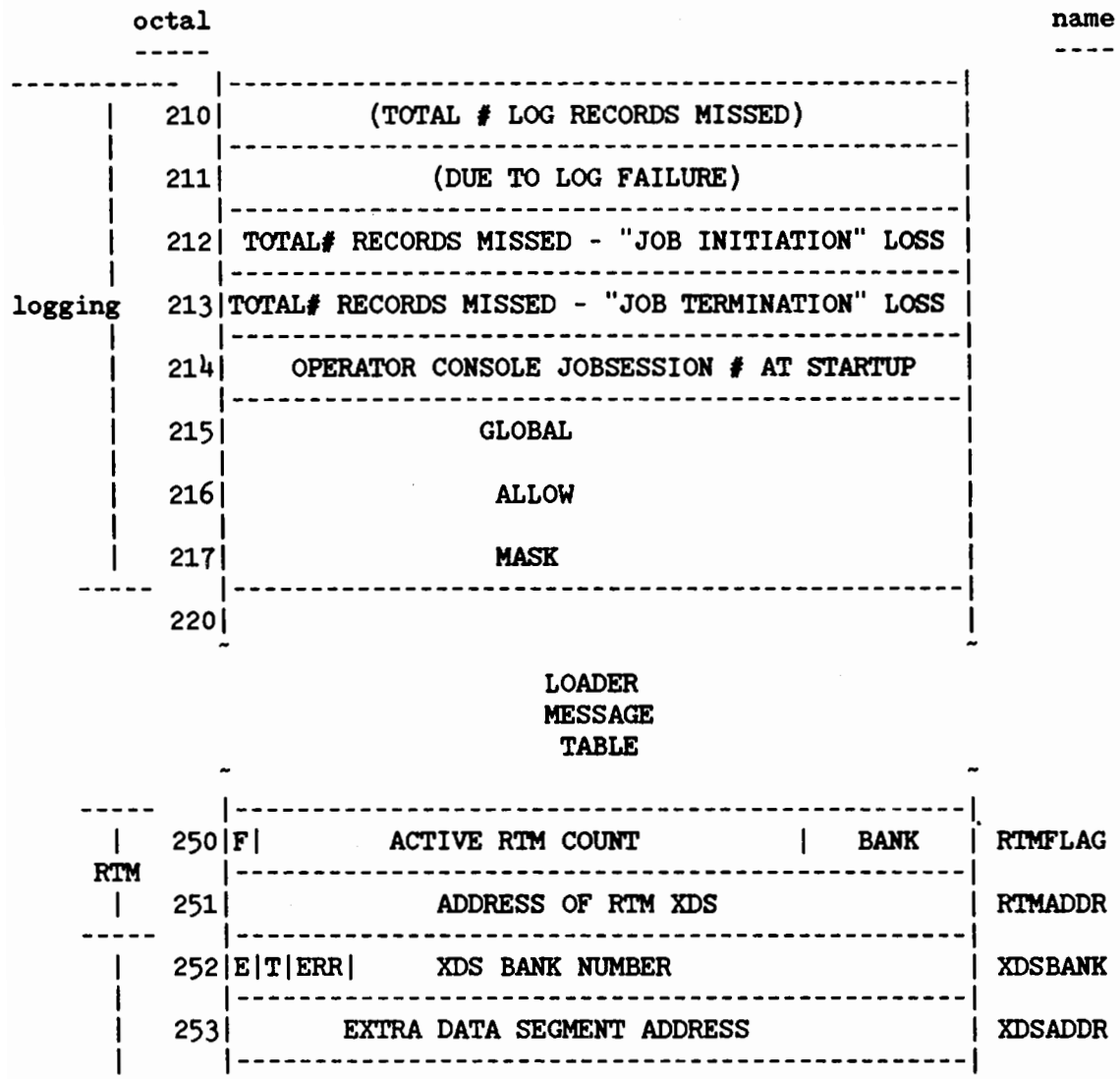
SYSTEM GLOBAL AREA (cont)



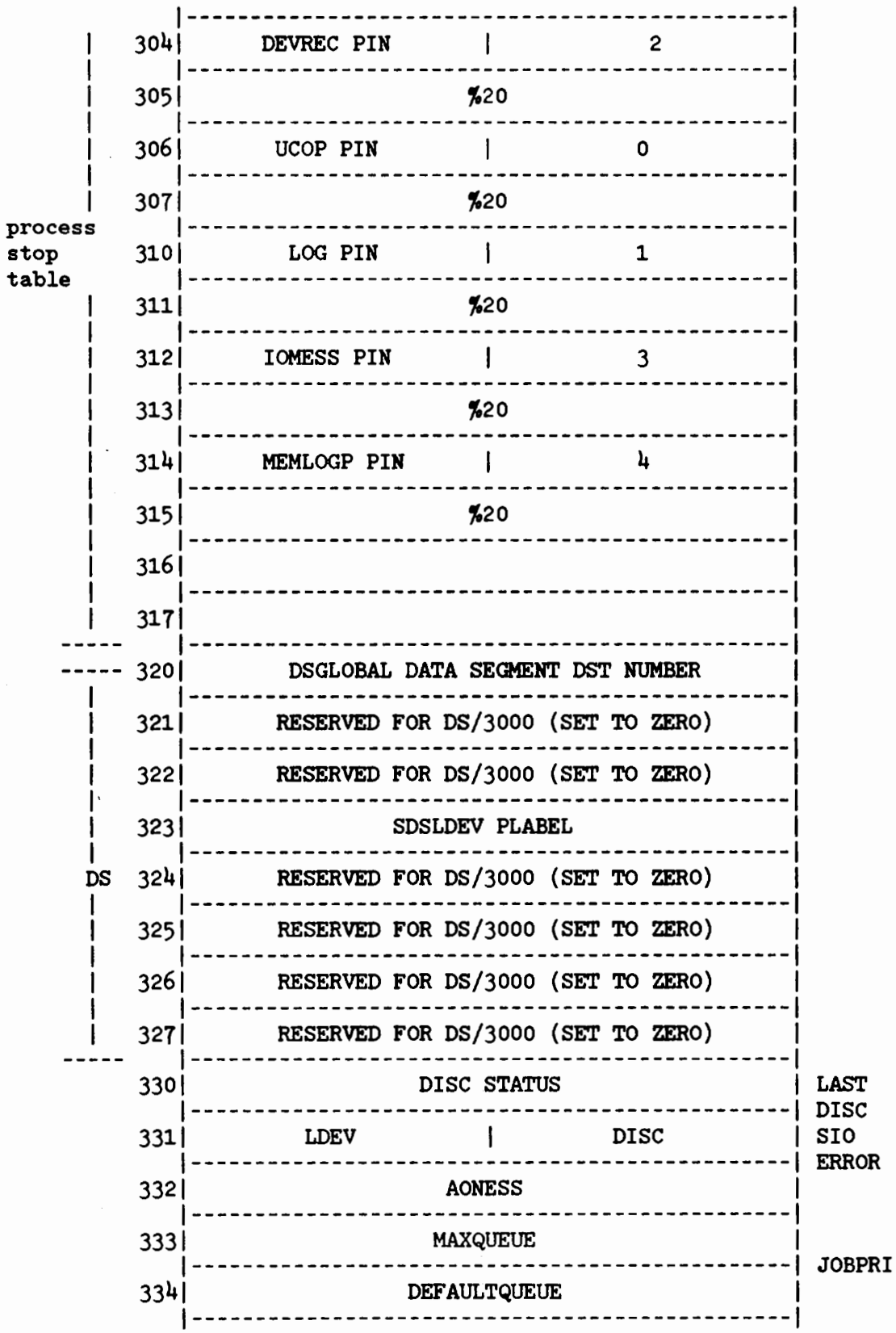

154 LOGICAL PROCESS TABLE MEMLOGP 11
155 EXTERNAL PLABEL OF "TERMINATE"
156 INTERNAL PLABEL OF "TERMINATE"
157 EXTERNAL PLABEL OF "COMMANDINTERP"
160 INTERNAL PLABEL OF "COMMANDINTERP"
161 EXTERNAL PLABEL OF "SPOOLIN"
162 INTERNAL PLABEL OF "TRACE0"
163 EXTERNAL PLABEL OF "TRACE0"
164 INTERNAL PLABEL OF "SPOOLIN"
165 EXTERNAL PLABEL OF "SPOOLOUT"
166 INTERNAL PLABEL OF "SPOOLOUT"
167 3 WORD
170 LOGGING
171 MASK
172 //////////|STATE | DST# - BUFFER 0
173 //////////|STATE | DST# - BUFFER 1
174 BUFFER LENGTH (SECTORS)
175 FREE AREA POINTER
176 FLAGX
177 # RECORDS WRITTEN IN BUFFER 0
200 # RECORDS WRITTEN IN BUFFER 1
201 FILE SIZE (BLOCKS) - 1ST HALF
202 FILE SIZE (BLOCKS) - 2ND HALF
203 (LOG FILE SIZE)
204 (BLOCKS)
205 LOG FILE NUMBER (LOGFILENUM)
reserved for logging
STATE:
0 EMPTY
1 CUR
2 FULL

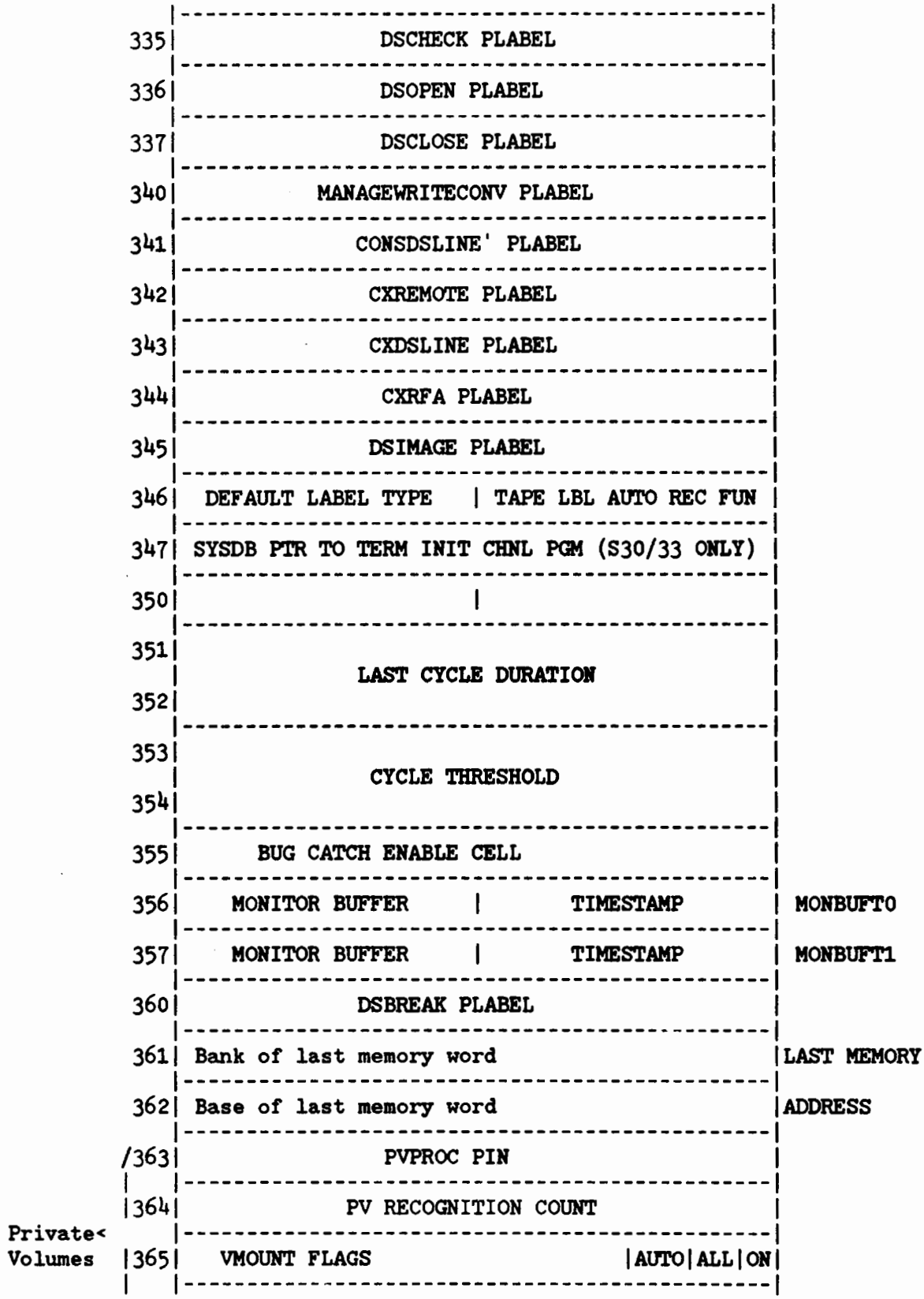
	206	NUMBER OF LOGGING [BLOCKS WRITTEN (1ST HALF)]
	207	BLOCKS WRITTEN [BLOCKS WRITTEN (2ND HALF)]

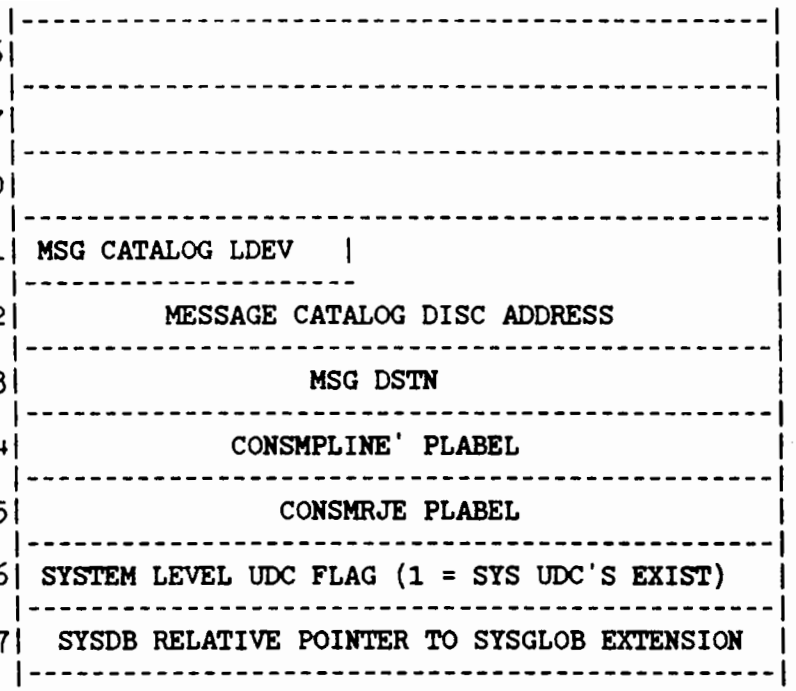
SYSTEM GLOBAL AREA (cont)



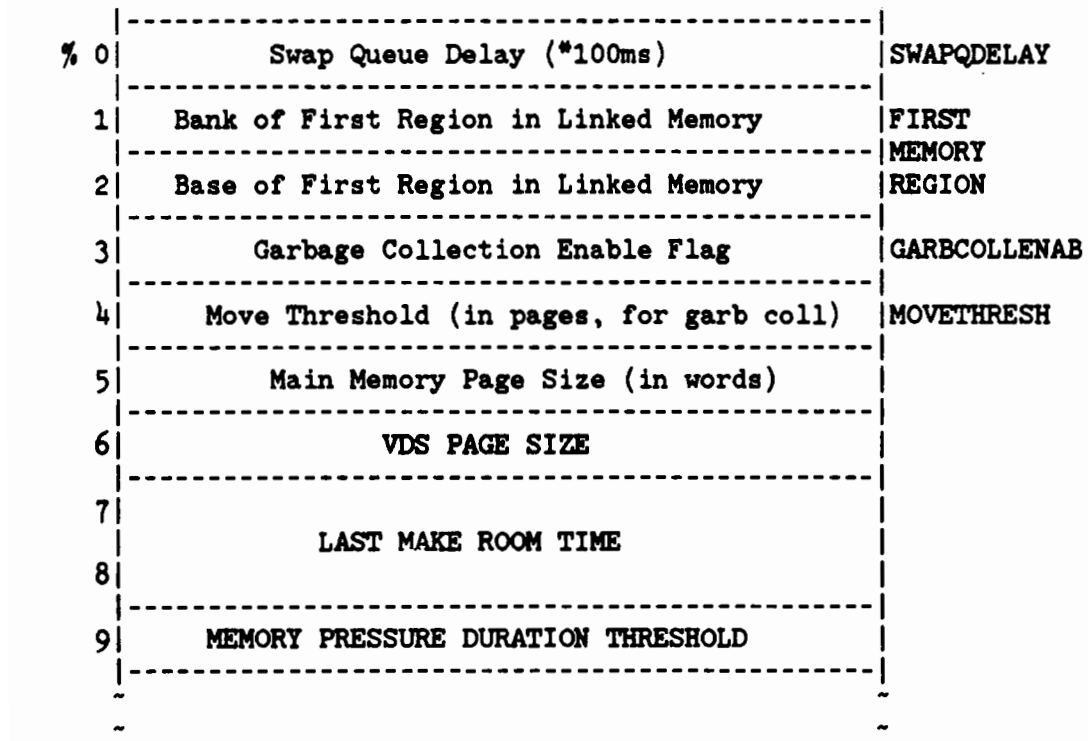
segment trace	254	CURRENT WORD COUNT	XDSCOUNT
	255	BUFFER SIZE	BUFFSIZE
	256	MAG TAPE LDEV	LDEV
-----	257	TRACE SEGMENT EXTERNAL LABEL	TLABEL
	260	STMON	
	261	MEASINFOTABPTR	
	262	MEASUREMENT STATISTICS CLASS MASK	GCLASSENABLEDMASK
	263	CLASS 0 STATISTICS BANK NUMBER	MEASSTATXDSBANK
	264	CLASS 0 STATISTICS ADDRESS	MEASSTSTXDSBASE
	265 266	SCAN POINT	
	267	MEASFLAGS	**
	270		
-----	271	Sysbase index of PCB at head of Dispatching Q	SYSDISQHEAD
	272	Sysbase index of PCB at tail of Dispatching Q	SYSDISPQTAIL
	273	RESERVED JB	
	274	RESERVED JB	
misc	275	RESERVED JB	
	276	HELP LOGICAL DEVICE NUMBER	
	277	CURRENT LOGON DST	DSTLOGON
-----	300 301	(STOP) (BITS) (see p. 1-24)	
	302	# PROCESS ENTRIES	
	303		

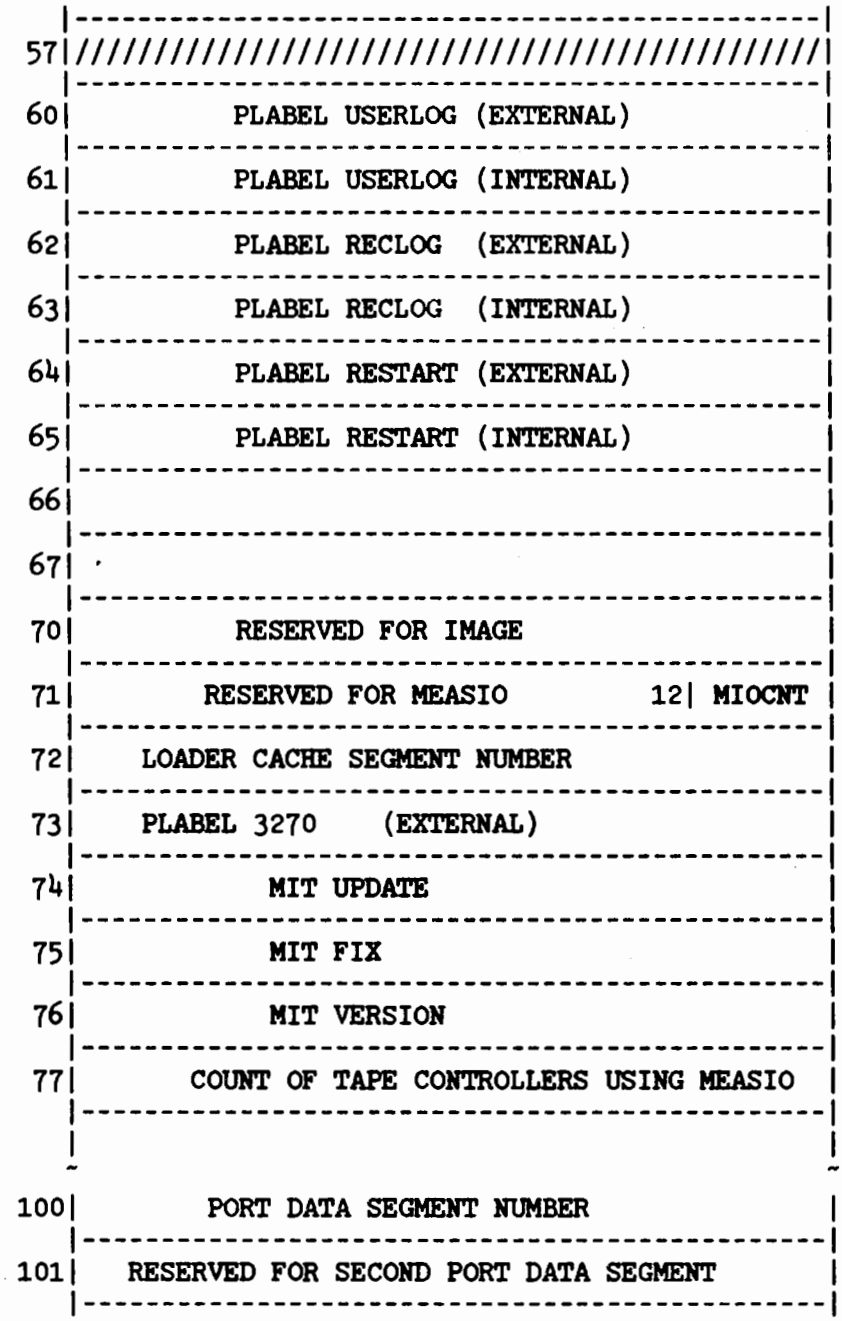

304 DEVREC PIN | 2
305 %20
306 UCOP PIN | 0
307 %20
process stop table
310 LOG PIN | 1
311 %20
312 IOMESS PIN | 3
313 %20
314 MEMLOGP PIN | 4
315 %20
316
317
320 DSGLOBAL DATA SEGMENT DST NUMBER
321 RESERVED FOR DS/3000 (SET TO ZERO)
322 RESERVED FOR DS/3000 (SET TO ZERO)
323 SDSLDEV PLABEL
DS 324 RESERVED FOR DS/3000 (SET TO ZERO)
325 RESERVED FOR DS/3000 (SET TO ZERO)
326 RESERVED FOR DS/3000 (SET TO ZERO)
327 RESERVED FOR DS/3000 (SET TO ZERO)
330 DISC STATUS
LAST DISC SIO ERROR
331 LDEV | DISC
332 AONESS
333 MAXQUEUE
JOBPRI
334 DEFAULTQUEUE


335
DSCHECK PLABEL
336
DSOPEN PLABEL
337
DSCLOSE PLABEL
340
MANAGEWRITECONV PLABEL
341
CONSDSLINE' PLABEL
342
CXREMOTE PLABEL
343
CXDSLINE PLABEL
344
CXRFA PLABEL
345
DSIMAGE PLABEL
346
DEFAULT LABEL TYPE
TAPE LBL AUTO REC FUN
347
SYSDB PTR TO TERM INIT CHNL PGM (S30/33 ONLY)
350
351
LAST CYCLE DURATION
352
353
CYCLE THRESHOLD
354
355
BUG CATCH ENABLE CELL
356
MONITOR BUFFER
TIMESTAMP
MONBUFT0
357
MONITOR BUFFER
TIMESTAMP
MONBUFT1
360
DSBREAK PLABEL
361
Bank of last memory word
LAST MEMORY
362
Base of last memory word
ADDRESS
/363
PVPROC PIN
364
PV RECOGNITION COUNT
Private<
Volumes
365
VMOUNT FLAGS
AUTO
ALL
ON


366
367
370
371
MSG CATALOG LDEV
372
MESSAGE CATALOG DISC ADDRESS
373
MSG DSTN
374
CONSMPLINE' PLABEL
375
CONSMRJE PLABEL
376
SYSTEM LEVEL UDC FLAG (1 = SYS UDC'S EXIST)
377
SYSDB RELATIVE POINTER TO SYSGLOB EXTENSION

SYSGLOB EXTENSION (%200 LONG; POINTER AT SYSDB+%377)





* MIOCNT = MEASIOCOUNT (3 BITS)
** MEASFLAGS (15:1) = 1 ==> MONITOR ENABLED
(14:1) = 1 ==> BUFFER FLIP/FLOP
(13:1) = 1 ==> EOT ON MONITOR TAPE

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SYSDB WORDS

ADDRESS	NAME	FUNCTION
DB+55	BUSY	- SYSDB relative pointer to BUSY TABLE for I/O resources
DB+56	HEAD	- SYSDB relative pointer to table containing head pointers to I/O resource queues
DB+57	TAIL	- SYSDB relative pointer to table containing head pointers to tail of I/O resource queues
DB+60	SIO COUNT	- Number of I/O Programs currently executing
DB+72	POWER FAIL	- 0-no power fail 1-system disc recovery 2-all other disc recovery 3-all other device recovery
DB+73	SYSUP	- System is up and operable
DB+74	CONSLDEVN	- System console logical device number

JOBSYNCH job synchronization via jobsynch (sysglob+121(8))

(13:1) - JOBSREADY - set by DEVREC & MORGUE (via procedure STARTDEVICE) indicating a ready job. This prevents UCOP from going to a wait state when a job is just made ready.

(15:1) - DEVFREED - set by DEALLOCATE when device count goes to 0.

NOTE - Both bits above used for synchronization of job-made-ready or devicefreed when UCOP is running.

(14:1) - JOBSWAITING- set by UCOP just before waiting if any job is waiting for list device. Signals DEALLOCATE to awake UCOP when a device is freed.

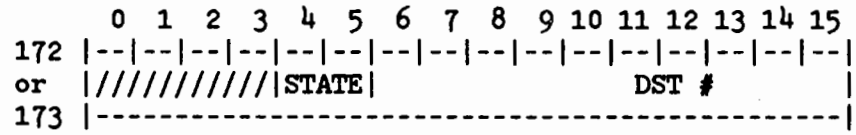
ALLOW MASK FORMAT

	BIT	COMMAND
WORD 1	0	ABORTIO
	1	ACCEPT
	2	DOWN
	3	GIVE
	4	HEADOFF
	5	HEADON
	6	REFUSE
	7	REPLY
	8	STARTSPOOL
	9	TAKE
	10	UP
	11	MPLINE
	12	DSCONTROL
	13	ABORTJOB
	14	ALLOW
	15	ALTSPOOLFILE
WORD 2	0	ALTJOB
	1	BREAKJOB
	2	DELETESPOOLFILE
	3	DISALLOW
	4	JOBFENCE
	5	LIMIT
	6	STOPSPOOL
	7	SUSPENDSPOOL
	8	OUTFENCE
	9	RECALL
	10	RESUMEJOB
	11	RESUMESPOOL
	12	STREAMS
	13	CONSOLE
	14	WARN
	15	WELCOME

WORD 3	0	MON
	1	MOFF
	2	VMOUNT
	3	LMOUNT
	4	LDISMOUNT
	5	MRJECONTROL
	6	JOBSECURITY
	7	DOWNLOAD
	8	MIOENABLE
	9	MIODISABLE
	10	LOG
	11	FOREIGN
	12	IMLCONTROL
	13	SHOWCOM

LOGGING RELATED LOCATIONS

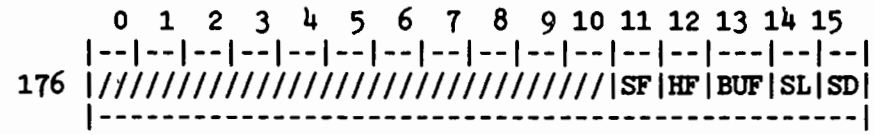
SYSDB



STATE = 0 if respective buffer empty
1 if respective buffer is current
2 if respective buffer is full

FLAGX

SYSDB



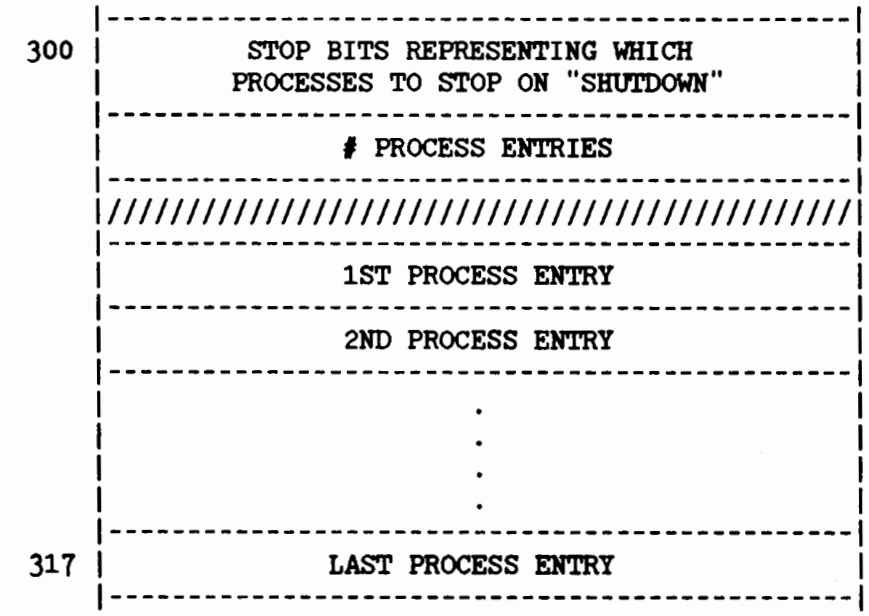
SF = 1 if soft failure
HF = 1 if hard failure
BUF = 0 if current log buffer is buffer 0
= 1 if current log buffer is buffer 1
SL = 1 to indicate a switch in log buffers (from 0 to 1 or from 1 to 0)
SD = 1 to indicate shutdown in progress

OPT AND SEGMENT TRACE CELLS

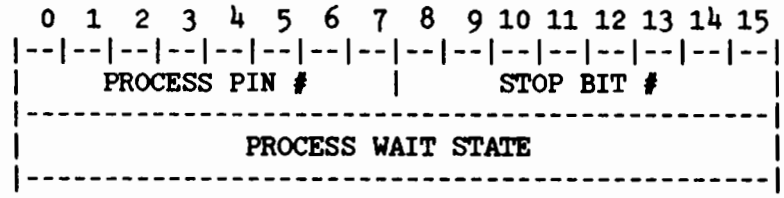
SYSDB

```
RTMFLAG* 250.(0:1)   F:  set if RTM enabled
           .(1:11)   :  # of active RTM processes
           .(12:4)   :  bank # of RTM xds

RTMADDR* 251


XDSBANK  252.(0:1)   E:  set if segment tracing enabled
           .(1:1)    T:  buffer toggle
           .(2:2)  ERR:  error code for MEASIO
                         0 = no error
                         1 = unrecoverable error
                         2 = EOT - end of tape
```

PROCESS STOP LIST GENERAL LAYOUT



ENTRY FORMAT



PREASSIGNED ENTRIES

entry #	process	stop bit #
1	devrec	2
2	ucop	0
3	log	1

Initial Memory Allocation

This section is a description of the method used by INITIAL to allocate memory for MPE tables and code segments in MPE IV. All memory allocated by INITIAL is permanently allocated. All non-core resident code and data is put on disc before exiting INITIAL.

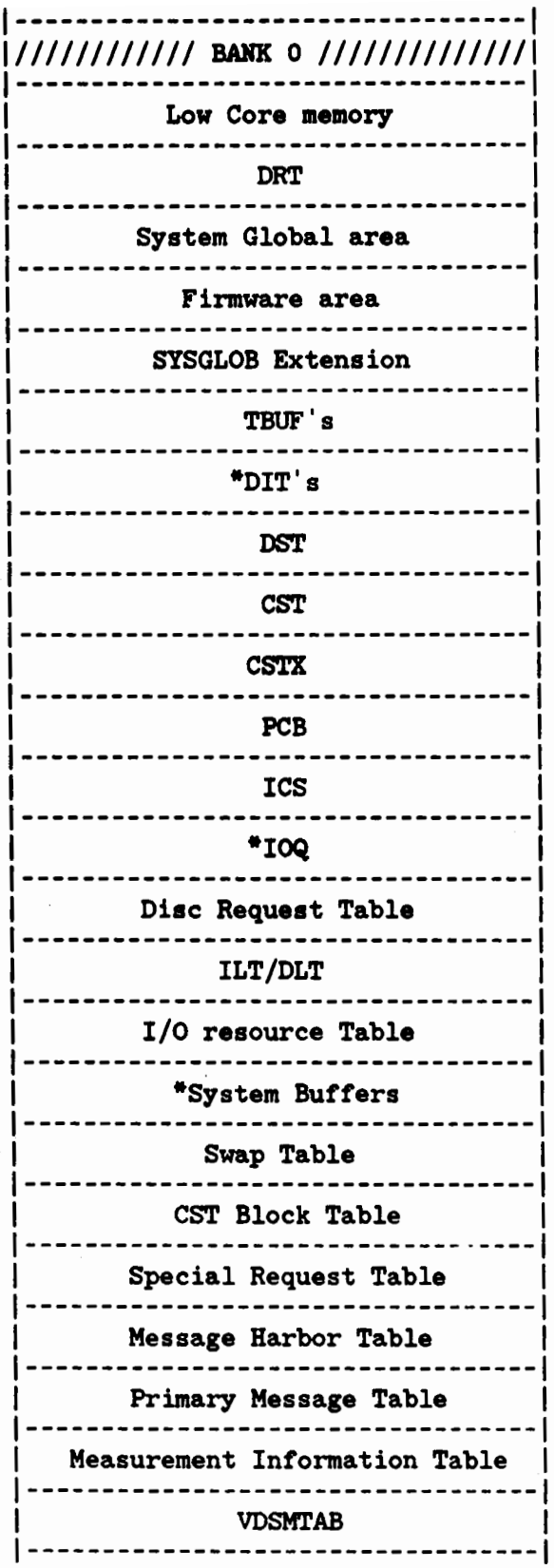
At the most basic level INITIAL will try to build memory to look exactly as diagrammed below. There are, however, several ways in which to deviate from this structure. Before going into the sources of these deviations, it is necessary to point out which portions of memory are used by INITIAL during the restart and therefore cannot be used by MPE until INITIAL has finished. Before INITIAL begins to allocate any memory space, it relocates its core resident code, its code segment swapping area and its stack to the highest configured memory space. Additionally, it uses the last %240 words of bank 0 on a series III and the last %326 words of bank 0 on series 30, 33 and 44 for its I/O buffer area and temporary code segment table. After INITIAL has built all of core resident MPE (tables and code), it builds the disc resident MPE tables. Since some of the disc resident tables may be too large to be built in INITIAL's stack, these tables are built in unused memory space. Therefore, in addition to the memory space required for INITIAL's code, INITIAL's stack and core resident MPE, there must be enough space left in which to build the largest of the disc resident tables.

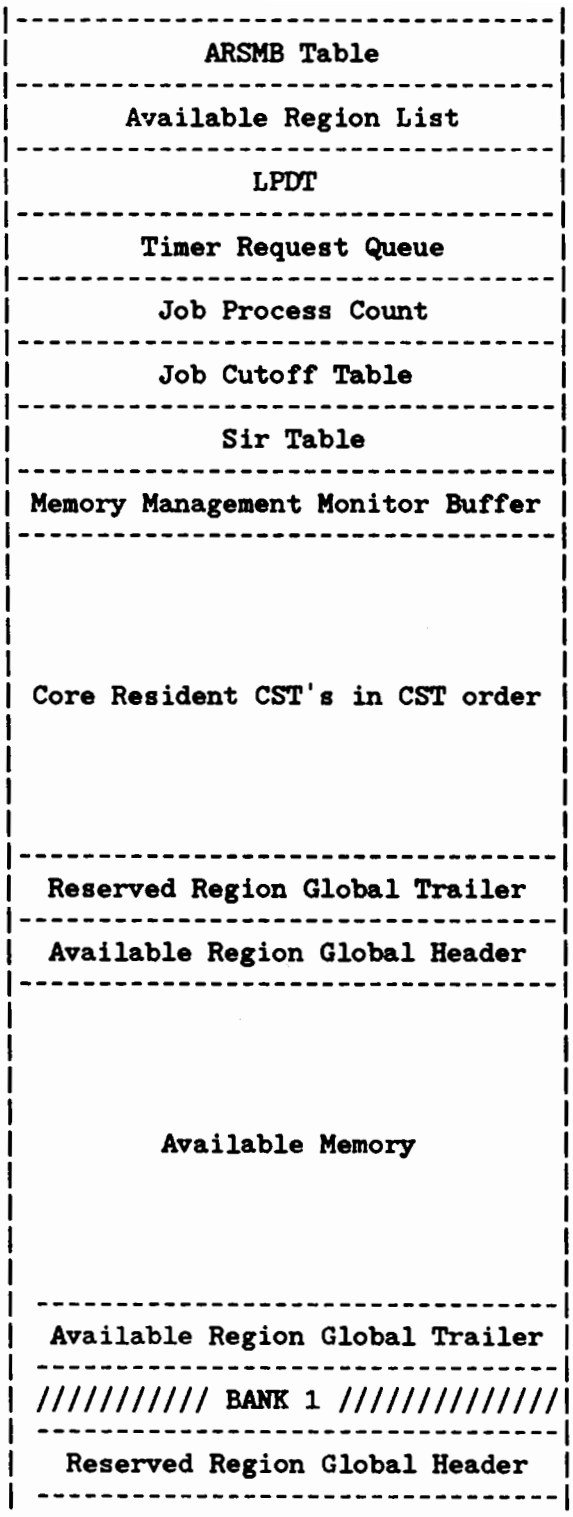
INITIAL will essentially build memory in the order shown below, however, there may be an unused fragment of memory between the DRT's and the system global area which INITIAL will fill with the smaller tables. Neither the tables marked with an asterisk nor the code segments will ever be put in this area.

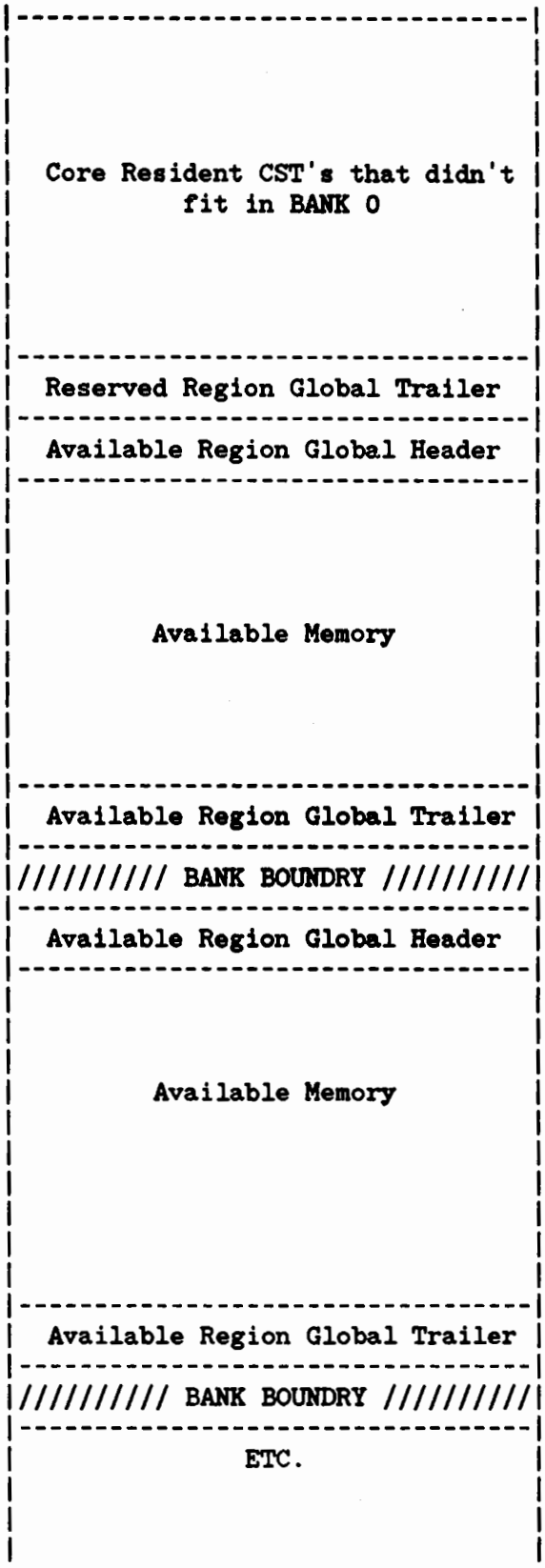
Beginning with the B MIT, all bank 0 dependencies have been removed from core resident MPE code. If there is insufficient space in bank 0 for any core resident code segment, INITIAL will put it into bank 1. At the present time core resident MPE is not large enough to occupy more than all of bank 0 and part of bank 1. If the system being built by INITIAL is configured with 128K words or 160K words of memory then INITIAL's stack will be in bank 1 (the code also on a 128K word memory size). If INITIAL is occupying part of bank 1 and the space is needed for a core resident MPE code segment or to build a disc resident table then INITIAL will print the error message "ERROR #350 OUT OF MEMORY".

Except for the ecxeptions stated above, for every allocation of memory INITIAL will first try to allocate any remaining space between the DRT's and SYSDB. It will then try the next available space in bank 0, then the next available space in bank 1. If it were necessary it could continue searching until all all banks were checked for available space.

Immediately before exiting INITIAL, INITIAL lays down all the memory region headers and trailers as shown below. For any one bank of memory there will only be one block of core resident MPE, regardless of its contents. The only block of core resident MPE that does not have a reserved region global header is in bank 0. It does have the reserved region global trailer though. Before placing any code outside bank 0 the first %23 words of every bank (except bank 0) is reserved for the region global header.


BANK 0
Low Core memory
DRT
System Global area
Firmware area
SYSGLOB Extension
TBUF's
*DIT's
DST
CST
CSTX
PCB
ICS
*IOQ
Disc Request Table
ILT/DLT
I/O resource Table
*System Buffers
Swap Table
CST Block Table
Special Request Table
Message Harbor Table
Primary Message Table
Measurement Information Table
VDSMTAB


ARSMB Table
Available Region List
LPDT
Timer Request Queue
Job Process Count
Job Cutoff Table
Sir Table
Memory Management Monitor Buffer
Core Resident CST's in CST order
Reserved Region Global Trailer
Available Region Global Header
Available Memory
Available Region Global Trailer
////////// BANK 1 //////////
Reserved Region Global Header


Core Resident CST's that didn't fit in BANK 0
Reserved Region Global Trailer
Available Region Global Header
Available Memory
Available Region Global Trailer
////////// BANK BOUNDRY //////////
Available Region Global Header
Available Memory
Available Region Global Trailer
////////// BANK BOUNDRY //////////
ETC.

CHAPTER 2 Memory Management Tables

2.1 Segment Table Structure

The current location and state of each data segment and loaded code is maintained in the segment table. This table is partitioned into parts, as shown in Figure 2-1. The partitions are based on the seg classes: a segment is a data segment, a segment is a system sl seg segment is part of a program. The structure and format of each par is described in the following.

Overall ST Structure

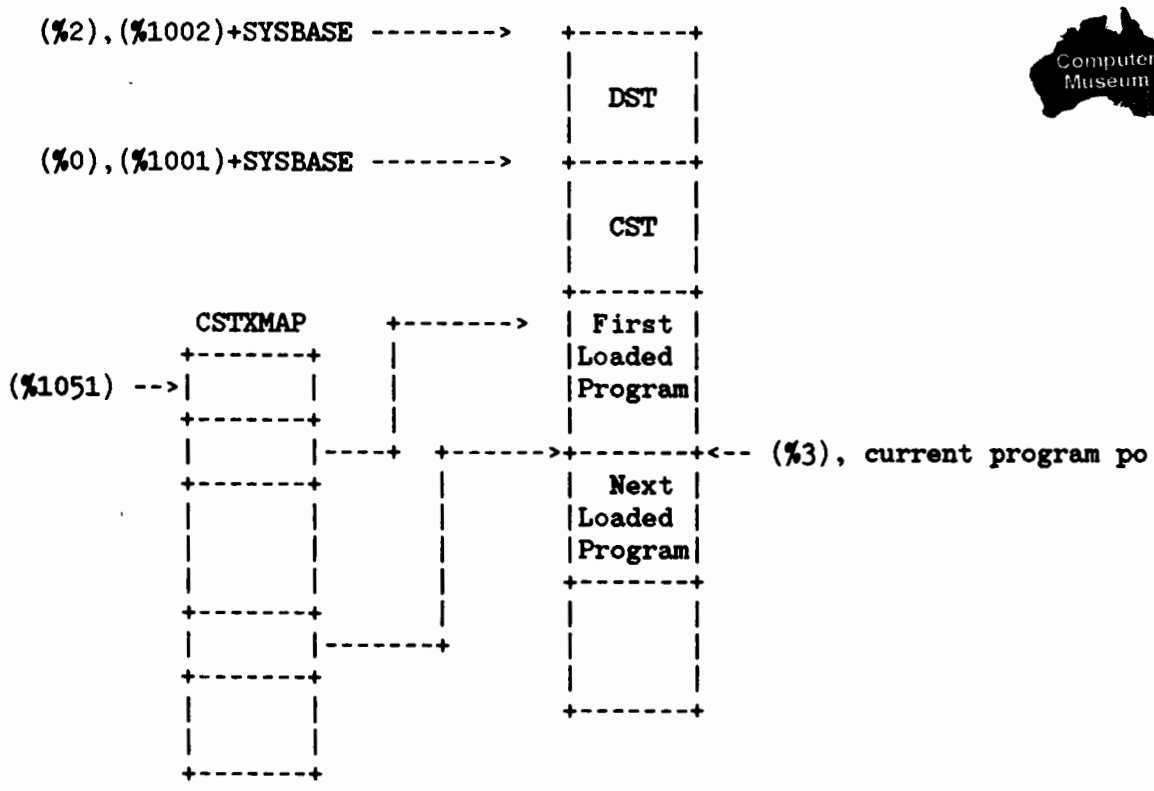


Figure 2-1

2.1.1 Pointers and DST #'s of Segment Table Compcnents

i. DST

```
% 2 absolute address of entry 0 of the DST
%1002 sysbase relative index of entry 0 of DST
DST# =2
```

ii. CST

```
% 0 absolute address of entry 0 of system sl
%1001 sysbase relative index of entry 0 of system sl
%1032 displacement from DST base of entry 0 of system sl
      = @ CST - @ DST    =DPC
DST# =1
```

iii. CSTX

```
% 0 absolute address of entry 0 of current program
%1033 displacement from DST base to first CSTX entry sl
      = @ CST (LAST) - @ DST (0) = DFS
DST# =4
```

iv. CSTXMAP

```
%1051 sysbase relative index of entry 0 of CSTXMAP
DST# =43 (%71)
```

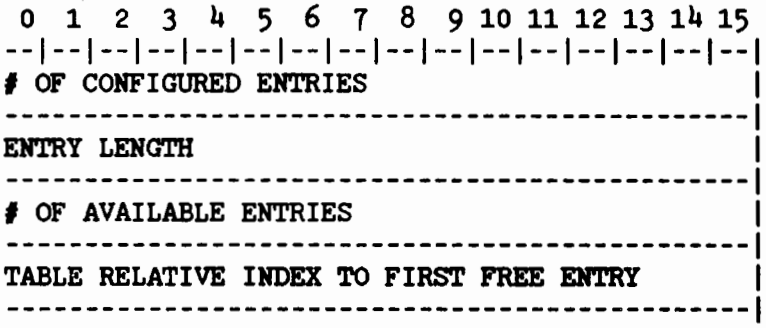
STANDARD SEGMENT IDENTIFIER FORMAT

I. SEGMENT IDENTIFIER FORMAT

```
SEGIDENTIFIER.(0:1) = 1 ==> SEG IS PART OF A PROGRAM
                        ==> (1:7) = PROGRAM INDEX INTO CSTXBLK,
                            (8:8) = LOGICAL SEG NUMBER (0-255)
SEGIDENTIFIER.(0:2) = 0 ==> SEG IS A DATA SEGMENT,
                            (2:14) = DST ENTRY NUMBER
SEGIDENTIFIER.(0:2) = 1 ==> SEG IS AN SL SEGMENT,
                            (2:14) = SL ENTRY NUMBER
   EQUATE SEGIDDATATYPE=0,
```

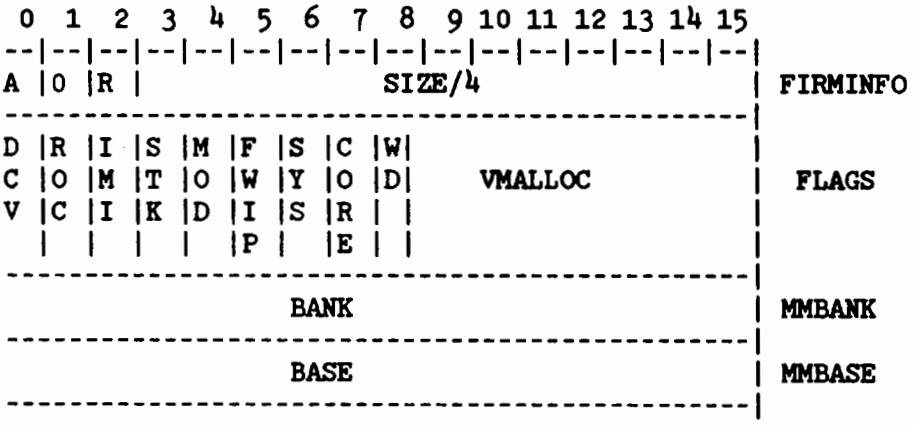
2.1.3 DST Entry Formats

DST Entry 0 Format

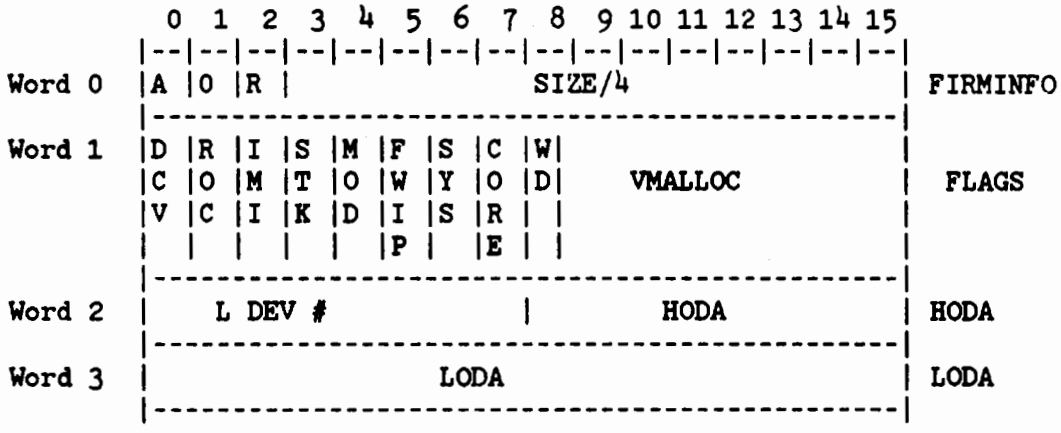


DST General Entry Format

Case (i) DST Entry for a Present Data Segment



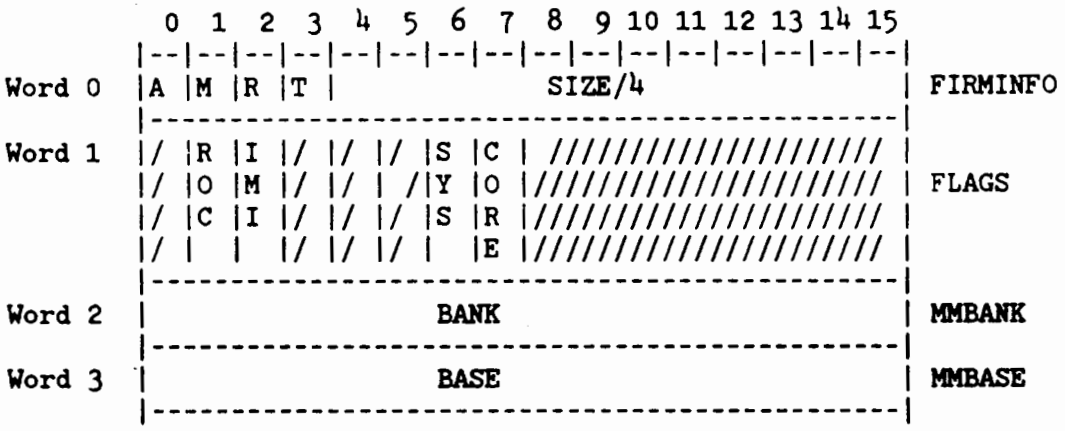
Case (ii) DST Entry for an Absent Data Segment



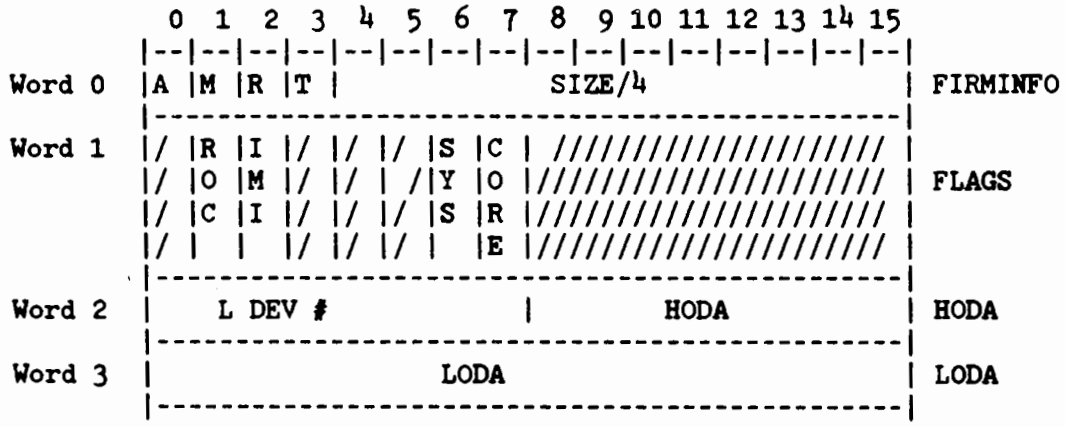
2.1.6 CST Entry Formats

CST General Entry Format

Case (i) CST Entry for a Present SL Segment or CSTX Segment



Case (ii) CST Entry for an Absent Segment SL or CSTX Segment



2.1.7 ST Entry Field Descriptions

A = 1 ==> segment absent
M = 1 ==> segment privileged
R = 1 ==> segemnt has been referenced
T = 1 ==> segment is being traced
DCV = 1 ==> disc copy is valid
STK = 1 ==> segment is a stack
MOD = 1 ==> a segment modification (exp., contr.) is pending
FWIP= 1 ==> a forced write of this segment is in progress
VMPAGECNT = # of virtual memory pages allocated to this segment
ROC = 1 ==> segment is recoverable overlay candidate
IMI = 1 ==> segment is in motion in
SYS = 1 ==> segment is a system segment
CORE= 1 ==> segment is core resident
WD= 1 ==> write disabled

TABLE FORMAT-CSTBLK

```
CSTBLK(0)-----------------------------------------
         0                                       *
         *   NUMBER OF ENTRIES IN TABLE          *
         ----------------------------------------
         1                                       *
         *   ANY UNASSIGNED ENTRY = -1           *
         ----------------------------------------
         2                                       *
         *   ANY ASSIGNED ENTRY > 0              *
         ----------------------------------------
         *                                       *
         *   REMAINING CSTBLK TABLE ENTRIES      *
         *                                       *
         ----------------------------------------
```

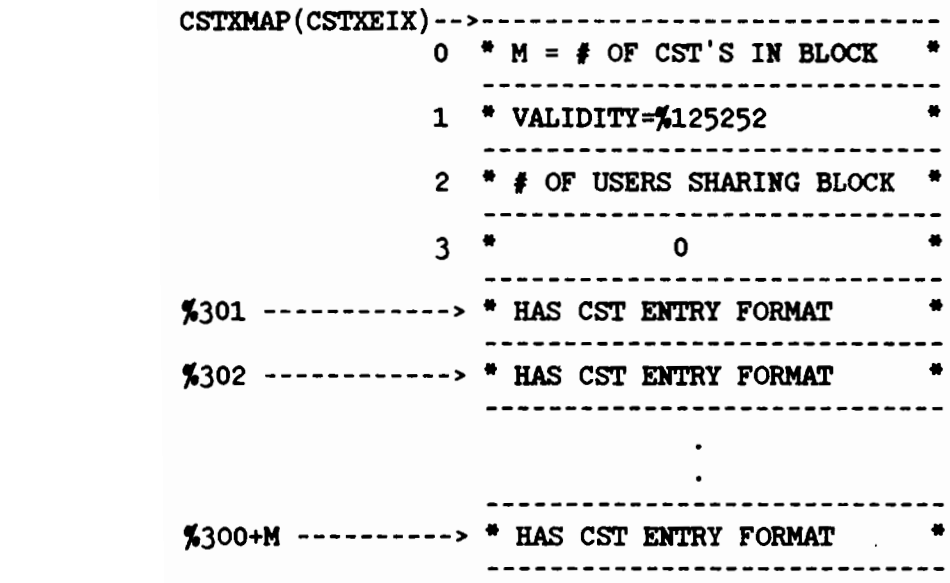
COMMENTS-

The table is initialized to minus one in each entry. When selected, the entry is replaced by a DST-relative index into the CST extension block.

2.1.8 Program Blocks and the CSTXMAP

Since programs can be dynamically loaded and unloaded, the segment table kept packed or fragmentation would occur. Thus, the block of ST entries program segment begins at an ST entry number that changes if a program w loaded before it gets unloaded. To manage this dynamic structure, an au structure, the CSTXMAP is used. A program is identified by its index, C into this map. The program's current beginning physical ST entry number equal to CSTXMAP (CSTXEIX).

ENTRY FORMAT-CST EXTENSION BLOCK

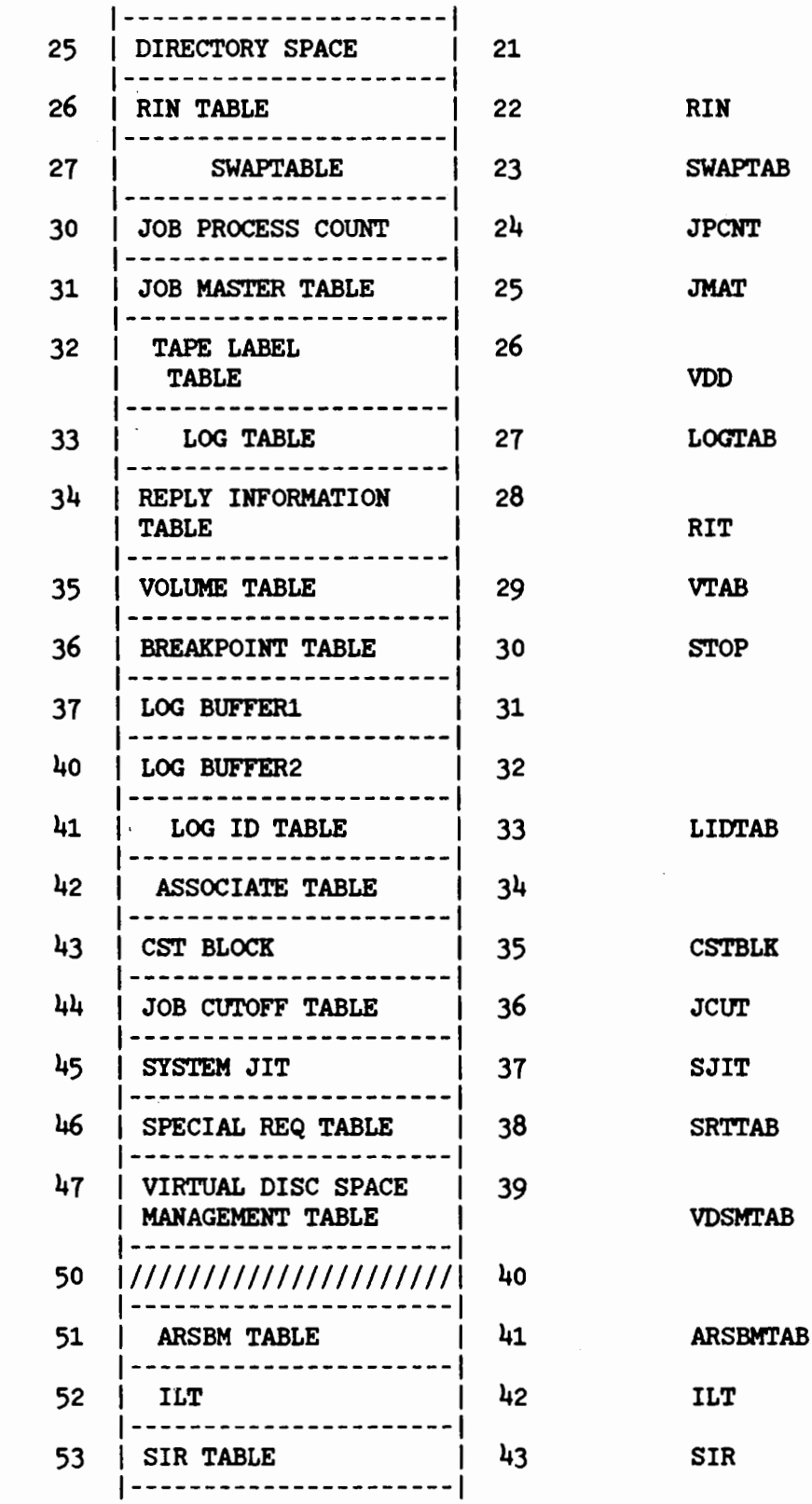


COMMENT
The value of CSTXEIX is established when a CST extension block is alloca This index into the array CSTXMAP is maintained in the PCB of each proce sharing the block.

2.1.9 Fixed DST Entry Assignments

OCTAL		DECIMAL	TABLE NAME
0		0	
1	CST	1	CST
2	DST	2	DST
3	PCB	3	PCB
4	CSTX	4	CSTX
5	SYSTEM GLOBAL AREA	5	SYS
6	CORE	6	CORE
7	ICS	7	ICS
10	SYSTEM BUFFERS	8	SBUF
11	UCOP REQUEST QUEUE	9	UCRQ
12	PROCESS-PROCESS COMMUNICATION TABLE	10	PPCOM
13	I/O QUEUE	11	IOQ
14	TERMINAL BUFFERS	12	TBUF
15	LOGICAL-PHYSICAL DEVICE TABLE	13	LPDT
16	LOGICAL DEVICE AND CLASS TABLE	14	LDT
17	DRIVER LINKAGE TABLE	15	DLT
20	I/O RESOURCE TABLES	16	BUSY, HEAD, TAIL
21	DISC FREE SPACE	17	
22	LOADER SEGMENT TABLE	18	LST
23	TIMER REQUEST LIST	19	TRL
24	DIRECTORY	20	DDS

DST ALLOCATION (CONT.)



DST ALLOCATION (CONT.)

54	FMAVT	44	FMAVT
55	INPUT DEVICE DIRECT	45	IDD
56	OUTPUT DEVICE DIRECT	46	ODD
57	WELCOME MESSAGE #1	47	LOGONDSTN1
60	WELCOME MESSAGE #2	48	LOGONDSTN2
61	CS DATA SEGMENT	49	CSTAB
62	PROCESS-JOB CROSS REFERENCE	50	PJXREF
63	SYSTEM JDT	51	SYSJDT
64	COMMAND LOGON DST	52	CILOGDST
65	MOUNTED VOL. SET TABLE	53	MVTAB
66	PRI.VOL. USER TABLE	54	PVUSER
67	AVAILABLE REGION LIST	55	ARLDTAB
70	DISC REQUEST TABLE	56	DISCREQTAB
71	MSG HARBOR TABLE	57	MSGHARBTAB
72	PRIMARY MESSAGE TABLE	58	PRIMMSGTAB
73	MEASUREMENT INFO TABLE	59	MEASINFOTAB
74	RESERVED	60	SECMSGTAB
75	FIRST FREE DST	61	

2.2 Swap Tables

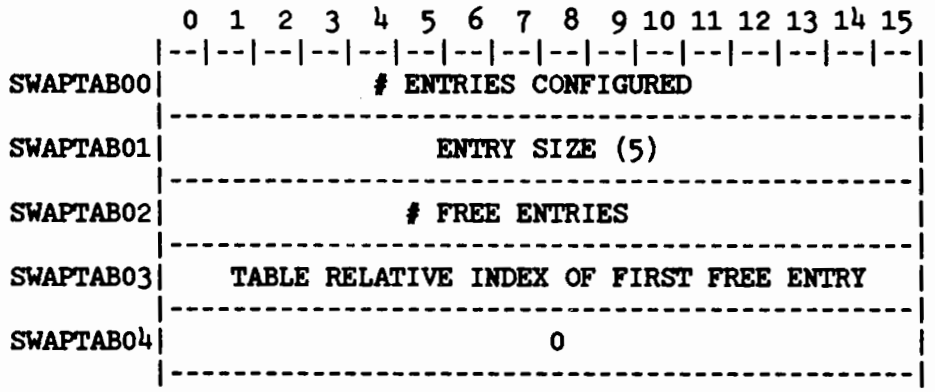
2.2.1 SWAPTAB

The Swaptab is a core resident memory management table used to ke track of the locality lists of the competing processes.

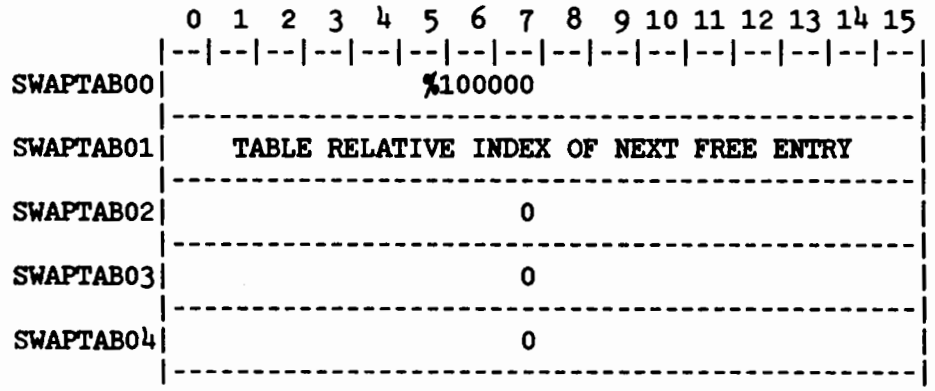
SWAPTAB DST# = 23 (%27)

%1025 Sysbase relative index of SWAPTAB entry 0.

SWAPTAB ENTRY 0 FORMAT



SWAPTAB UNASSIGNED ENTRY FORMAT

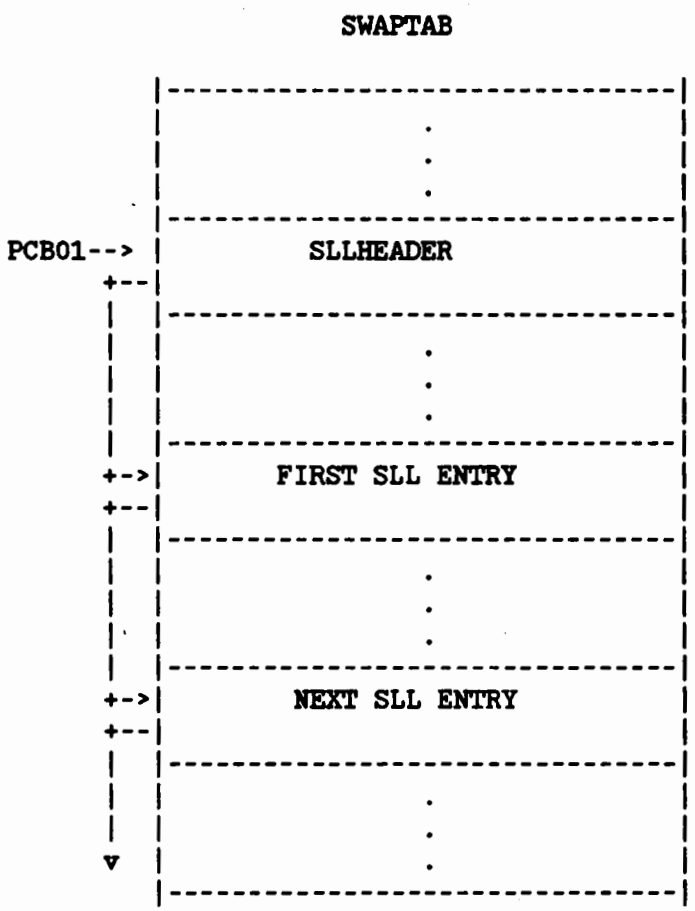


An assigned entry in the swaptab is a process' SLL header or a member of a process' SLL. These formats are now described.

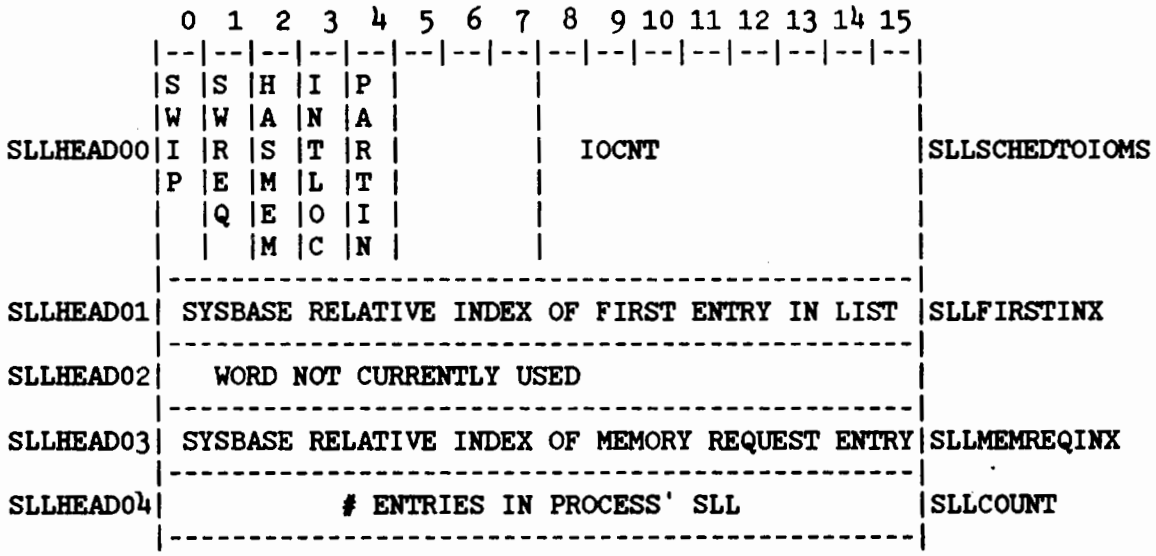
2.2.2 Segment Locality Lists (SLL)

The system maintains for each process a segment locality list (SL
the segments belonging to that process' current working set. The
process' SLL consists of a header and a list of entries.
The header and list entries are taken from the SWAPTAB.

A process' SLL is located via the process' pcbentry. PCB01
contains the sysbase relative index of the process' SLL header.



SLL HEADER FORMAT



SLLHEAD00 .(0:1) SWIP, Swap In Progress Flag
.(1:1) SWREQ, Swap Required Flag
.(2:1) HASMEM, Has Memory Flag
.(3:1) PARTIN, Process partially swapped in
.(4:4) Available
.(8:8) IOCNT, Segment read completions until awake

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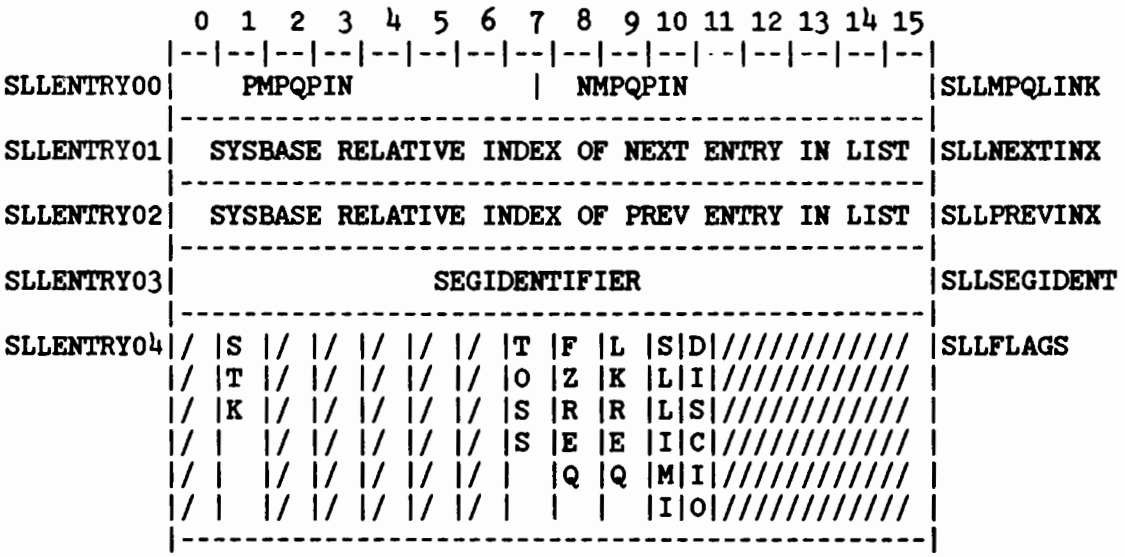
SLL LIST ENTRY FORMAT



SLLENTRY00 .(0:8) PMPQPIN, previous make present deferred queue pin
.(8:8) NMPQPIN, next make present deferred queue pin

SLLENTRY01 .(0:16) SYSBASE, relative index of next entry in list (=0=> 1 entry)

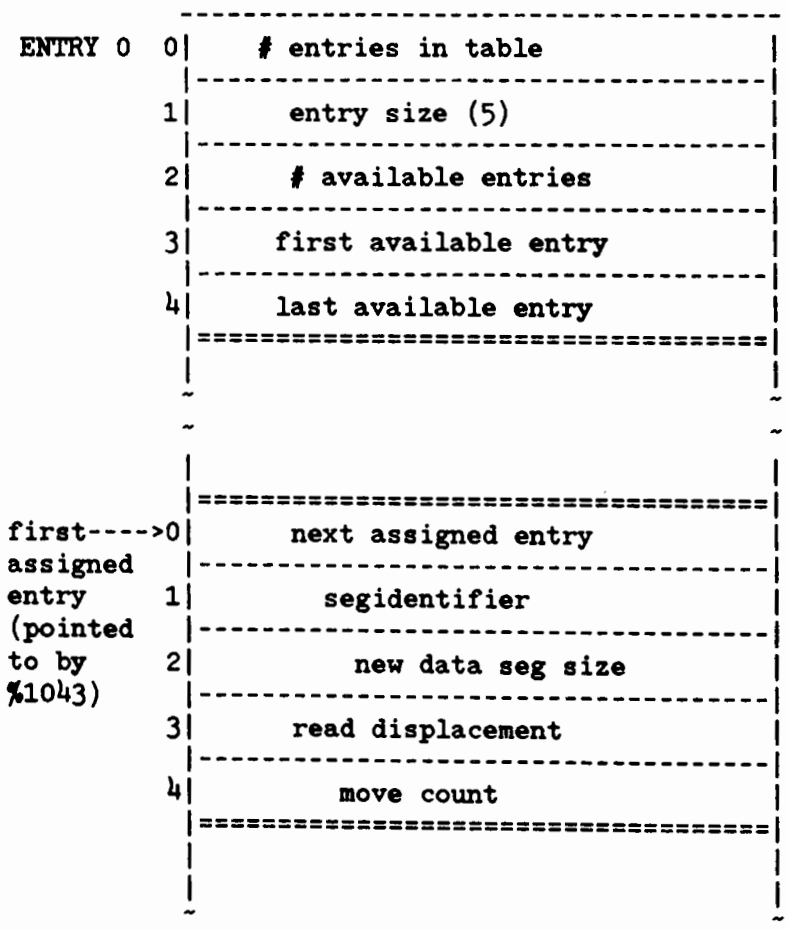
SLLENTRY02 .(0:16) SYSBASE relative index of previous entry in list (=0==> first entry)

SLLENTRY03 Has standard segment identifier format.

SLLENTRY04 .(1:1) STK ==> process' stack entry
.(7:1) TOSS ==> Toss this entry
.(8:1) FRZREQ ==> Process requests a freeze on seg
.(9:1) LKREQ ==> Process requests a lock on seg
.(10:1) SLLIMI ==> process is queued for this segment
.(11:1) DISIOSEG ==> process waiting for disc i/o against thi seg

SPECIAL REQUEST TABLE

(USED FOR PASSING DATA SEGMENT SIZE CHANGE INFO AND FOR KEEPING A LIST OF DEVICES WAITING FOR A SEGMENT TO ARRIVE IN MEMORY.)



2.3 Main Memory Region Headers and Trailers

Main memory is partitioned into regions. Each region is in one of three states: available, reserved, or assigned.

An available region is available for consumption by the free space alloc mechanism. An available region consists of neighboring subregions, each which is either a hole or an overlay candidate. An available region is linked into the available region list of appropriate size.

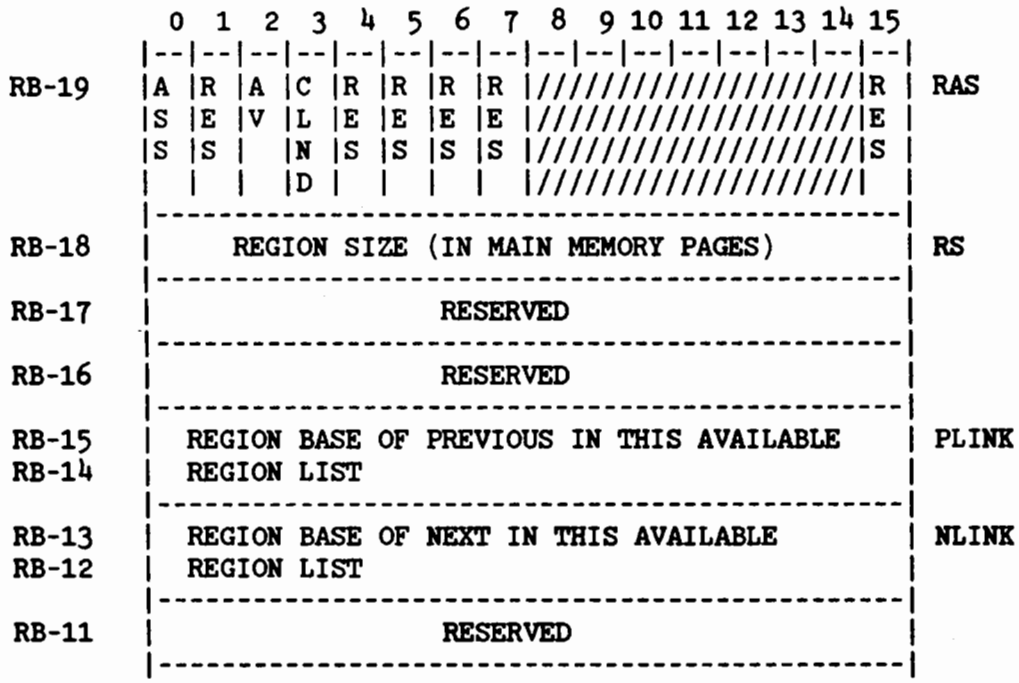
A reserved region is a main memory region which is in the transition state from available to assigned. A reserved region has been cleaned, and there is a pending disc read of a segment into the region.

Assigned regions are occupied by present segments. Available and reserved regions consist of one or more adjacent subregions. Region headers and trailers are partitioned into global and local components. The global region header/trailer is only valid for the first/last subregion in regions consisting of more than one subregion.

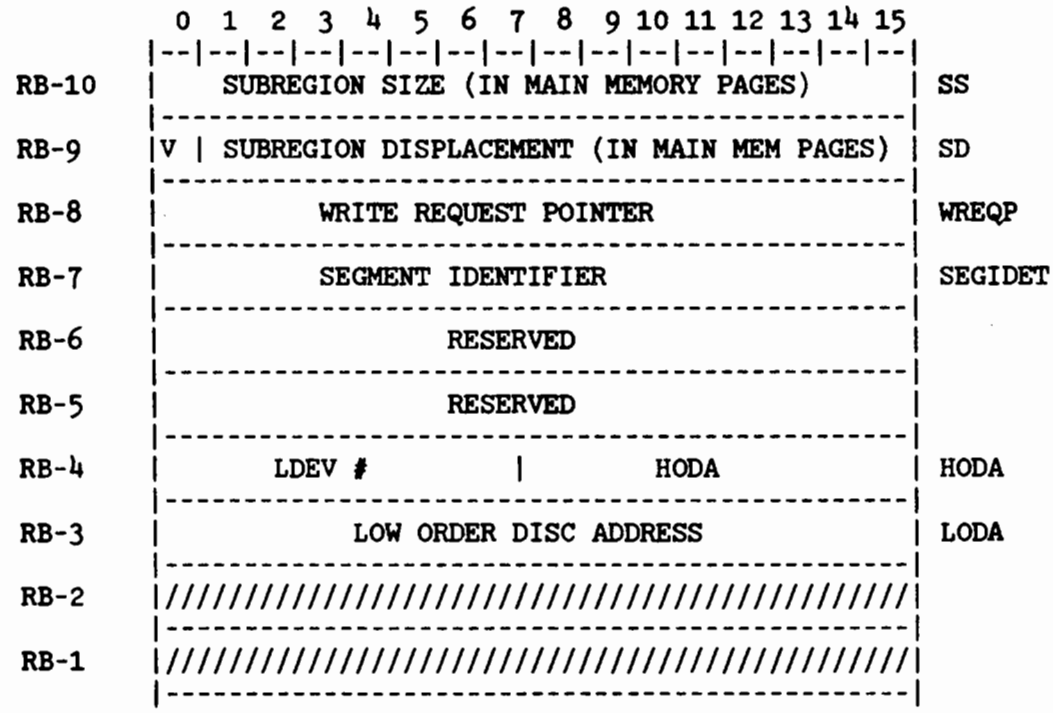
The region headers and trailers of available, reserved, and assigned regions contain the state and control information pertaining to the current or planned contents of the region.

2.3.1 Available Region Headers and Trailers

Available Region Global Header Format
(only valid for first subregion)

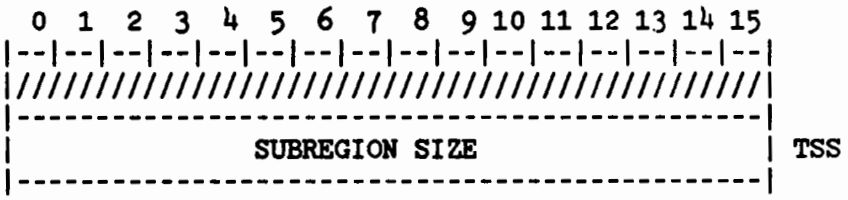


Available Region Subregion Header
(Valid for All Subregions)

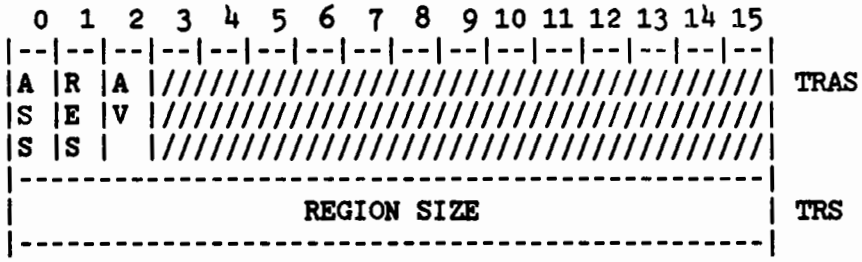


RB ===>

Available Region Subregion Trailer

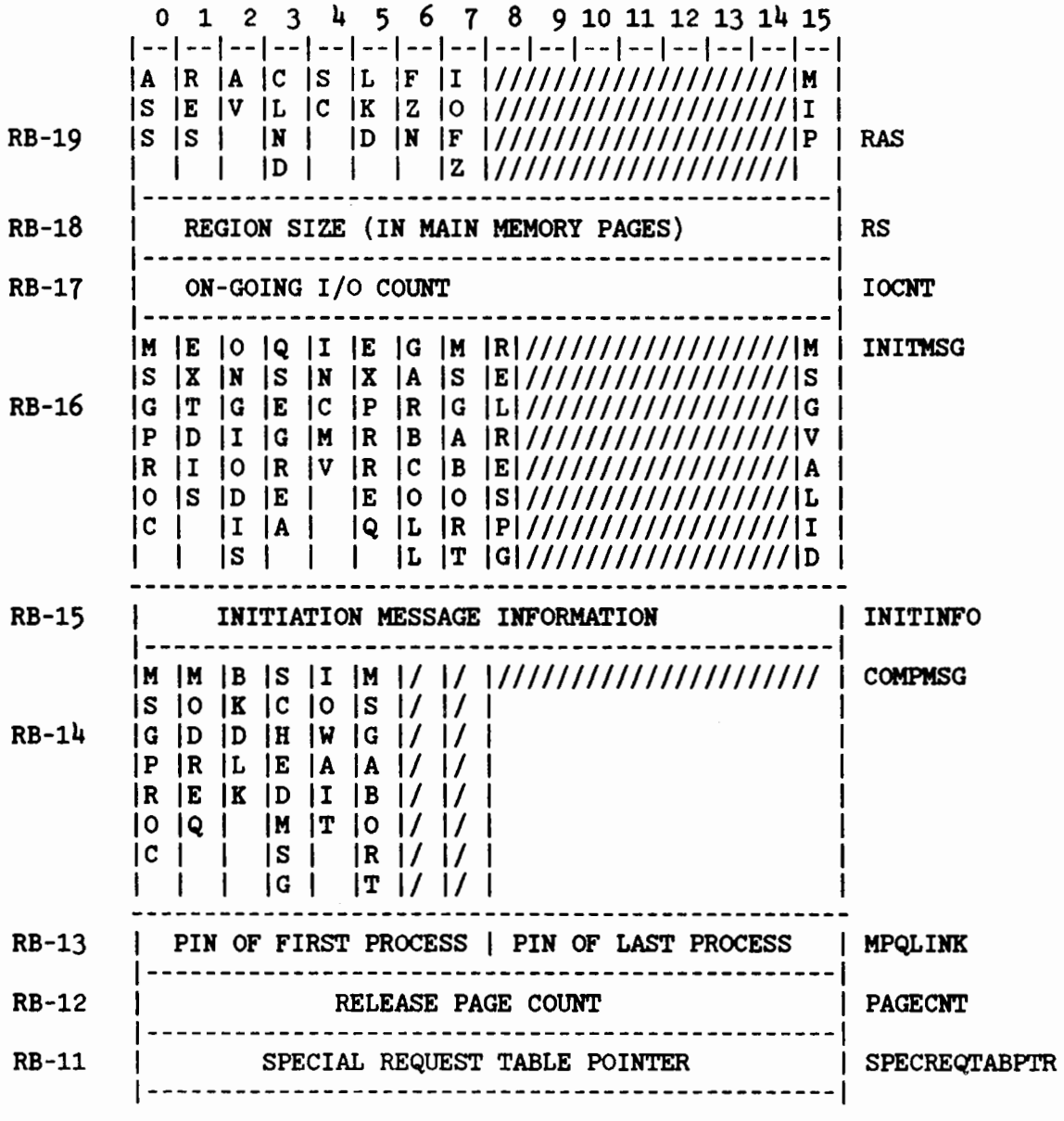


Available Region Global Trailer
(Valid Only for Last Subregion)

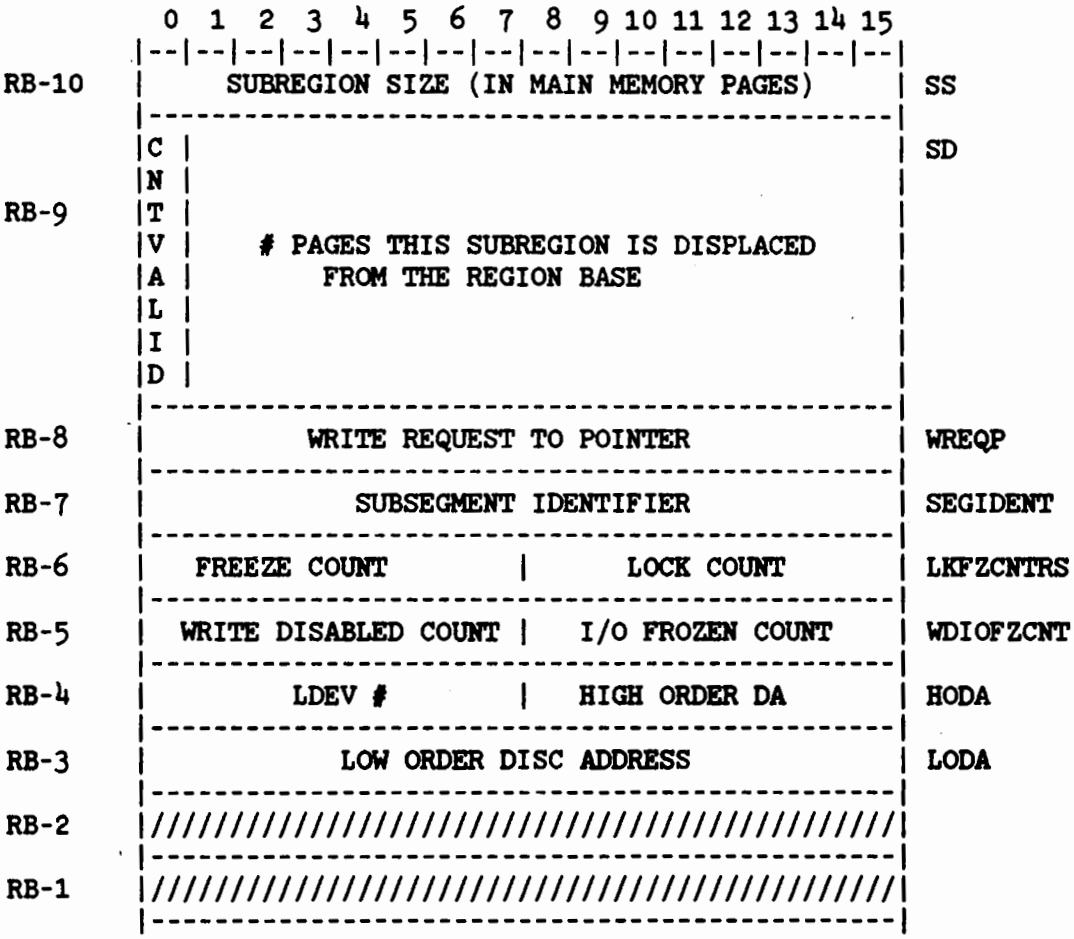


2.3.2 Reserved Region Headers and Trailers

Reserved Region Global Header Format
(Only Valid for First Subregion)

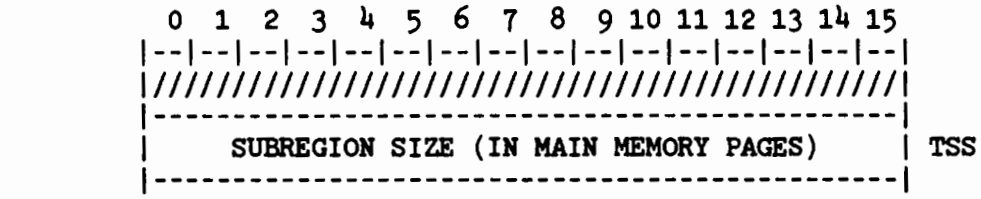


Reserved Region Subregion Header
(Valid for all Subregions)

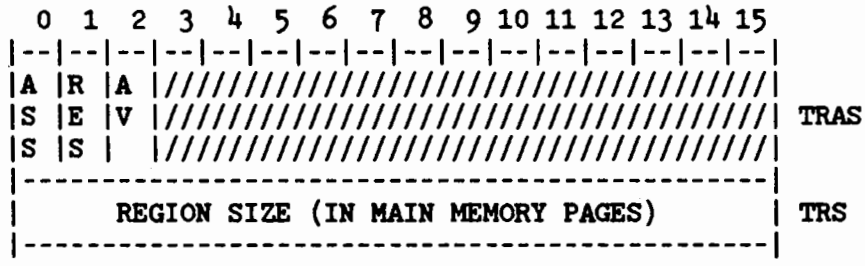


RB ==> First Word of Segment

Reserved Region Subregion Trailer
(Valid for All Subregions)

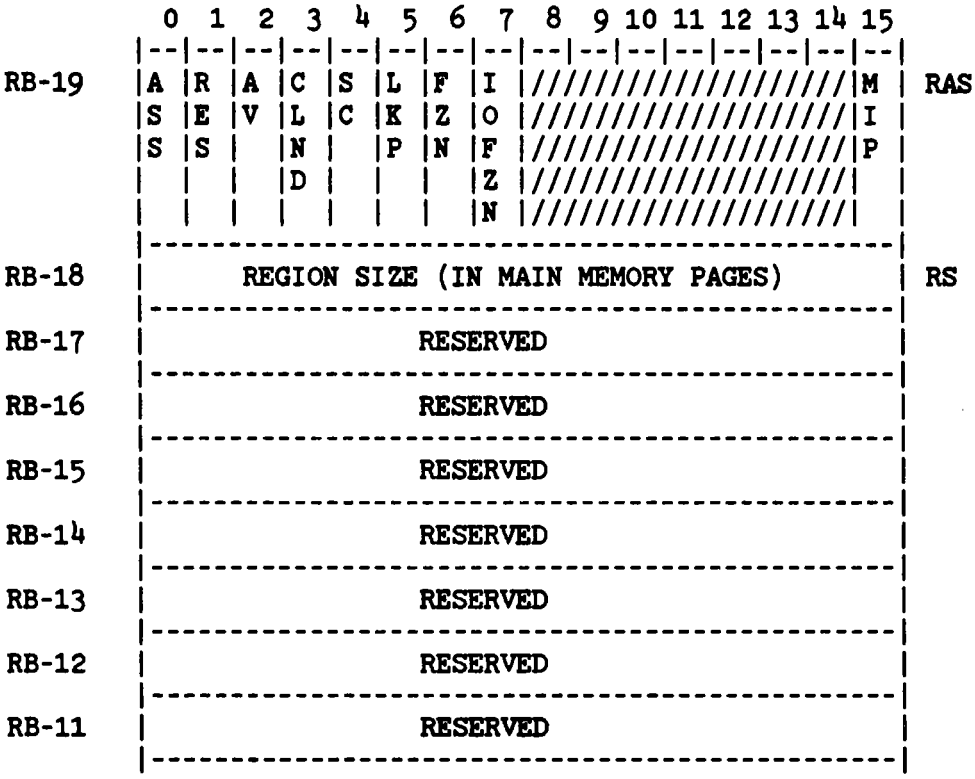


Reserved Region Global Trailer
(Valid Only for Last Subregion)

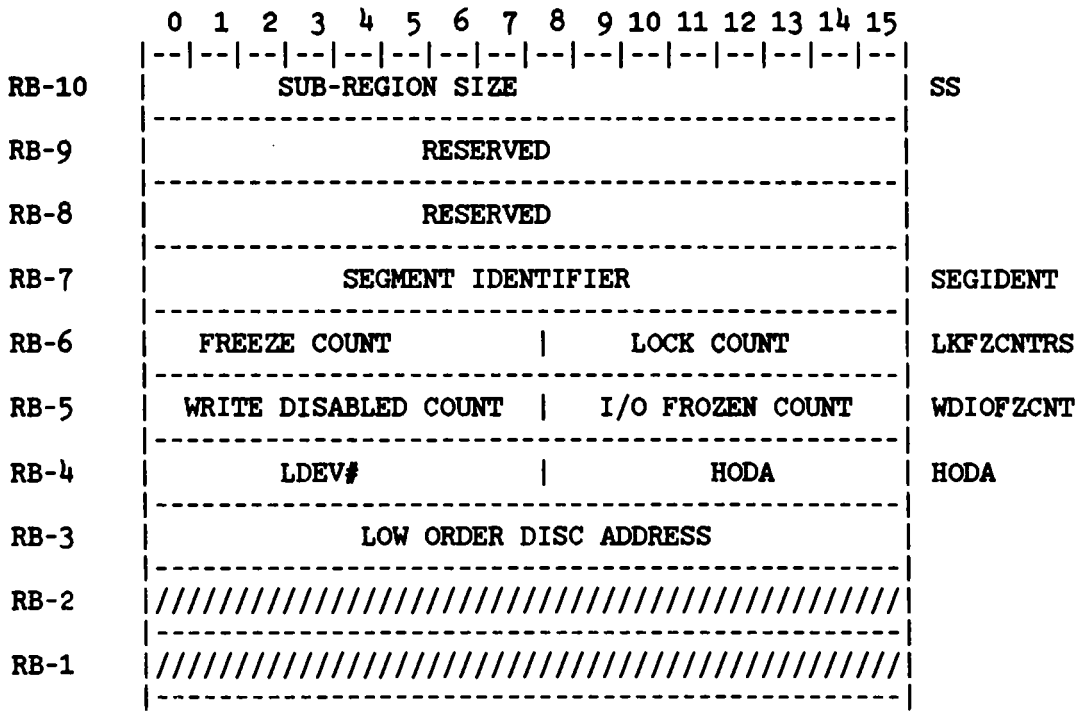


2.3.3 Assigned Region Headers and trailers

Assigned Region Global Header Format

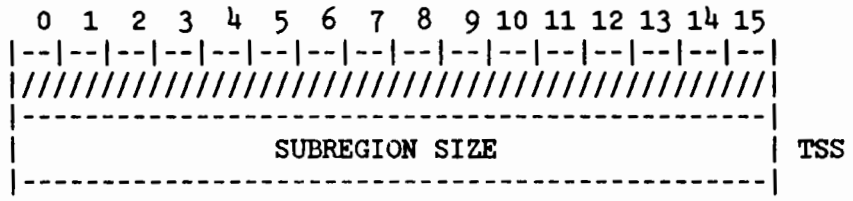


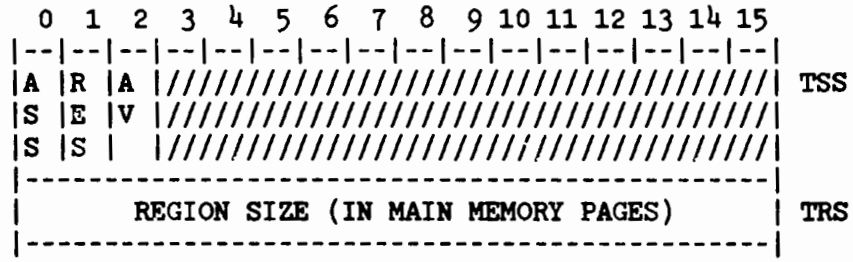
Assigned Region Subregion Header



RB==>

Assigned Region Subregion Trailer Format





2.3.4 Region Header and Trailer Field Descriptions

RAS, Region Assignment State
- .(0:1) Region Assigned Flag
- .(1:1) Region Reserved Flag
- .(2:1) Region Available Flag
- .(3:1) Region Cleaned Flag
- .(4:1) Size Change Pending Flag
- .(5:1) Region Locked Flag
- .(6:1) Region Frozen Flag
- .(7:1) Region I/O Frozen Flag
- .(8:7) Available
- .(15:1) Blocked Lock Migration in Progress Flag

IOCNT, On-Going I/O Count
= # of on-going I/O's in the region which must complete befo

initiation message can be processed.

INITMSG, Initiation Message
- .(0:1) Message Processed Toggle Switch
- .(1:1) Message Externally Disabled Flag
- .(2:1) Message On-going I/O Disabled Flag
- .(3:1) Queue Segment Read Disc Request Flag
- .(4:1) Incore Move Request Flag
- .(5:1) Expansion Request Flag
- .(6:1) Garbage Collection Flag
- .(7:1) Message Aborted Flag
- .(8:1) Release Residual Pages Flag
- .(9:6) Available
- .(15:1) Message Valid Flag

INITINFO, Initaition Message Auxiliary Information
= Sysbase relative index of segment read disc request if INI
QREADREQ=1
or
= +/- Displacement to initiation message for moves and expan

COMPMSG, Completion Message

- .(0:1) Message Processed Toggle Switch
- .(1:1) Segment Modification Required
- .(2:1) Block Lock Request
- .(3:1) Send Scheduler A Message
- .(4:1) Awaken A Device
- .(5:1) Message Aborted
- .(6:2) Available

```
MPQLINK,   Make Present Deferred Queue Link

            .(0:8)  PIN Of First Process Waiting for this Segment
            .(8:8)  PIN of Last Process Waiting for this Segment
PAGECNT,    Release Page Count
            =# of extra pages to release before processing initiation
            message.
SPECREQTABPTR, points into special request table to the list of
               devices queried on this segment.
SS,         Subregion Size
SD,         Subregion Displacement
            .(0:1)  Displacement Count Valid Flag
            .(1:15) # Pages to Base of Region
WREQP,      Write Request Pointer
            = Sysbase Relative Index of Disc Write Request when the
            Data Segment in the Subregion is in Motion Out
SEGIDENT,   Segment Identifier- has standard segment identifier format
```

Space Allocation Structures

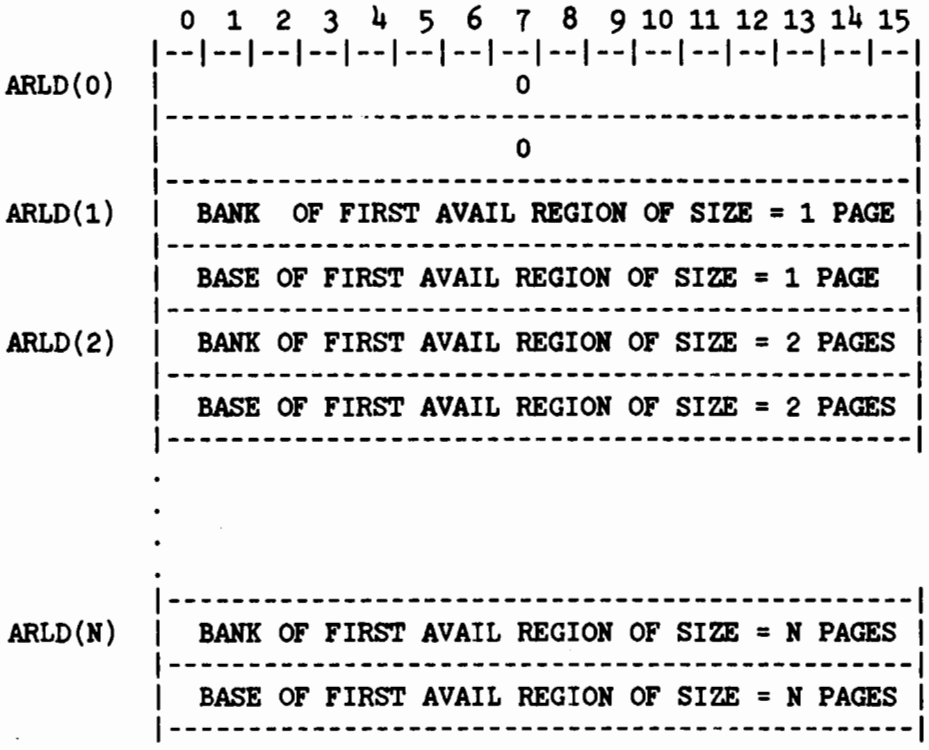
Available regions in main memory are kept track of by multiple free
All available regions of the same size are linked into to the same
able region list (ARL). A bitmap is maintained to indicate which l
non-empty (ARSBM). A sysglob cell is maintained which contains the
of the largest currently available region.

%1045 MAXAVAILREG, number of pages in largest currently available r

Available Region List (ARL)

%1044 SYSBASE index of base of ARL

ARL DST # = 55 (%67)

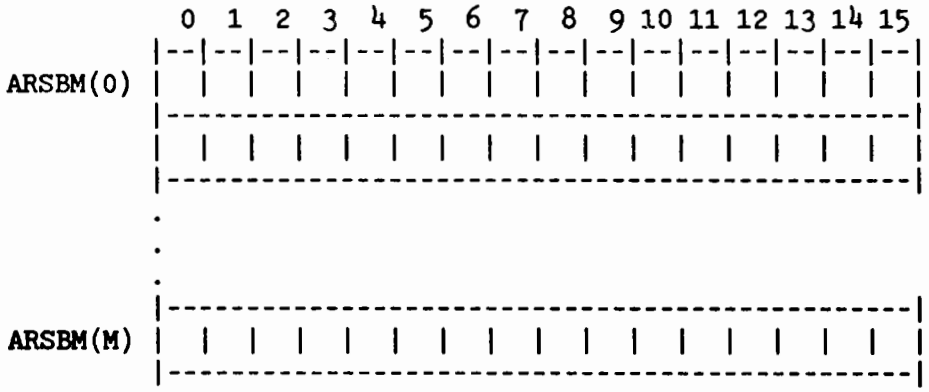


Where N = maximum available region size
= (2**16/2**pagepower) pages

Available Region Size Bit Map (ARSBM)

%1004 SYSBASE index of base of ARSBM

ARSBM DST# = 58 (%71)

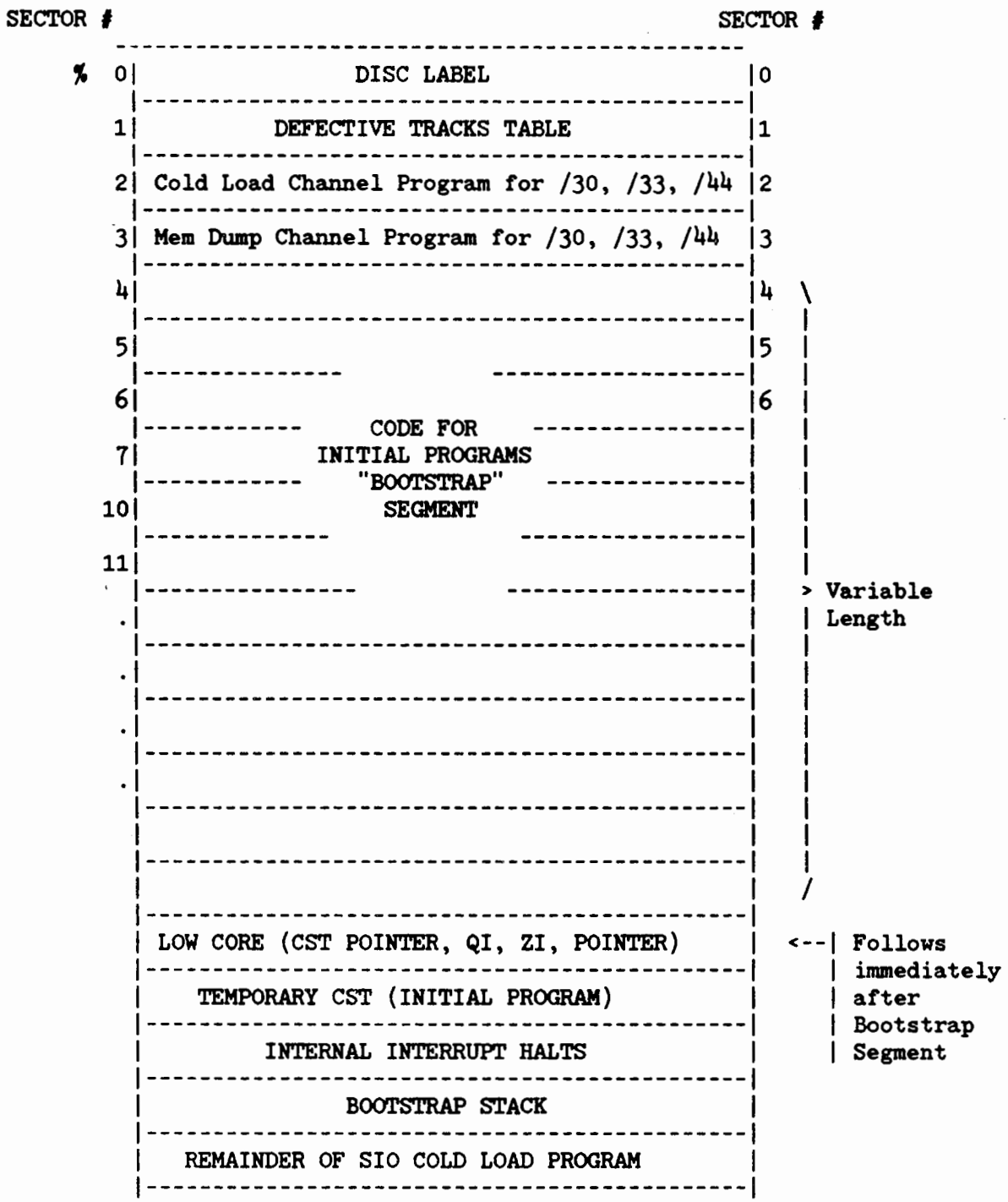


M = (# of available region sizes/16) +1

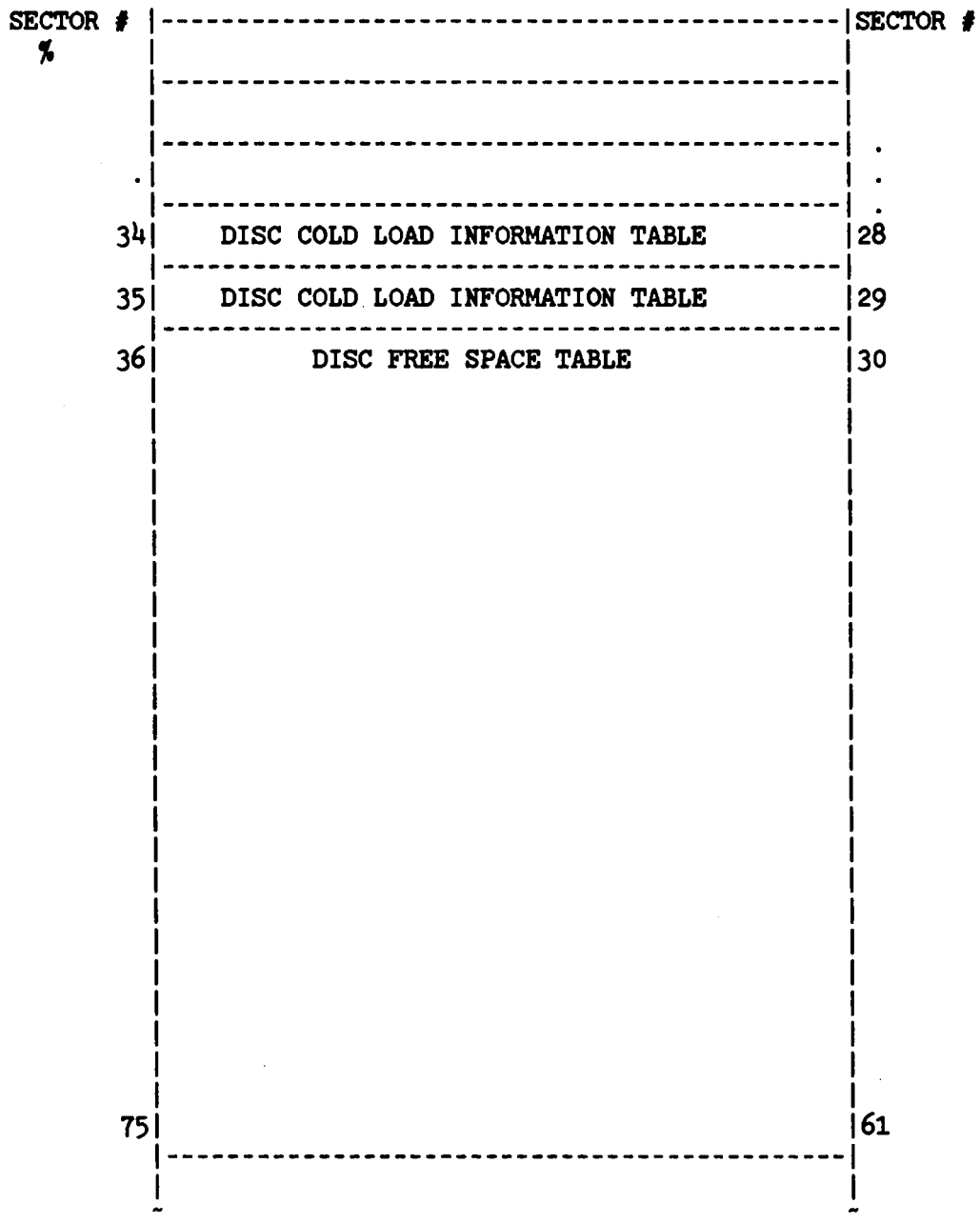
ARSBM (J) . (K:1) = 1 ==> the available region list of size J*16+K Pages is non-empty.

CHAPTER 3 DISC LAYOUT

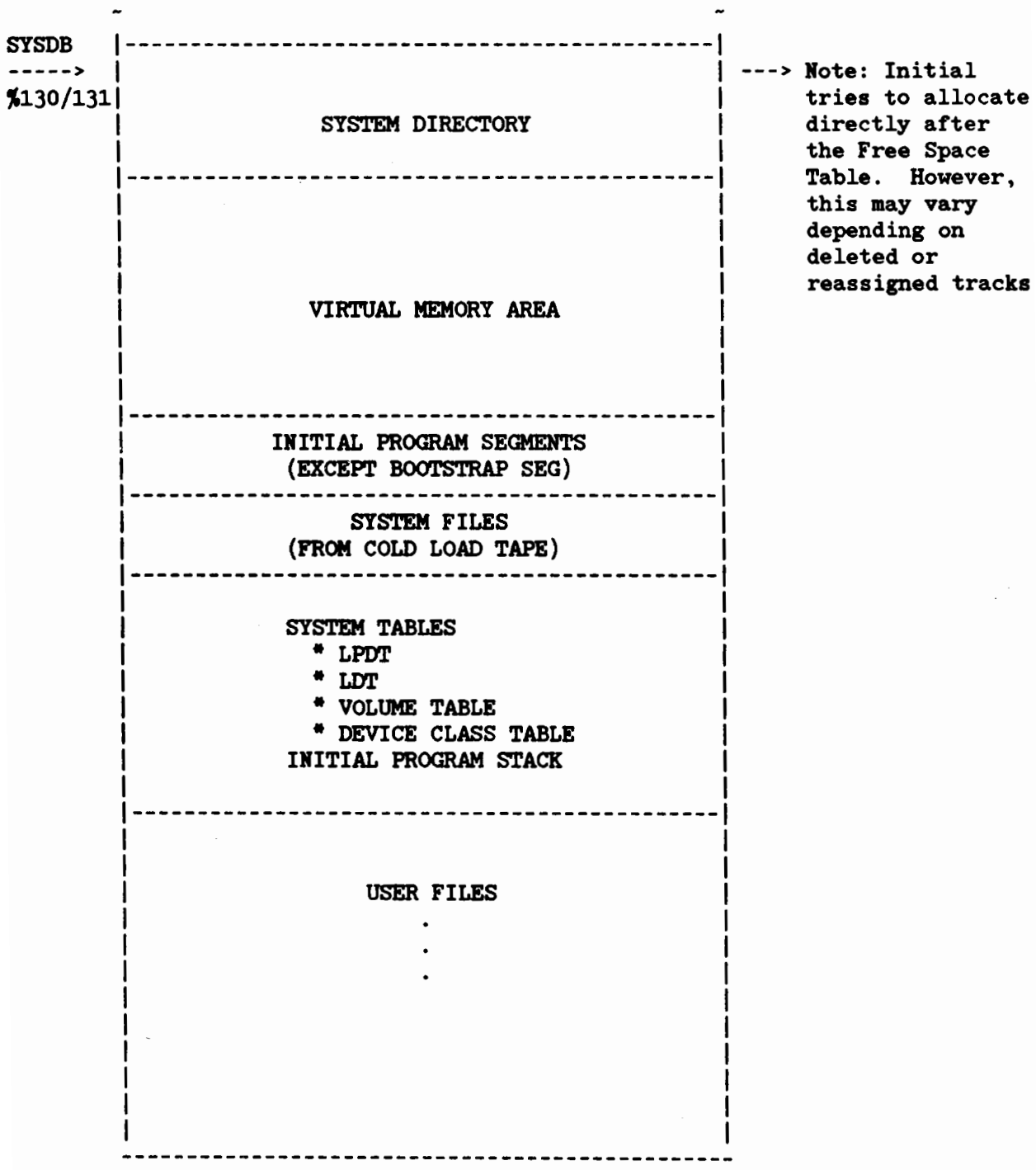
SYSTEM DISC LAYOUT



SYSTEM DISC LAYOUT (CONT.)

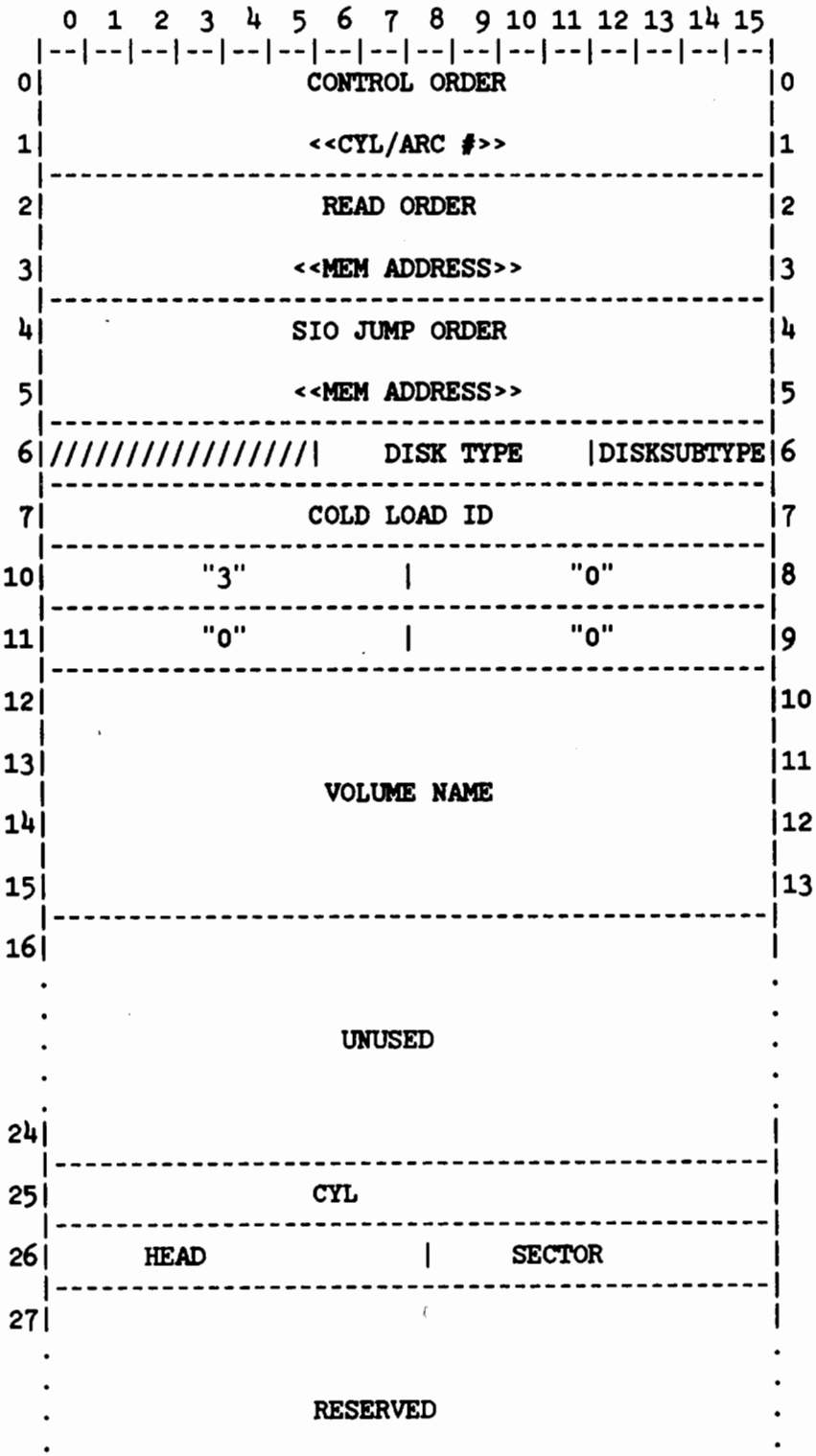


SYSTEM DISC LAYOUT (CONT.)



DISC LABEL (Sector 0 of disc)

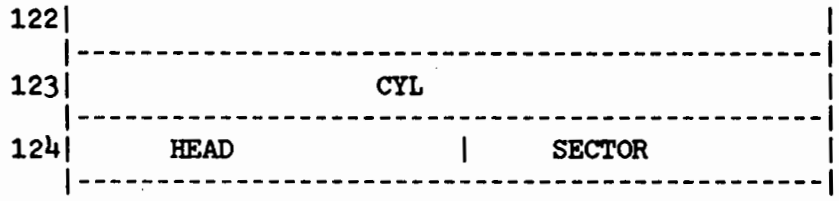
SYSTEM VOLUME



DISC BOOTSTRAP SIO PROGRAM (SYSTEM DISC ONLY)

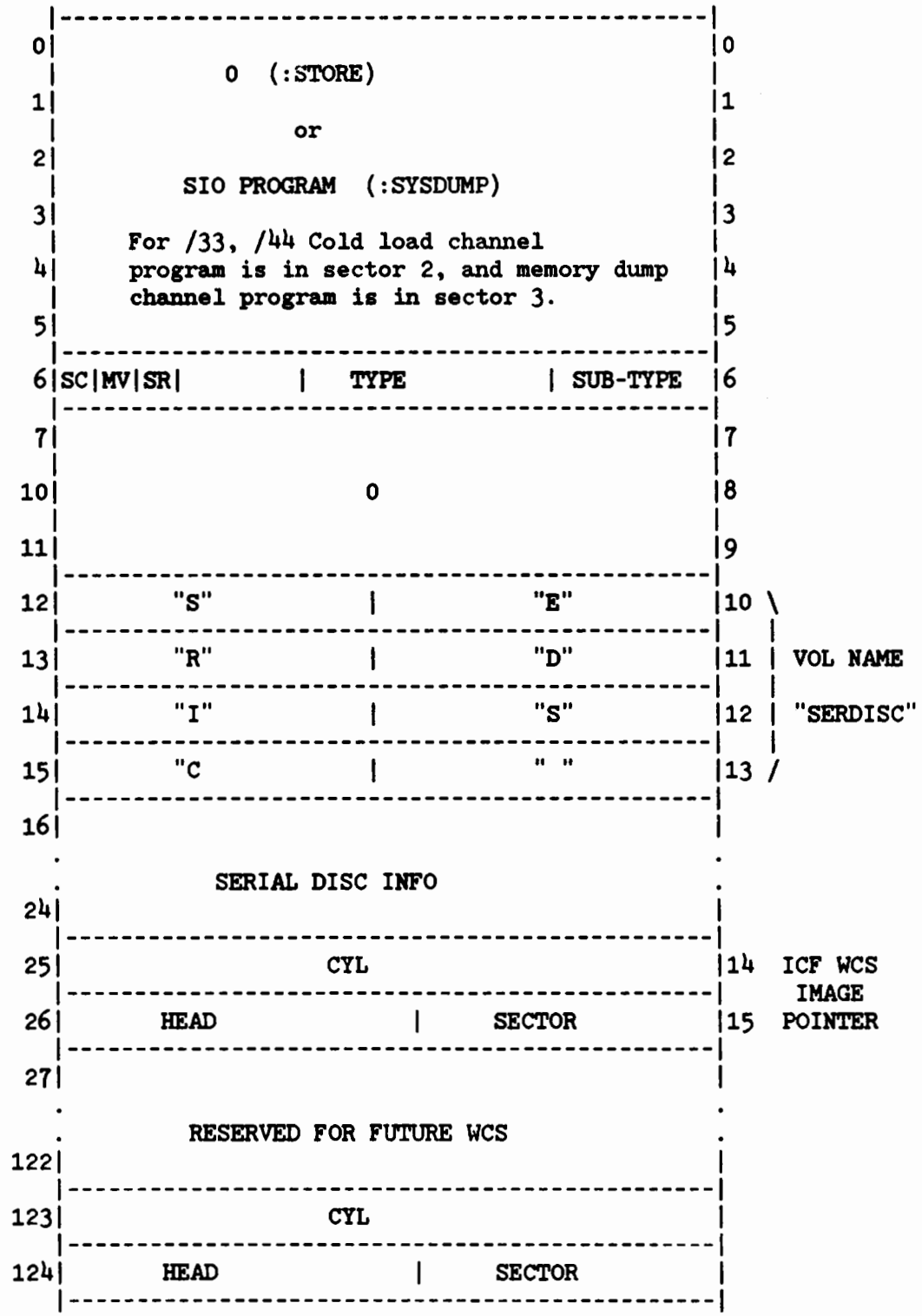
Words 0-5 contain the Ascii string "SYSTEM DISC " for /33, /44

ICF WCS IMAGE POINTER


122
123
CYL
124
HEAD
SECTOR

DISC LABEL SECTOR 0 (CONT.)

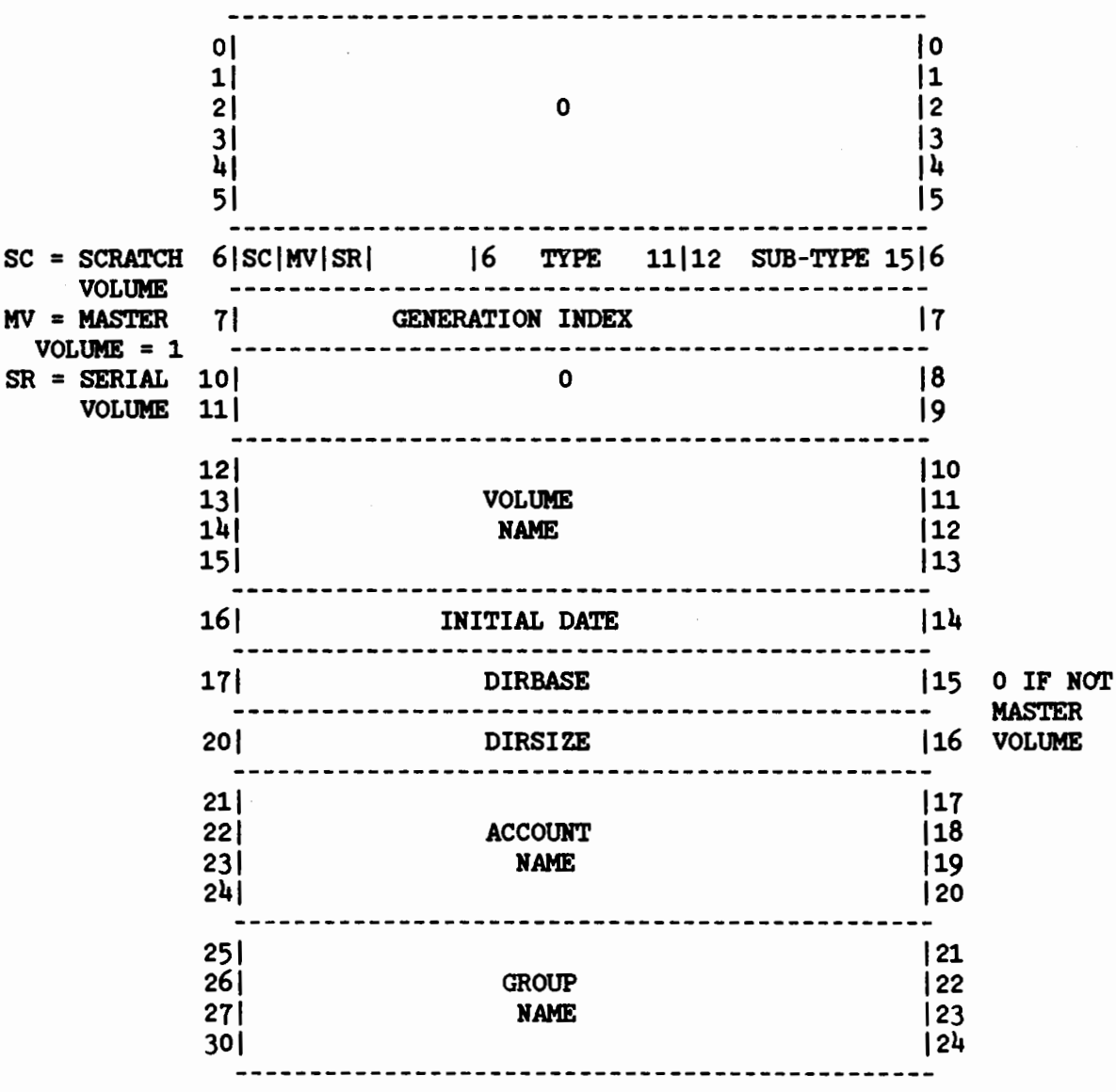
SERIAL VOLUME



DISC LABEL (cont)

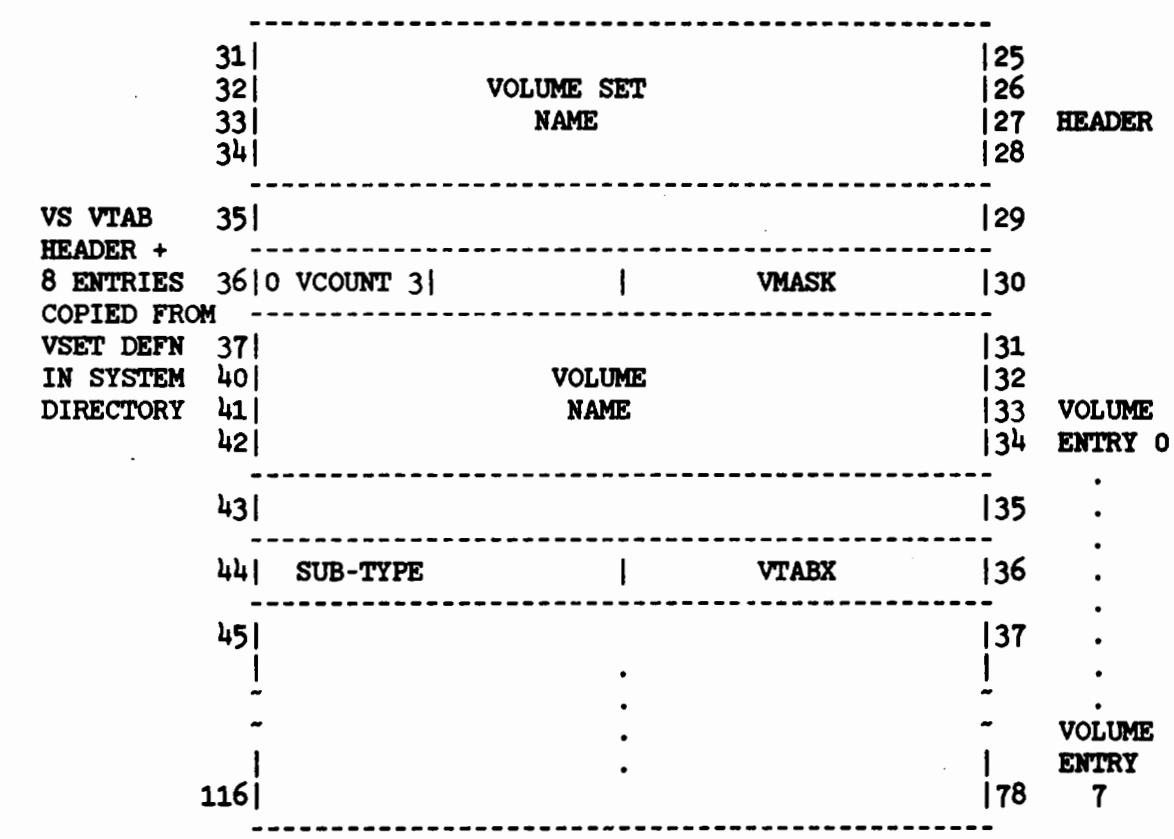
SECTOR 0

MASTER VOLUME



SC = SCRATCH VOLUME
MV = MASTER VOLUME = 1
SR = SERIAL VOLUME

MASTER VOLUME (CONT.)

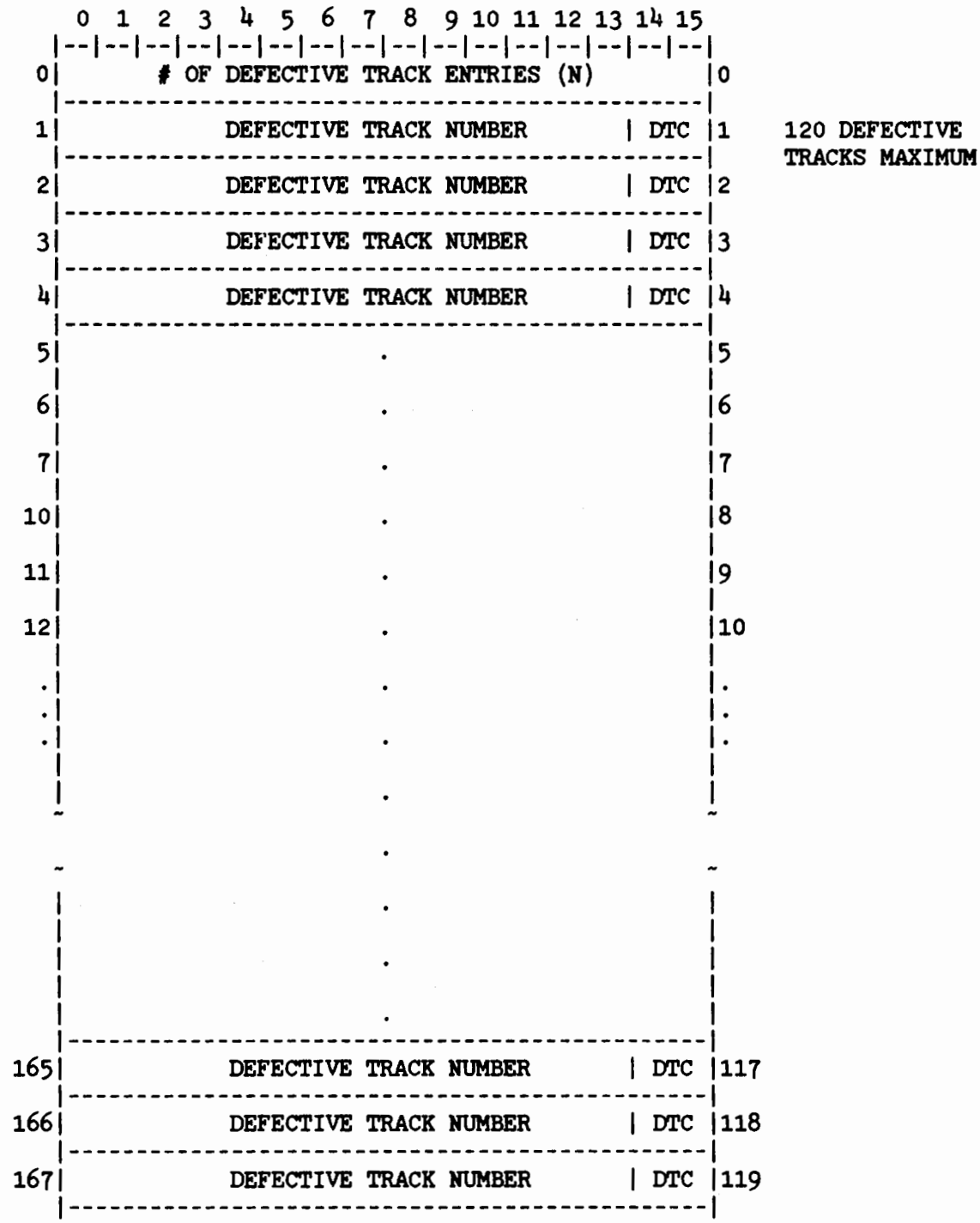


SECTOR 0

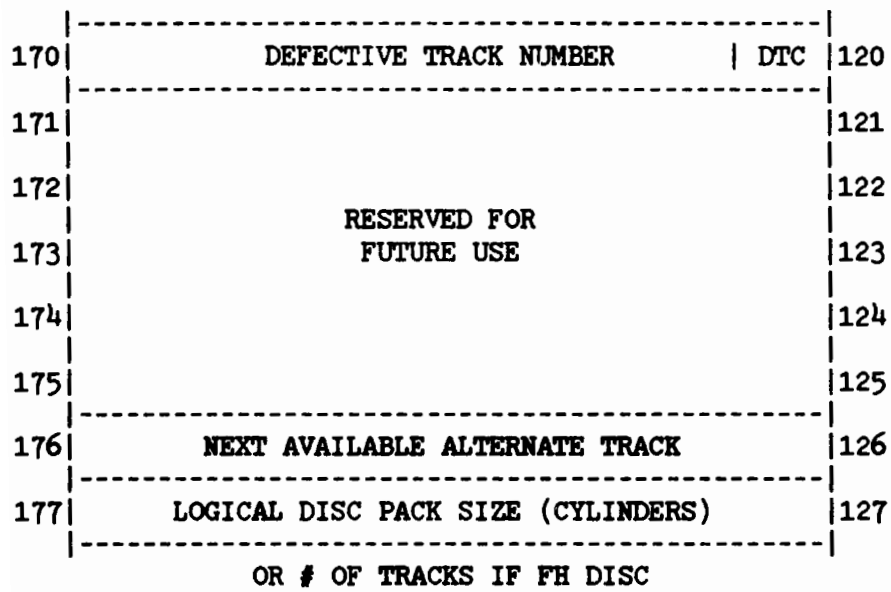
SLAVE VOLUME

	0				0				0
	1								1
	2								2
	3								3
	4								
SC = SCRATCH VOLUME	5								
MV = MASTER VOLUME = 0	6	SC	MV	SR	6 TYPE 11			12 SUB-TYPE 15	6
SR = SERIAL VOLUME	7	GENERATION INDEX							7
	10	0							8
	11								9
	12								10
	13	VOLUME							11
	14	NAME							12
	15								13
	16	INITIAL DATE							14
	17	0							15
	20								16
	21								17
	22	ACCOUNT							18
	23	NAME							19
	24								20
	25								21
	26	GROUP							22
	27	NAME							23
	30								24
	31								25
	32	VOLUME SET							26
	33	NAME							27
	34								28

DEFECTIVE TRACKS TABLE (Sector 1 of Disc)



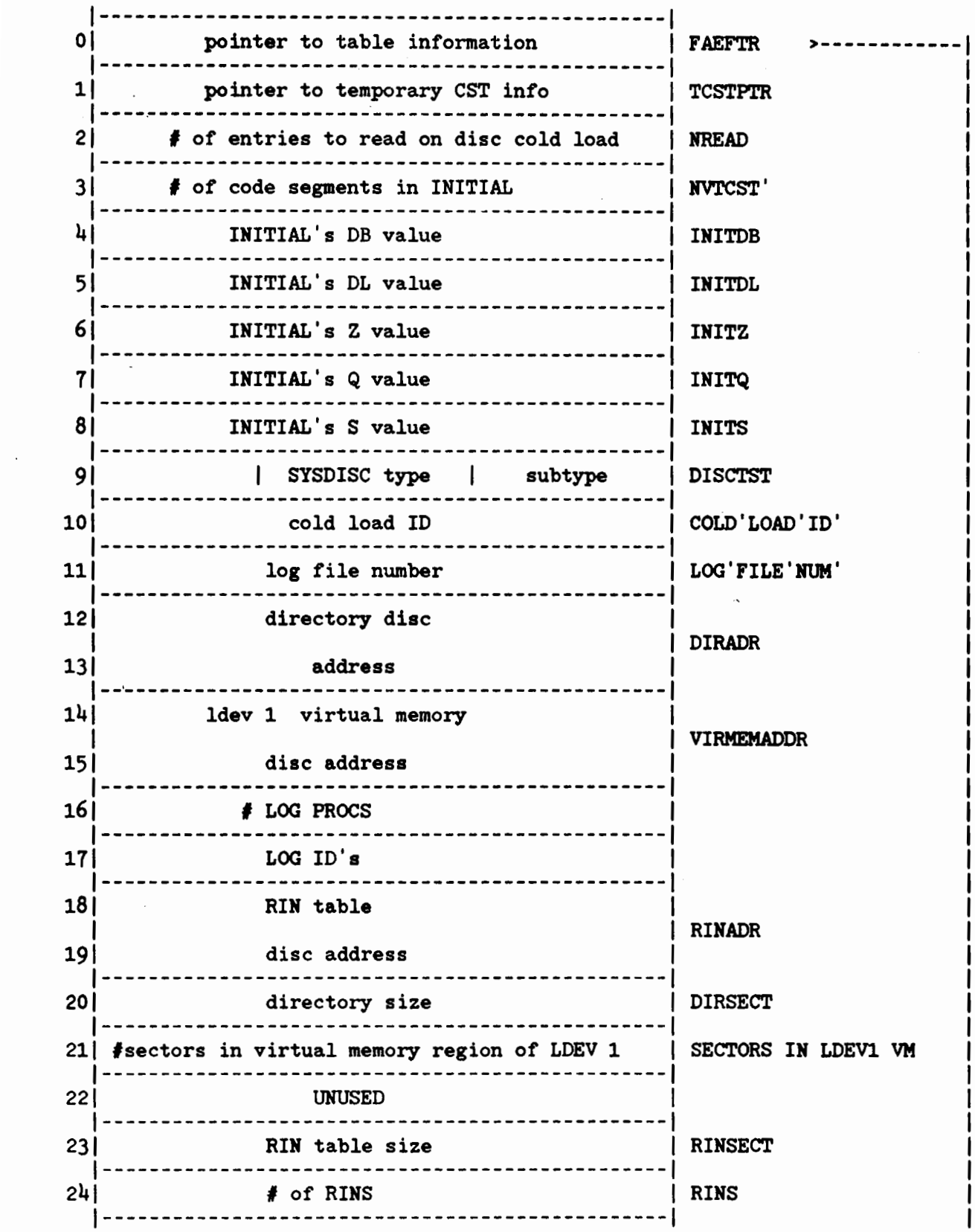
DEFECTIVE TRACKS TABLE (CONT.)



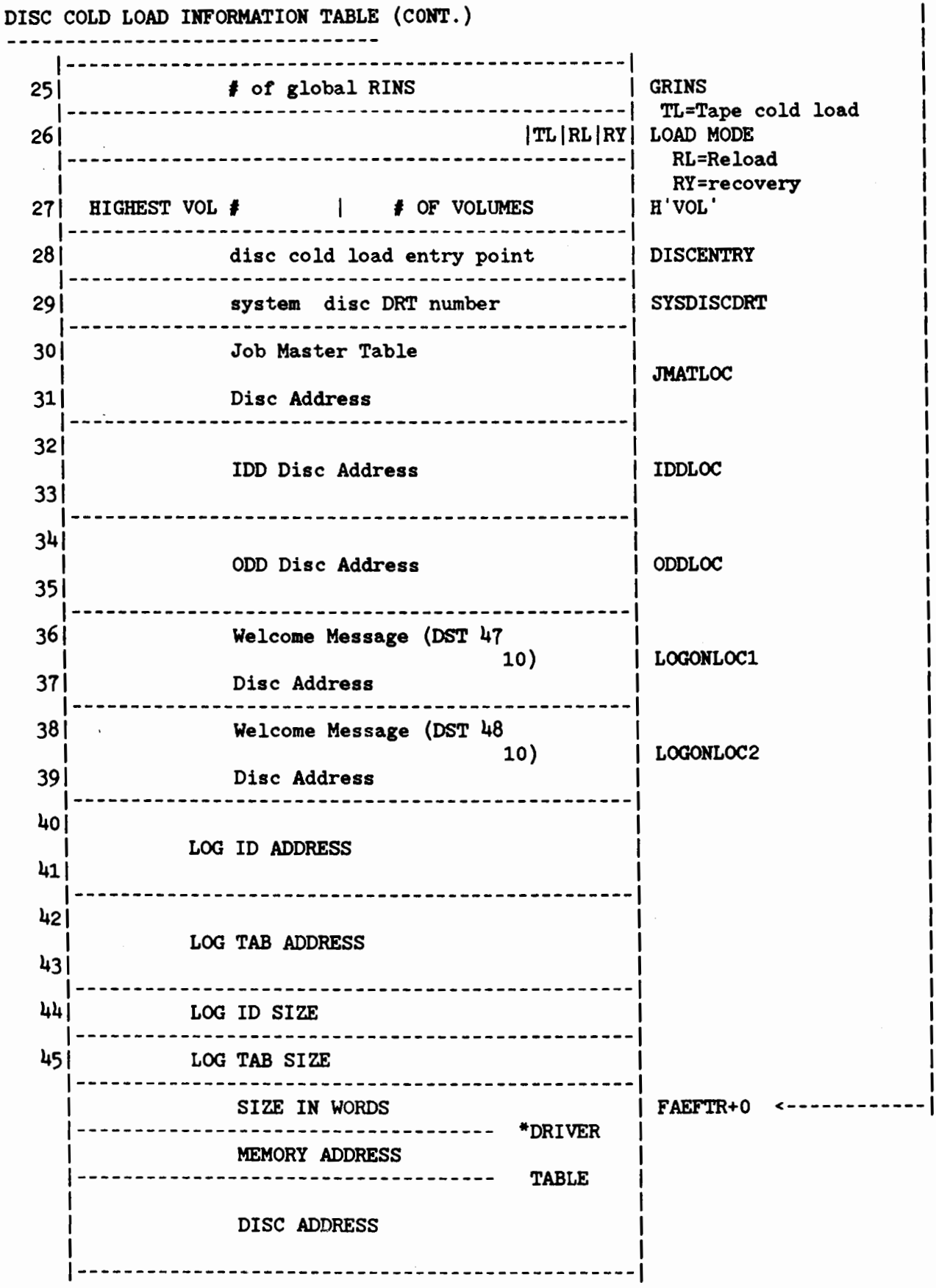
DTC	(DEFECTIVE TRACK CODE)
0	suspect
1	suspect alternate
2	deleted
3	reassigned

NOTE: The situation where there are two entries for the same track, n, one having a DTC of 0 (suspect) and the other having a DTC 3 (reassigned) results from a situation where the disc driver could not "read" (unreadable) the address of the particular track.

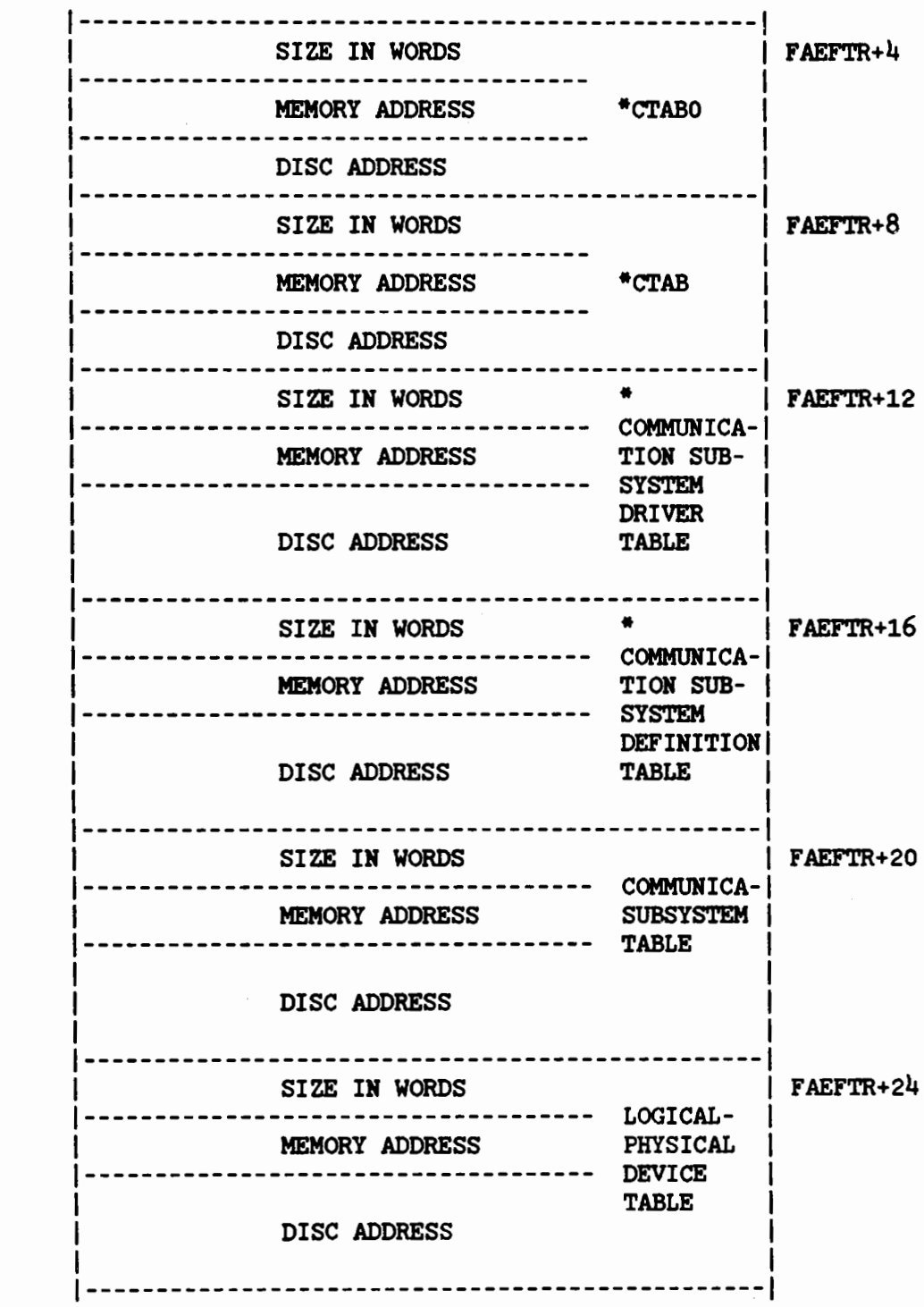
DISC COLD LOAD INFORMATION TABLE (SECTORS 28-29)

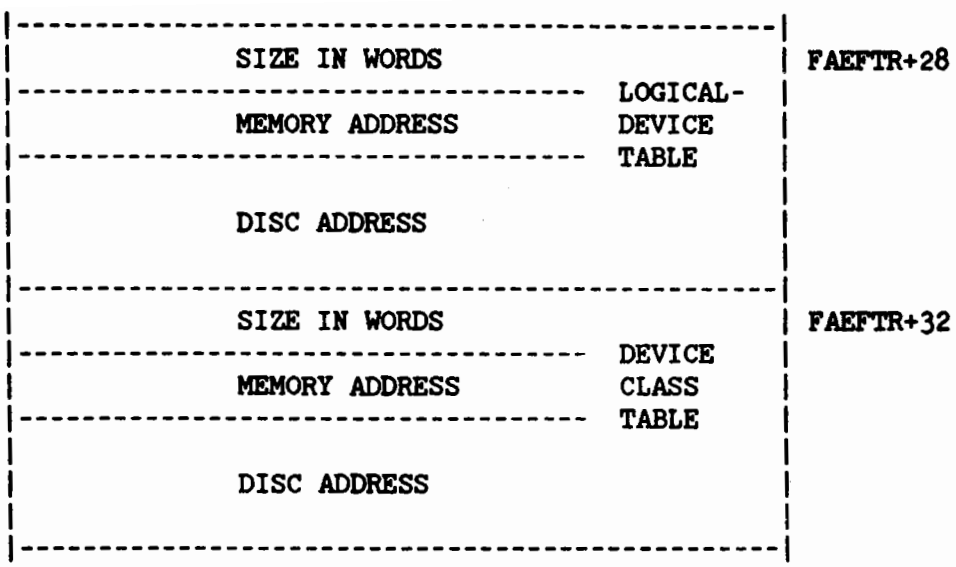


DISC COLD LOAD INFORMATION TABLE (CONT.)

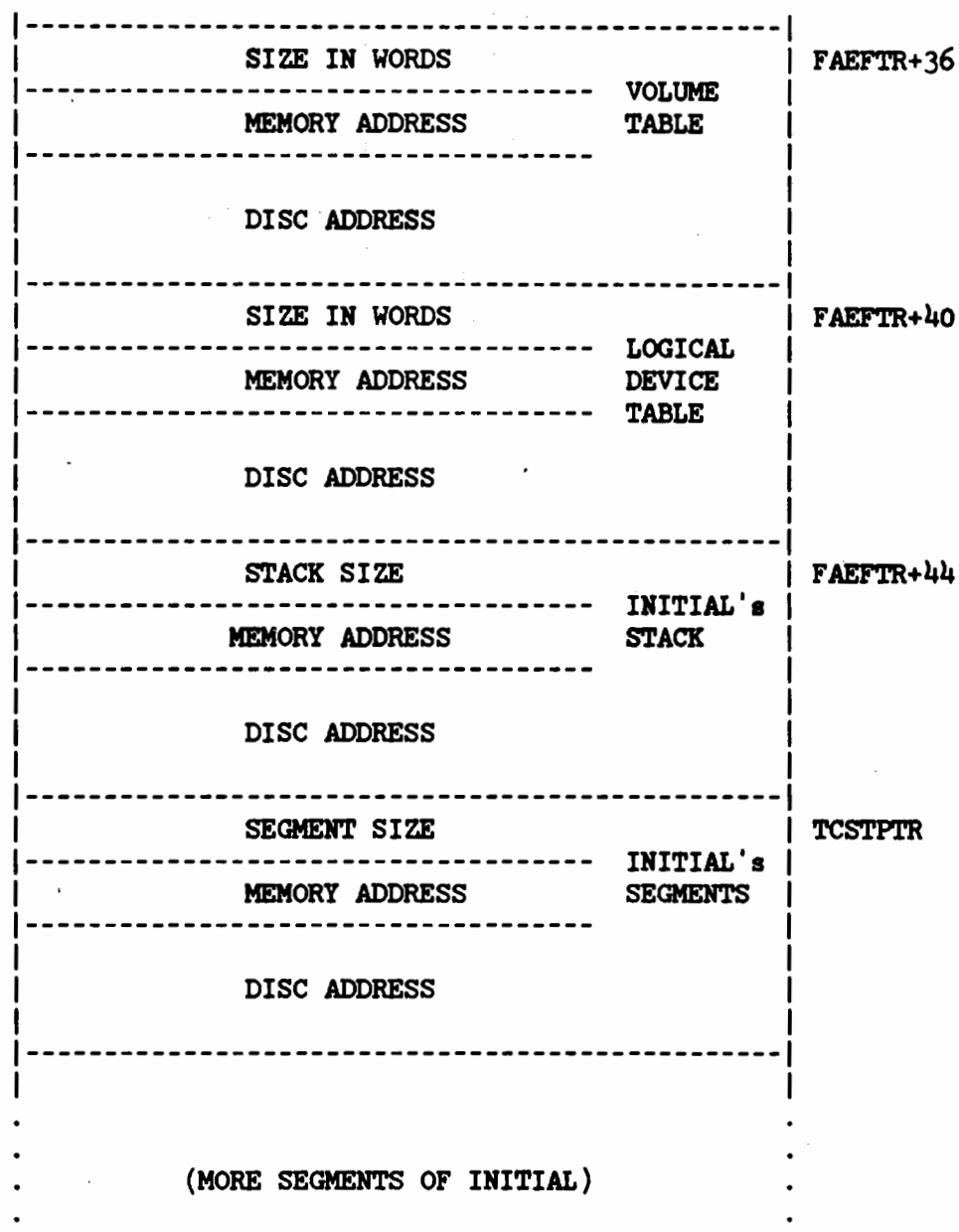


DISC COLD LOAD INFORMATION TABLE (CONT.)




SIZE IN WORDS
FAEFTR+28
MEMORY ADDRESS
LOGICAL-
DEVICE
TABLE
DISC ADDRESS
SIZE IN WORDS
FAEFTR+32
MEMORY ADDRESS
DEVICE
CLASS
TABLE
DISC ADDRESS

DISC COLD LOAD INFORMATION TABLE (CONT.)



INITIAL PROGRAM CST MAP

LOGICAL CST#	PHYSICAL CST#	SEGMENT NAME	
17	37	BOOTSTRAP |	
16	36	RESIDENT |---->	core resident
15	35	MAINSEG1 \	
14	34	CONFIGURE |	|non-core resident
13	33	DEFCTRACKS|	|but present in core
12	32	SETUP |------|	at completion of
11	31	FILEIO |	|cold load
10	30	DISKSPACE |	
7	27	DIRECTORY1|	
6	26	DIRECTORY2/	
5	25	SL PROGRAM	
4	24	PROCESS	
3	23	MAINSEG1B	
2	22	MAINSEG2	
1	21	MAINSEG3	
0	20	MAINSEG4	

*code segment swapping starts at completion of MAINSEG1

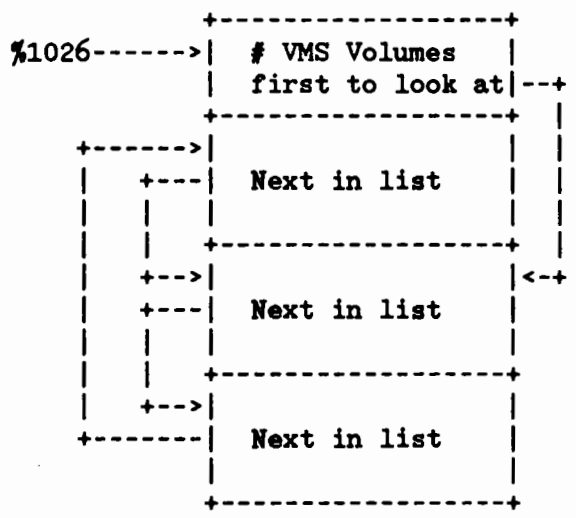
Virtual Disc Space Management Structures

Disc space for data segments is allocated from reserved regions of system volumes which have been assigned the virtual memory supporting (VMS) attribute. The data structure used for accounting and management of the virtual disc space of the various VMS volumes is the Virtual Disc Space Management Table (VDSMTAB). This structure consists of a circular list of entries, one for each VMS volume. Each entry contains the information defining the state of the virtual memory region on that volume.

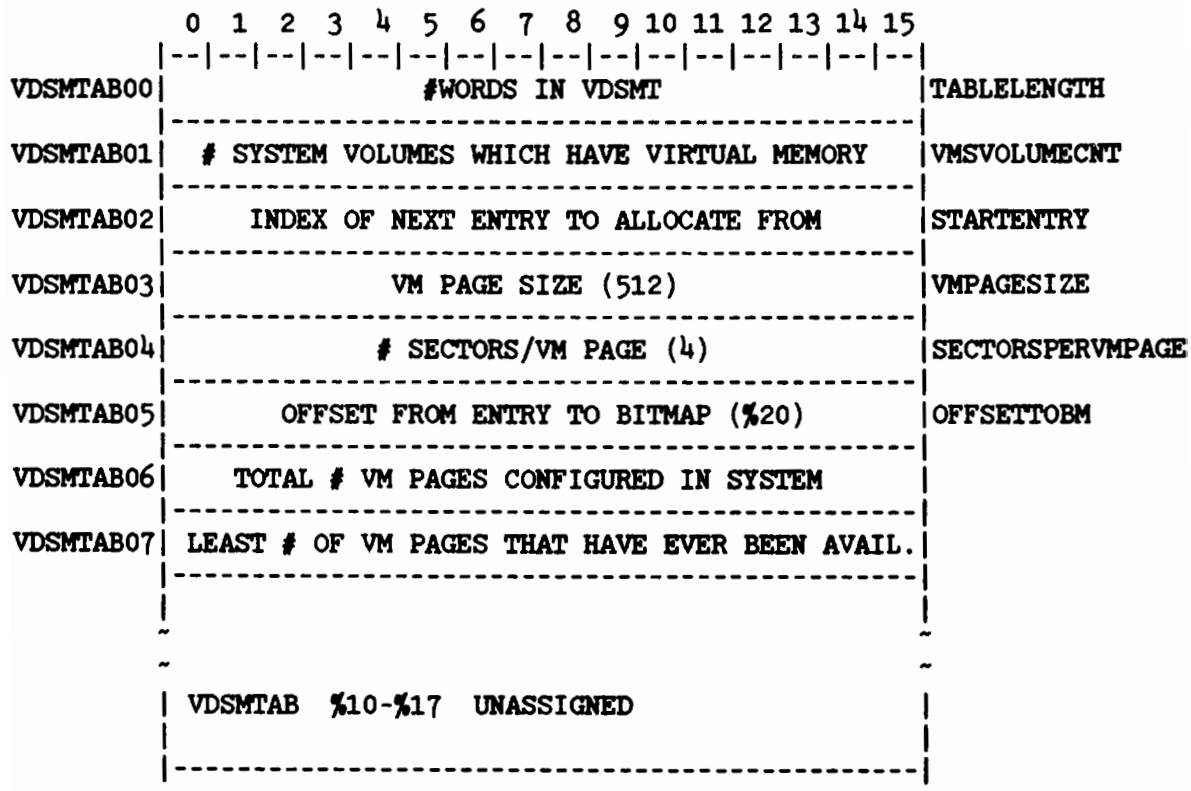
Virtual Disc Space Management Table

VDSMTAB DST# = 39 (%47)
VDSMTABPTR= %1026

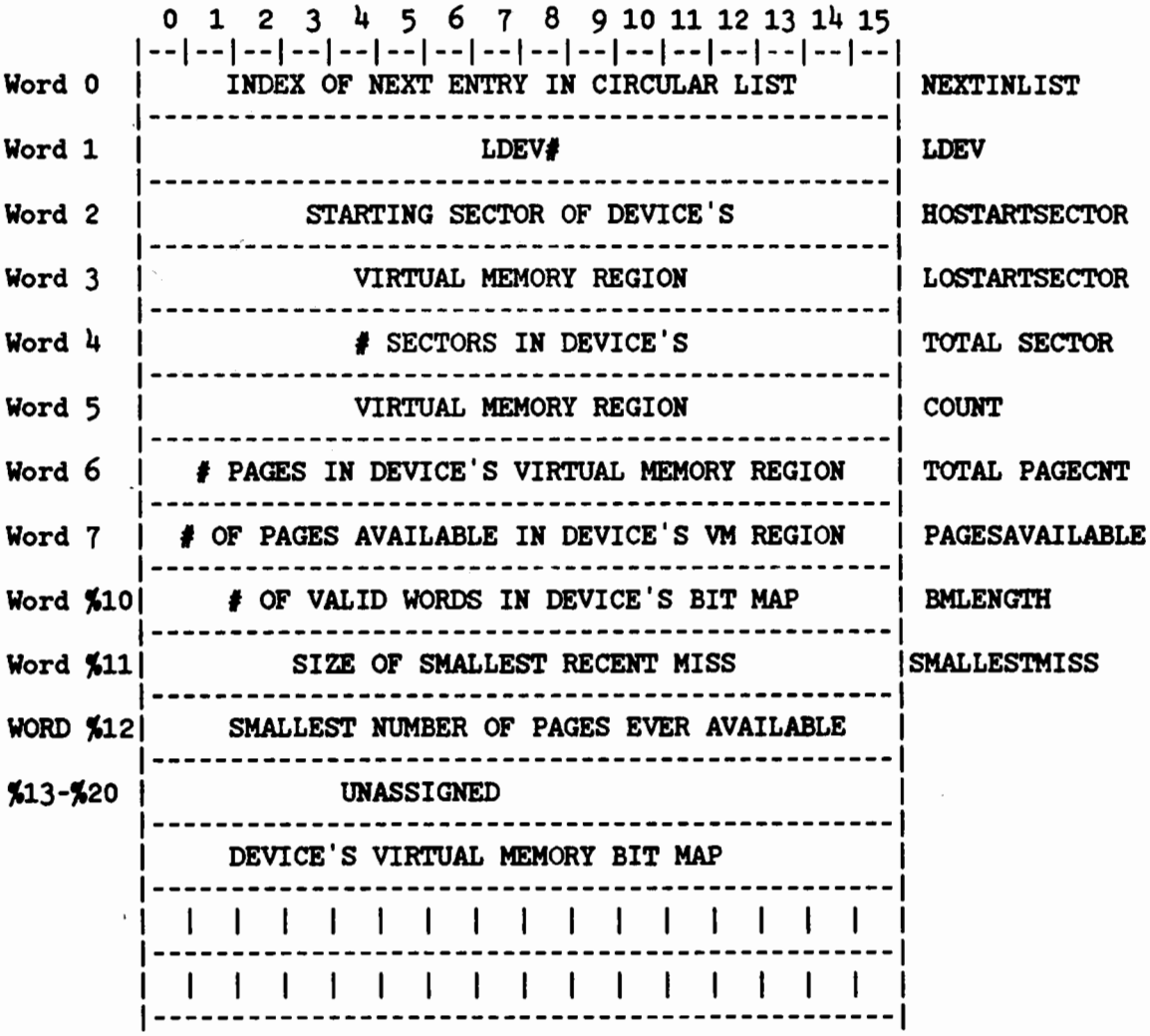
General Structure



VDSMTAB Entry 0 Format



VDSMTAB GENERAL ENTRY FORMAT



***COMMENT: A bit on in a device's VMBIT MAP
==> Corresponding VM page is free.

DISK FREE SPACE TABLE

There is one disc-free-space table for each disc in the system. The table begins at sector #30(10) and its size is specified within the table itself. The table is read one page at a time, as needed, into an extra data segment (DST #17(10)). A page consists of one or more sectors and is currently equal to 2 sectors. The table is kept packed at all times and disc addresses are in ascending order. Any two entries represent two disjoint areas on the disc.

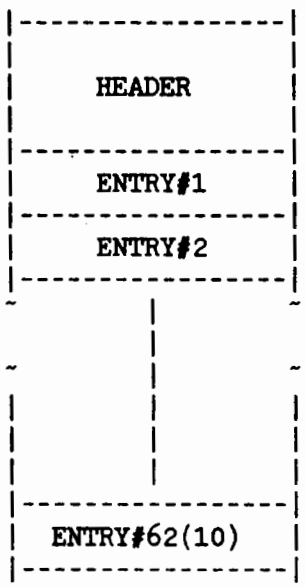
DISCSPC can be called to:

1. Fetch a specified size at any location. If the space allocated corresponds exactly to one table entry, the entry is deleted and the table collapsed.

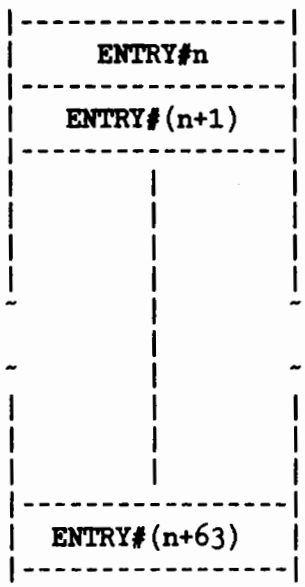
2. Fetch a specified size at a particular location. If the location is in the middle of a free area, an additional table entry is created and the table expanded. If the location abuts either end of a free area, the table size is unchanged; if it abuts both ends, the table is collapsed as above.

3. Return a specified size at a particular place. The table will be expanded if the returned space does not abut free space.

format of page #1

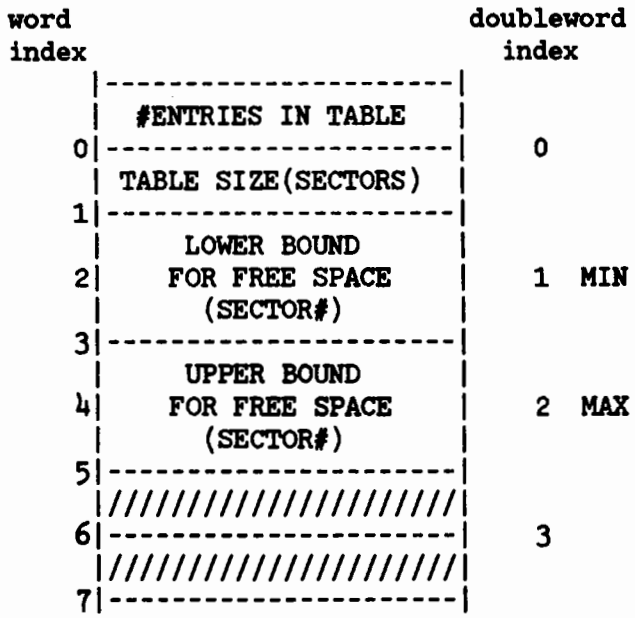


format of succeeding pages



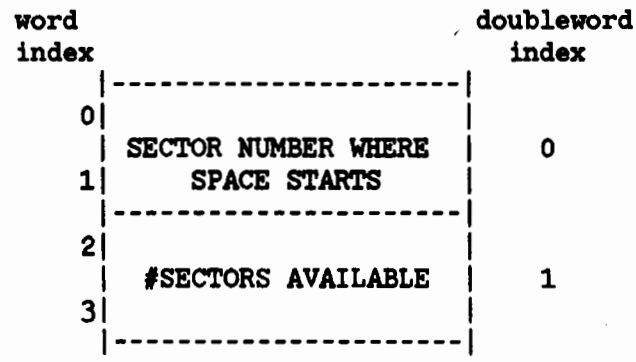
DISC FREE SPACE TABLE (CONT.)

HEADER FORMAT (8 WORDS)



MIN & MAX are disc addresses indicating the minimum and maximum disc addresses accountable by DISCSPC (i.e. no space which goes outside these bounds may be requested or returned).

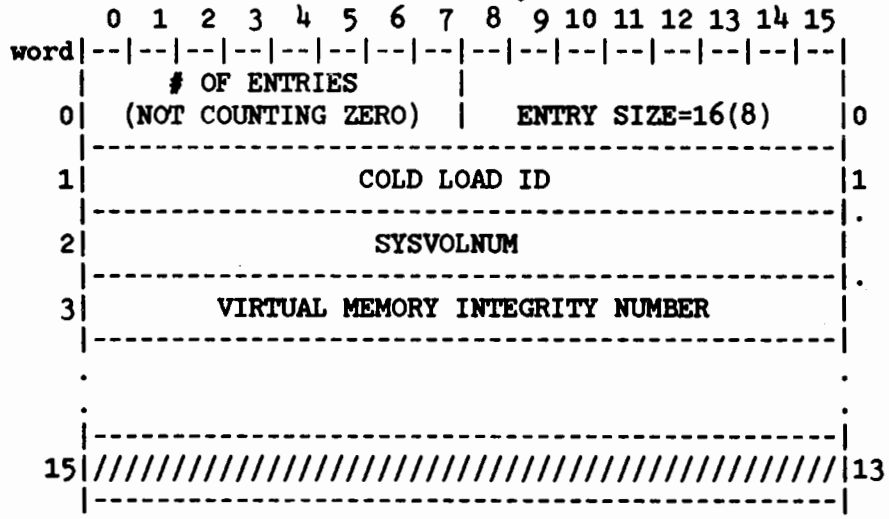
ENTRY FORMAT (4 WORDS/ENTRY)



VOLUME TABLE

SIR #22=%26
DST #29=%35

zero entry



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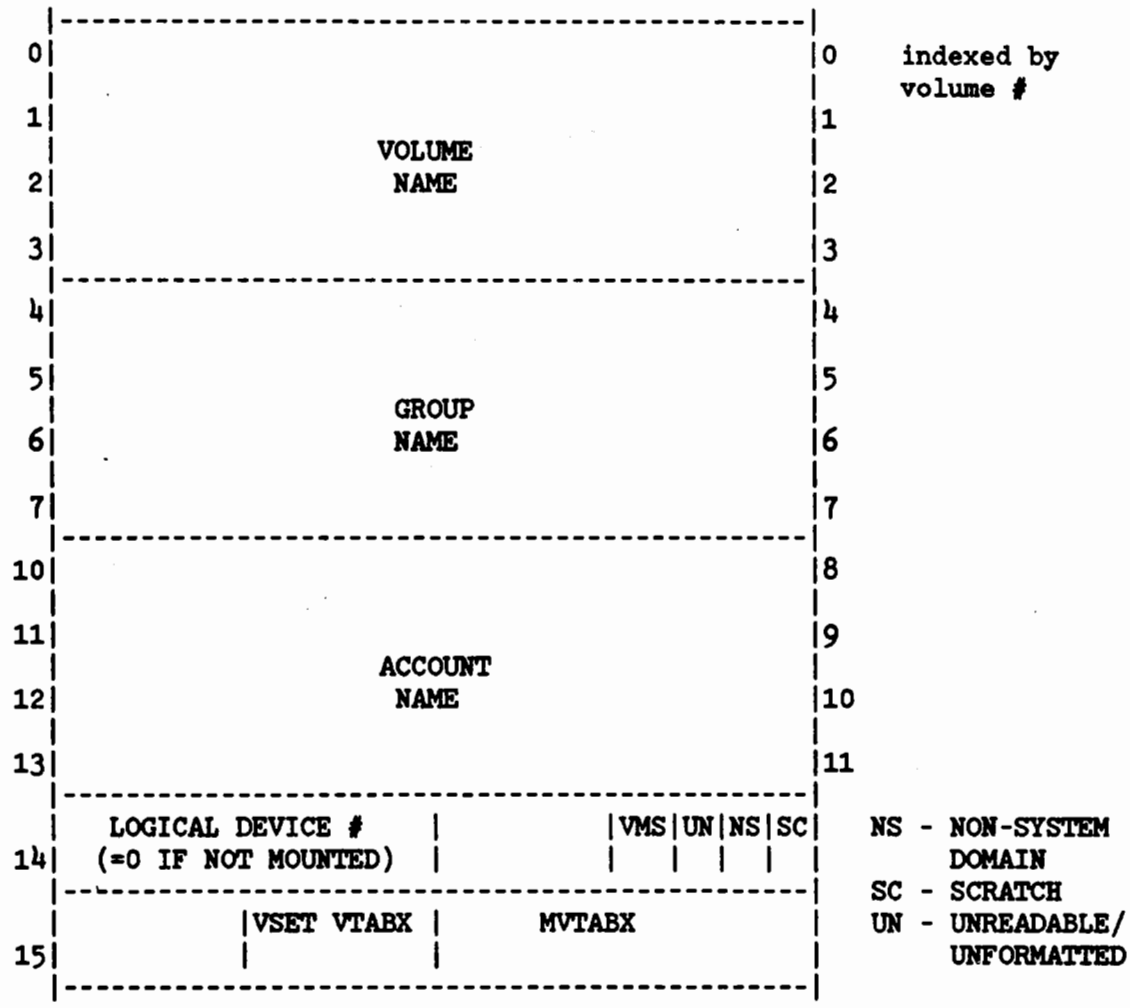
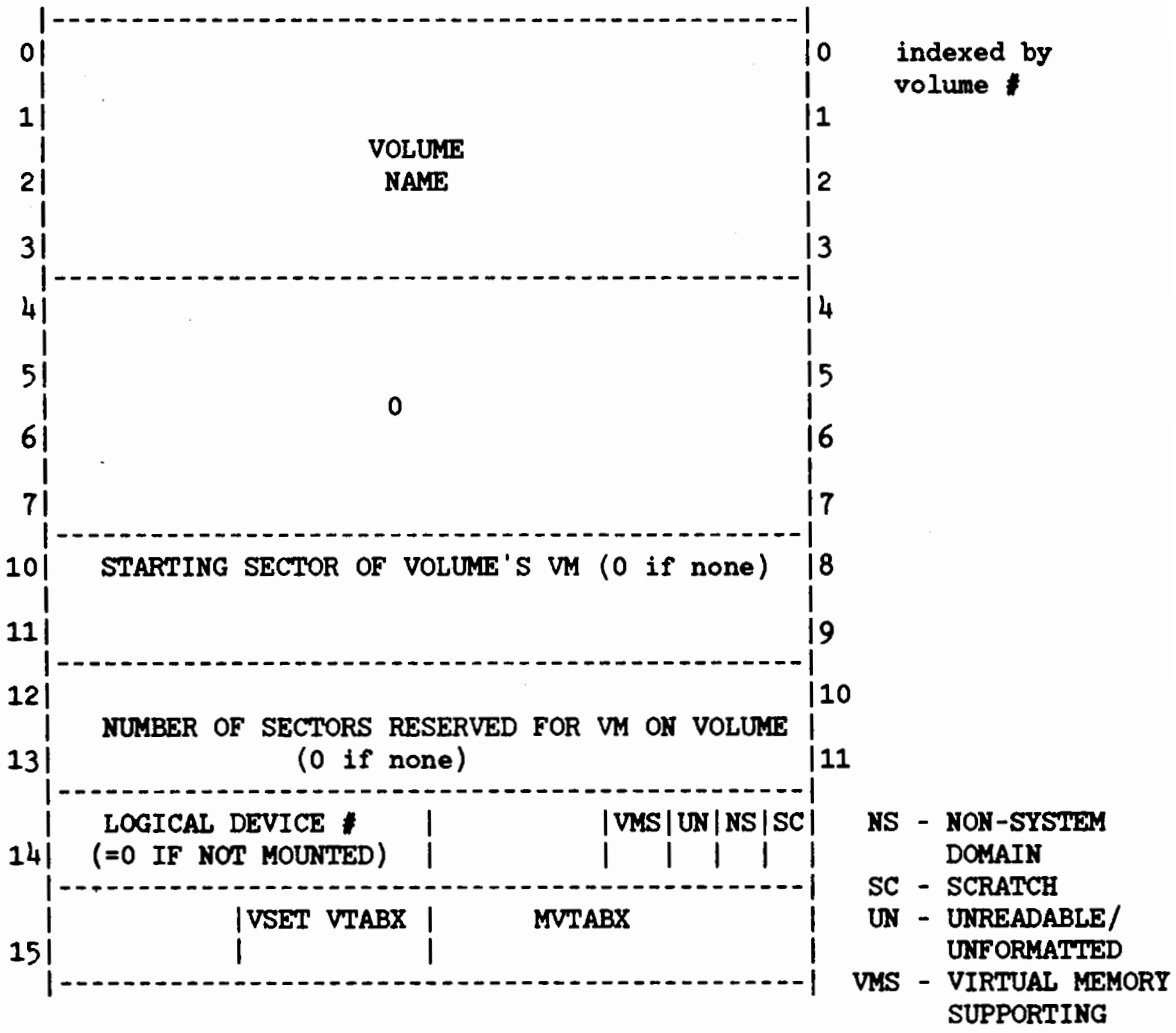
TYPICAL PRIVATE VOLUME ENTRY



TYPICAL SYSTEM VOLUME ENTRY

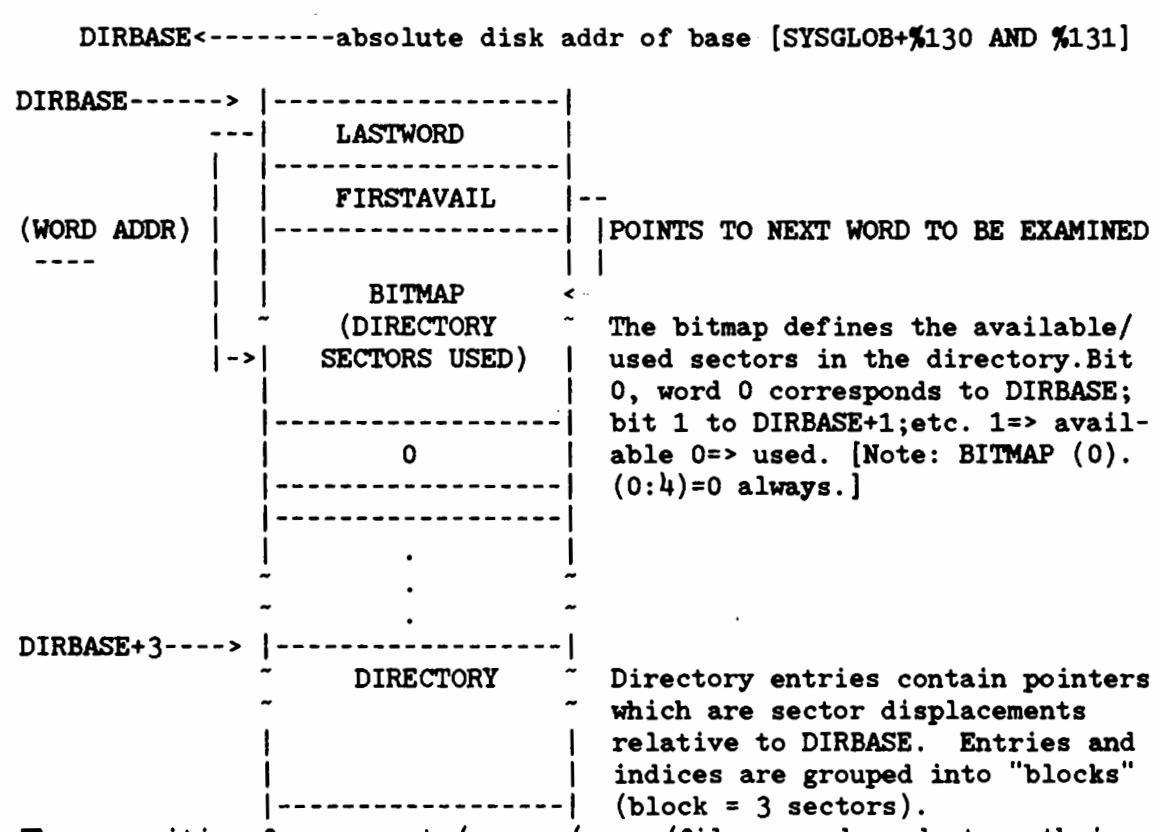


CHAPTER 4 DIRECTORY

DIRECTORY

Directory on disc consists of a contiguous area

SYSGLOB cells:



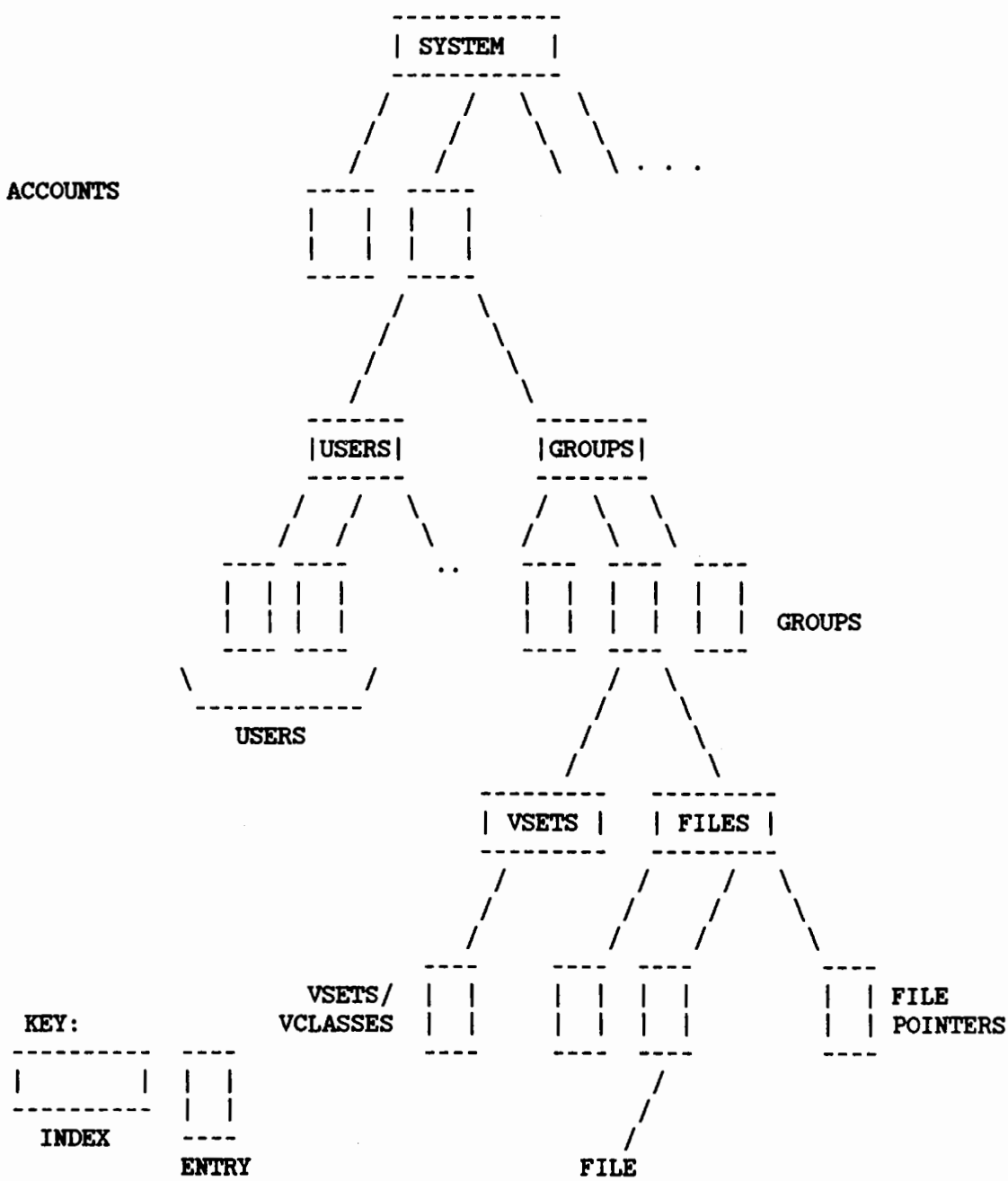
The capacities for accounts/groups/users/files are dependent on their block sizes, described in the directory data segment.

*	SYSSAIBSIZE	System acct index block size (sectors)
	SYSAUIBSIZE	Acct. user index block size (sectors)
	SYSAGIBSIZE	Acct. group index block size (sectors)
	SYSGFIBSIZE	Group file index block size (sectors)
	SYSGVSIBSIZE	Group volume set definition ind. blk. size(sectors)
*	SYSAEBSIZE	Acct. entry block size (sectors)
	SYSUEBSIZE	User entry block size (sectors)
	SYSGEBSIZE	Group entry block size (sectors)
	SYSFEBSIZE	File entry block size (sectors)
	SYSMAXBSIZE	Maximum of above. (used to initialize DDS.)
	SYSVSEBSIZE	Volume set definition entry block size (sectors)

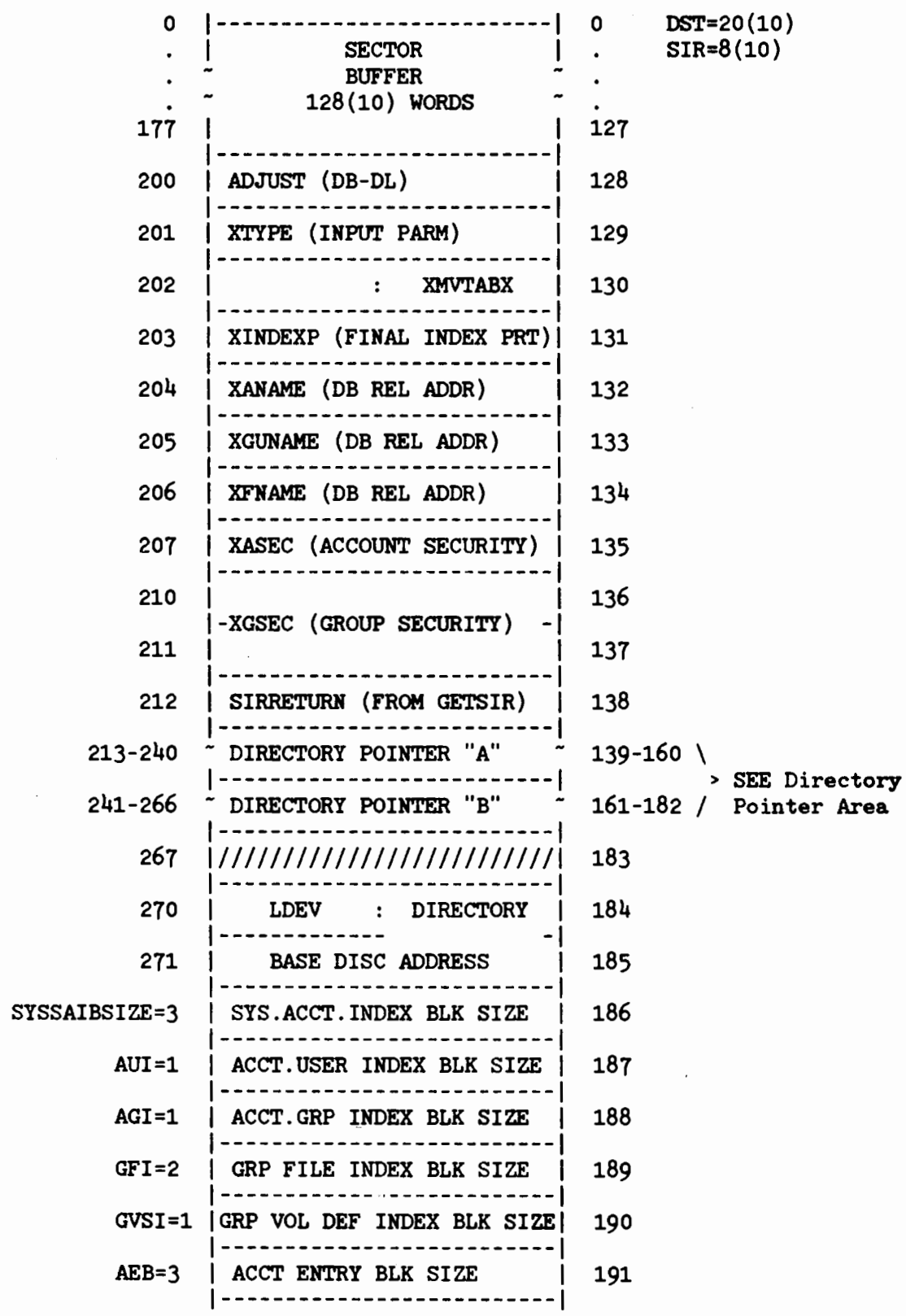
*These values are used once for the creation of the (root) system, account index or new systems. This root index is always at address DIRBASE+3.

OVERVIEW OF DIRECTORY

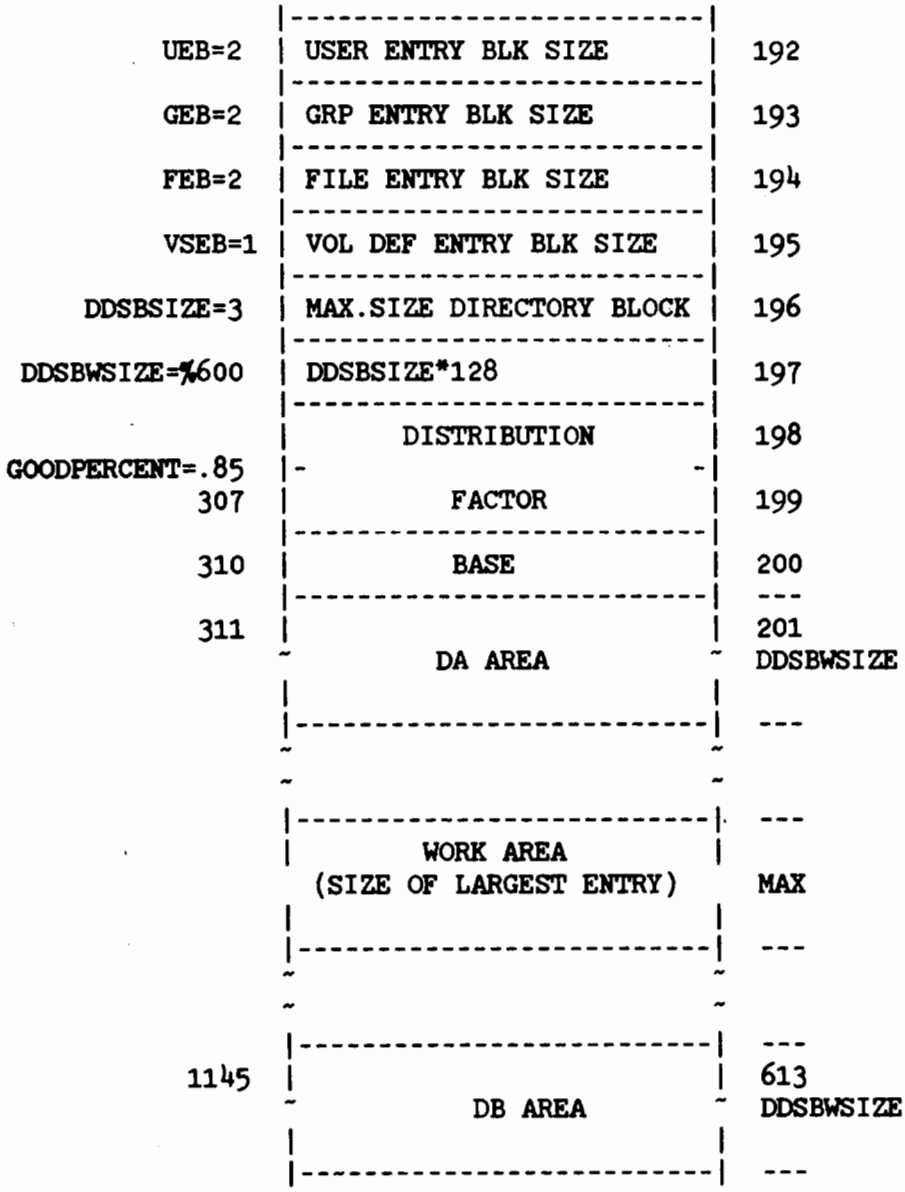
OVERVIEW OF DIRECTORY

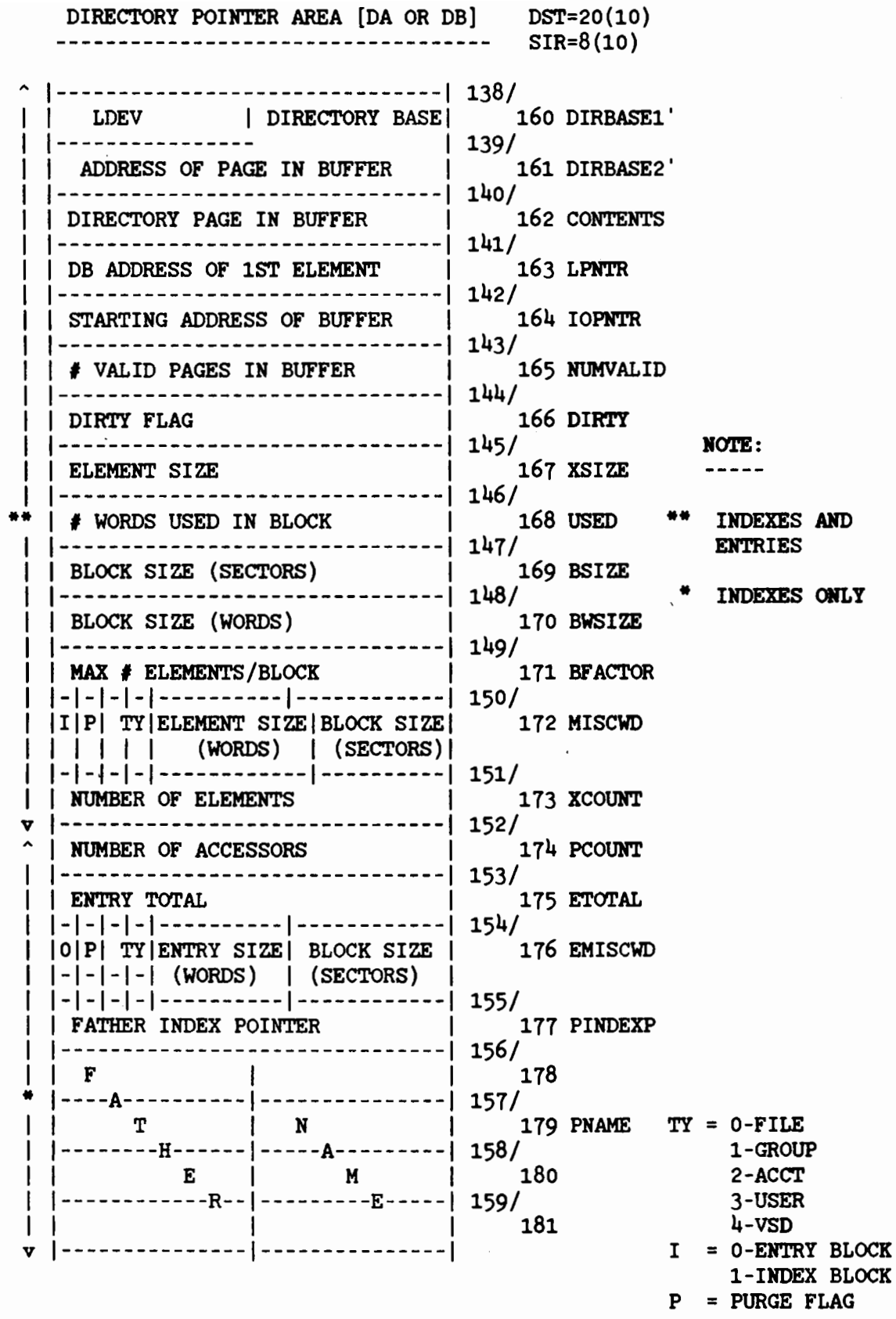


DIRECTORY DATA SEGMENT



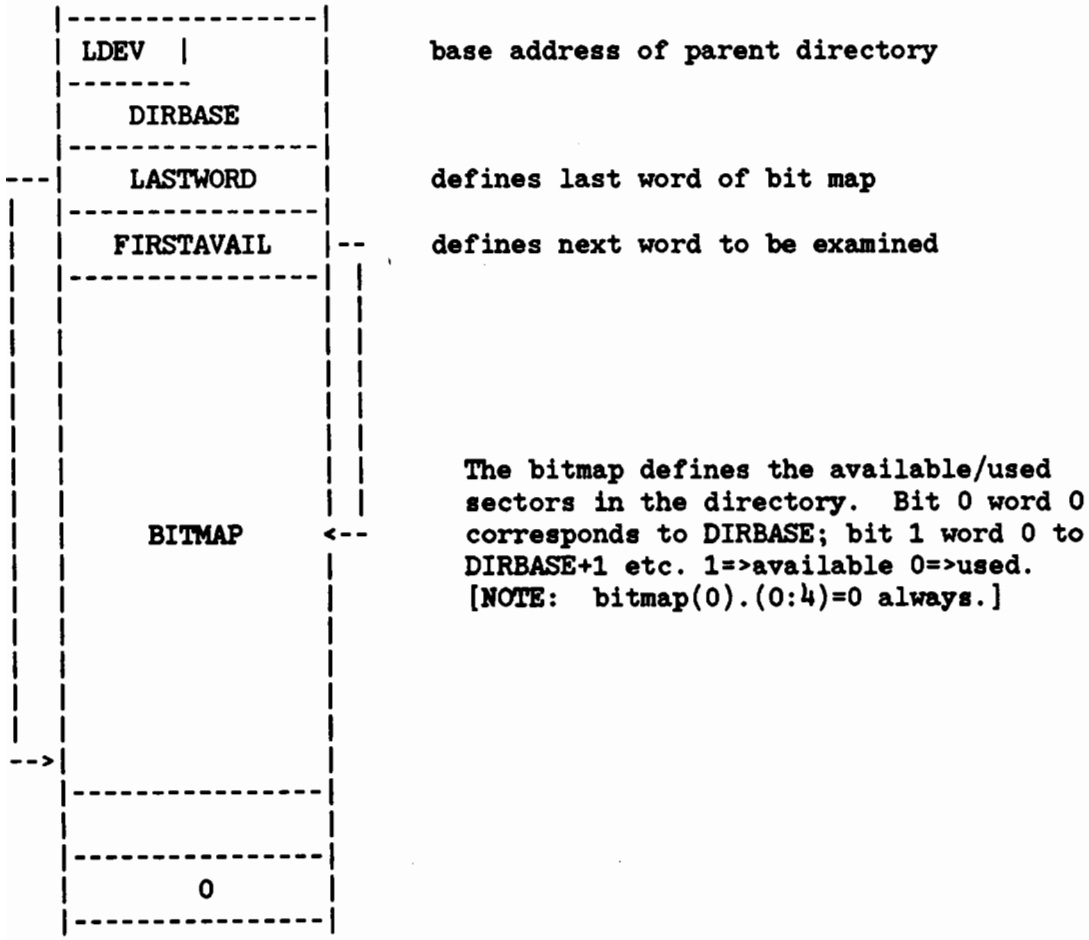
DIRECTORY DATA SEGMENT (CONT.)



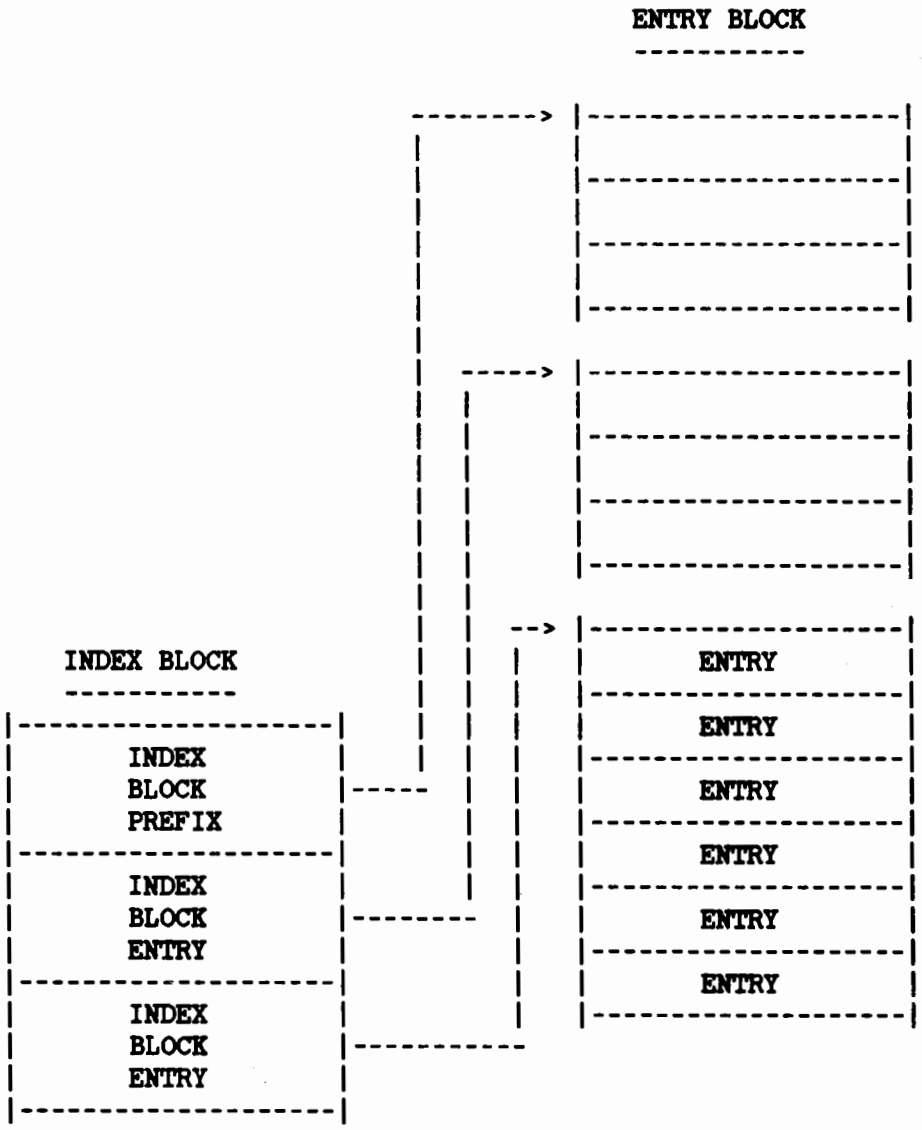

DIRECTORY POINTER AREA [DA OR DB]
DST=20(10)
SIR=8(10)
LDEV
DIRECTORY BASE
ADDRESS OF PAGE IN BUFFER
DIRECTORY PAGE IN BUFFER
DB ADDRESS OF 1ST ELEMENT
STARTING ADDRESS OF BUFFER
VALID PAGES IN BUFFER
DIRTY FLAG
ELEMENT SIZE
WORDS USED IN BLOCK
BLOCK SIZE (SECTORS)
BLOCK SIZE (WORDS)
MAX # ELEMENTS/BLOCK
I P TY ELEMENT SIZE (WORDS) BLOCK SIZE (SECTORS)
NUMBER OF ELEMENTS
NUMBER OF ACCESSORS
ENTRY TOTAL
0 P TY ENTRY SIZE (WORDS) BLOCK SIZE (SECTORS)
FATHER INDEX POINTER
F
A
T
N
H
E
A
M
R
E
138/ 160 DIRBASE1'
139/ 161 DIRBASE2'
140/ 162 CONTENTS
141/ 163 LPNTR
142/ 164 IOPNTR
143/ 165 NUMVALID
144/ 166 DIRTY
145/ 167 XSIZE
146/ 168 USED
147/ 169 BSIZE
148/ 170 BWSIZE
149/ 171 BFACTOR
150/ 172 MISCWD
151/ 173 XCOUNT
152/ 174 PCOUNT
153/ 175 ETOTAL
154/ 176 EMISCWD
155/ 177 PINDEXP
156/ 178
157/ 179 PNAME
158/ 180
159/ 181
NOTE:
** INDEXES AND ENTRIES
* INDEXES ONLY
TY = 0-FILE
1-GROUP
2-ACCT
3-USER
4-VSD
I = 0-ENTRY BLOCK
1-INDEX BLOCK
P = PURGE FLAG

DIRECTORY SPACE DATA SEGMENT (DIRSDS)

DST=21
10
SIR=8
10



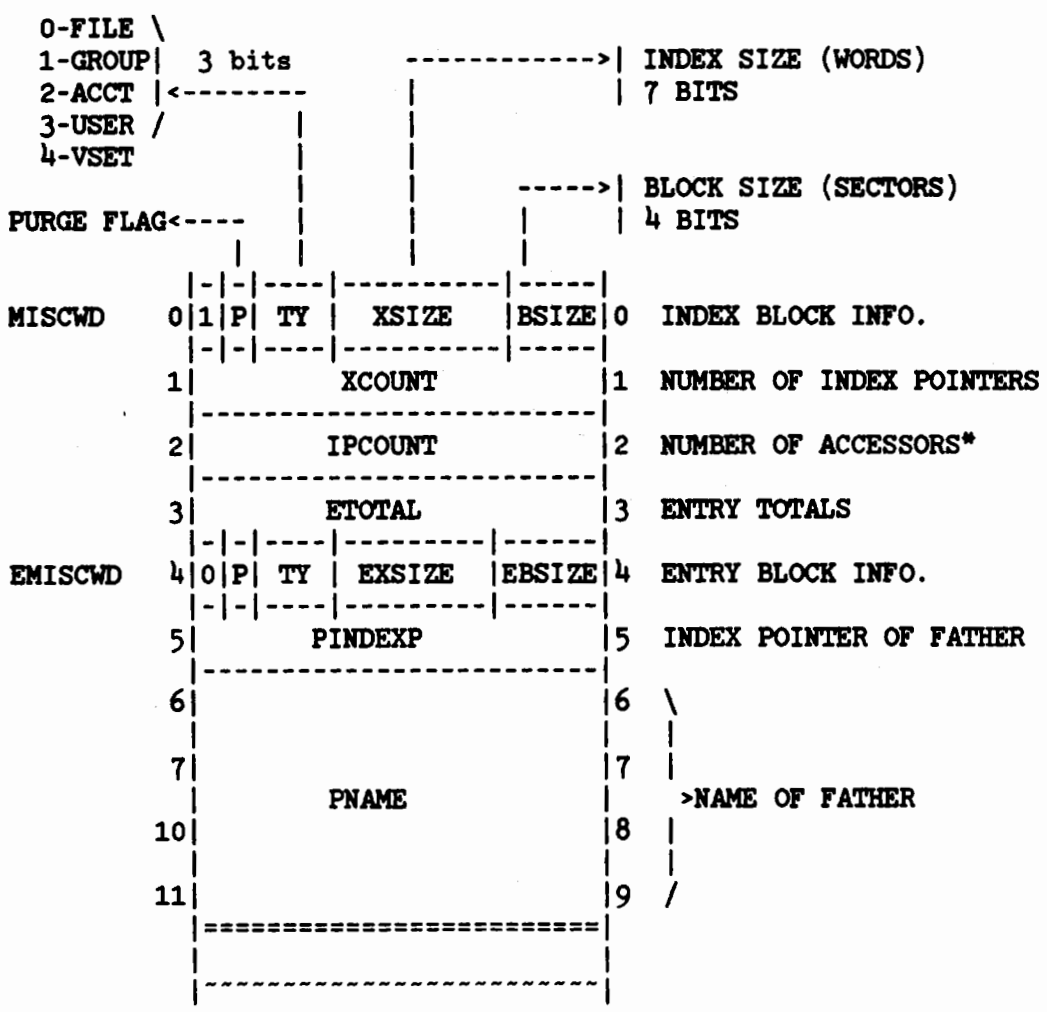
DIRECTORY STRUCTURE



DIRECTORY DEFINITIONS

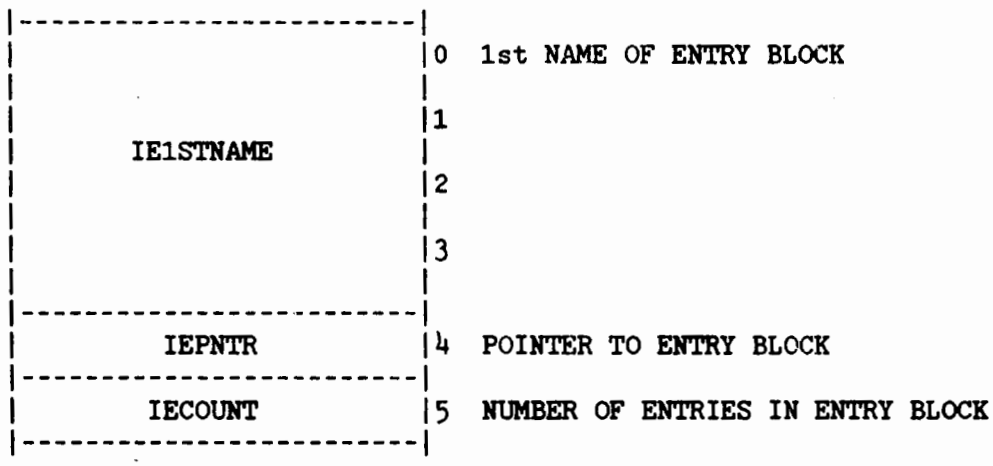
>PAGE - smallest allocatable record ("phys.recd")-currently sector.
>BLOCK - integral# of pages; contains contiguous indices or entries.
>INDEX - pointer to entry block, containing name of 1st entry.
>ENTRY - information-containing "object" may contain pointer to an index block.
>POINTER - 15-bit positive relative page number (relative to directory base).
>DDS - directory data segment.
>ELEMENT - a generic name for index or entry.

INDEX BLOCK PREFIX (10 WORDS)

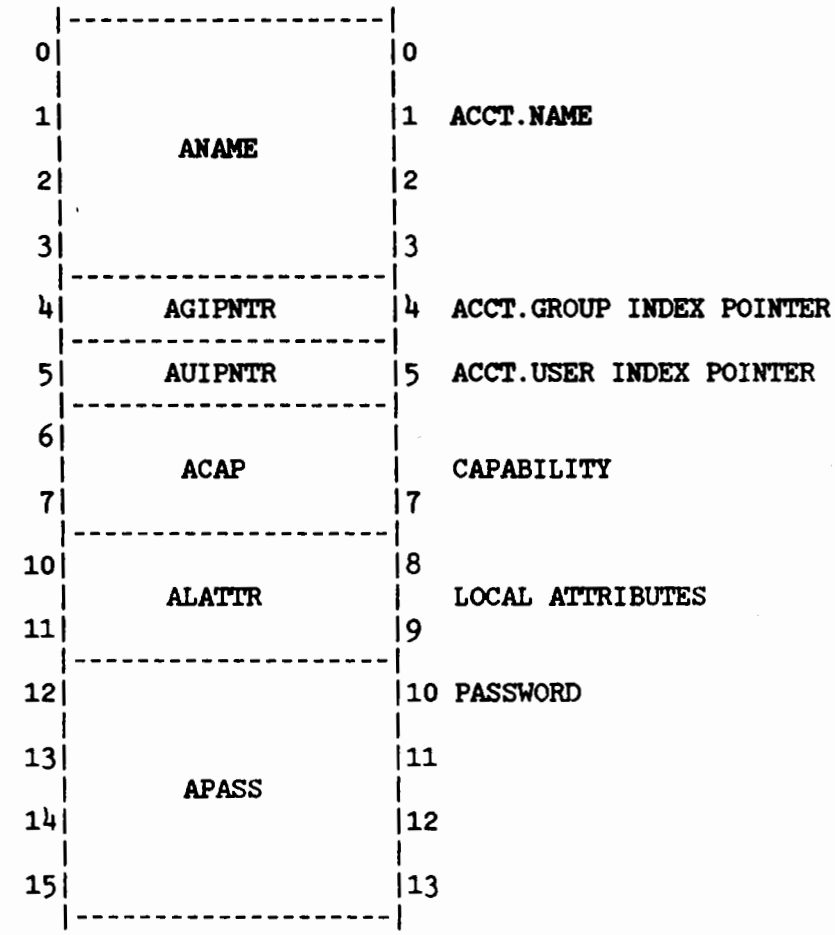


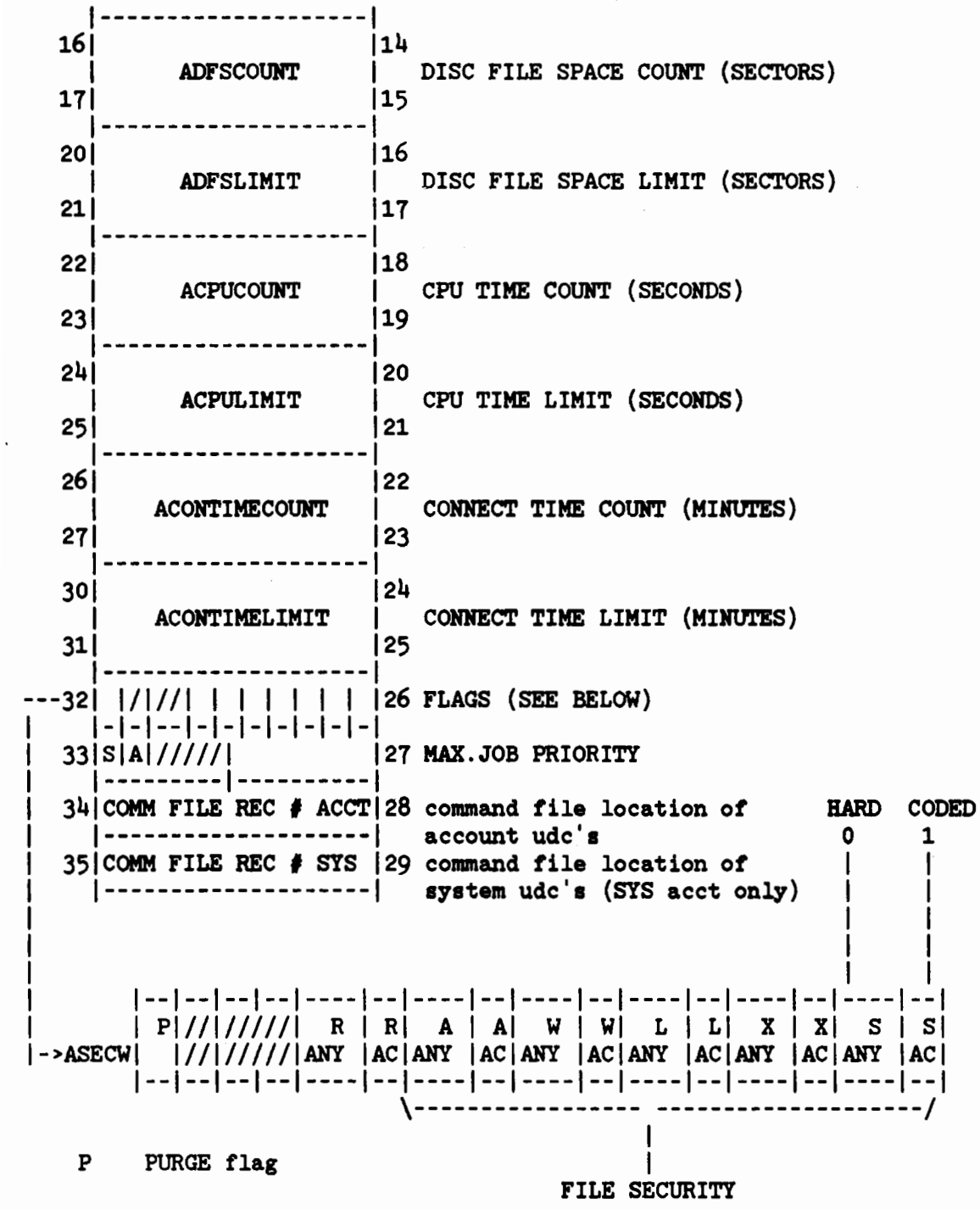
*The count is incremented by each access that uses and relies upon a pointer to the index block, ie, it is guaranteed not to be purged while the count is not = 0.

INDEX ENTRY (6 WORDS)



ACCOUNT ENTRY (%36 WORDS)



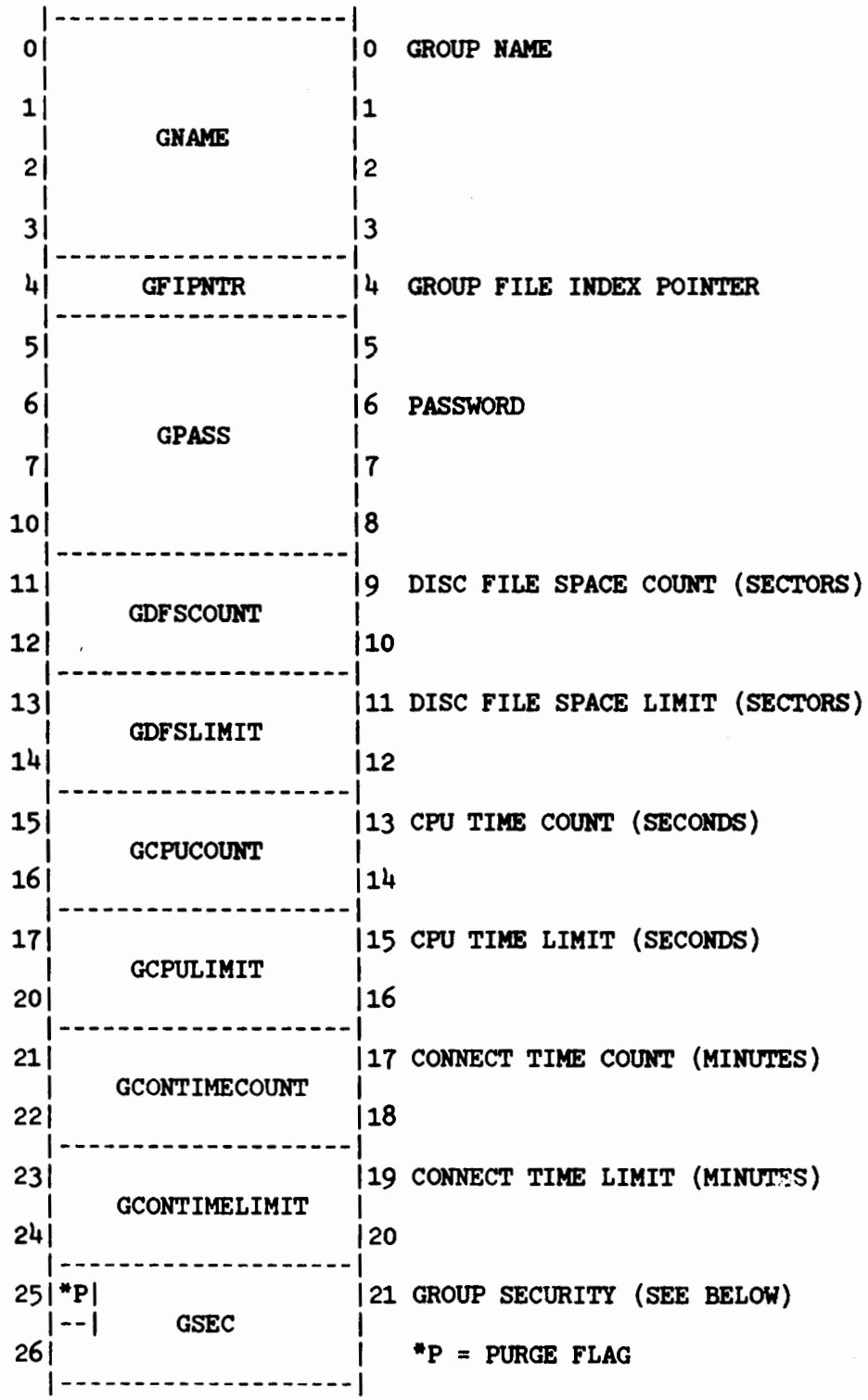


P PURGE flag

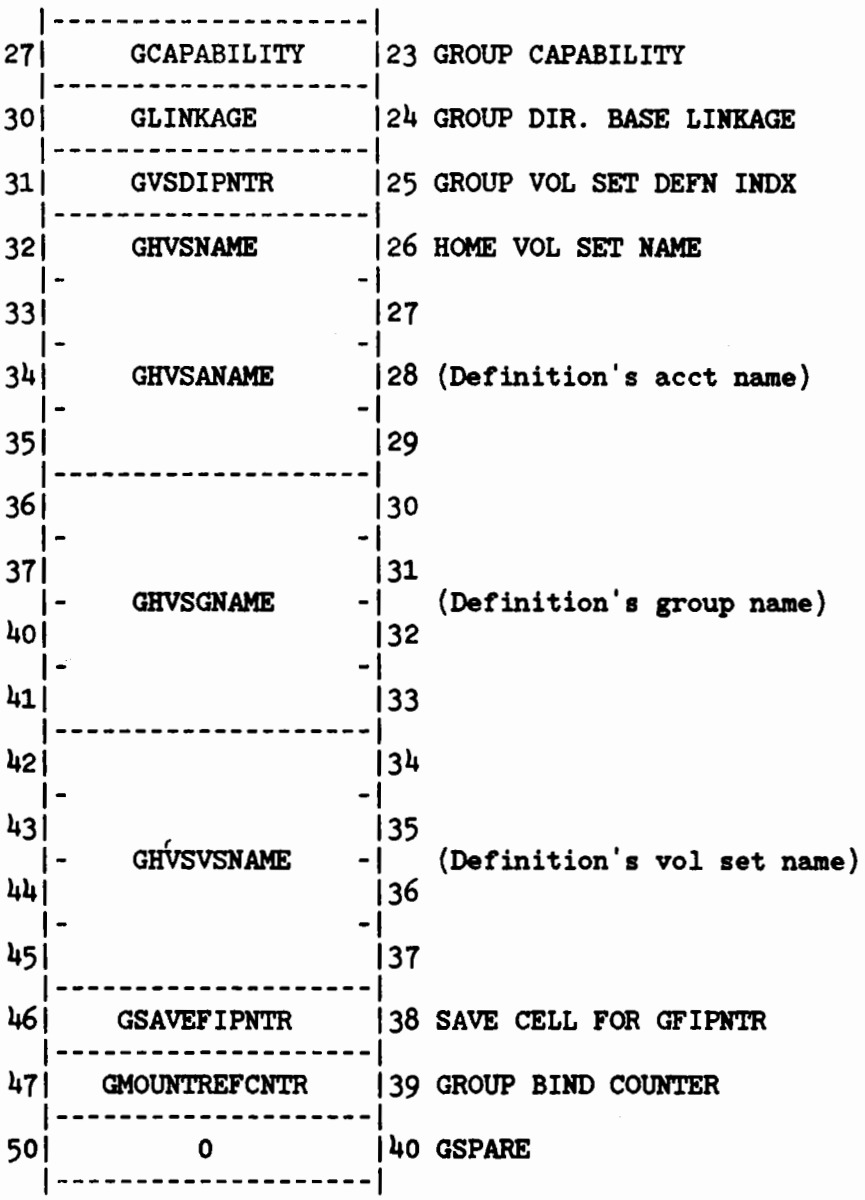
S If 1, system level UDC's exist (only in "SYS" account)

A If 1, account level UDC's exist for account

GROUP ENTRY (%51 WORDS)



GROUP ENTRY (CONT.)



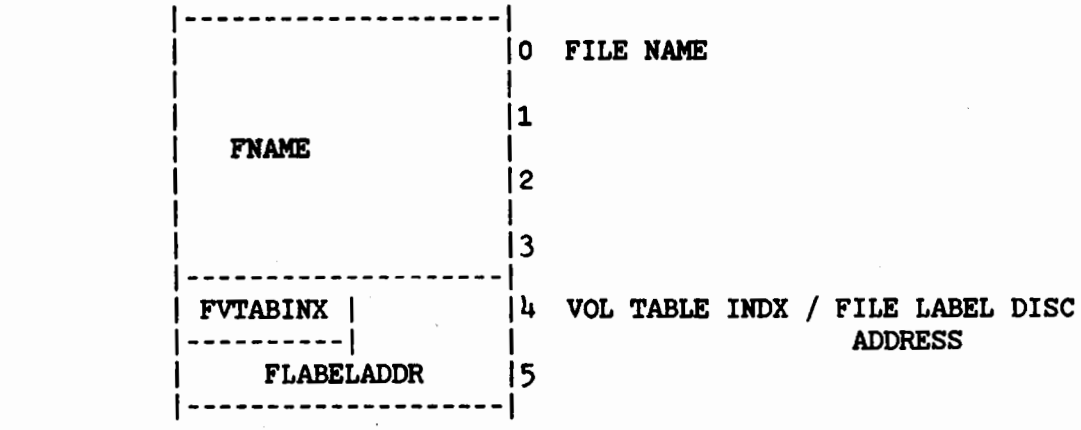
GROUP ENTRY (CONT.)

GLINKAGE (0:1) = 0; System Domain
(0:1) = 1; Private Volumes
(8:8) = 0; Not Bound
(8:8) <>0; Bound

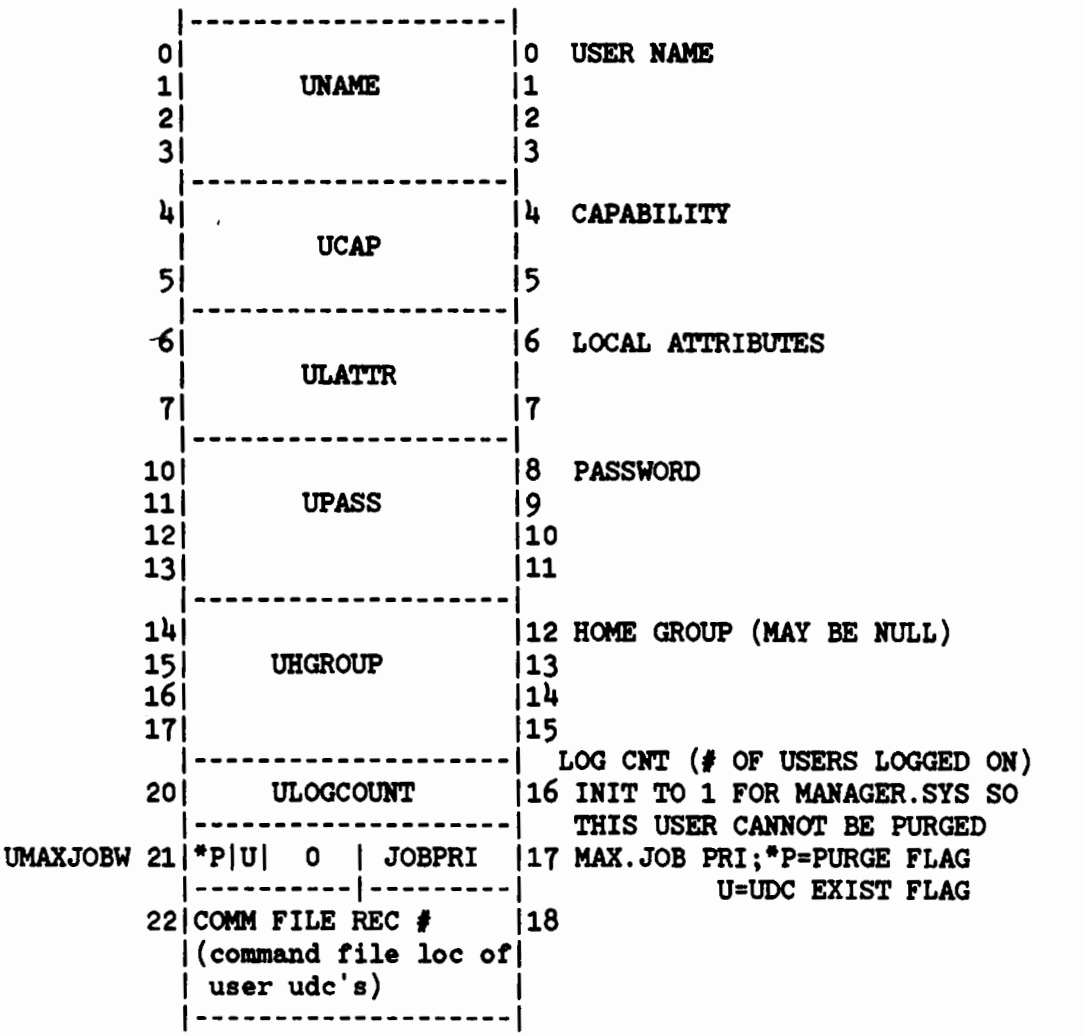
GROUP SECURITY MASK

	P	///	R	R	R	R	R	A	A	A	A	A	W	W	W	W
25		///	ANY	AC	AL	GU	GL	ANY	AC	AL	GU	GL	ANY	AC	AL	GU
	W	L	L	L	L	L	X	X	X	X	X	S	S	S	S	S
26	GL	ANY	AC	AL	GU	GL	ANY	AC	AL	GU	GL	ANY	AC	AL	GU	GL

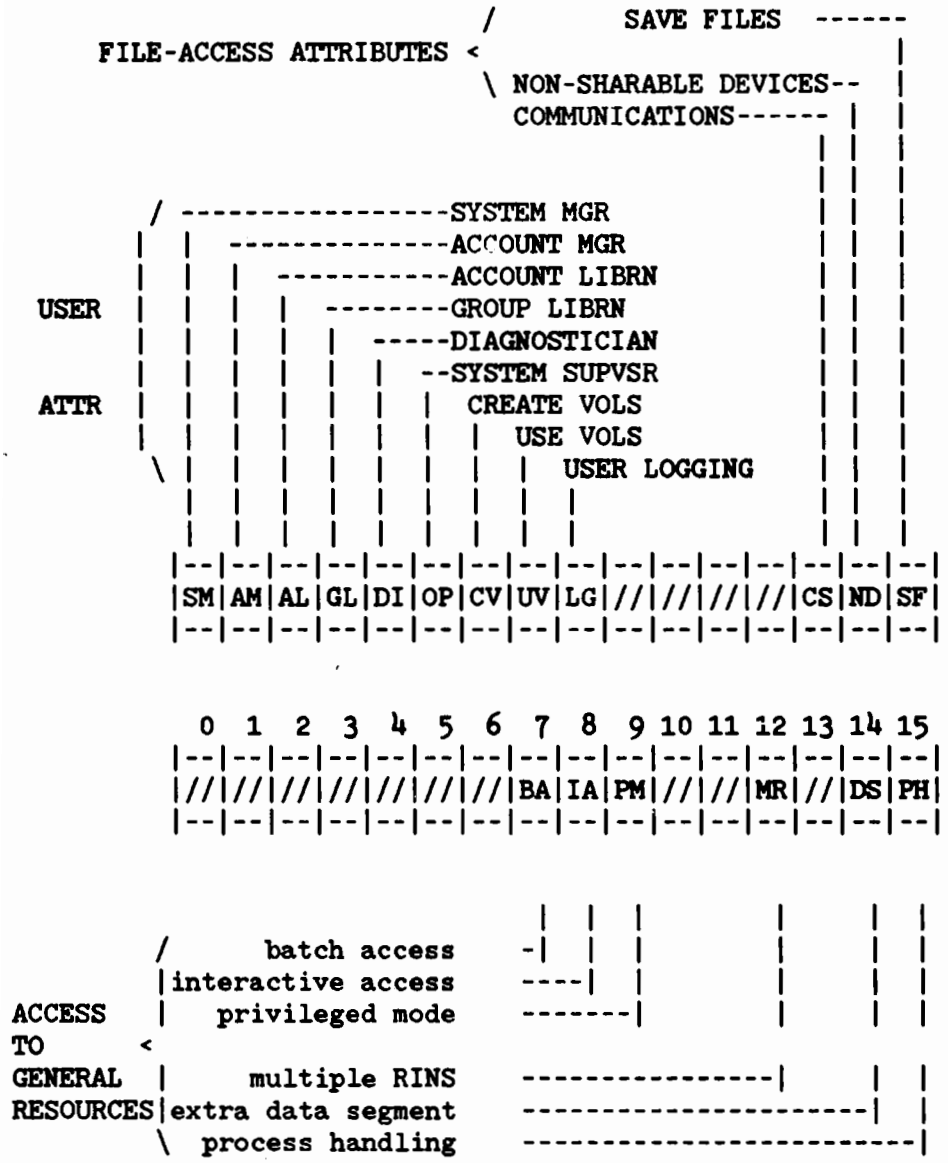
FILE ENTRY (FILE POINTER)(6 WORDS)



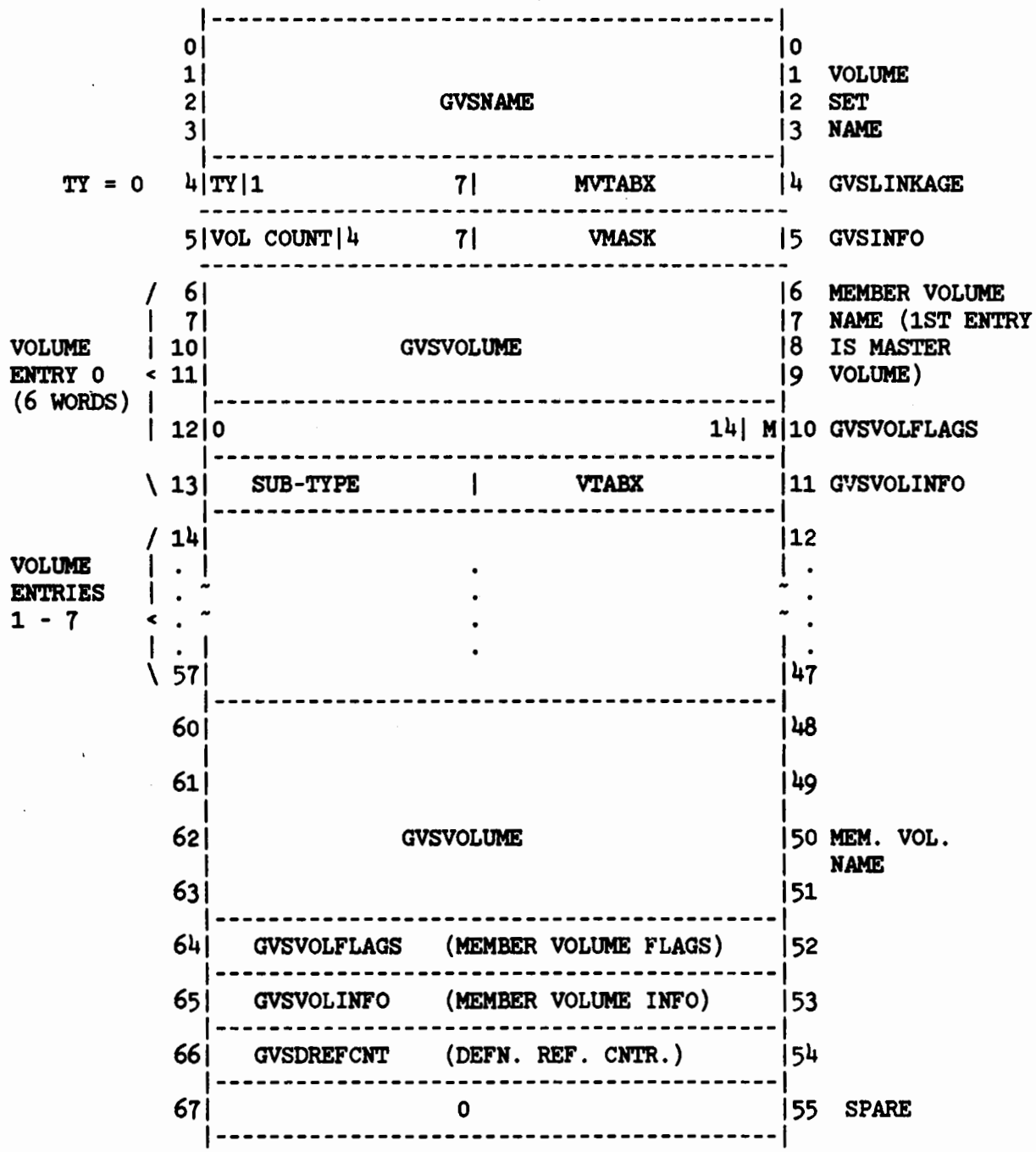
USER ENTRY (19 WORDS)



USER ATTRIBUTES/CAPABILITY

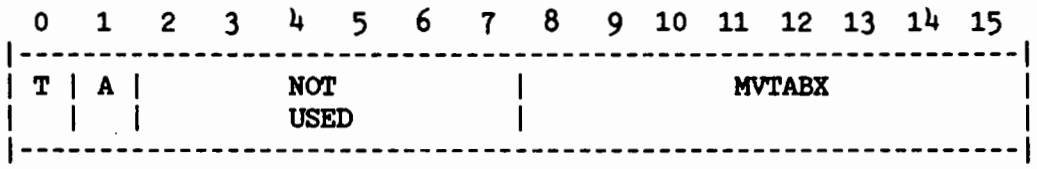


VOLUME SET DEFINITION ENTRY



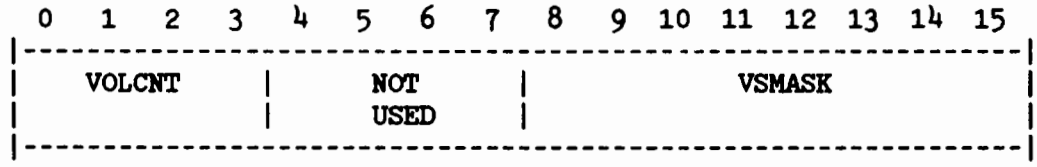
TY = 0 VOLUME SET
= 1 VOLUME CLASS
MVTABX: MOUNTED VOLUME TABLE INDEX (IF MOUNTED)
VOL COUNT: NO. OF VOLUMES
VMASK: VOLUME MASK
M = 0 NOT MOUNTED
= 1 MOUNTED
VTABX: VOLUME TABLE INDEX

G V S L I N K A G E



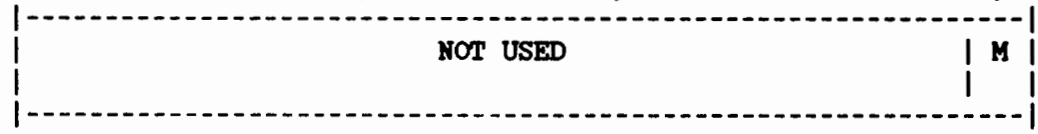
T - TYPE
1 = Volume Set Definition
0 = Volume Set Class
A - ALLOCATING FLAG
0 = not initialally allocating (not 1st user of set)
1 = 1st user of set allocating resources (transitional)
MVTABX - Mounted Volume Table Index
0 if volume set not logically mounted

G V S I N F O



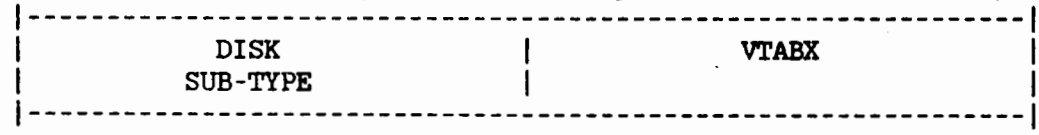
VOLCNT - Number of members in set
VSMASK - Bit mask of volume member usage
Order is from right to left
i.e. bit 15 is 1st member, bit 14 is 2nd member ...

G V S V O L F L A G S



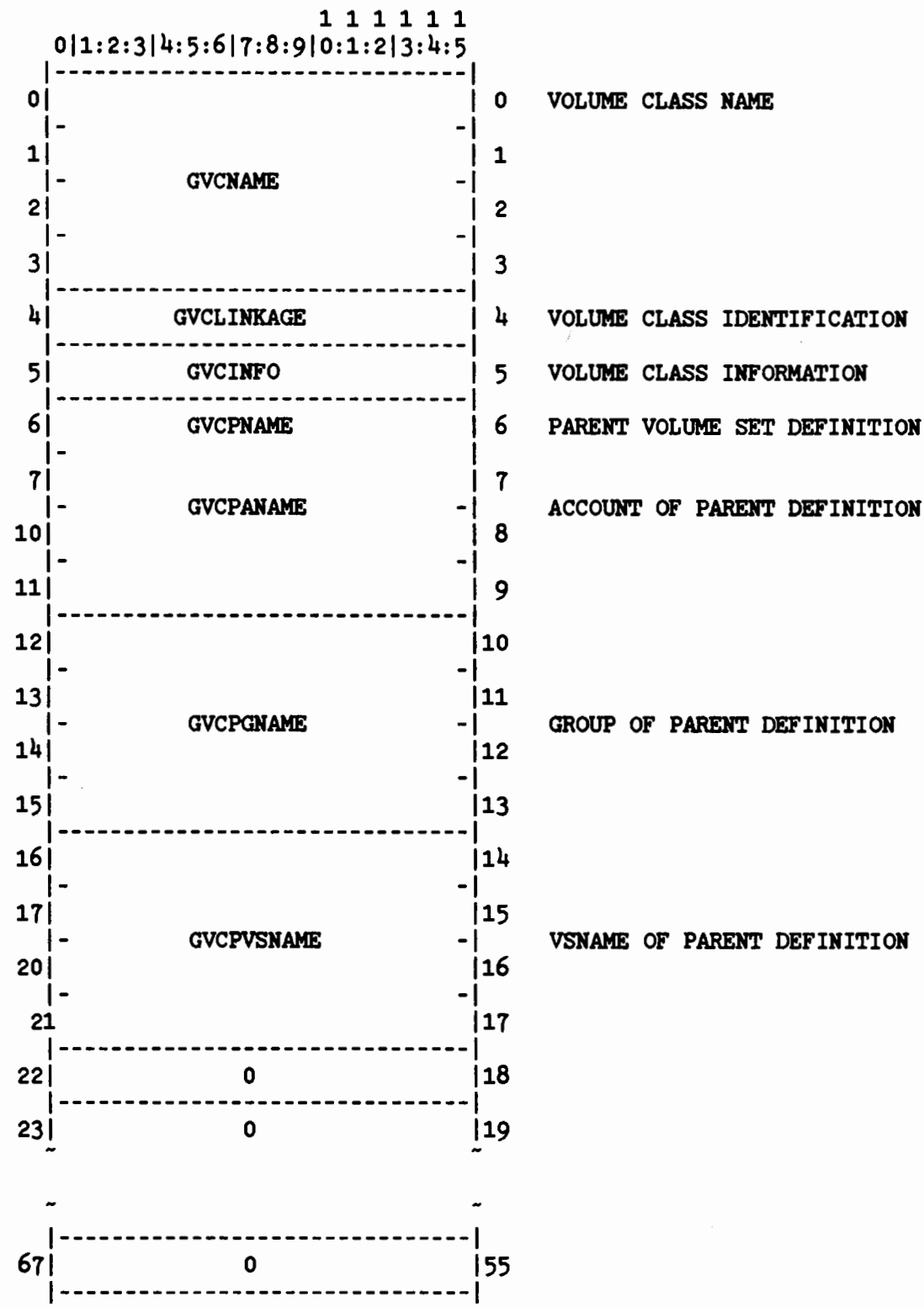
M - Member Mounted Flag
0 = not mounted
1 = mounted

G V S V O L I N F O

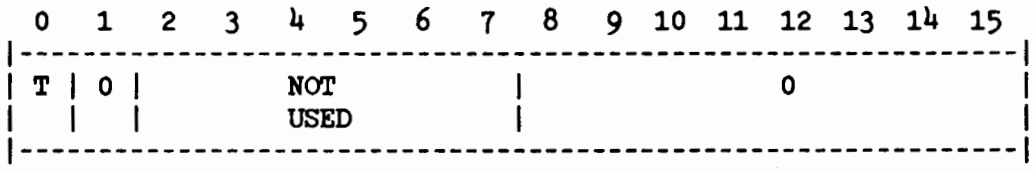


VTABX - Volume Table Index

VOLUME SET CLASS ENTRY



G V C L I N K A G E



T - TYPE
1 = Volume Set Definition
0 = Volume Set Class

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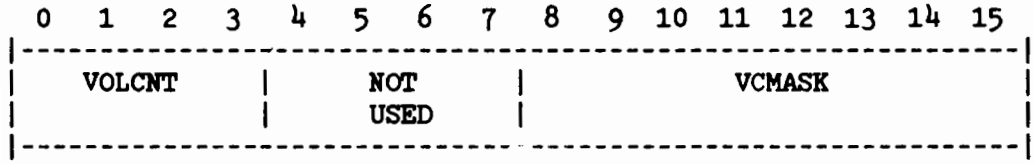
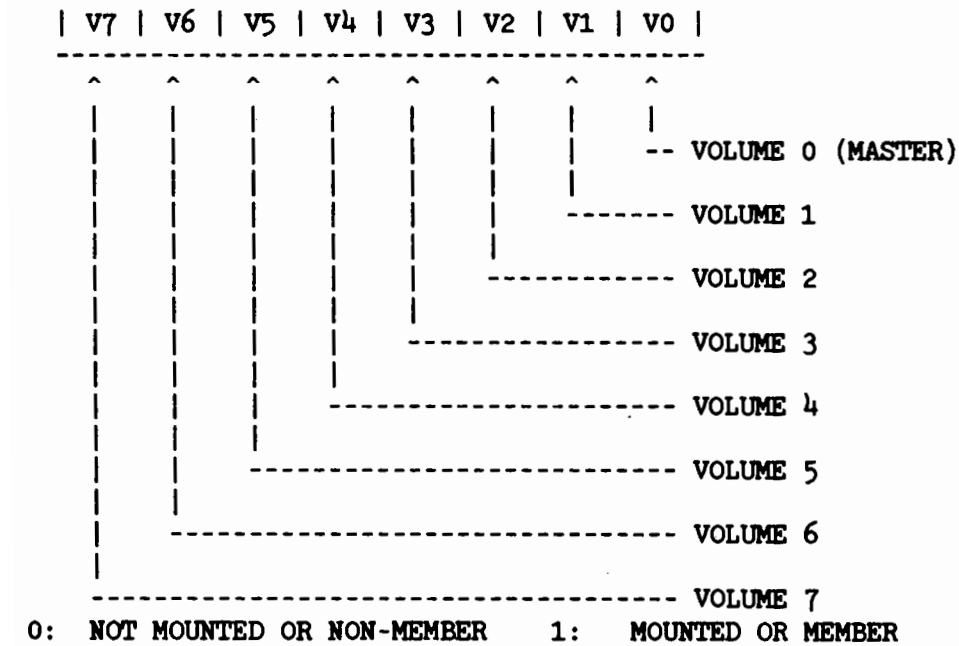
G V C I N F O



VOLCNT - Number of members in set
VCMASK - Bit mask of volume member usage (VOLUME CLASS MASK)
Order is from right to left
i.e. bit 15 is 1st member, bit 14 is 2nd member ...

VOLUME MASK FORMAT

- USED IN MVTAB, PVUSER, FILE CONTROL BLOCK (FCB), VOLUME SET/CLASS DEFINITION, VOLUME SET VTAB.
- 8-BIT MASK.



0: NOT MOUNTED OR NON-MEMBER 1: MOUNTED OR MEMBER

SIR# ALLOCATION DST %53

decimal SIR #	octal SIR #	SIR NAME
1	1	LOAD PROCESS SIR
2	2	LOCK SEGMENT SIR
3	3	IDD
4	4	ODD
5	5	PROCESS TREE STRUCTURE
6	6	SCHEDULING QUEUE
7	7	CST ENTRIES
8	10	SYSTEM DIRECTORY
9	11	LPDT
10	12	LDT
11	13	STORAGE IN OVERLAY AREA
12	14	DISC FREE SPACE TABLE
13	15	JPCNT
14	16	JCUT
15	17	JMAT
16	20	FMAVT
17	21	LOADER SEGMENT TABLE
18	22	VDD
19	23	SPOOL
20	24	MESSAGE CATALOGUE
21	25	RIT
22	26	VOLUME TABLE
23	27	WELCOME MESSAGE SIR
24	30	ASSOCIATION TABLE
25	31	CS ALLOCATE SIR
26	32	LOGGING BUFFER
27	33	PV MVTAB
28	34	MEASSIR
29	35	PV USER TABLE
30	36	IMAGE
31	37	KSAM
32	40	USER LOGGING
33	41	DEBUG BREAKPOINT TABLE
34	42	PCBSIR
35	43	SUB-QUEUE MAPPING TABLE
36	44	CILOG
37	45	FILE INTEGRITY
38	46	RIN
39	47	TAPE LABELS
40	50	1st JOB
41	51	2nd JOB
.	.	.
.	.	.
.	.	.
.	.	.

MULTIPLE SIR ALLOCATION

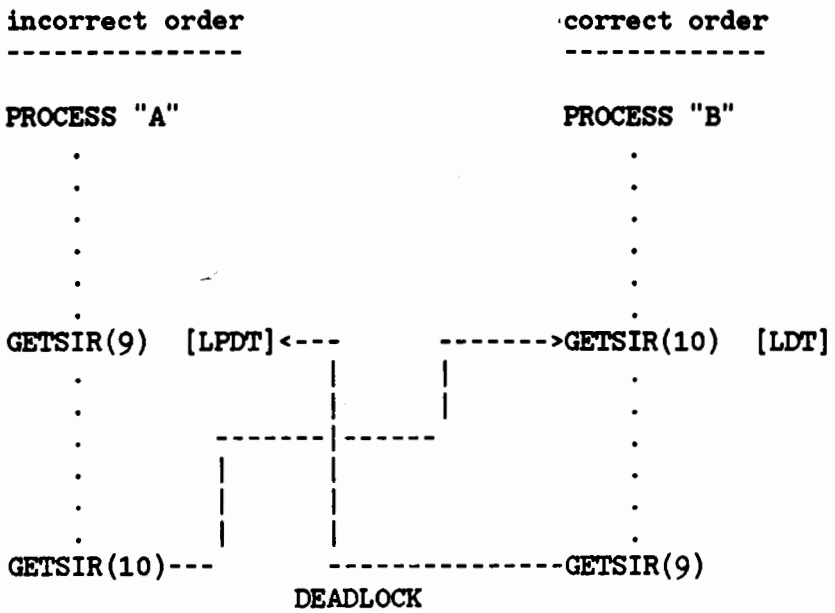
The five conventional chains used by MPE for SIR allocation and deallocation are:

LOWER->LOGICAL RANK->HIGHER
1. LDT(10)->LPDT(9)->VDD(18)
2. JMATSIR(15)->LPDT(9)->JPCNT(13)
3. FMAVTSIR(16)->FILESIR(37)->DIRECT.(8)->DISC FREE SPACE TBLE(12)
4. FMAVTSIR(16)->FILESIR(37)->RINTABLE(38)
5. SEGTABSIR (%21)-> BKPTSIR(%41)-> LOCKSIR(2)

Multiple SIR allocation requires care to avoid process deadlock situations. The rule that should be followed when working with the above SIRs is as follows:

Never attempt a GETSIR of lower rank than the SIR currently held (if any).

For example: suppose two processes, A and B, required the SIRs for the LDT and LPDT. Deadlock would result if done as below due to process A not following the convention order.

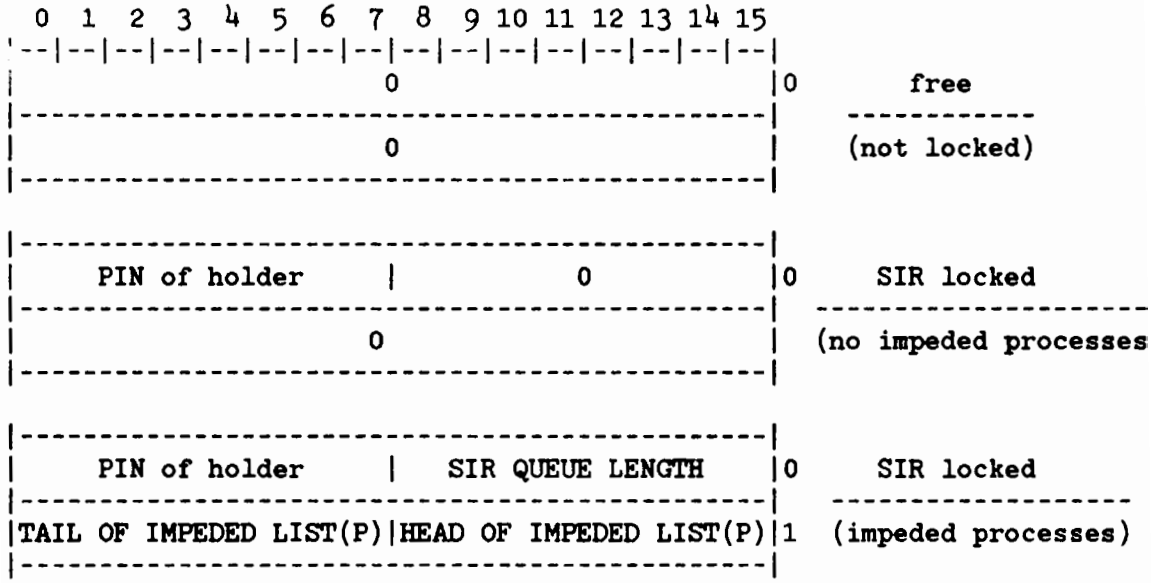


SIR TABLE INFORMATION

The system internal resource table is located in non-linked memory (resident table). The SIR table is used to protect critical system elements against access by more than one process, i.e., it provides a "lock out" mechanism. Each critical system resource (usually a table) is assigned a specific SIR number. Procedures are provided within MPE to lock (GETSIR) and unlock (RELSIR) the SIR. Processes attempting to obtain a SIR that is not available are impeded by the system. The SIR table entries form the head of a linked list in this case. If more than one process becomes impeded, word 8 of the PCB entry is used to add the "new" process to the growing list. The method of disimpeding the process depends on the SIR type.

A SIR does not respect process priority and operates in a FIFO manner. As processes become impeded on behalf of a SIR the new entries are entered at the tail of the impeded list. When the current holder of the SIR releases it, only the first process in the list (pointed at by the head pointer) is dis-impeded. The linked list head and all pointers are then updated and the newly dis-impeded process will obtain the SIR.

SIR ENTRY FORMATS



P = PIN#
PIN = PCB table entry number
SIR QUEUE LENGTH- number of processes queued for this SIR

The SIR table is indexed by SIR#, each SIR# corresponding to a unique, preassigned system internal resource. Entry #0 is not used.
Impeded lists are established by using the SIR table entry (1). (8:8) as the head of the list and PCB(8). (8:8) for elements. Pin numbers are always used as pointers, with 0 indicating end of list.

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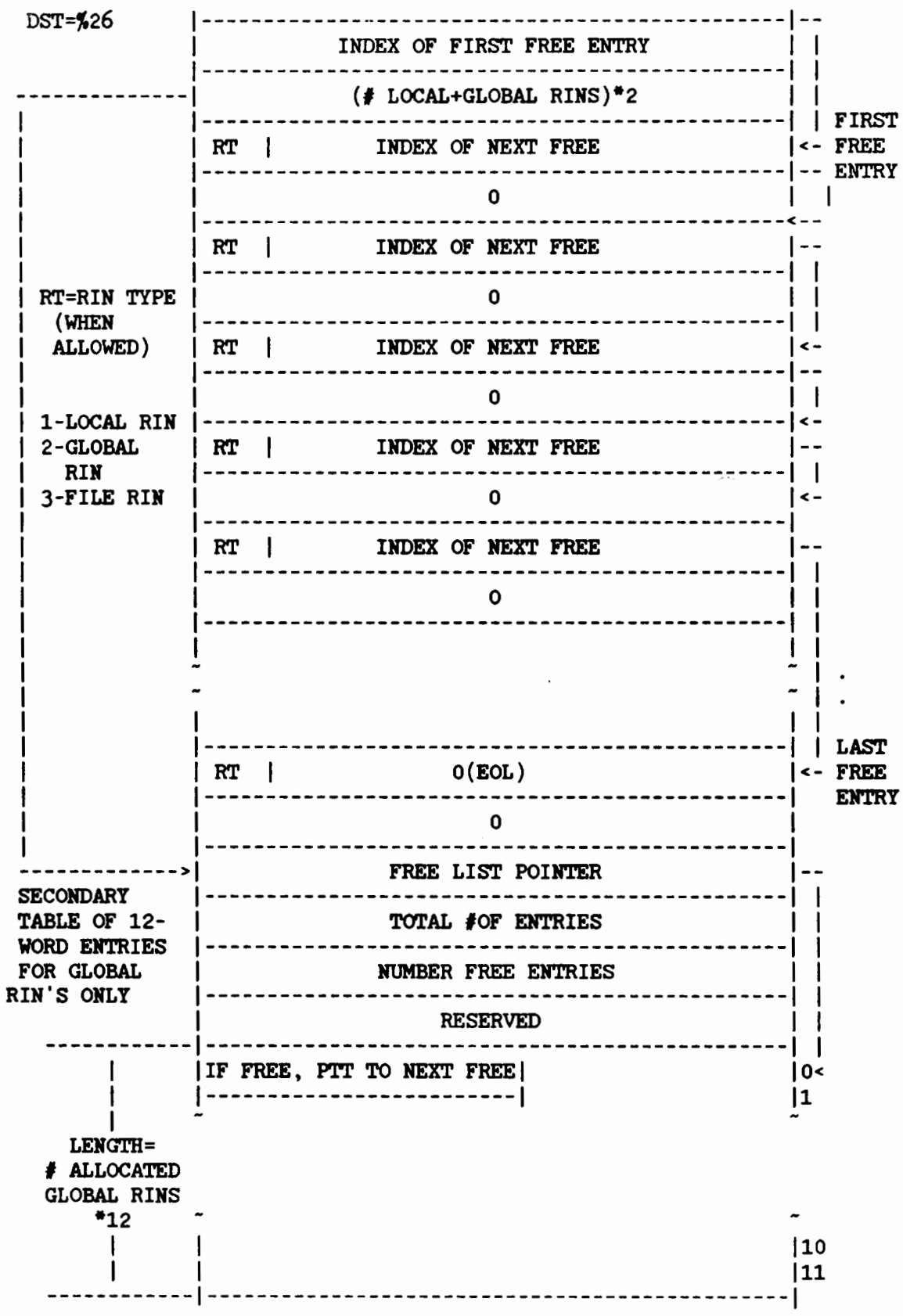
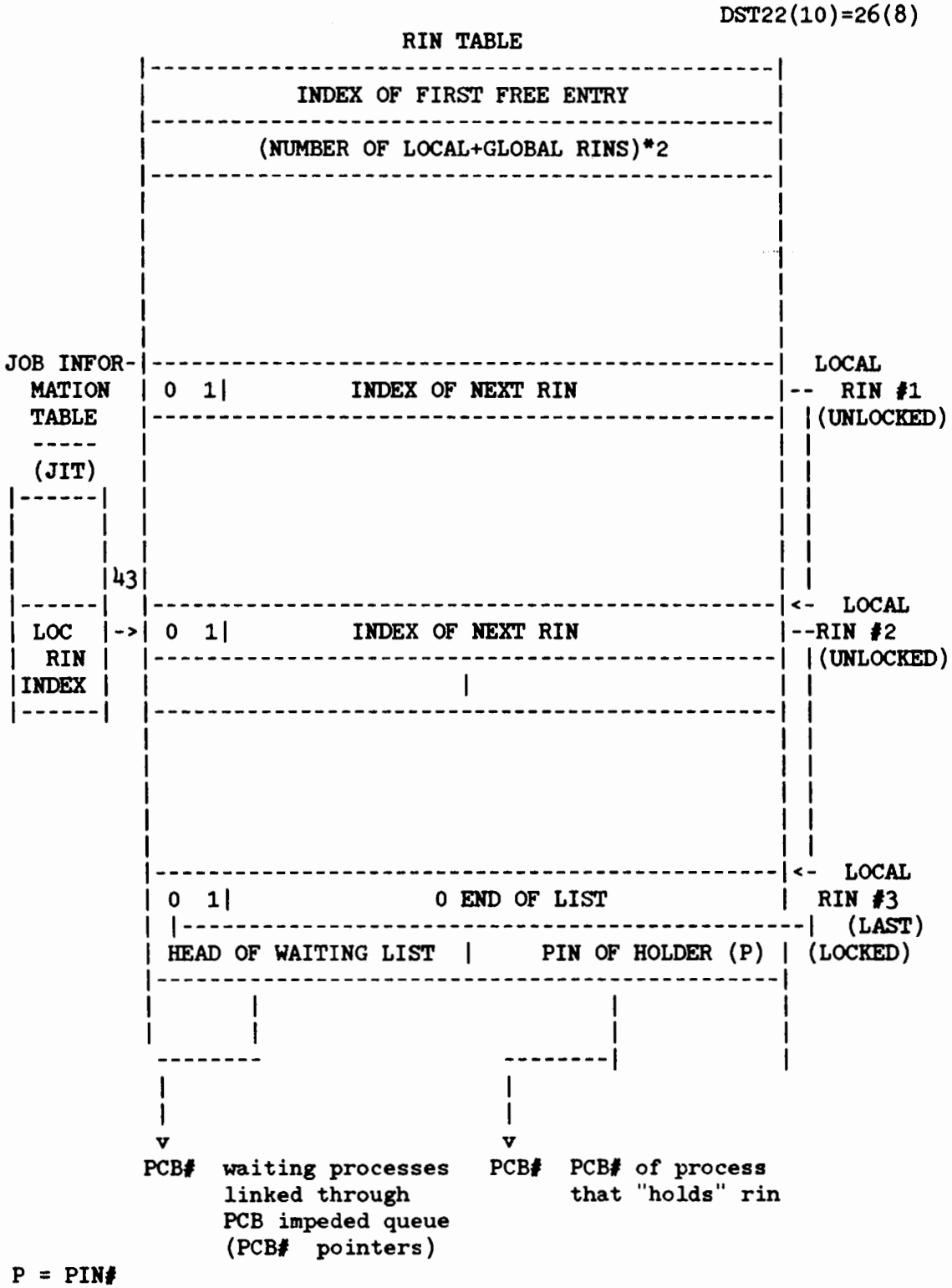
RIN TABLE GENERAL LAYOUT (Initialized State)

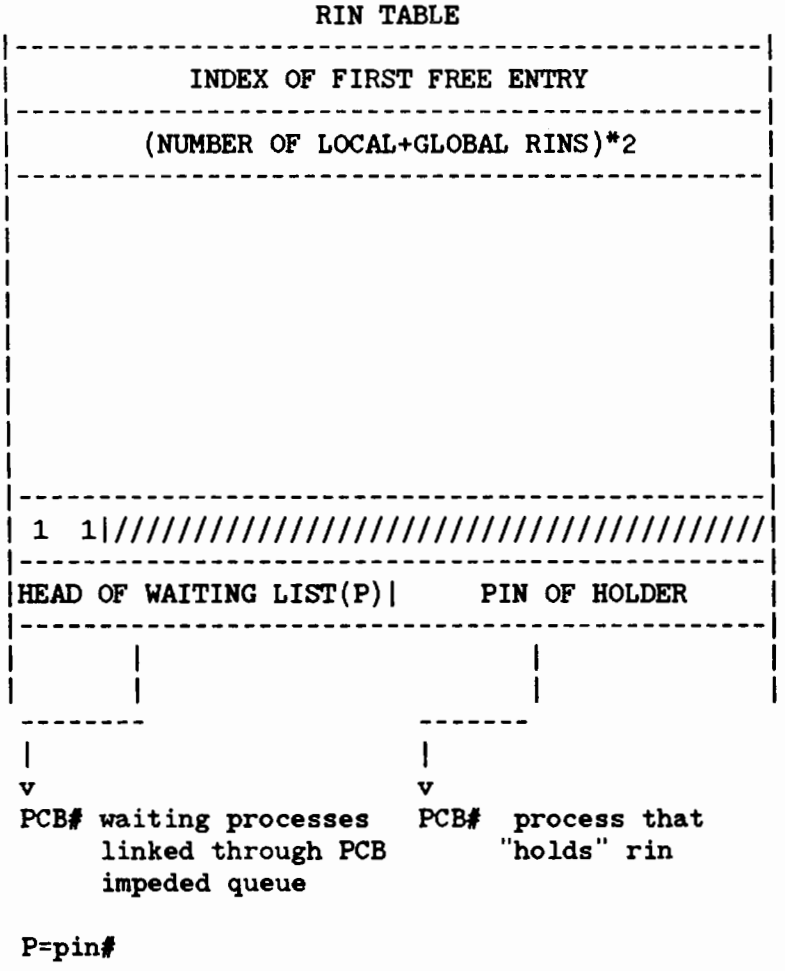


ALLOCATION AND LOCKING OF LOCAL RINS

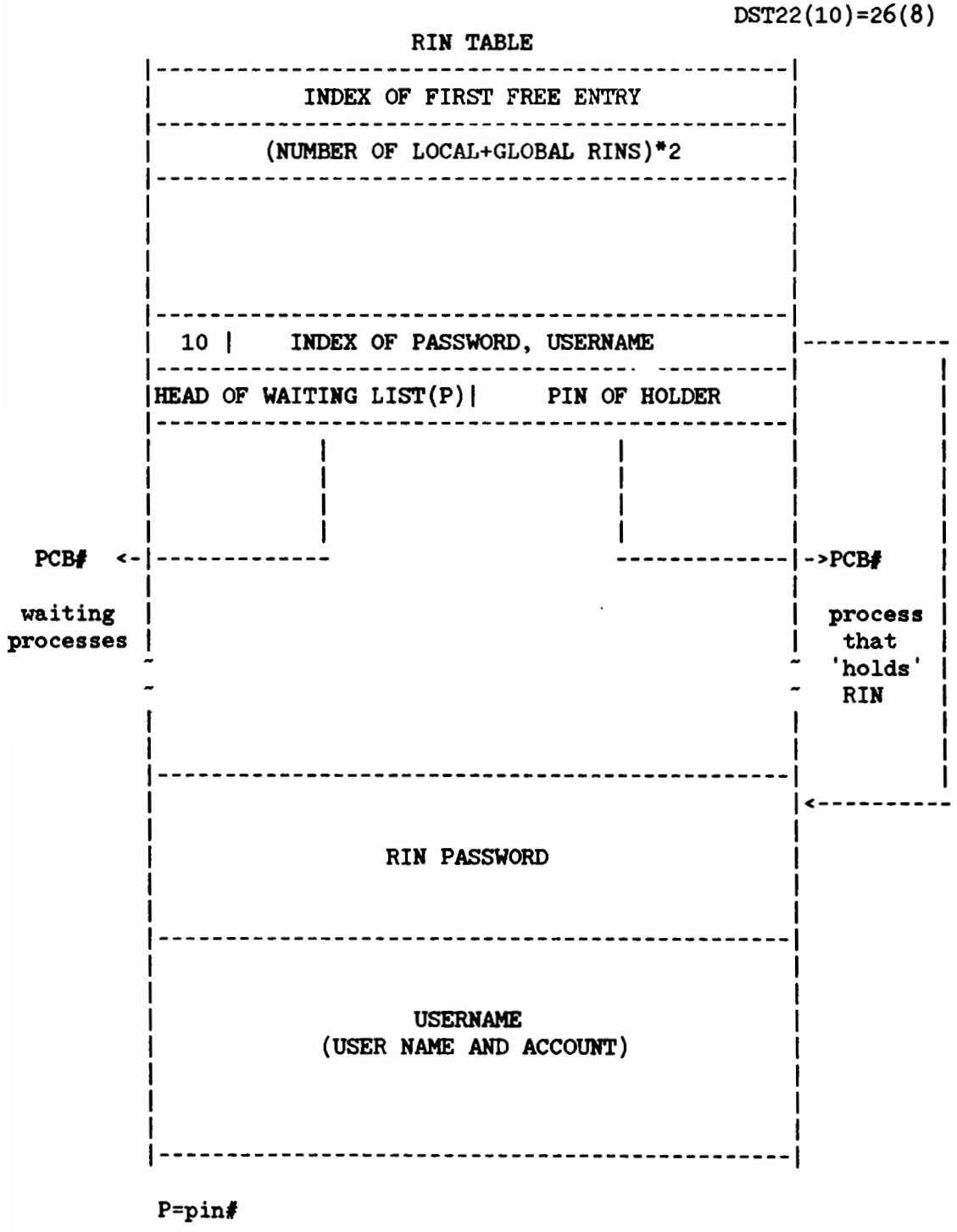


ALLOCATION AND LOCKING OF FILE RINS

DST22(10)=26(8)



ALLOCATION AND LOCKING OF GLOBAL RINS



1.0 Introduction

2.0 File System Overview

2.1 Buffers

3.0 Table Formats

3.1 File System Section of PCBX (PXFILE)

3.1.1 Overhead
3.1.2 Control Block Table (PXFCBT)
3.1.3 Available Block
3.1.4 Available File Table (AFT)

3.2 File Control Block Table (CBTAB)

3.2.1 Overhead
3.2.2 Vector Table (VT)
3.2.3 Control Block Area
3.2.4 Access Control Block (ACB)
3.2.5 Logical Access Control Block (LACB)
3.2.6 Physical Access Control Block (PACB)
3.2.7 File Control Block (FCB)

3.3 File Label (FLAB)

3.4 File Multi-Access Vector Table (FMAVT)

3.5 System Global Area (SYSGLOB)

3.6 SIRs, Locks, and Deadlocks

1.0 Introduction

This document describes the MPE-IV file system. Section 2 describes the basic concepts. Section 3 describes the table structures used.

2.0 File System Overview

I/O to files is done by reference to file numbers, which are assigned by calling the FOPEN intrinsic. This establishes an initial "point of attachment", which may be described as a connection between a program (i. e., process) and that particular point in a particular file at which the next FREAD or FWRITE would cause data to be transferred. A point of attachment is described by a control block, of which there are several different kinds (described later). Control blocks may exist in the process's own stack, in an extra data segment assigned by the file system, or (because of file sharing) in some other process' stack. In order to find control blocks quickly, a pointer scheme called vectors is used. A control block is uniquely described by a vector, which consists of one word with the low ten bits containing a segment number, and the upper six containing an index into a table (the "vector table") which describes the location of the control block within that segment. The entire assemblage, consisting of five overhead words, the vector table, and all of the control blocks to which it points, comprises a contiguous piece of storage called the "control block table". If it is in an extra data segment, the control block table comprises the entire segment; if in a stack, it occupies part of the PXFILE part of the PCBX, usually beginning at segment-relative location 106 octal.

The point of attachment is described by a "physical access control block", or PACB, which will exist as a result of an FOPEN to any file (except $NULL). Any required I/O buffers are associated with the PACB; see section 2.1.

All FOPENs specifying "multi-access" for all processes running under a single job use a single PACB for references to a multi-access file. Although all these are attached to a single point in the file, the type of attachment (i. e., AOPTIONS) may be different. So, each FOPEN specifying a multi-access file establishes a "logical access control block", or LACB, which contains the point-of-attachment local values. The use of a single buffer (i. e., PACB) insures that references by various processes or against various FOPENs within one process are dealt with in strict sequential order. Note that references to a file by other jobs, or by other processes not specifying multi-access, will be through other PACBs, whose buffers will be read or written at the pleasure of the file system; in order to insure any sort of coherence to such shared references, the jobs must use global RINS and FLOCK and FUNLOCK the file. $STDIN, $STDLIST, and spoolfiles are opened multi-access automatically.

In the case of disk files, there is another kind of control block: the file control block, or FCB. It contains copies of information read from the file label, such as the end- of-file pointer, the extent map, and the record and block structure. The EOF pointer is updated in the FCB as the file is written, and all changes made to the FCB are posted to the file label when the file is closed. An FCB is shared by all jobs in the system which reference the file.

The file number assigned by an FOPEN is an index into the Available File Table (AFT), a table of four-word entries which is at the end of the PXFILE part of the PCBX. Two of these words are vectors to the PACB and (if it exists) the LACB.

Because control blocks are shared among processes, it is necessary to have a scheme for coordinating access to them. A control block is "locked" by a process which requires exclusive access to it for a time. Other processes which attempt to lock the block will find it already locked, and will be impeded and queued. It may also be necessary to lock an entire control block table so that a process can create or destroy a control block in it, or lock or unlock an existing control block in the table.

Another table used by FOPEN is the File Multi-Access Vector Table (FMAVT). This table exists in a system extra data segment and is used by all jobs and processes in the system. When a file is being FOPENed with multi-access specified, the FMAVT is searched; if the file is already open, the FMAVT gives the PACB vector for the prior reference for each job.

2.1 Buffers

A bit in AOPTIONS specifies, when a file is opened, whether access is to be buffered or unbuffered. If unbuffered, data is transferred directly between the I/O device and the user's buffer (usually in his stack), which will be frozen in memory for the duration of the transfer. If buffered, the data is moved between the user's buffer and a file system buffer to which the I/O is actually done.

Buffers are associated with the PACB, attached to it as an appendage.

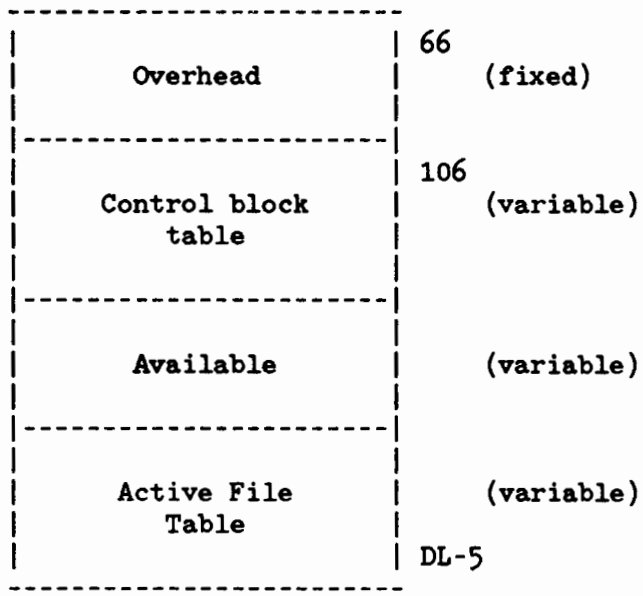
3.0 Table Formats

This section gives a detailed discussion of the main tables constructed and used by the file system. The location and overall structure of each table is given, in addition to the table format and a discussion of each field in the table. Table indices at the right of the table are in octal. Index names apply to the entire word; if in parentheses, the names are defined in the file system listing but not explicitly used there.

3.1 File System Section of PCBX (PXFILE)

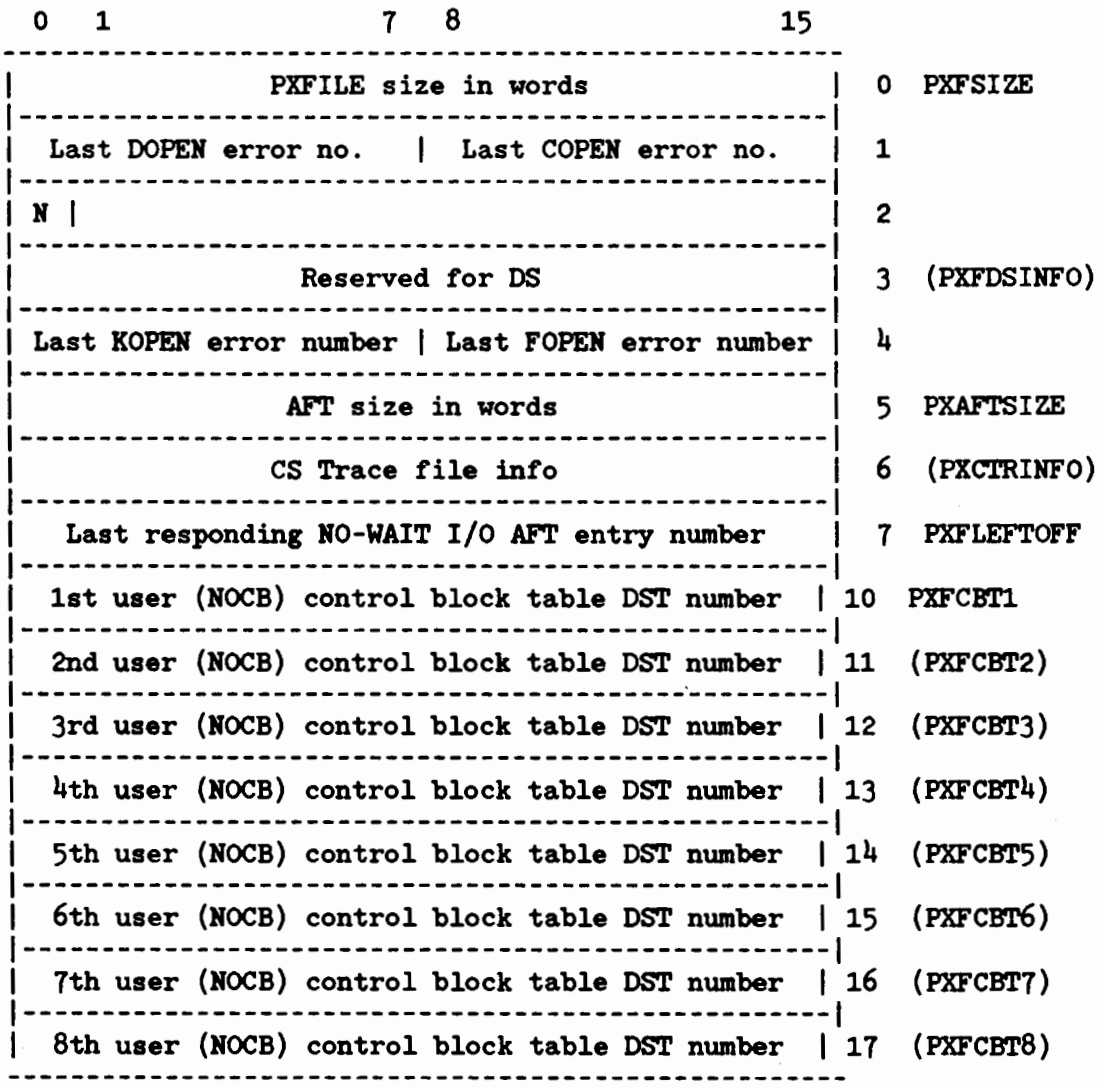
The PXFILE area is a sub-section of the PCBX. It is a contiguous, expandable and contractable block of storage that is managed by the file system primarily for its own use. Other subsystems, namely CS and DS, also make use of the PXFILE section. In doing so they must conform to the conventions of the file system.

The overall structure of the PXFILE area is:



3.1.1 Overhead

The part labeled Overhead contains information that pertains to the entire section. It ordinarily begins at segment-relative location 66 octal, but is usually addressed via the pointer at DL-3.



Partial word field identifiers are:

```
     PXFDOPEN      = PXFILE(1).(0:8)#,   last DOPEN error code
     PXFCOPEN      = PXFILE(1).(8:8)#,   last COPEN error code
N =  PXFNOCB       = PXFILE(2).(0:1)#,   no CB's in PXFILE CBT?
     PXFKOPEN      = PXFILE(4).(0:8)#,   last KOPEN error code
     PXFFOPEN      = PXFILE(4).(8:8)#,   last FOPEN error code
```

Discussion:

PXFAFTSIZE — This is the size (in words) of the Active File Table (AFT). The size is in words to simplify calculating the size of the available block.

PXFCBT1-8 — These are the DST numbers of the user (NOCB) control block tables. A DST number of 0 indicates that no data segment is allocated.

PXFCOPEN — This contains the last COPEN error number. Not used by the file system.

PXFCTRINFO — This contains information pertinent to the CS trace file. Not used by the file system.

PXFDOPEN — This contains the last DOPEN error number. Not used by the file system.

PXFDSINFO — Reserved for DS. Not used by the file system.

PXFFOPEN — This contains the last FOPEN error number. If it is zero then the last FOPEN completed successfully; otherwise the last FOPEN was unsuccessful and the number is the file system error number.

PXFKOPEN — This contains the last KOPEN error number. KSAM is partly imbedded in the file system, and an FOPEN failure on a KSAM file can be caused by a failure to open either the key file or the data file. This error number is used in conjunction with PXFFOPEN to determine which file caused the KSAM open failure. This error number is not used by the file system.

PXFLEFTOFF — This is the AFT entry number of the last file/line that completed a no-wait I/O; if zero then no no-wait I/O has been completed. This cell is maintained solely by and for the IOWAIT intrinsic.

PXFNOCB This bit signifies that control blocks are not to be created in the PXFILE control block table. This bit is set by the NOCB parameter to the CREATE intrinsic or the :RUN command. This feature permits the user to have as much stack space as possible; otherwise the file system will take several hundred words of stack for the PXFILE control block table.

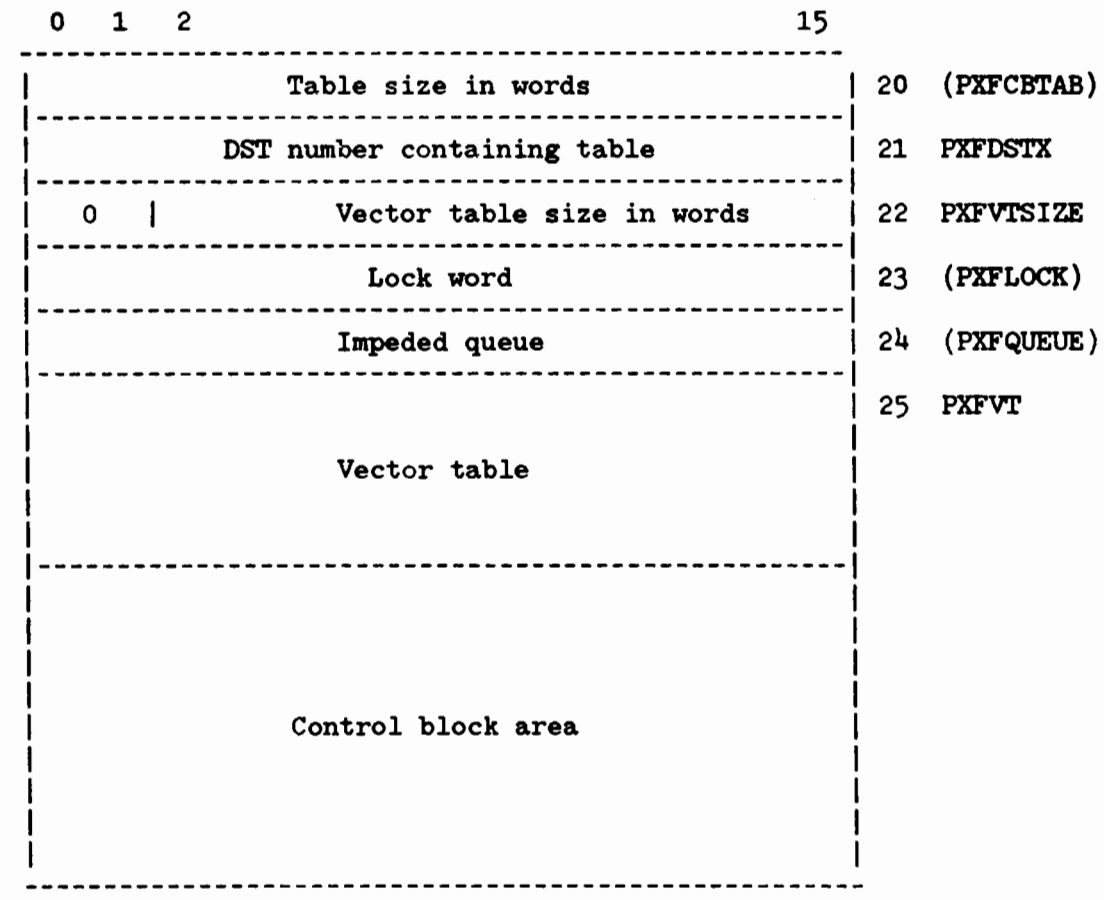
PXFSIZE This is the size (in words) of the complete PXFILE area. It is the sum of the overhead block, the control block table, the active file table and the available block.

3.1.2 PXFILE Control Block Table (PXFCBT)

Addressing within a PXFILE control block table is somewhat more complicated than addressing an extra data segment CBT since the table does not begin at DB+0. As a result all pointers within the table are table relative; the starting address of the table must be added to a pointer to generate a final DB-relative address. This addressing convention is consistently applied to all control block tables.

When the control block table is expanded, space is taken from the AVAILABLE area. If no space is available then the PXFILE area is expanded and the acquired space is added to the AVAILABLE area.

Refer to section 3.2 for a more detailed description of file control block tables.



The following identifier is also used:

```
PXFCBTSIZE      = PXFILE(16)#,    table size in words
```

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Discussion:

PXFCBTAB	This is the first word of the control block table; it is used when referring to the entire table.
PXFCBTSIZE	This is the size in words of the control block table. It is used principally for calculating the size of the available block.
PXFDSTX	This is the DST number of the data segment that contains the control block table. This is the same as the DST number of the stack itself. The common convention of referring to the DST number of the stack as zero is not used, because the file system may refer to a PXFILE control block table in another stack, which would result in an ambiguity since that PXFILE control block table would also have a DST number of zero.
PXFLOCK	This is the lock word for the table and has the same format as the lock word for a control block in the table, i. e. lock bit, break bit, lock count, and locking PIN.
PXFQUEUE	This is the impeded queue for the table and has the same format as the impeded queue for a control block in the table.
PXFVT	This is the first word of the vector table. It is used when referring to the vector table in general.
PXFVTSIZE	This is the size, in words, of the vector table. This is the length of the table and does not reflect the number of entries used or unused.

3.1.3 Available Block

The part labeled Available is used to provide space when the Control Block Table or the Active File Table is expanded. These two tables grow towards each other, and when more space is needed it is simply taken from the Available Block.

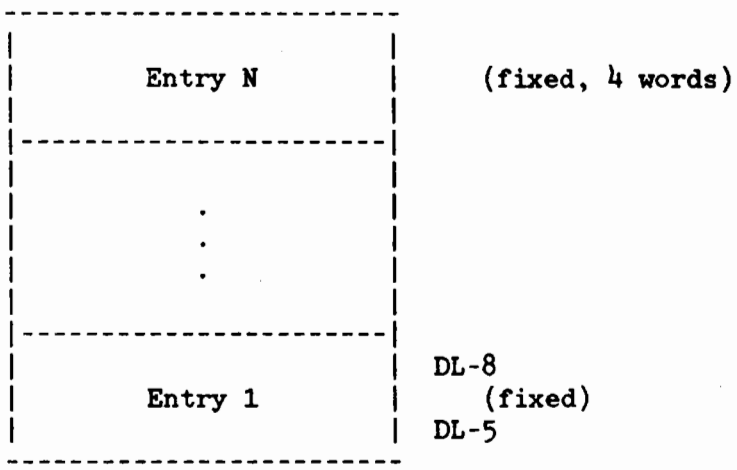
When the Available area is exhausted, the PXFILE area is expanded, the AFT is relocated and the new space is added to the Available Block.

Currently the PXFILE area is only expanded; it is never contracted.

3.1.4 Available File Table (AFT) (also called Active File Table.)

The part labeled Available File Table contains information used by the file system (or CS, DS, etc.) to grossly characterize the file access and, most importantly, to give the location of the control blocks.

The overall structure of the AFT is:

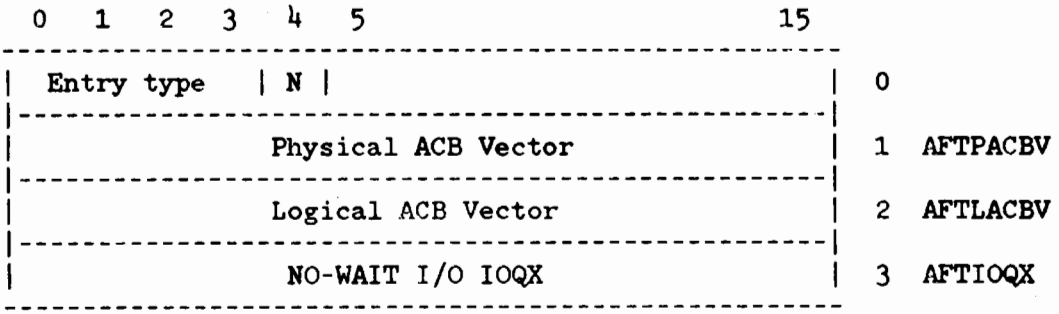


where N = PXFAFTSIZE/4.

The length of the AFT is specified by PXFAFTSIZE. Unused entries are all zeroes. When the table is full it is expanded by taking space from the Available block.

The AFT is negatively indexed by file number: the entry at DL-8 corresponds to file number 1, the entry at DL-12 corresponds to file number 2, etc.

The structure of a file system AFT entry is:



The entry format depends on the entry type; the file system uses entry type 0.

The following partial word field identifiers are used:

```
AFTTYPE         = AFT.(0:4)#,     entry type
AFTNULL         = AFT.(4:1)#,     $NULL file
```

Discussion:

AFTIOQX This is the IOQ index of the pending no-wait I/O (if any). This is applicable if the file was opened with the NOWAIT option specified. Also, CS and DS have the same capability and use this cell in a consistent manner. This is because the IOWAIT intrinsic services the file system as well as CS and DS, and is the principal user of this cell. In the case of a message file the accessor's reply port (file system basic IPC port) is stored in this cell. If this cell is zero there is no no-wait I/O pending.

AFTLACBV This is the vector of the Logical ACB (LACB) (if any). This is applicable if the file was opened with the multi-access option specified.

AFTNULL This bit signifies that the file is $NULL and that there are no control blocks.

AFTPACBV This is the vector of the Physical ACB (PACB). A PACB exists for all files except $NULL.

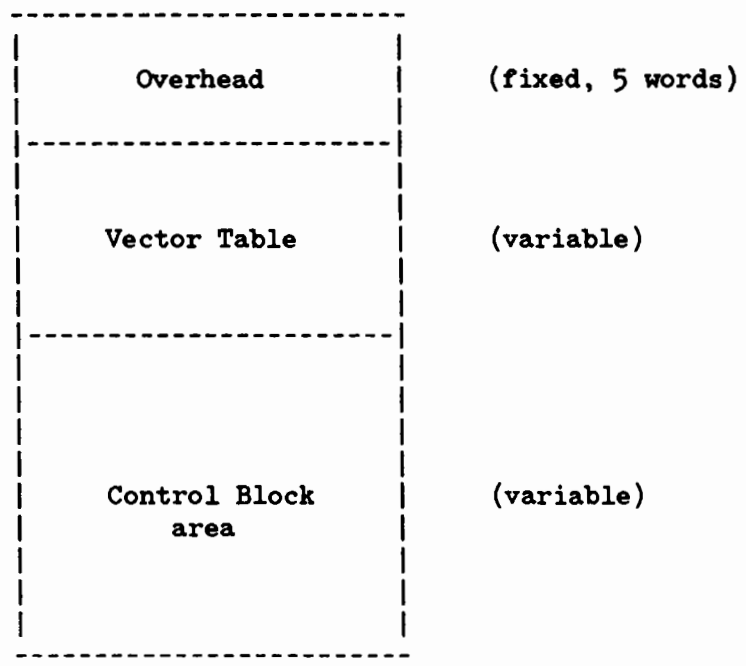
AFTTYPE This is the AFT entry type number. At present the following entry types are defined:

0 - file system
1 - remote file
2 - DS (no-wait I/O disallowed)
3 - DS (no-wait I/O allowed)
4 - CS
5 - CS
6 - KSAM
7 - 3270
8 - Message File

3.2 File Control Block Table (CBTAB)

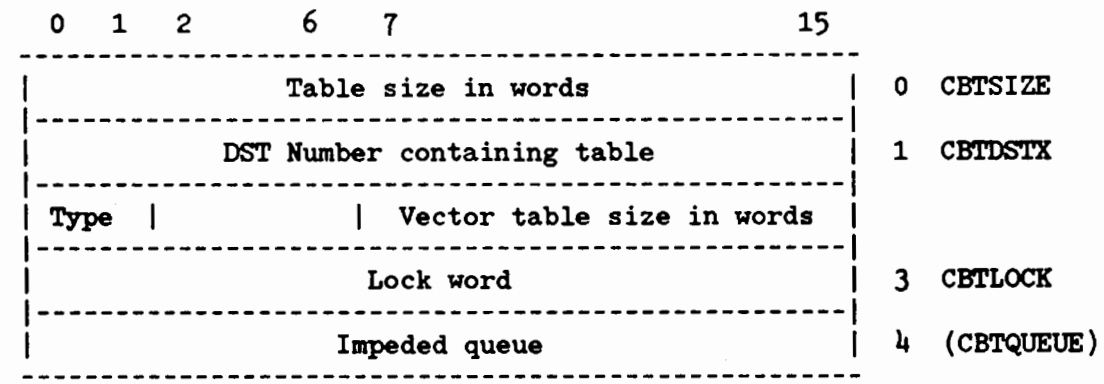
A file control block table can be located in two places: (a) as a sub-part of the PXFILE area, as discussed in section 3.1.2; or (b) in a data segment. Although putting control block tables in PXFILE has the advantage of providing rapid access, it detracts from the space for the user's stack; so the larger control blocks (or optionally, all control blocks) are put into extra data segments. On the other hand, referencing extra data segments may result in an absence trap, which is slow. Extra data segment control block tables are of three kinds: expandable, non-expandable, and shared FCB. Non-expandable CBT's are used for a single PACB with buffers, i. e. where the control block is large, or where the control block can't be local to a single process, i. e., for multi-access. Expandable (or NOBUF) CBT's are used for small control blocks, to wit, LACB's, PACB's with no buffers, and FCB's which are local to a single process. A list of the expandable CBT's associated with a process is kept in the overhead area of PXFILE (cf. section 3.1.1). When a small control block is needed, these CBT's are checked in order to see if one of them has room. Shared FCB CBT's are like expandable CBT's except that they belong to the system rather than to a single process; the system keeps a list of DST's which it has assigned for this purpose.

The overall structure of a control block table is:



3.2.1 Overhead

The part labeled Overhead contains information pertaining to the entire table.



Other identifiers used:

```
CBTTYPE   = CBTAB(2).(0:2)#;  control block table type
CBTVTSIZE = CBTAB(2).(7:9)#;  vector table size
```

Discussion:

CBTDSTX — This is the DST number of the data segment that contains the control block table. If the table is contained in a stack, i.e. in the PXFILE area, then this is the DST number of the stack and not 0.

CBTLOCK — This is the lock word for the table and has the same format as the lock word for a control block in the table, i. e. lock bit, break bit, lock count, and locking PIN. The table is locked, thus insuring exclusive access, whenever a control block is being created or destroyed. It isn't necessary to lock the table while locking a control block within it because control block locking is done pseudo-disabled.

CBTQUEUE — This is the impeded queue for the table and has the same format as the impeded queue for a control block in the table. There is no second impeded queue because that facility is used exclusively for BREAK requests against the PACB for $STDIN/$STDLIST.

CBTSIZE — This is the size in words of the table. It is initialized when the table is created and changed when the table is expanded. At present a table is never contracted, even though this is possible.

CBTTYPE — This field is the type of the control block table. Possible values are:

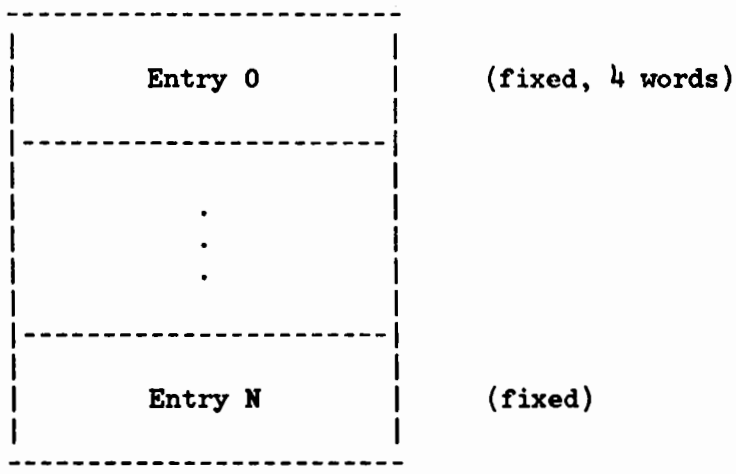
0 - stack [PXFILE]
1 - NOBUF (expandable)
2 - System shared FCB
3 - Buffered (contains a single PACB)

CBTVTSIZE — This is the size, in words, of the vector table area in the control block table. It does not reflect the number of entries used or unused.

3.2.2 Vector Table

The part labeled Vector Table contains information used to locate and lock or unlock control blocks in the control block table.

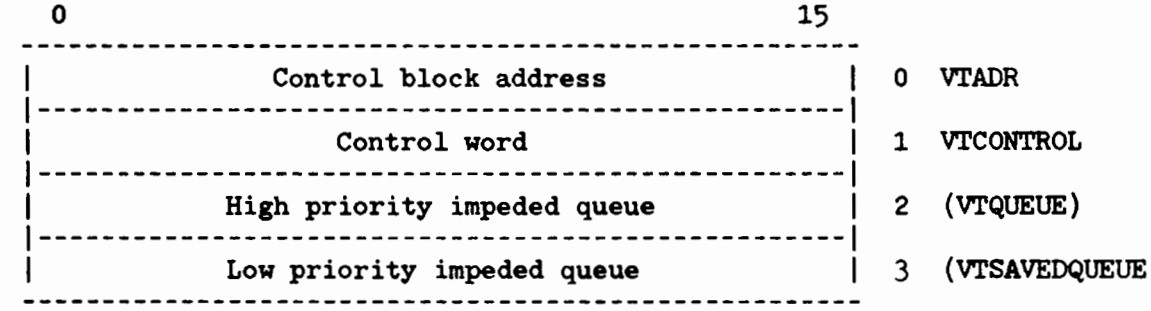
The vector format is found in section 7.3.4 of Chapter 7.
The overall structure of the vector table is:



where N = (CBTVTSIZE/4)-1. Since only six bits are available for a vector table index, the vector table can contain at most 64 entries.

An unused vector table entry will have zeroes in all the words of the entry. A used vector table entry will have a non-zero value in the first word of the entry (the control block address is necessarily non-zero).

The general structure of a vector table entry is:



Discussion:

VTADR — Control block address is the table relative address of the control block associated with the vector table entry. It is a word displacement from the beginning of the control block table.

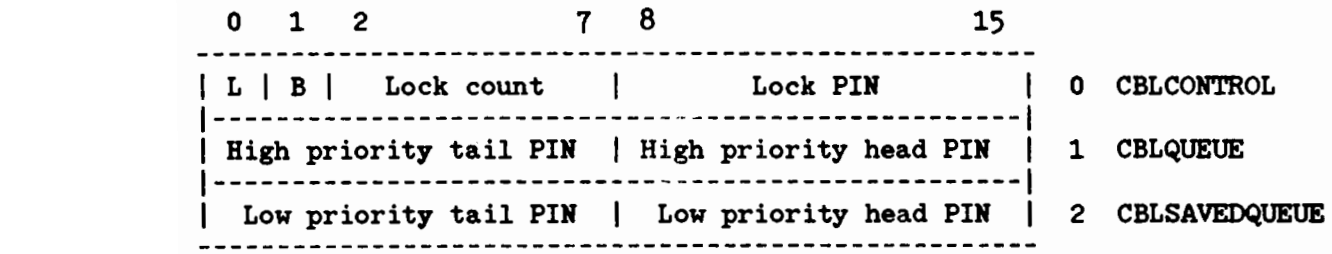
VTCONTROL — The control word is used to coordinate access to the control block. It contains a bit which indicates that the control block is being accessed, and therefore "locked", and a byte which contains the PIN of the process which has exclusive access to the control block. Other processes attempting to access the block will be impeded and queued.

VTQUEUE — The high priority impeded queue is a byte pair of PINs that are the head and tail of the impeded queue of processes waiting for access to the control block. Processes are impeded and unimpeded by the file system using the normal mechanisms available under MPE.

VTSAVEDQUEUE — The low priority impeded queue is a byte pair of PINs and has the same format as VTQUEUE. The only time this word is used is when the control block is in BREAK mode, which can only happen to an ACB corresponding to $STDIN/$STDLIST. It is used to save the current VTQUEUE when the control block goes into BREAK mode and to restore VTQUEUE when the control block goes back into non-BREAK mode.

The last three words of a vector table entry comprise a sub-block for the locking system that is used to coordinate access to a particular control block.

The structure of the vector table entry control sub-block is:



The following partial word field identifiers are used:

```
CBLLOCK         = CBL.(0:1)#,       lock bit
CBLBREAK        = CBL.(1:1)#,       break bit
CBLCOUNT        = CBL.(2:6)#,       lock count
CBLPIN          = CBL.(8:8)#,       PIN holding lock
CBLTAIL         = CBL(1).(0:8)#,    high priority tail PIN
CBLHEAD         = CBL(1).(8:8)#,    high priority head PIN
CBLSAVEDTAIL    = CBL(2).(0:8)#,    low priority tail PIN
CBLSAVEDHEAD    = CBL(2).(8:8)#;    low priority head PIN
```

Discussion:

CBLBREAK This is the BREAK bit and is used only for the ACB corresponding to $STDIN/$SDTLIST.

CBLCONTROL This identifier is used when referring to the first word of the vector table control sub-block.

CBLCOUNT This is a count of the number of times that the control block is locked by CBLPIN. It is 0 if the control block is not locked and is greater than 0 if the control block is locked.

CBLHEAD This is the PIN of the process at the head of the high priority impeded queue.

CBLLOCK This is the lock bit for a control block; 1 denotes locked.

CBLPIN This is the PIN of the process which has locked the control block and has exclusive access to it. If the control block is not locked then this field is 0.

CBLQUEUE This is the high priority impeded queue.

CBLSAVEDHEAD This is the PIN of the process at the head of the low priority impeded queue.

CBLSAVEDQUEUE This is where CBLQUEUE is saved when creating a break queue.

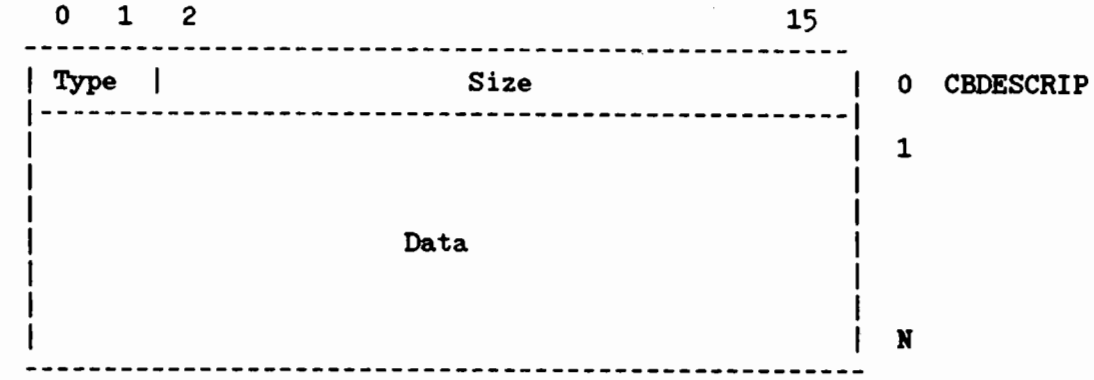
CBLSAVEDTAIL This is the PIN of the process at the tail of the low priority impeded queue.

CBLTAIL This is the PIN of the process at the tail of the high priority impeded queue.

3.2.3 Control Block Area

The part labeled CONTROL BLOCK AREA contains the control blocks used by the file system.

To facilitate storage management, all control blocks have the same overall structure:



where N = Size-1.

Partial word field identifiers are:

```
CBTYPE          = CB.(0:2)#,      control block type no.
CBSIZE          = CB.(2:14)#;     control block size
```

Discussion:

CBDESCRIP — This is the first word of a control block; the format is common for all control blocks.

CBSIZE — This is the size (in words) of the control block. The size includes the descriptor word.

CBTYPE — This is the type number of the control block. There are four types of control blocks:

0 - Garbage
1 - FCB
2 - PACB
3 - LACB

When a control block table is created the initial control block area is completely allocated to a single control block of type garbage. When space is requested for a new control block the control block area is scanned (using a first fit algorithm) for a garbage control block that

is as large as the size requested. The space for the new control block is taken from this garbage control block and the space remaining becomes the new garbage control block size.

When space is returned it becomes a new garbage control block. To reduce fragmentation the new garbage control block is combined with either of the two neighboring control blocks if they are of type garbage.

If space is requested and no garbage control block is large enough to contain the new control block then the control block area and control block table are expanded by a sufficient amount. If expansion is not possible, some other control block table must be used.

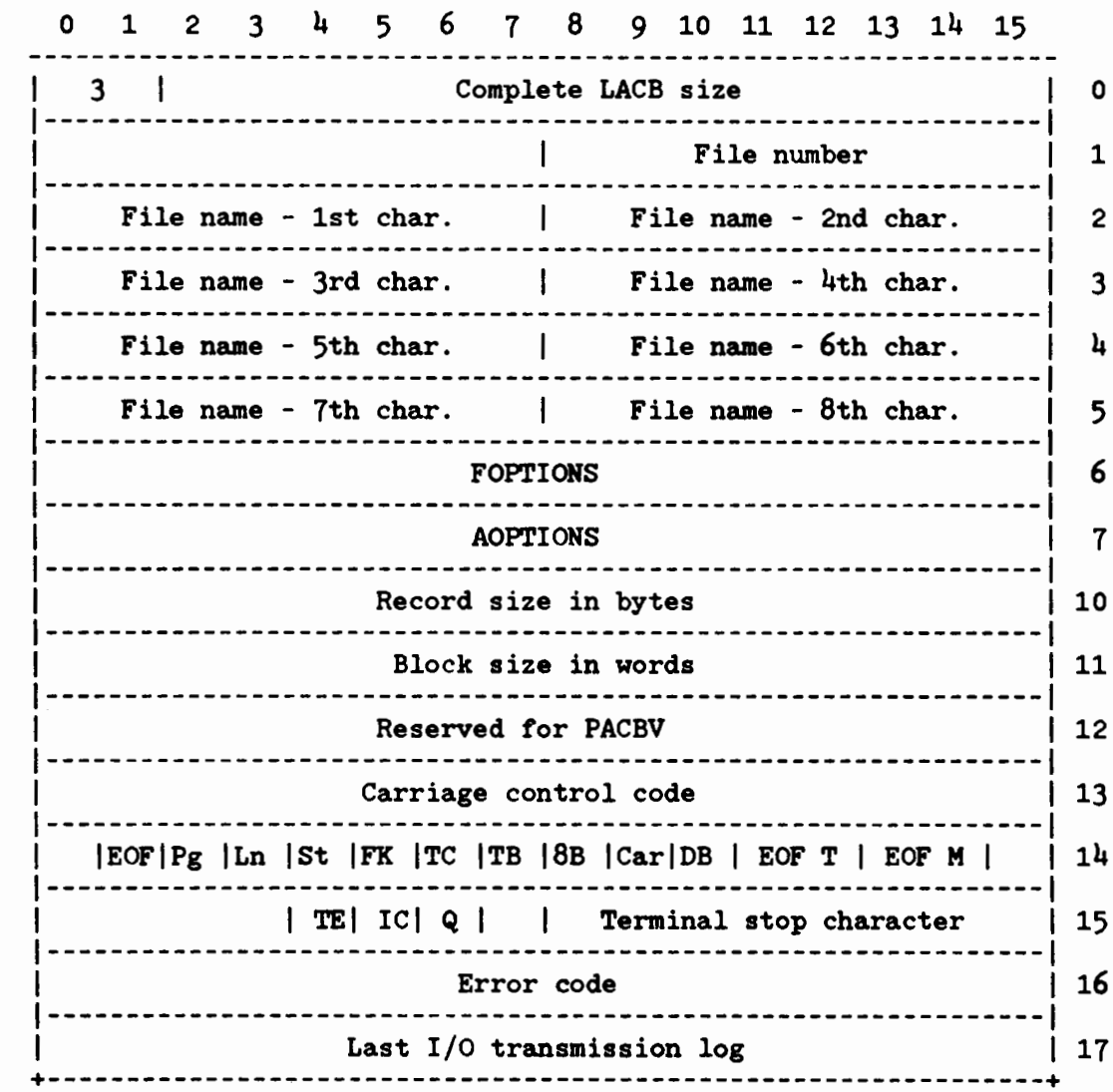
3.2.4 Access Control Block (ACB)

Virtually every file system intrinsic constructs an ACB as its first action. When using the multi-access option, each accessor shares a single PACB. However each accessor is permitted to view the shared file in a slightly different manner than the other accessors. For example, one accessor may access the file in a read-only mode while the other accessors may access the file in a read-write mode. To do this, each accessor must, during his access, have a slightly different ACB.

The PACB holds information that is global to all accessors of the file. The LACB holds information that is local to each accessor of the file. At the beginning of a particular access, an ACB is constructed by calling LOC'ACB, which copies information from both the LACB and the PACB. At the end of the access, the ACB is released by calling UNLOC'ACB; this updates the PACB and LACB from the ACB since some of the fields may have been modified due to the access. This scheme nearly eliminates EXCHANGEDB's to access the various data segments.

3.2.5 Logical Access Control Block (LACB)

All LACBs have the same structure:



Partial word field identifiers are:

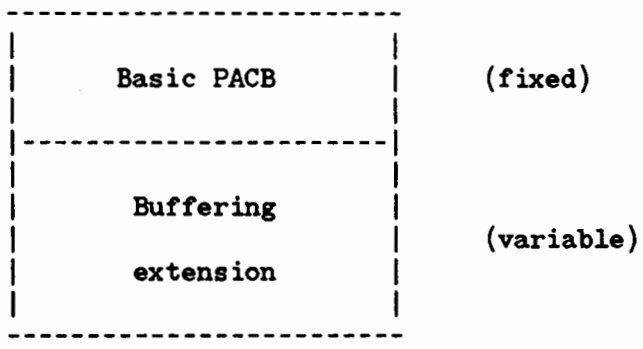
```
LACBSIZE        = LACB.(2:14)#,   size in words
LACBSTOPCHAR    = LACB(2).(0:8)#, terminal stop character
```

Discussion:

LACBAOPTIONS	See ACBAOPTIONS.
LACBBSIZE	See ACBBSIZE.
LACBCTL	See ACBCTL.
LACBERROR	See ACBERROR.
LACBFNUM	See ACBFNUM.
LACBFOPTIONS	See ACBFOPTIONS.
LACBMODE	See ACBMODE.
LACBNAME1-8	See ACBNAME.
LACBPACB	This is the vector of the Physical ACB (PACB) for the file.
LACBRSIZE	See ACBRSIZE.
LACBSIZE	This is the size, in words, of the LACB. All LACBs are sixteen (decimal) words long.
LACBSTATE	See ACBLSTATE.
LACBSTOPCHAR	See ACBSTOPCHAR.
LACBTLOG	See ACBTLOG.

3.2.6 Physical Access Control Block (PACB)

The overall structure of the PACB is:

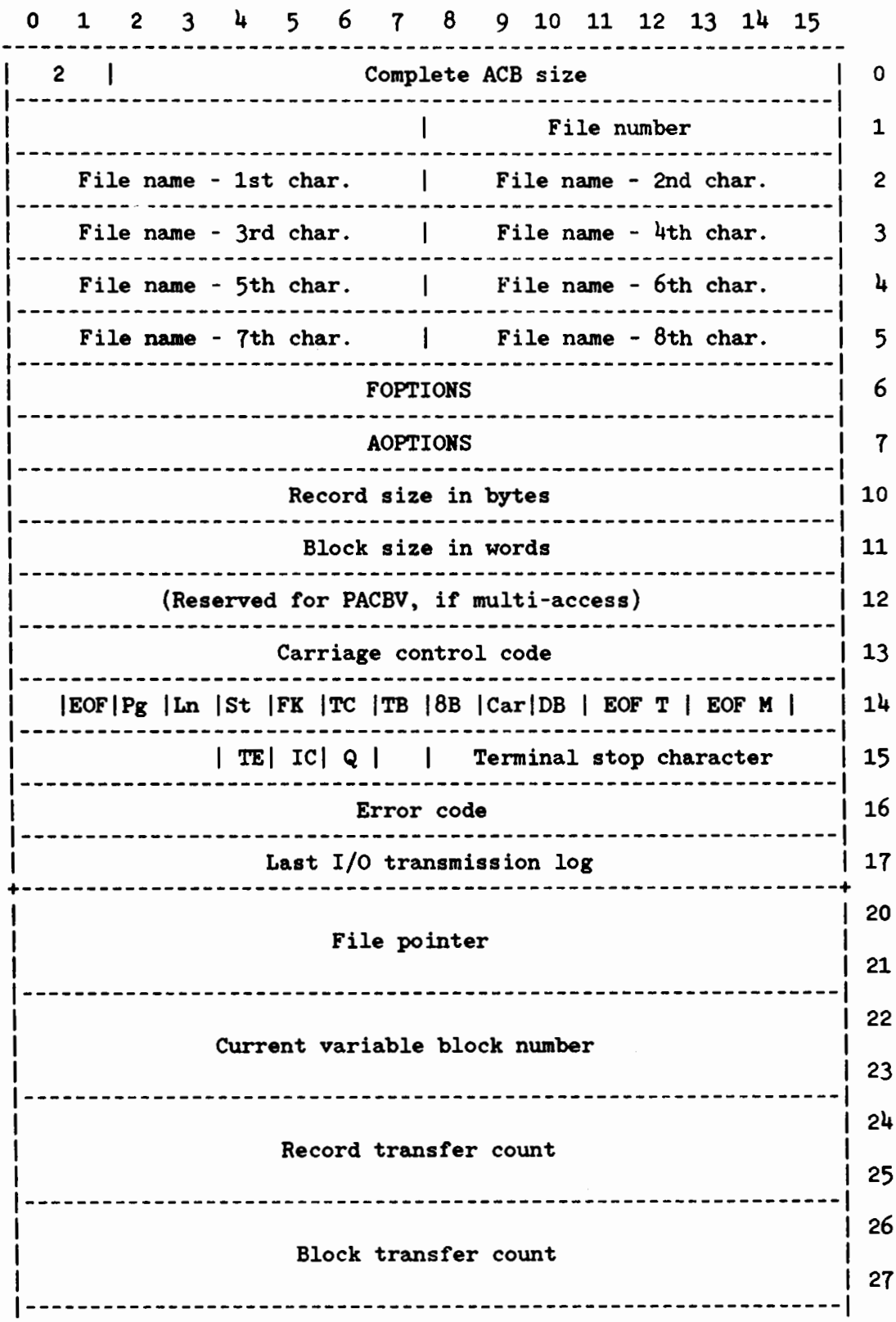


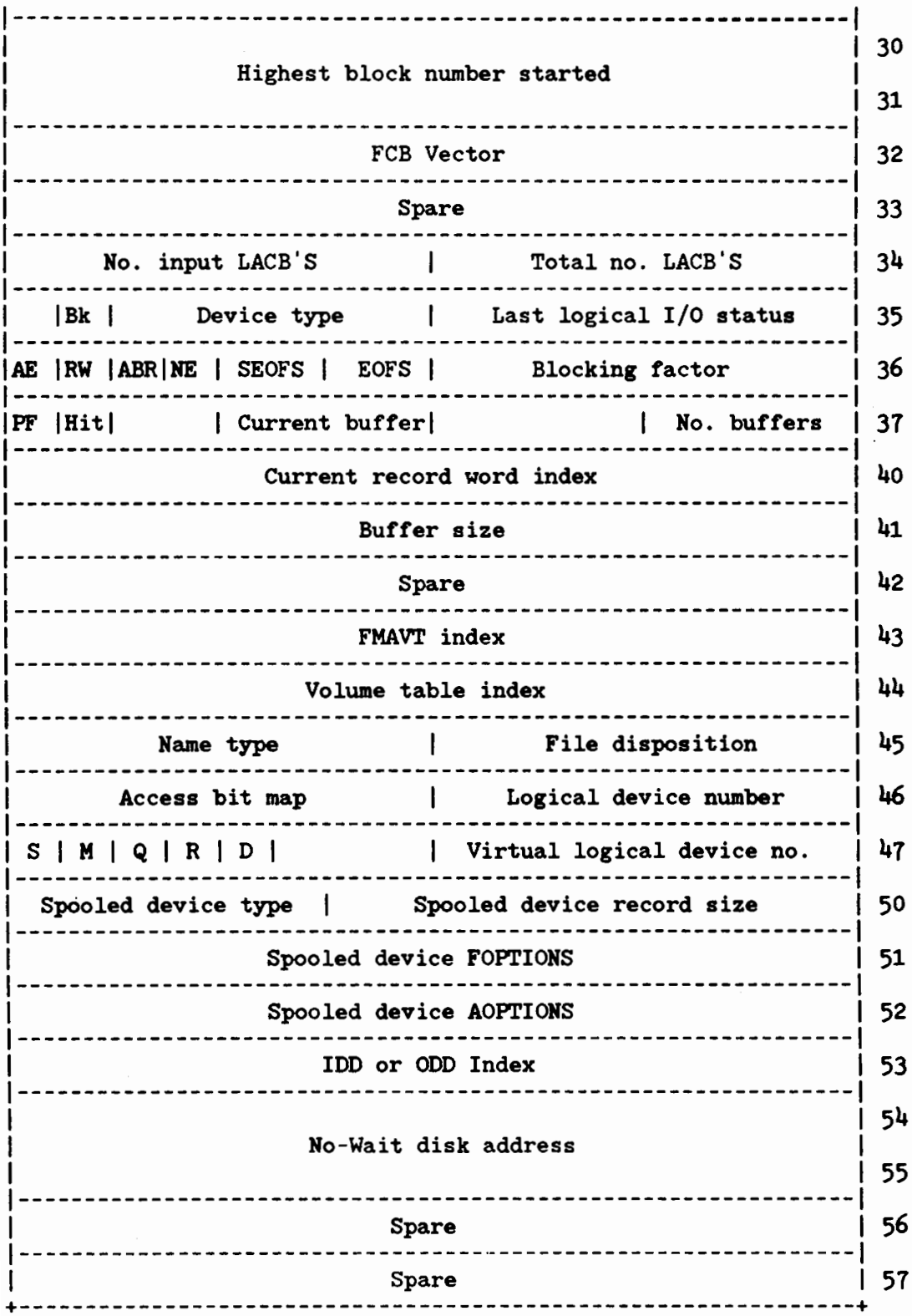
The buffering extension is optional; it is present if and only if the file is accessed with buffering. There are thus two possible formats for an ACB:

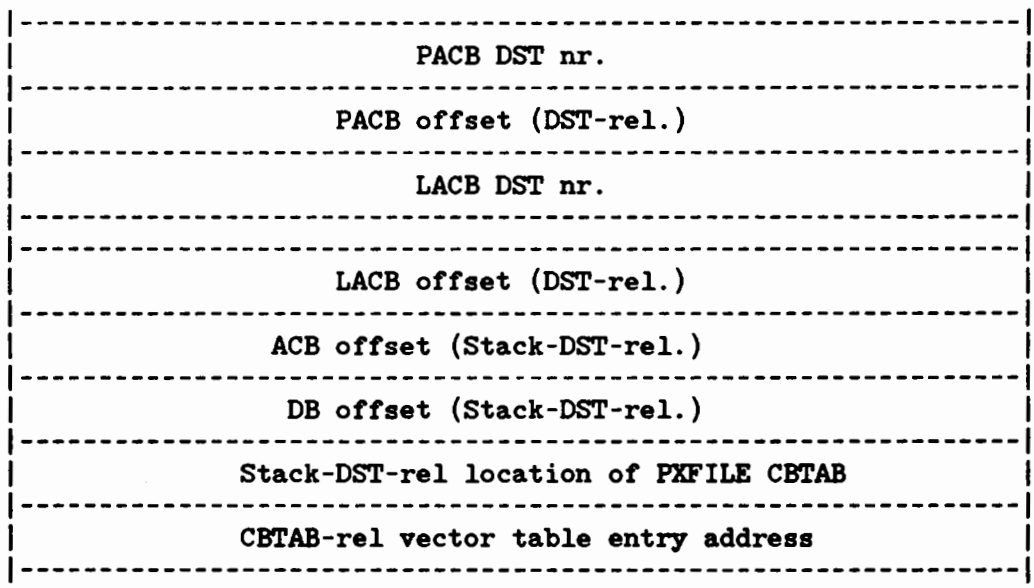
1. No buffers; the buffering extension is not present.

2. PACB buffers; the buffering extension is present and the buffers are in the buffering extension.

If multiple PACB buffers exist, there will be a buffering extension for each, immediately preceding the buffer. The basic PACB (or NOBUF PACB) is copied into the the ACB as words 0 thru 57 octal; an ACB "extension" is then generated in words 60 thru 67. The resulting ACB thus has the following format:


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
2
Complete ACB size
0
File number
1
File name - 1st char.
File name - 2nd char.
2
File name - 3rd char.
File name - 4th char.
3
File name - 5th char.
File name - 6th char.
4
File name - 7th char.
File name - 8th char.
5
FOPTIONS
6
AOPTIONS
7
Record size in bytes
10
Block size in words
11
(Reserved for PACBV, if multi-access)
12
Carriage control code
13
EOF Pg Ln St FK TC TB 8B Car DB EOF T EOF M
14
TE IC Q
Terminal stop character
15
Error code
16
Last I/O transmission log
17
File pointer
20
21
Current variable block number
22
23
Record transfer count
24
25
Block transfer count
26
27


Highest block number started
FCB Vector
Spare
No. input LACB'S
Total no. LACB'S
Bk
Device type
Last logical I/O status
AE
RW
ABR
NE
SEOFS
EOFS
Blocking factor
PF
Hit
Current buffer
No. buffers
Current record word index
Buffer size
Spare
FMAVT index
Volume table index
Name type
File disposition
Access bit map
Logical device number
S
M
Q
R
D
Virtual logical device no.
Spooled device type
Spooled device record size
Spooled device FOPTIONS
Spooled device AOPTIONS
IDD or ODD Index
No-Wait disk address
Spare
Spare
30
31
32
33
34
35
36
37
40
41
42
43
44
45
46
47
50
51
52
53
54
55
56
57



The following identifiers are used when referring to an ACB:

```
(ACBSIZE)      = ACB.(2:14)#,        size in words
ACBFNUM        = ACB(1).(8:8)#,       file number
ACBNAME        = ACB(2)#,             file name
ACBNAME1       = ACBDBL(1)#,          file name - first half
ACBNAME2       = ACBDBL(2)#,          file name - second half
ACBFOPTIONS    = ACB(6)#,             FOPTIONS
ACBAOPTIONS    = ACB(7)#,             AOPTIONS
ACBRSIZE       = ACB(8)#,             record size (bytes)
ACBBSIZE       = ACB(9)#,             block size (words)

ACBCTL         = ACB(11)#,            carriage control word
ACBLSTATE      = ACB(12)#,            local state flags
ACBEOF         = ACBLSTATE.(1:1)#,    end of file sensed
ACBLPCTL       = ACBLSTATE.(2:2)#,    page and line control
ACBPAGECTL     = ACBLSTATE.(2:1)#,    page control
ACBLINECTL     = ACBLSTATE.(3:1)#,    line control
ACBSTREAM      = ACBLSTATE.(4:1)#,    stream I/O
ACBFKEYS       = ACBLSTATE.(5:1)#,    restore function keys
ACBXMITCRLF    = ACBLSTATE.(6:1)#,    transmit CR,LF to user
ACBTBLOCK      = ACBLSTATE.(7:1)#,    disable block mode
ACBBINARYIO    = ACBLSTATE.(8:1)#,    8-bit terminal transfers
ACBCARRIAGE    = ACBLSTATE.(9:1)#,    carriage control flag
(ACBDEFBLOCK)  = ACBLSTATE.(10:1)#,   default blocking
ACBREADCODE    = ACBLSTATE.(11:4)#,   input EOF check
ACBREADTYPE    = ACBLSTATE.(11:2)#,   input EOF type
ACBREADMODE    = ACBLSTATE.(13:2)#;   input EOF mode

ACBMODW        = ACB(13)#,            mode word
ACBMODE        = ACBMODW.(0:8)#,      mode setting
ACBTAPEERROR   = ACBMODW.(4:1)#,      report recovered tape error
ACBINHIBCRLF   = ACBMODW.(5:1)#,      inhibit terminal CR/LF
```

```
ACBQUIESCE     = ACBMODW.(6:1)#,     critical output verify
ACBSTOPCHAR    = ACBMODW.(8:8)#,     terminal stop character
ACBERROR       = ACB(14)#,           error code
ACBTLOG        = ACB(15)#,           last I/O transmission log
ACBFPTR        = ACBDBL(08)#,        current record number
ACBBLK         = ACBDBL(09)#,        current variable block
ACBRTFRCT      = ACBDBL(10)#,        logical record tfr count
ACBBTFRCT      = ACBDBL(11)#,        block transfer count
ACBHIBLK       = ACBDBL(12)#,        highest block started
ACBFCB         = ACB(26)#,           FCB vector

ACBSHCNTS      = ACB(28)#,           LACB counts
ACBSHCNTIN     = ACBSHCNTS.(0:8)#,   # of Read LACB'S
ACBSHCNT       = ACBSHCNTS.(8:8)#,   # of LACB'S
ACBSTATW       = ACB(29)#,           access class, status, etc.
ACBBREAK       = ACBSTATW.(1:1)#,    break ($STDIN/LIST only)
ACBDTYPE       = ACBSTATW.(2:6)#,    device type
ACBACCCL       = ACBSTATW.(2:3)#,    device access class
ACBSUBCL       = ACBSTATW.(5:3)#,    device sub-class
ACBSTATUS      = ACBSTATW.(8:8)#,    last logical I/O status
ACBQSTATUS     = ACBSTATW.(8:5)#,    qualifying status part
ACBGSTATUS     = ACBSTATW.(13:3)#,   general status part
ACBGSTW        = ACB(30)#,           global state flags
ACBNOWAITEOF   = ACBGSTW.(0:1)#,     EOF advanced?
ACBNOWAITMODE  = ACBGSTW.(1:1)#,     last I/O: 0  = read, 1  = write
ACBABORTREAD   = ACBGSTW.(2:1)#,     abort broken re-read?
ACBNEWEOF      = ACBGSTW.(3:1)#,     EOF advanced - tape file
ACBSAVEEOFS    = ACBGSTW.(4:2)#,     for saving ACBEOFS
ACBEOFS        = ACBGSTW.(6:2)#,     EOF flags - :EOD/:
ACBBLKFACT     = ACBGSTW.(8:8)#,     records/block
ACBBUFX        = ACB(31)#,           buffer data & misc. flags
ACBPRIV        = ACBBUFX.(0:1)#,     privileged access only
ACBHIT         = ACBBUFX.(1:1)#,     buffer hit flag
ACBCURRBUF     = ACBBUFX.(4:4)#,     current buffer nr.
ACBNUMBUFS     = ACBBUFX.(12:4)#,    number of buffers less 1
ACBBUFUSED     = ACB(32)#,           used block word count
ACBBUFSIZE     = ACB(33)#,           buffer size (words)
ACBXXXX        = ACB(34)#,           spare
ACBFMAVTX      = ACB(35)#,           FMAVT index
ACBVDADDR      = ACB(36)#,           volume table index
ACBDNTD        = ACB(37)#,           type & disposition
ACBDNTYPE      = ACBDNTD.(0:8)#,     name type for dir. search
ACBDISP        = ACBDNTD.(8:8)#,     file disposition
ACBAMLD        = ACB(38)#,           access mask & LDEV
ACBACCESS      = ACBAMLD.(0:8)#,     access mask
ACBDADDR       = ACBAMLD.(8:8)#,     logical device number

ACBSPFL        = ACB(39)#,           spool control flags
ACBSPOOLED     = ACBSPFL.(0:1)#,     spooled device flag
ACBSPOOLIO     = ACBSPFL.(0:2)#,     spooled IN/OUT
ACBSPSQ        = ACBSPFL.(2:2)#,     squeeze flags
ACBSPSQZ       = ACBSPFL.(2:1)#,     file squeezed
ACBSPRSQ       = ACBSPFL.(3:1)#,     request to sqz
ACBSPDSQ       = ACBSPFL.(4:1)#,     squeeze just done
```

```
ACBSPVDEV      = ACBSPFL.(8:8)#,      spooled virtual device
ACBSPTYRC      = ACB(40)#,            spooled dev type/recsize
ACBSPTYPE      = ACBSPTYRC.(0:6)#,    spooled dev type
ACBSPREC       = ACBSPTYRC.(6:10)#,    spooled dev rec size
ACBSPFOPT      = ACB(41)#,            spooled dev FOPTIONS
ACBSPAOPT      = ACB(42)#,            spooled dev AOPTIONS
ACBSPXDDX      = ACB(43)#,            IDD/ODD index
ACBNOWAITDA    = ACBDBL(22)#,         No-wait disk address
ACBNOWAITLDEV = ACB(27)#,
```

Discussion:

ACBABORTREAD — This flag is used to abort a broken terminal re-read. The flag is set via the ABORT parameter to FUNBREAK. If the flag is set then the READ PENDING message will be aborted along with the re-read. This feature is needed to handle the BREAK...:ABORT, etc. situation.

ACBACCCL — This is the access class part of the device type number. The following are legal values:

0 - direct (e.g. disc)
1 - serial input (e.g. card reader)
2 - parallel input/output (e.g. terminal)
3 - serial input/output (e.g. mag tape)
4 - serial output (e.g. line printer)

ACBACCESS — This is the access bit map for the file. The following are the bit definitions of this eight-bit field:

(0:1) - unused
(1:1) - unused
(2:1) - read
(3:1) - append
(4:1) - write
(5:1) - lock
(6:1) - execute
(7:1) - save

This access security is determined by the ACCCHECK intrinsic and enforced by the file system.

ACBAOPTIONS — This is the AOPTIONS in effect for this file access.

ACBBINARYIO — This bit controls full eight bit transfers on the 2644 page mode terminal. It is adjusted by FCONTROL(26) and FCONTROL(27).

ACBBLK — This is the block number of the current variable record format block. Applicable iff the record format is variable.

ACBBLKFACT	This is the blocking factor for the file. It is the number of records in a block. Legal values range from 1 to 255.
ACBBREAK	This is the break mode flag. It is applicable iff the ACB is for $STDIN or $STDLIST. If set it means that the BREAK key has been hit and that the CI should have high priority access to the ACB. The flag will be cleared when a RESUME or ABORT is issued.
ACBBSIZE	This is the block size, in words, of the file.
ACBBTFRCT	This is the total number of blocks transferred to and from the file. The initial value is 0D.
ACBBUFUSED	This is the word index, relative to the base of the block, for the selected record within the block. This is applicable iff the file access is buffered.
ACBCARRIAGE	This bit signifies that the file has carriage control. It is the same as the carriage control bit in ACBFOPTIONS if the file is spooled. If not spooled, the bit is zero, and IOMOVE will pass the FWRITE carriage control parameter directly to the driver rather than imbedding it as the first character of the output record.
ACBCTL	This is the CONTROL parameter from the last FWRITE. This value is pertinent iff the file was opened with carriage control.
ACBCURRBUF	This is the buffer number (0-relative) containing the most recently referenced record. Applicable iff the file access is buffered.
ACBDADDR	This is the logical device number of the file. For a disc file this is the logical device number of the first extent.
ACBDEFBLOCK	This bit signifies that the file is to be accessed with default blocking. The bit is initialized from the FOPEN stateword STATE. It does not need to be in the ACB; it is mentioned here only to signify that the bit is effectively used due to the way ACBLSTATE is initialized from STATE.
ACBDISP	This is the file close disposition derived from the FOPEN call. The only way this can be specified is via a file equation. The legal values are the same as those for FCLOSE.

ACBDNTYPE — This is the file reference format type number and is derived from the FOPEN call. The following are legal values:

0 - full name
1 - account name absent
2 - group and account name absent
3 - null name

This information is needed by FRENAME.

ACBDTYPE — This is the device type number of the file. The following are legal values (octal):

0 - moving head disc
1 - fixed head disc
7 - foreign disc
10 - card reader
11 - paper tape reader
20 - terminal
24 - card reader/interpreter/punch
26 - SSLC
27 - programmable controller
30 - magnetic tape
31 - serial disc
40 - line printer
41 - card punch
42 - paper tape punch
43 - CALCOMP 500 plotter
44 - CALCOMP 600 plotter
45 - CALCOMP 700 plotter

ACBEOF — This bit is set when EOF has been sensed.

ACBEOFS — This is the type of EOF detected on $STDIN(X). This field consists of two bits:

(0:1) - super colon (i.e. EOF for $STDINX)
(1:1) - regular colon (i.e. EOF for $STDIN)

Applicable for multi-access to $STDIN(X) only.

ACBERROR — This is the error number for the file. It is used by all intrinsics except FOPEN. When an error is detected the error number is placed in this cell. The error number is cleared at the beginning of each callable intrinsic except FCHECK (which reads it).

ACBFCB — This is the FCB vector for the file. Applicable only to disc files.

ACBFKEYS — This bit controls the definition of the f1 and f2 function keys on the 2644 page mode terminal; it is adjusted by FCONTROL(32) and FCONTROL(33). (Obsolete function)

ACBFNUM — File number, range from 1 to 255. Used mostly for calling routines that access things such as labels by file number.

ACBFOPTIONS — This is the FOPTIONS in effect for this file access.

ACBFPTR — This is the sequential access record pointer; it contains the next sequential record number. The initial value is 0D. This value is used only by the FREAD, FWRITE and FUPDATE intrinsics. However the value is maintained by all data transferring file system intrinsics.

ACBFMAVTX — This is the entry index into the file multi-access vector table (FMAVT). This is valid iff the file access is multi-access.

ACBGSTATE — These are miscellaneous state flags. These are "global" in nature in that they are the same for all accessors in a multi-access environment. The constituent bits are described individually.

ACBGSTATUS — This is the general part of the last I/O status for the file. The following are the legal values:

0 - pending
1 - successful
2 - end of file
3 - unusual condition
4 - irrecoverable error

ACBHIBLK — This is the highest block number for which an anticipatory read has been issued, and is applicable iff the file access is buffered. The initial value is -1D.

ACBHIT — This is the buffer hit flag. If set it indicates that the last read or write request was serviced without any physical I/O required. This flag is used only for performance measurement. The code which manipulates it is optional to the file system, and is controlled by compiler toggle X3.

ACBINHIBCRLF — This bit controls the termination of lines written to the terminal. If not set then each line is terminated with a CR and LF; if set then no line termination characters are used. This bit is valid iff the file is a terminal file; it is adjusted by FSETMODE.

Computer Museum

ACBLINECTL — This is the line control bit. If not set then each line is post-spaced; if set then each line is pre-spaced. This bit is used by line printers and terminals only. It is adjusted by FCONTROL(1) and FWRITE with the appropriate carriage control.

ACBLPCTL — This are the line and page control bits, which are described separately.

ACBLSTATE — These are miscellaneous state flags. They are "local" in nature in that they may be different for each accessor in a multi-access environment. Bits (9:6) are initialized from the stateword local variable called STATE in FOPEN; the ten remaining bits are initialized individually. The constituent bits are described individually.

ACBMODE — These are miscellaneous mode flags. The constituent bits are described individually.

ACBNAME — This is the local file name. The name is eight bytes in length with trailing blanks added.

ACBNEWEOF — This flag when set indicates that a new tape mark should be written before the tape is rewound or backspaced. Applicable only to mag tape files.

ACBNOWAITEOF — This bit is used to save the value of the local EOF advanced flag NEWEOF in IOMOVE between the I/O initiation and I/O completion calls. This flag is applicable iff the file is accessed in no-wait I/O mode.

ACBNOWAITMODE — This cell is used to save the I/O mode between no-wait I/O initiation and completion calls. If the bit is set then the last I/O request was a write; otherwise it was a read. This cell is pertinent iff the file is accessed in no-wait I/O mode.

ACBNUMBUFS — This is the number of buffers, less one, used for the file access. Applicable iff the file access is buffered.

ACBPAGECTL — This is the page control bit. If not set then a page is assumed to consist of 60 lines (auto page eject); if set then a page is assumed to consist of 66 lines (no auto page eject). This is used primarily for line printers but is also valid for terminals; these are the only devices for which this is valid. This bit is adjusted by FCONTROL(1) and FWRITE with the appropriate carriage control.

ACBPRIV	This flag when set indicates that the file is privileged in that it has a negative file code; the user must be in privileged mode to access it.
ACBQSTATUS	This is the qualifying part of the last I/O status for the file. The values are unique for each general status part. See I/O System IMS for all legal values.
ACBQUIESCE	This bit controls critical output verification. If set, buffered output is guaranteed to have been written to the device when control is returned to the user. This bit is adjusted by FSETMODE.
ACBREADCODE	This field consists of the input EOF checking type and mode, and is used to generate the P1 parameter to ATTACHIO. These fields are described individually.
ACBREADMODE	This field controls the input EOF checking mode. It is 00 for reading $STDIN, 01 for reading $STDINX, and 10 for the command interpreter.
ACBREADTYPE	This field controls the input EOF checking type. It is 01 for JOBs, 10 for SESSIONs, and 00 for DATA.
ACBRSIZE	This is the file's record size in positive bytes.
ACBRTFRCT	This is the total number of records transferred to and from the file. The initial value is 0D.
ACBSAVEEOFS	This field is used to save the contents of ACBEOFS during BREAK mode processing.
ACBSHCNT	This is the total number of LACBs that exist for this PACB. Valid iff the file access is multi-access.
ACBSHCNTIN	This is the total number of input-only LACBs that exist for this PACB. Valid iff the file access is multi-access.
ACBSHCNTS	This is the total LACB and total input-only LACB counts, each of which is described separately.
ACBSIZE	This is the size, in words, of the complete ACB. It includes the buffering extension, if present.
ACBSPAOPT	This is the AOPTIONS for the spooled device. Applicable iff the file access is to a spooled device.
ACBSPFOPT	This is the FOPTIONS for the spooled device. Applicable iff the file access is to a spooled device.

ACBSPOOLED — This is the spooled device flag. If set then the file access is to a spooled device.

ACBSPOOLIO — This field is a combination of the spooled device flag and the input/output mode of the spooled device. Legal values are:

00 - not spooled
01 - illegal
10 - input spooling
11 - output spooling

ACBSPREC — This is the record size, in bytes, of the spooled device. Applicable iff the file access is to a spooled device.

ACBSPTYPE — This is the device type (from the LDT) of the spooled device. Applicable iff the file access is to a spooled device.

ACBSPTYRC — This cell contains the spooled device type and record size, which are described separately.

ACBSPVDEV — This is the logical device number of the spooled device. Applicable iff the file access is to a spooled device.

ACBSPXDDX — This is the index into the IDD or ODD for a spoolfile. Applicable iff the file access is to either a spooled device or a spoolfile.

ACBSTATUS — This is the last I/O status for the file. It comes from the I/O status part of the IOCB returned by ATTACHIO. Not all ATTACHIO calls update this cell.

ACBSTOPCHAR — This is the record termination character used for terminal reads. This character can be changed via FCONTROL(25).

ACBSTREAM — This bit signifies inter-block garbage for disc files. If set, the block size is a multiple of 128 words and therefore there is no garbage data between blocks. This fact is used to improve multi-record I/O by mapping the request into as few ATTACHIOs as possible.

ACBSUBCL — This is the sub-class part of the device type number. The sub-class is unique for each access class. The following are the legal sub-class values for each device class:

0 - direct
  0 - moving head disc
  1 - fixed head disc
  7 - foreign disc
1 - serial input
  0 - card reader
  1 - paper tape reader
2 - parallel input/output
  0 - terminal
  4 - card reader/punch
  6 - SSLC
  7 - programmable controller
3 - serial input/output
  0 - mag tape
  7 - serial disc
4 - serial output
  0 - line printer
  1 - card punch
  2 - paper tape punch
  3 - CALCOMP 500 plotter
  4 - CALCOMP 600 plotter
  5 - CALCOMP 700 plotter

ACBTAPEERROR — This bit controls the reporting of recovered mag tape errors. If not set the recovered errors are not reported to the user; if set then recovered errors are reported to the user by returning CCL and error number 39. Valid iff the file is a mag tape file. This bit is adjusted by FSETMODE.

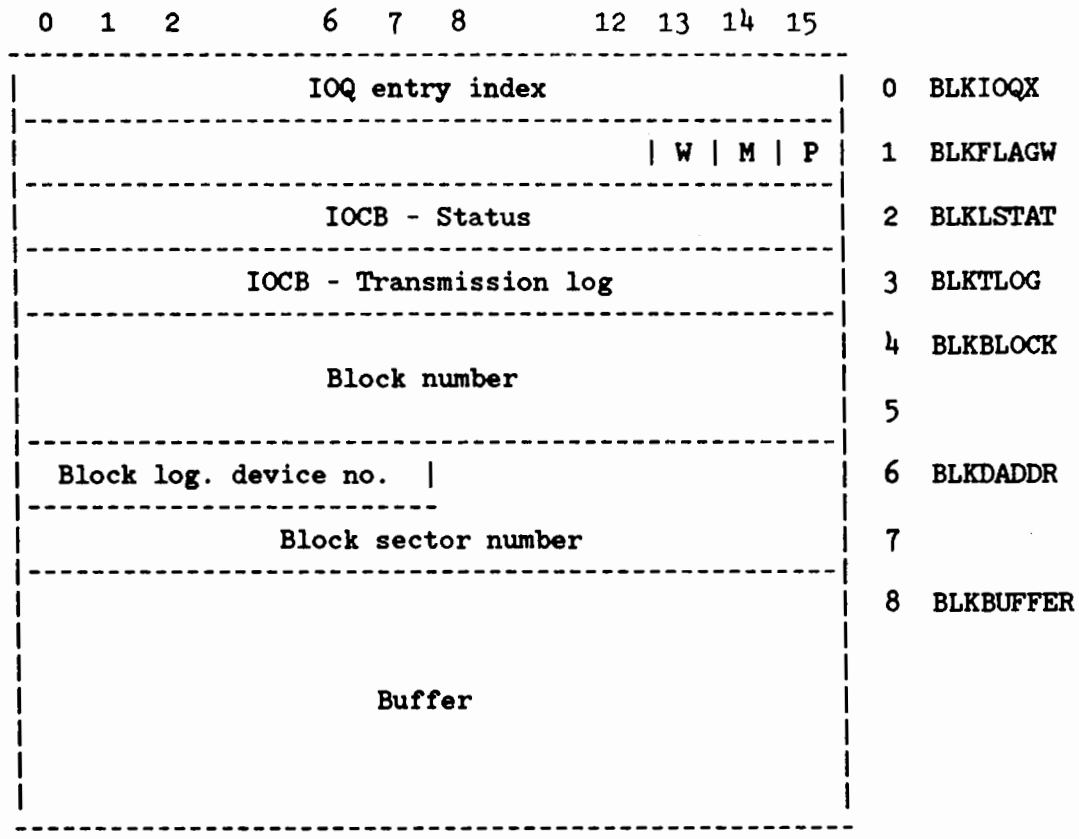
ACBTBLOCK — This bit controls block mode transfers on the 2644 page mode terminal. This bit is adjusted by FCONTROL(28) and FCONTROL(29).

ACBTLOG — This is the last I/O transmission log for the file. It comes from the I/O transmission log part of the IOCB returned by ATTACHIO. Not all ATTACHIO calls update this cell.

ACBVDADDR — This is the volume table index for the file. Applicable iff the file is a disc file.

ACBXMITCRLF — This bit controls CR and LF insertion into the user buffer on the 2644 page mode terminal. This bit is adjusted by FCONTROL(30) and FCONTROL(31).

If present, the PACB buffering extension contains from one to sixteen block buffers each having the following format:



Other identifiers used:

BLKIOCB	= BLKDBL(1)#,	IOCB
(BLKLDEV)	= BLK(6).(0:8)#,	block logical device number
BLKFLAGS	= BLK(1).(13:3)#,	block I/O flags
BLKIOOUT	= BLK(1).(13:1)#,	last I/O was write?
BLKDIRTY	= BLK(1).(14:1)#,	buffer modified?
BLKIOPEND	= BLK(1).(15:1)#,	I/O in progress?
BLKIOCOMP	= BLK(1).(14:2)#,	I/O complete - not dirty

Discussion:

BLKBLOCK — This is the block number of the data contained in the buffer. A value of -1D indicates that the buffer is empty.

BLKBUFFER — If ACB buffering is used, this is the buffer location. When system buffers were used, the buffer location was given by BLKSYSBUFX and BLKSYSBUFDISP.

BLKDADDR — This is the block's logical device and sector number.

BLKDIRTY	This flag is set if the contents of the buffer has been modified. When the block buffer is reused this flag is checked to see if the block needs to be written to the device.
BLKFLAGS	These are the miscellaneous flags associated with the block, which are described separately.
BLKIOCB	This is the IOCB returned by the I/O system when the block I/O has completed. On a blocked I/O request this is obtained from the ATTACHIO call; on an unblocked I/O request this is obtained from WAITFORIO.
BLKIOCOMP	This is the buffer modified flag (BLKDIRTY) and the I/O in progress flag (BLKIOPEND), which are described separately. This field is usually interrogated to see if it contains the value 2, which means that the buffer has been modified but not yet written to the device.
BLKIOOUT	This is the mode of the I/O operation for the block. It is set by a write and cleared by a read.
BLKIOPEND	This is the I/O in progress flag. It is set if the I/O is pending; it is cleared when the I/O has completed.
BLKIOQX	This is the IOQ index of the unblocked I/O request for the block. It is used as the argument to WAITFORIO, which insures the completion of the I/O request.
BLKLDEV	This is the logical device number of the block.
BLKLSTAT	The I/O status part of the IOCB consists of the PCB number and the error code for the completed I/O request.
BLKTLOG	The transmission log part of the IOCB is the number of words or bytes transferred by the the I/O request.

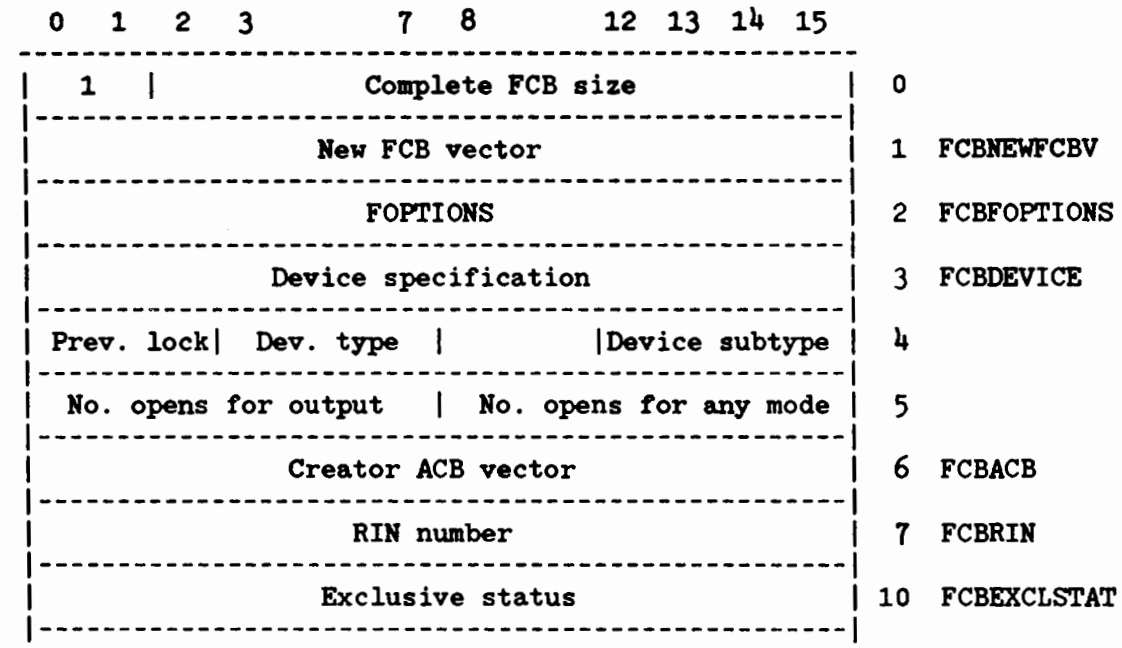
3.2.7 File Control Block (FCB)

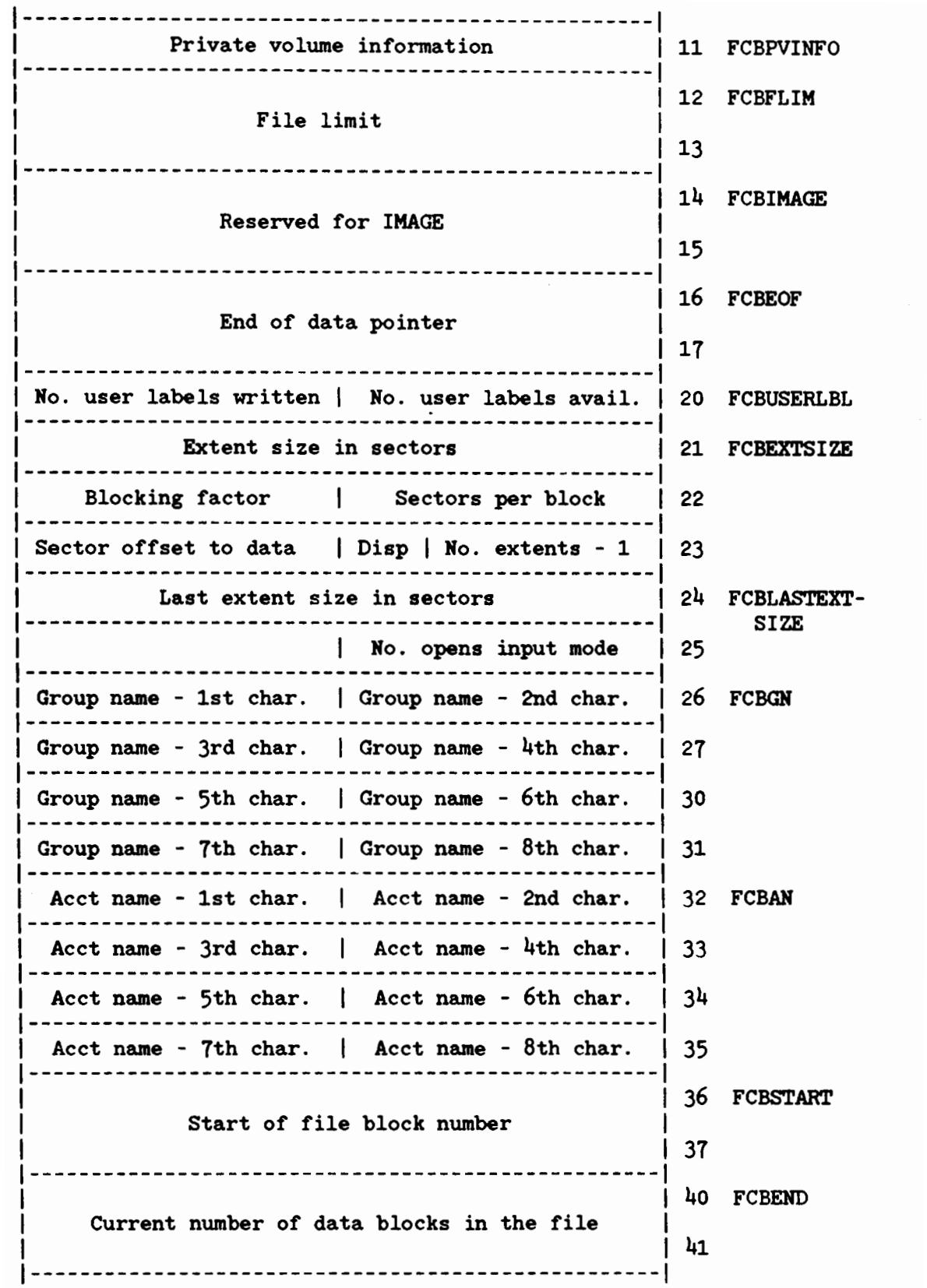
The FCB coordinates access to a file on a sharable device. At present the only sharable device is a disc, so only disc files have FCBs.

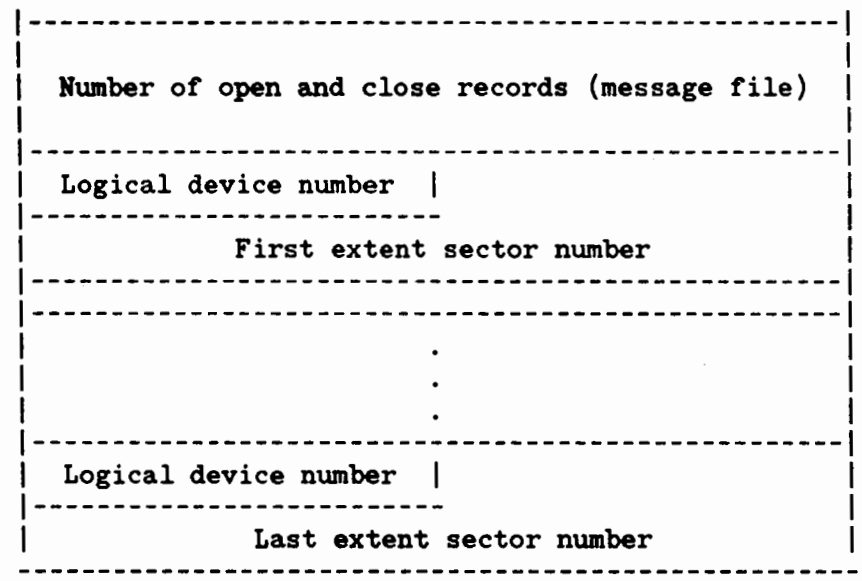
The information contained in an FCB is derived from the file label. The FCB is used to hold this information, rather than the file label, since it can be accessed more quickly.

The FCB can be contained in a stack when first created. If another process opens the file, the FCB will be moved to a system data segment (which will be created if it doesn't already exist) so that the first process' entire stack need not be present when the second process is dealing with the file. The number of a data segment containing a list of numbers of shared file system data segments is kept in system global location 1076 octal. The size of the FCB depends on the maximum number of extents specified at FOPEN; there are 44 (octal) words plus two per extent. There will be at least one extent, since the file label always exists in the first extent. The FCB extent map is in terms of logical device and sector number. The extent map in the file label is in terms of volume rather than logical device; the map is converted by VTABTOLDEV when the label is read, and converted back by LDEVTOVTAB when the label is written to disk.

The FCB has the following format:




Private volume information
11 FCBPVINFO
File limit
12 FCBFLIM
13
Reserved for IMAGE
14 FCBIMAGE
15
End of data pointer
16 FCBEOF
17
No. user labels written
No. user labels avail.
20 FCBUSERLBL
Extent size in sectors
21 FCBEXTSIZE
Blocking factor
Sectors per block
22
Sector offset to data
Disp
No. extents - 1
23
Last extent size in sectors
24 FCBLASTEXT-SIZE
No. opens input mode
25
Group name - 1st char.
Group name - 2nd char.
26 FCBGN
Group name - 3rd char.
Group name - 4th char.
27
Group name - 5th char.
Group name - 6th char.
30
Group name - 7th char.
Group name - 8th char.
31
Acct name - 1st char.
Acct name - 2nd char.
32 FCBAN
Acct name - 3rd char.
Acct name - 4th char.
33
Acct name - 5th char.
Acct name - 6th char.
34
Acct name - 7th char.
Acct name - 8th char.
35
Start of file block number
36 FCBSTART
37
Current number of data blocks in the file
40 FCBEND
41



Other identifiers used:

```
FCBSIZE       = FCB.(2:14)#,     size in words
FCBLKST       = FCB(4).(0:2)#,   previous lock state
FCBDTYPE      = FCB(4).(2:6)#,   device type
FCBSUBTYPE    = FCB(4).(12:4)#,  device subtype
FCBOCNTOUT    = FCB(5).(0:8)#,   no. accessors - output
FCBOCNT       = FCB(5).(8:8)#,   no. accessors
FCBLBLEOF     = FCB(16).(0:8)#,  no. labels written
FCBLBL        = FCB(16).(8:8)#,  no. labels available
FCBBLKFACT    = FCB(18).(0:8)#,  blocking factor
FCBSECTPBLK   = FCB(18).(8:8)#,  sectors per block
FCBSECTOFF    = FCB(19).(0:8)#,  sector offset to data
FCBDISP       = FCB(19).(8:3)#,  pending disposition
FCBNUMEXTS    = FCB(19).(11:5)#, no. extents less 1
FCBOCNTIN     = FCB(21).(8:8)#,  no. acccessors - input
FCBLABEL      = FCBDBL(18)#,     label LDEV and sector
FCBLDEV       = FCB(36).(0:8)#,  label LDEV
```

Discussion:

FCBACB This is the vector of the ACB that was created at the same time as the FCB. This is used in conjunction with FCBNEWFCBV when relocating the FCB.

FCBAN This is the account name of the file. It is eight bytes in length with trailing blanks added.

FCBBLKFACT This is the blocking factor of the file. It is the number of logical records in a physical block. Legal values range from 1 to 255.

FCBDEVICE — This specifies the device on which the file resides. If it is positive then it represents a logical device number; if negative it represents a (negative) device class index.

FCBDISP — This is the pending FCLOSE disposition for the file. Legal values are:

domain disposition
- 0 - no change
- 1 - save permanent
- 2 - save temporary and rewind
- 3 - save temporary but do not rewind
- 4 - release
- 7 - invalid file (file label access error)

FCBDTYPE — This is the device type number of the first extent of the file. See ACBDTYPE for a list of legal values.

FCBEND — Block number of the file's EOF, relative to FCBSTART.

FCBEOF — This is the end-of-file pointer for the file. It is a double integer representing the number of records in the file. It can also be viewed as the record number of the next record past EOF.

FCBEXCLSTAT — This is the exclusive status of the file access. If -1 then the file is being accessed exclusively; otherwise it is the number of semi-exclusive accessors.

FCBEXTMAP — This is the extent map of the file. The number of extents is specified by FCBNUMEXTS; a 0D extent descriptor indicates that the extent has not been allocated.

FCBEXTSIZE — This is the extent size, in sectors, of the file. All extents in the file except possibly the last have this size. This is a logical value, and legal values range from 1 to 65535 sectors. This restricts the maximum file size to 2097120 sectors (268,431,360 words).

FCBFLIM — This is the end-of-space pointer for the file. It is a double word integer representing the maximum number of records (fixed length record format) or blocks (undefined or variable length record format) in the file.

FCBFOPTIONS — This is the FOPTIONS in effect for the file.

FCBGN — This is the group name of the file. It is eight bytes long with trailing blanks added.

FCBLABEL — This is the logical device and sector number of the file label, which is the same as the first extent descriptor.

FCBLASTEXTSIZE — This is the size, in sectors, of the last extent in the file. If the file has one extent then this is the same as FCBEXTSIZE; otherwise this value may be different from FCBEXTSIZE. This is the size of the last physical extent for the file; it is not the size of the last allocated extent.

FCBLBL — This is the number of user labels allocated for the file. Since each label is a sector long, this is also the number of sectors allocated for user labels.

FCBLBLEOF — This is the end-of-data pointer for the user labels. It is analogous to FCBEOF in that it represents the number of labels written. The initial value is 0.

FCBLDEV — This is the logical device number of the first extent of the file.

FCBLKST — This is the previous lock state of the file and is derived from the file label. Legal values are:

0 - no accessors
1 - read
2 - write
3 - read/write

FCBNEWFCBV — This is the vector of the new FCB for the file. It is used in conjunction with FCBACB to move the FCB to a system (shared FCB) control block table when the second accessor is established. If this value is zero then there is no new FCB; if non-zero then a new FCB has been created.

FCBNUMEXTS — This is the maximum number of extents, less one, allowed for the file. It is not the number of extents presently allocated, which is always determined by counting non-zero entries in the extent map.

FCBNUMOPENCLSREC — Number of open and close records in the message file.

FCBOCNT — This is the number of accessors for the file. Alternatively it can be viewed as the number of PACBs created for the file.

FCBOCNTIN — This is the number of file accessors having input access.

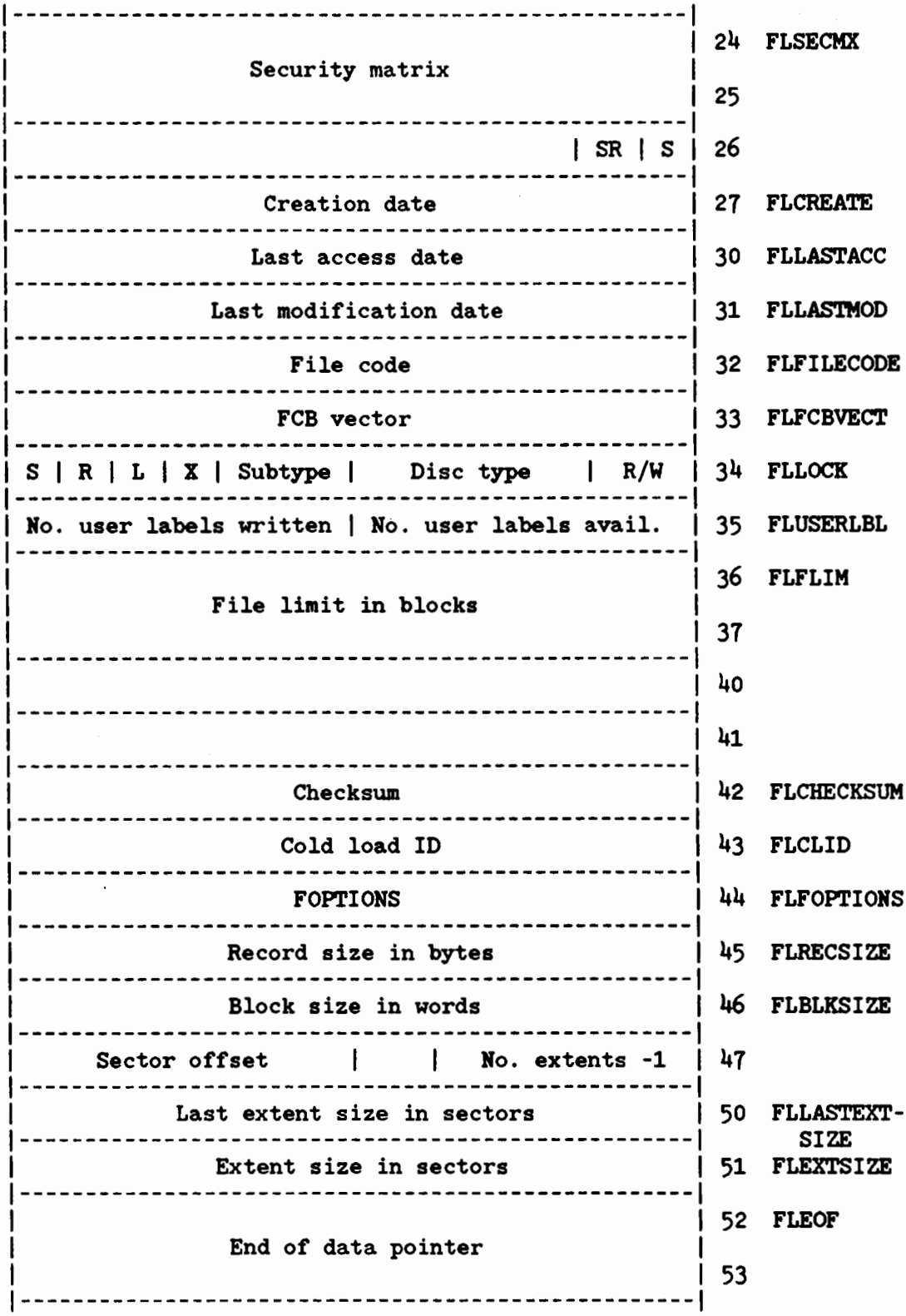
FCBOCNTOUT — This is the number of file accessors having output access.

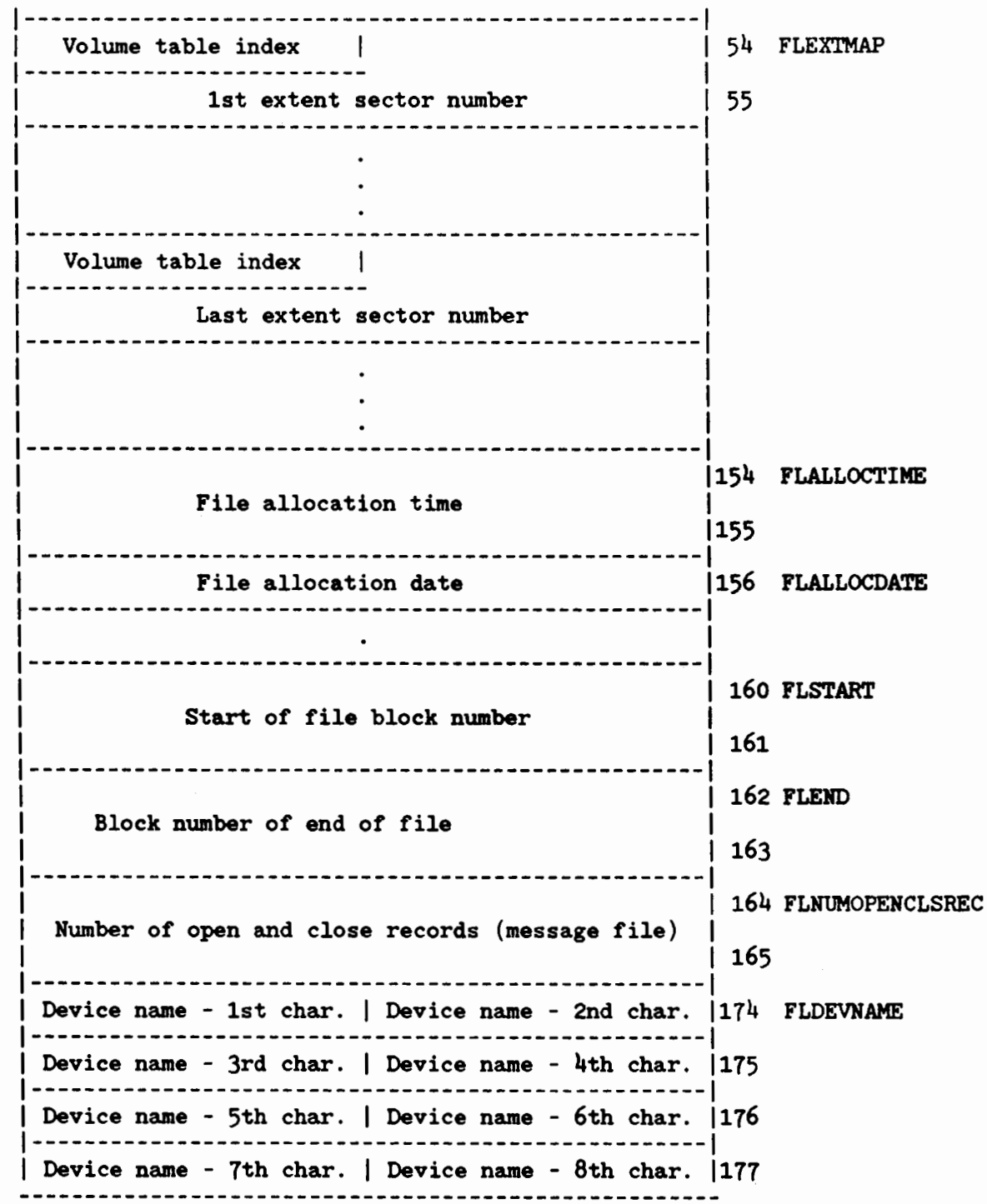
FCBRIN	This is the RIN number used to support dynamic locking (i.e. FLOCK and FUNLOCK) for the file. If there is no dynamic locking then this number is zero.
FCBSECTOFF	This is the sector offset from the file label to the first block of the file. This is not necessarily equal to FCBLBL+1 since an integral number of blocks are allocated for the file and user labels.
FCBSECTPBLK	This is the number of sectors in a block for the file.
FCBSIZE	This is the size, in words, of the complete FCB. It includes the extent map.
FCBSTART	Block number of the file's start, excluding the file label block.
FCBSUBTYPE	This is the device sub-type number of the first extent.
FCBUSERLBL	This field describes the user labels for the file. It consists of FCBLBL and FCBLBLEOF, described separately.

3.3 File Label (FLAB)

The file label has the following format:

0 1	2 3	4 5	6 7	8 9	10 11	12 13	14 15		
File name - 1st char.				File name - 2nd char.				0	FLLOCNAME
File name - 3rd char.				File name - 4th char.				1	
File name - 5th char.				File name - 6th char.				2	
File name - 7th char.				File name - 8th char.				3	
Group name - 1st char.				Group name - 2nd char.				4	FLGRPNAME
Group name - 3rd char.				Group name - 4th char.				5	
Group name - 5th char.				Group name - 6th char.				6	
Group name - 7th char.				Group name - 8th char.				7	
Acct name - 1st char.				Acct name - 2nd char.				10	FLACCTNAME
Acct name - 3rd char.				Acct name - 4th char.				11	
Acct name - 5th char.				Acct name - 6th char.				12	
Acct name - 7th char.				Acct name - 8th char.				13	
Creator name - 1st char.				Creator name - 2nd char.				14	FLUSERID
Creator name - 3rd char.				Creator name - 4th char.				15	
Creator name - 5th char.				Creator name - 6th char.				16	
Creator name - 7th char.				Creator name - 8th char.				17	
Lockword - 1st char.				Lockword - 2nd char.				20	FLLOCKWORD
Lockword - 3rd char.				Lockword - 4th char.				21	
Lockword - 5th char.				Lockword - 6th char.				22	
Lockword - 7th char.				Lockword - 8th char.				23	


Security matrix
24 FLSECMX
25
SR | S
26
Creation date
27 FLCREATE
Last access date
30 FLLASTACC
Last modification date
31 FLLASTMOD
File code
32 FLFILECODE
FCB vector
33 FLFCBVECT
S | R | L | X | Subtype | Disc type | R/W
34 FLLOCK
No. user labels written | No. user labels avail.
35 FLUSERLBL
File limit in blocks
36 FLFLIM
37
40
41
Checksum
42 FLCHECKSUM
Cold load ID
43 FLCLID
FOPTIONS
44 FLFOPTIONS
Record size in bytes
45 FLRECSIZE
Block size in words
46 FLBLKSIZE
Sector offset | | No. extents -1
47
Last extent size in sectors
50 FLLASTEXT-SIZE
Extent size in sectors
51 FLEXTSIZE
End of data pointer
52 FLEOF
53



Other identifiers used:

```
FLSECURE      = FLAB(22).(15:1)#,   file secure bit
(FLSRRELEASE)= FLAB(22).(14:1)#,   STORE/RESTORE released bit
(FLSTORE)     = FLAB(28).(0:1)#,    file being stored
FLRESTORE     = FLAB(28).(1:1)#,    file being restored
```

```
(FLLOAD)     = FLAB(28).(2:1)#,    file loaded
FLEXCL       = FLAB(28).(3:1)#,    exclusive access
FLSR         = FLAB(28).(0:2)#,    S & R bits
FLSRL        = FLAB(28).(0:3)#,    S, R, & L bits
(FLSRLX)     = FLAB(28).(0:4)#,    S, R, L, & X bits
FLSUBTYPE    = FLAB(28).(4:4)#,    device sub-type
FLDTYPE      = FLAB(28).(8:6)#,    device type
FLSTATUS     = FLAB(28).(14:2)#,   write/read status
(FLLBLEOF)   = FLAB(29).(0:8)#,    no. labels written
(FLLBL)      = FLAB(29).(8:8)#,    no. labels available
FLSECTOFF    = FLAB(39).(0:8)#,    sector offset to data
FLNUMEXTS    = FLAB(39).(11:5)#,   no. extents less 1
FLLABEL      = FLABDBL(22)#,       label VTAB and sector
FLVTAB       = FLAB(44).(0:8)#,    label VTAB index
```

Discussion:

FLACCTNAME This is the account name of the file. It is eight bytes in length with trailing blanks added.

FLALLOCDATE Date that the file was allocated on this system.

FLALLOCTIME Doubleword containing the time that the file was allocated on this system.

FLBLKSIZE This is the block size, in sectors, of the file.

FLCHECKSUM This is the exclusive-OR checksum of the file label (excluding words 34, 42, and 43 octal) and is used for error detection. Each time the file label is read from disc the check sum is calculated and compared against the value recorded in the file label. Similarly, each time the file label is written to the disc the check sum is calculated and inserted into the file label.

FLCLID This is the cold load number in effect the last time that the file was accessed. This should always be the current cold load number. If it is not it means that the system crashed while the file was open and that the data in the file label should be "reset" (principally the FCB vector FLFCBVECT).

FLCREATE This is the creation date of the file. It is in the format defined by the intrinsic CALENDAR.

FLDEVNAME This is the FOPEN device specification that was used when the file was created. This information is needed when new extents are allocated.

FLDTYPE This is the device type number of the first extent of the file; see ACBDTYPE for a list of legal values. This value is determined by configuration.

FLEND	Number of current data blocks (that is, the end of file block number relative to the start of file).
FLEOF	This is the end-of-file pointer for the file. It is a double word integer representing the number of records in the file. It can also be viewed as the record number of the next record past EOF.
FLEXCL	This is the exclusive access flag for the file. If set it means that the file has been opened exclusively by a single accessor. If not set then the file is potentially accessible by others.
FLEXTMAP	This is the extent map of the file. The number of extents is specified by FLNUMEXTS; a 0D extent descriptor indicates that the extent has not been allocated.
FLEXTSIZE	This is the extent size, in sectors, of the file. All extents in the file, except the last, have this extent size. This is a logical value, and legal values range from 1 to 65535 sectors. This limits the maximum file size to 2097120 sectors.
FLFCBVECT	If non-zero, this is the vector of the FCB for the file. If zero, the file is not being accessed.
FLFILECODE	This is the file code of the file. Known values are:

-401	IMAGE data set
-400	IMAGE root file
1024	USL file
1025	BASIC data file
1026	BASIC program file
1027	BASIC fast program file
1028	RL file
1029	Program file
1030	STAR file
1031	SL file
1040	Cross Loader ASCII file (SAVE)
1041	Cross Loader relocatable binary file
1042	Cross Loader ASCII file (DISPLAY)
1050	EDITOR KEEPQ file (non-COBOL)
1051	EDITOR KEEPQ file (COBOL)
1060	RJE punch file
1069	RSAM (Bob Strand's ISAM) file
1070	QUERY procedure file
1071	QUERY work file
1072	QUERY work file
1080	KSAM key file

1081 to 1089	Reserved for KSAM
8000 to 8099	Reserved for APL

FLFLIM — This is the end-of-space pointer for the file. It is a double integer representing the maximum number of records (fixed length record format) or blocks (undefined or variable length record format) in the file.

FLFOPTIONS — This is the FOPTIONS of the file.

FLGRPNAME — This is the group name of the file. It is eight bytes long with trailing blanks added.

FLLABEL — This is the volume table index and sector number of the file label, which is the same as the first extent descriptor.

FLLASTACC — This is the last access date of the file. It is in the format defined by the intrinsic CALENDAR.

FLLASTMOD — This is the last modification date of the file. It is in the format defined by the intrinsic CALENDAR.

FLLASTEXTSIZE — This is the size, in sectors, of the last extent in the file. If the file has one extent then this is the same as FLEXTSIZE; if the file has more than one extent then this value may be different from FLEXTSIZE. This is the size of the last physical extent for the file; it is not the size of the last allocated extent.

FLLBL — This is the number of user labels allocated for the file. Since each label is a sector long, this is also the number of sectors allocated for user labels.

FLLBLEOF — This is the end-of-data pointer for the user labels. It is analogous to FLEOF in that it represents the number of labels written.

FLLOAD — This is the LOADED flag for the file. If set it means that the file is a loaded program or SL file and cannot be modified except by a privileged accessor. This flag is set and cleared by the loader, not the file system.

FLLOCK — This identifies the word containing the lock bits, which are described separately.

FLLOCKWORD — This is the lock word of the file. It is eight bytes long with trailing blanks added. If it is all blanks then the file does not have a lockword.

FLLOCNAME — This is the local name of the file. It is eight bytes long with trailing blanks added.

FLNUMEXTS — This is the number of extents, less one, allowed for the file. It is not the number of extents allocated. Legal values range from 0 to 31, i. e., 1 to 32 extents.

FLNUMOPENCLSREC — Number of open and close records in the message file.

FLRECSIZE — This is the record size of the file in negative bytes.

FLRESTORE — This is the RESTORE flag for the file. If set it means that the file is being RESTOREd and cannot be accessed. RESTORE also sets the STORE bit for the file (FLSTORE); see FLSR for a full description of the use of these bits. This flag is set and cleared by STORE/RESTORE, not the file system.

FLSECMX — This is the security matrix of the file. The bits are organized into five groups of six bits each. (Bits 0:2 are not used.) The groups correspond to the access types: READ, APPEND, WRITE, LOCK, and EXECUTE. Within each group, each bit specifies who may have the access: ANY, ACCOUNT MGR, ACCOUNT LIBRARIAN, GROUP, GROUP LIBRARIAN, CREATOR.

FLSECTOFF — This is the sector offset from the file label to the first block of the file. This is not necessarily equal to FLLBL+1 since an integral number of blocks are allocated for the file and user labels.

FLSECURE — This is the file security enforcement flag for the file. If not set then the file has been RELEASEd and the security matrix FLSECMX should be ignored. If set then secured as specified by the security matrix.

FLSR — This is the STORE and RESTORE flags for the file, which are described separately. STORE and RESTORE decode the two-bit field to indicate their operation. Legal values are:

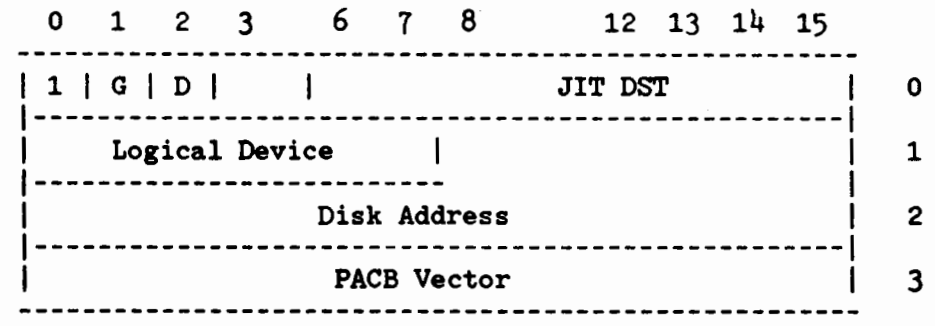
0 - file not in use by either STORE or RESTORE
1 - illegal value
2 - file being STOREd
3 - file being RESTOREd

The file system interprets the leftmost bit as indicating that the file is being accessed by either STORE or RESTORE. The rightmost bit is interpreted as indicating what access should be permitted: 0 (file being STOREd) allows read access; 1 (file being RESTOREd) allows no access. This field is set and reset by STORE/RESTORE, not the file system.

FLSRL	This is the STORE, RESTORE and LOADED flags for the file, which are described separately.
FLSRLX	This is the STORE, RESTORE, LOADED and exclusive flags for the file, which are described separately.
FLSRRELEASE	This flag is used by STORE/RESTORE. If a file is STOREd with the ";RELEASE" keyword, STORE will set this flag in the tape copy of the file label. RESTORE will allow any user to access such files, regardless of the file's normal security. If this bit is off in the tape copy of the file label, RESTORE applies normal security checks (as defined by the information in FLSECMX and FLSECURE). This bit is zero for files on disc.
FLSTART	Block number of the file's start, excluding the file label block.
FLSTATUS	This is the read/write status of the file. Legal values are: 0 - no accessors 1 - read 2 - write 3 - read/write
FLSTORE	This is the STORE/RESTORE flag for the file. If set it means that the file is being either STOREd or RESTOREd. The RESTORE bit (FLRESTORE) must be interrogated to determine which operation is taking place; see FLSR for a full description of the use of these bits. This flag is set and cleared by STORE/RESTORE, not the file system.
FLSUBTYPE	This is the device sub-type number of the first extent of the file. This value is determined by configuration.
FLUSERID	This is the creating user name of the file. It is eight bytes long with trailing blanks added.
FLUSERLBL	This field describes the user labels of the file. It consists of FLLBL and FLLBLEOF, which are described separately.
FLVTAB	This is the volume table index of the first extent of the file.

3.4 File Multi-Access Vector Table (FMAVT) (SIR %20)

The FMAVT points to the shared PACB for files opened multi-access. It occupies its own data segment (DST 54 octal). Its entry format is:



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Since spoolfiles are multi-access, they will have entries in the FMAVT. Disk files and spool files have the disk address in words 1 and 2, and bit D is 0. For device files, the disk address is zero and bit D is 1. Unused entries have word 0 all zeroes. Bit G is set on for global multi-access. This allows multi-access between jobs.

3.5 System Global Area (SYSGLOB)

The file system uses several words in the system global area for its own use.

```
SHFCBDST      = SYSDB+%76,     shared FCB DST no.
MONITOR       = SYSDB+%77,     monitoring flag word
MAXSSECT      = SYSDB+%100,    max # spoolfile sectors
NUMSSECT      = SYSDB+%102,    current # spoolfile sectors
EXTSSECT      = SYSDB+%104,    # sectors/spoolfile extent
SPOOLINDEX    = SYSDB+%132,    class spool index
CSIOWAIT      = SYSDB+%135,    CSIOWAIT PLABEL
CCLOSEPLABL   = SYSDB+%140,    CS CCLOSE PLABEL - FPROCTERM
DSCHKPLABL    = SYSDB+%335,    DSCHECK PLABEL
DSOPENPLABL   = SYSDB+%336,    DSOPEN PLABEL
DSCLOSEPLABL  = SYSDB+%337,    DSCLOSE PLABEL
SDSLDEVLABEL  = SYSDB+%323,    PLABEL for SDSLDEV
MANWCPLABL    = SYSDB+%340;    MANAGEWRITECONV PLABEL
```

3.6 SIRs, Locks, and Deadlocks

The file system uses two SIRs: the File SIR, which is intended to protect file label integrity, and the FMAVT SIR, which is to guarantee the integrity of the FMAVT. Since the file system locks these resources, and also locks control blocks, deadlocks can occur if locking is done in the wrong order. Not only must the file system handle locking correctly, but the entire ensemble of the file system, its callers, and its callees must do so also. These include KSAM, which has a SIR of its own, and SYSDUMP and STORE, which lock the File SIR because they tweak bits in file labels. The presently accepted order is:

Get FMAVT SIR
Lock ACB
Get File SIR
Lock FCB

It may not be necessary to do all of these things in any particular procedure. In modifying a procedure, you should be sure that any of these locks which you change are consistent not only within your own code, but also with its callers and callees.

CHAPTER 7 PROCESS TABLES

7.1 Introduction

The operating system maintains state, control, and accounting information on each process. The data structures for this purpose are the process control block table (PCB; core resident, 1 entry per process) and the process control block extension (PCBX; contained in the process' stack below DL). Process related information which must be accessible even when the process' stack is not present in main memory is maintained in the process' PCB entry. All other process related information is maintained in the process' PCBX.

A process is identified in the system by its PCB entry number, referred to as its PIN (process identification number), or by its PCBPT=(PIN)*(PCB entry size).

The structure of the PCB table, PCB entry format, PCBX structure, and PCBX format are specified in this chapter.

7.2 Process Control Block Table Structure and Format

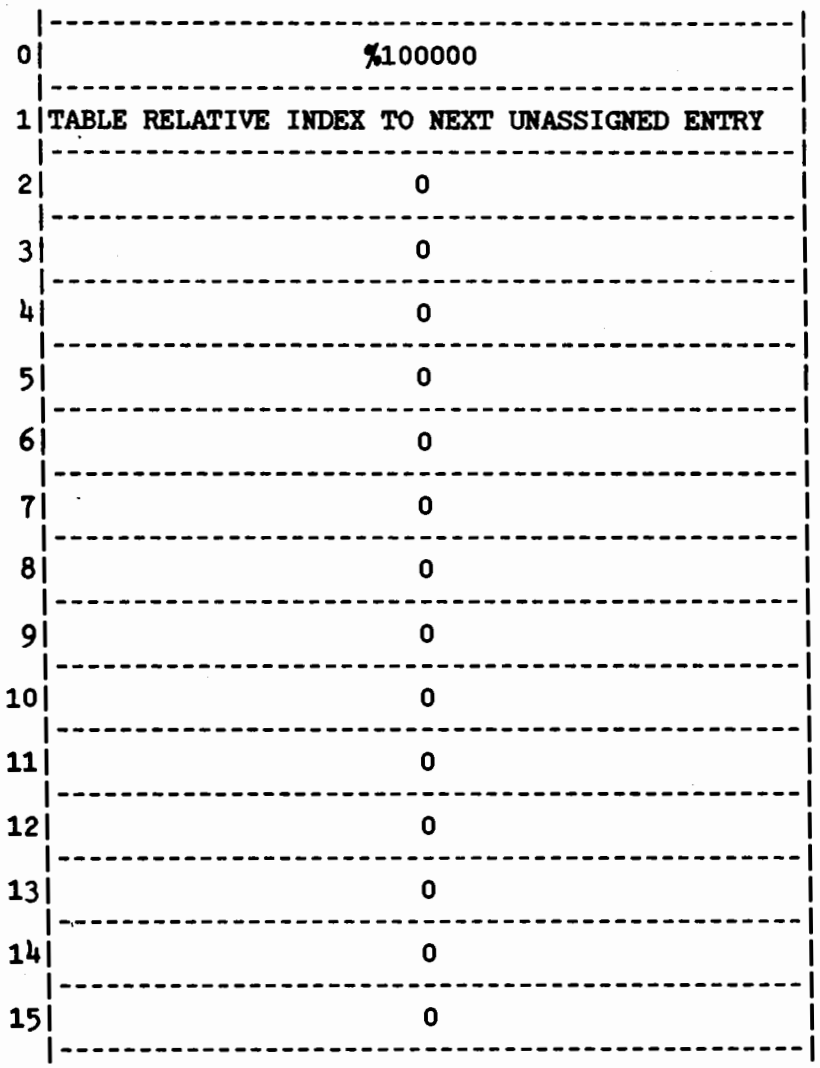
7.2.1 Fixed Cells Related to PCB

3	Absolute address of base of PCB table
4	Absolute address of current process' PCB entry
%1003	Sysbase relative address ov PCB table base
%1271	Sysbase relative address of head of dispatching queue's PCB entry
%1272	Sysbase relative address of tail of dispatching queue's PCB entry

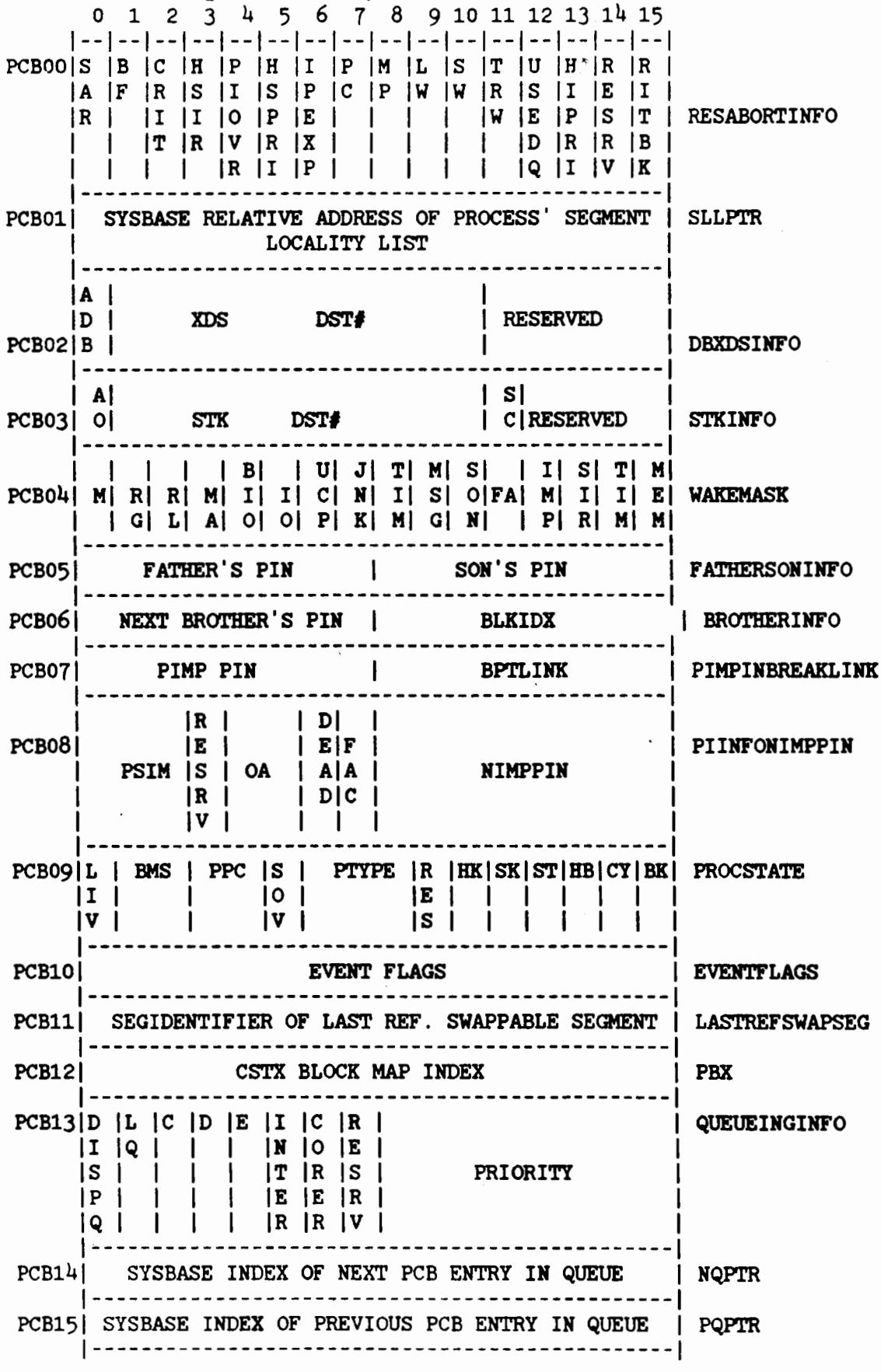
7.2.2 PCB Entry 0 Format

0	# OF CONFIGURED ENTRIES
1	ENTRY LENGTH (%20)
2	# OF UNASSIGNED ENTRIES
3	TABLE RELATIVE INDEX TO FIRST UNASSIGNED ENTRY
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0

7.2.3 Unassigned PCB Entry Format



7.2.3 Assigned PCB Entry Format



7.2.4 PCB Assigned Entry Field Descriptions

```
PCB00  .(0:1)   SAR ==> scheduling attention required
       .(1:1)   Bounds Flag -- Priv mode bounds check
       .(2:1)   CRIT ==> process is critical
       .(3:1)   HSIR ==> process has a sir
       .(4:1)   PIOVR ==> pending PI, process critical
       .(5:1)   HSPRI ==> hold sir priority
       .(6:1)   IPEXP ==> incore protect expired
       .(7:1)   PC ==> prempt capability
       .(8:1)   MP ==> must preempt
       .(9:1)   LW ==> long wait
       .(10.1)  SW ==> short wait
       .(11.1)  TRW ==> terminal read wait
       .(12.1)  USEDQ ==> used a quantum since transaction began
       .(13.1)  HIPRI ==> hold impeded priority
       .(14:1)  Reserved for future use.
       .(15.1)  RITBK

PCB01  .(0:16)  SLLPTR, SYSBASE relative index to process' segment
                locality list

PCB02  .(0:1)   ADB, set if db pointing to an absolute address
       .(1:10)  XDS, DST entry number of extra data seg. to which
                DB is set; zero if none.
       .(11:4)  Reserved for expansion of DST entry number field

PCB03  .(0:1)    STOVRALL FLAG ==> stack overflow is already allocated
       .(1:10)   DST entry number of process' stack
       .(11:1)   SC, set if executing system code
       .(12:3)   Reserved
```

PCB (CONT.)

PCB04	.(0:1)	M, mourning wait.
	.(1:1)	RG, global RIN wait.
	.(2:1)	RL, local RIN wait.
	.(3:1)	MA, mail wait.
	.(4:1)	BIO, blocked I/O wait.
	.(5:1)	IO, I/O wait.
	.(6:1)	UCP, UCOP wait and RIT wait.
	.(7:1)	JNK, junk wait.
	.(8:1)	TIM, timer wait.
	.(9:1)	MSG, file system basic ipc message wait.
	.(10:1)	SON, son wait.
	.(11:1)	FA, father wait.
	.(12:1)	IMP, process waiting to be unimpeded.
	.(13:1)	SIR, process waiting for a sir.
	.(14:1)	TIM, process waiting for a time out.
	.(15:1)	MEM, process waiting for memory.
PCB05	.(0:8)	FPIN, father's PCB entry number
	.(8:8)	SPIN, son's PCB entry number
PCB06	.(0:8)	BPIN, brother's PCB entry number
	.(8:8)	BLKIDX (reserved)
PCB07	.(0:8)	PIMPPIN, previous impeded pin.
	.(8:8)	BPTLINK, breakpoint link for process.
PCB08	.(0:3)	PSIM, pseudo - interrupt mode 1: hard kill 2: soft kill 3: stop 4: hibernate 5: escape 6: break 7: normal
	.(3:1)	Reserved for future use.
	.(4:2)	OA 0: other source 1: father 2: son 3: reply done on RIT wait
	.(6:1)	DEAD, set during expiration.
	.(7:1)	FAC, if set, the father is to be activated on process termination.
	.(8:8)	NIMPPIN, next impeded process' pin

PCB (CONT.)

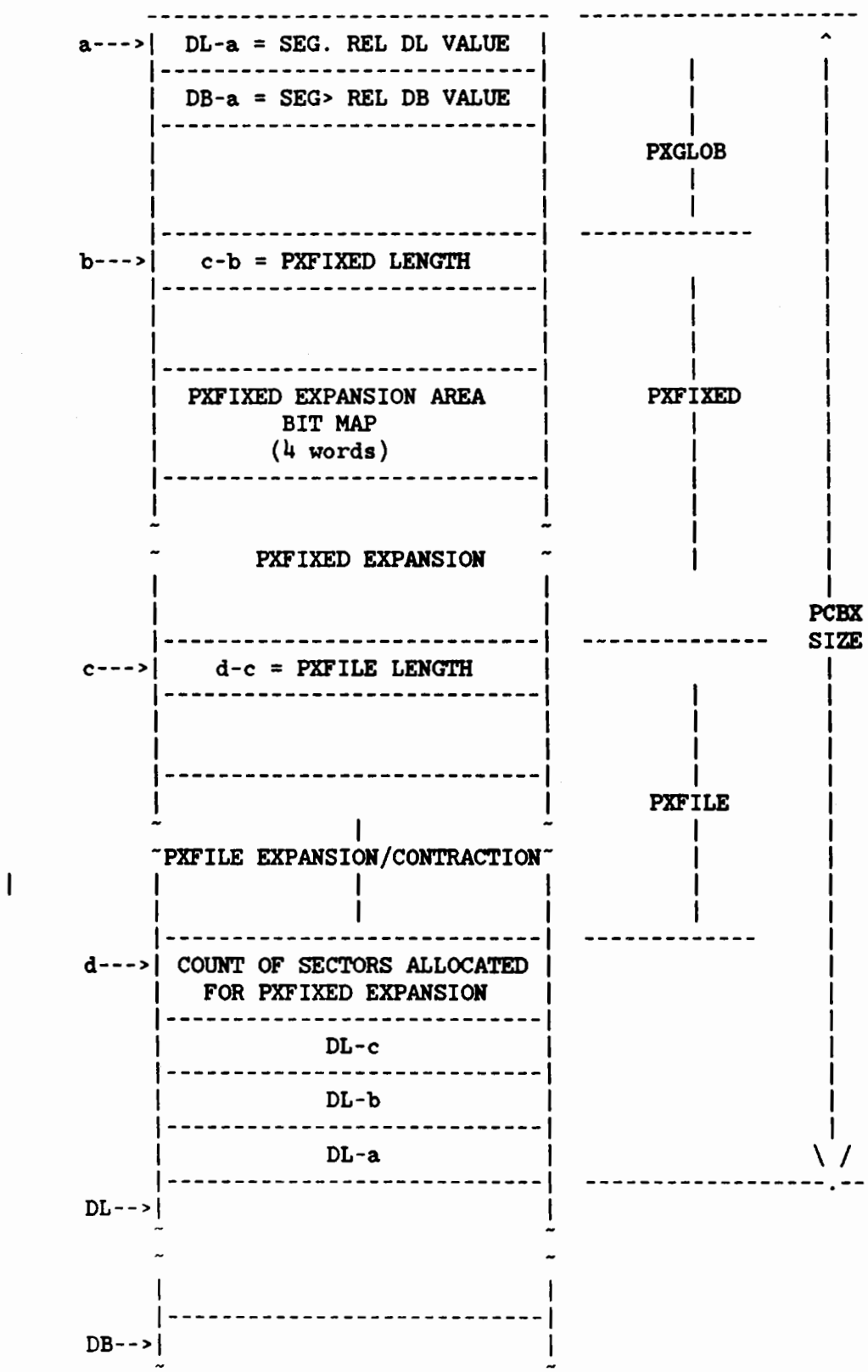
PCB09	.(0:1)	LIVE, set if process is alive.
	.(1:2)	BMS, block mail, valid if MA set 0: sent to father 1: rec from father 2: send to son 3: rec from son
	.(3:2)	PPC, process to process communication, set with respect to son. 0: null 1: son to father 2: father to son 3: blocked
	.(5:1)	STOV, stack overflow bit
	.(6:3)	PTYPE, process type 0: user 1: user, son of main 2: user, main 3: user, main, task 4: system 5: 6: system, UCOP 7:
	.(9:1)	Reserved for future use.
	.(10:1)	HK, hard kill pseudo interrupt
	.(11:1)	SK, soft kill pseudo interrupt
	.(12:1)	ST, stop pseudo interrupt
	.(13:1)	HB, hibernate pseudo interrupt
	.(14:1)	CY, control-y pseudo interrupt
	.(15:1)	BK, break pseudo interrupt
PCB10	.(0:16)	EVENTFLAGS, one for each wait class in PCB04
PCB11	.(0:16)	LASTREFSWAPSEG, segment identifier of last referenced swappable code segment.
PCB12	.(0:16)	PBX, CSTX block map index of process' program.
PCB13		(QUEUEING INFO)
	.(0:1)	DISPQ ==> on dispatching queue
	.(1:1)	L scheduling class
	.(2:1)	C scheduling class
	.(3:1)	D scheduling class
	.(4:1)	E scheduling class
	.(5:1)	INTER ==> process is interactive
	.(6:1)	CORER ==> process is core resident
	.(7:1)	Reserved for future use.
	.(8:8)	Process' scheduling priority

PCB14 .(0:16) NQPTR, sysbase index of PCB entry of next process in scheduling queue

PCB15 .(0:16) PQPTR, sysbase index of PCB entry of previos process in scheduling queue

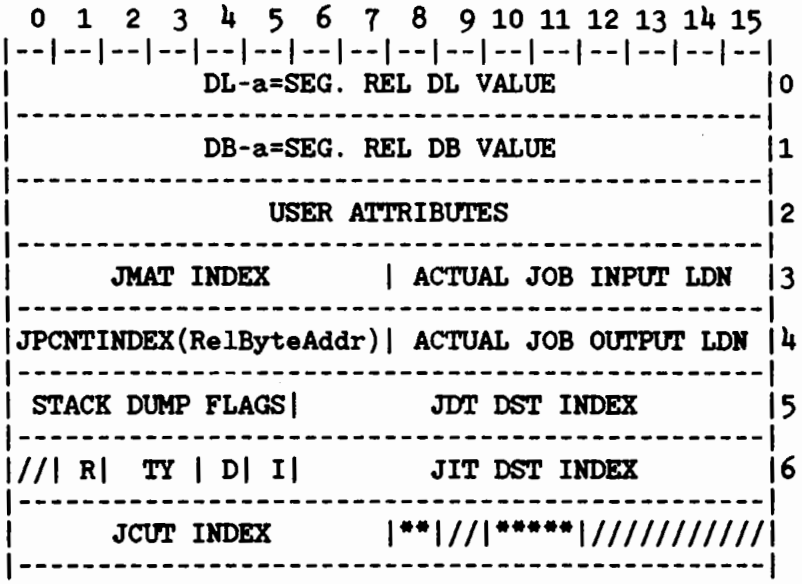
7.3 PCBX Structure and Format

7.3.1 PCBX General Structure



7.3.2 PXGLOB FORMAT

The PXGLOB portion of the pcbx is for job information, and contains the same job related information for all processes belonging to the same job.

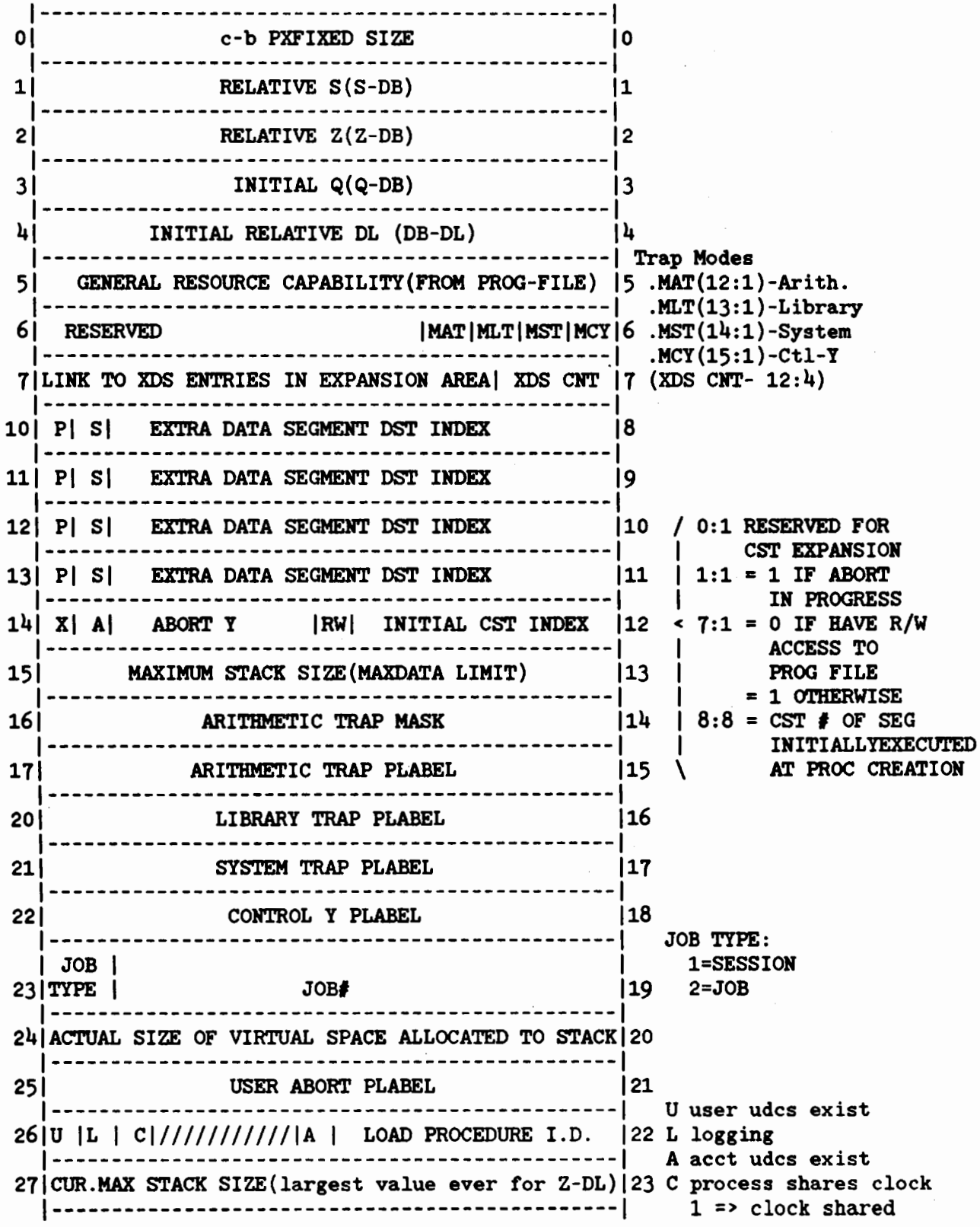


R = restart bit
I = job in/list interactive
D = job in/list duplicative
TY = job type
0 = undefined
1 = session
2 = job
3 = task
* = reserved:

Stack Dump Flags
Bit 0 = Armed
Bit 1 = Suppress ASCII
Bit 2 = Suppress traceback
Bit 3 = Q-63 to S
Bit 4 = QINIT to S
Bit 5 = DL to QINIT

7.3.3 PXFIXED ASSIGNMENTS

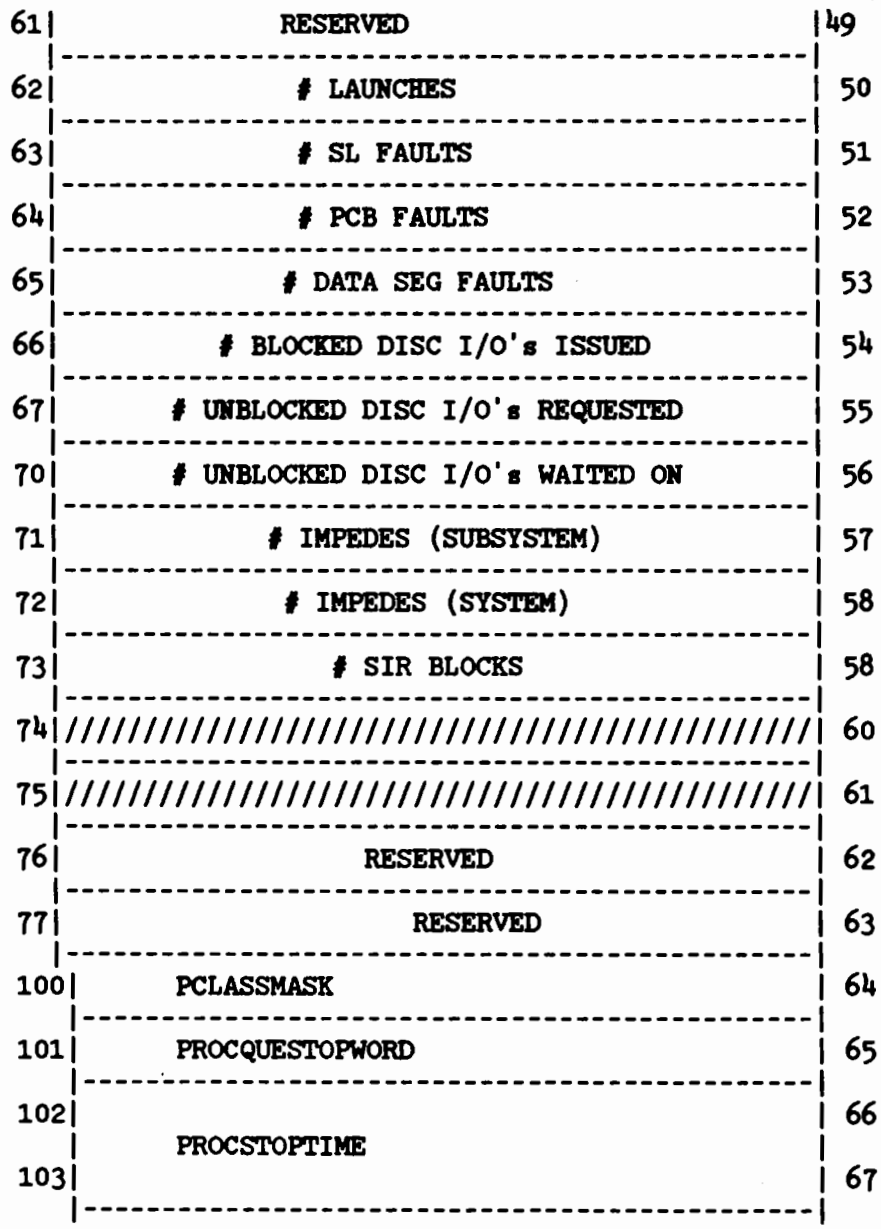
The PXFIXED portion of the pcbx contains specific information and control information.



(reserved)

PXFIXED (CONT.)

30	PROCESS CPU TIME	24
31	(MSEC)	25
32	MAXIMUM DATA SEG SIZE USED(IN SECTORS)	26
33	TOTAL VIRTUAL STORAGE USED(IN SECTORS)	27
34	CURRENT EXTRA DATA SEGMENT SPACE	28
35	MAXIMUM EXTRA DATA SEGMENT SPACE	29
36	////////////////////// STOV COUNT	30
37	PROCESS EXECUTION TIME REMAINDER (IN MSEC)	31
40	SET TO-1 WHEN IN BREAK MODE*	32
41	CONTINUE FLAG (:CONTINUE COMMAND)**	33
42	IMAGE PLABL	34
43	ERROR LEVEL	35
44	INTRINSIC ERRORS	36
45	INTRINSIC ERRORS	37
46	INTRINSIC ERRORS	38
47	INTRINSIC ERRORS	39
50	INTRINSIC ERRORS	40
51	INTRINSIC ERRORS	41
52	TSLR, virtual time since last rescheduled	42
53	TSTB, virtual time since transaction began	43
54	TSSWAPIN, virtual time since swapin	44
55	TSLA, virtual time since last absence	45
56	TSLD, virtual time since last deallocation	46
57	QCNT, quantums used since transaction began	47
60	RESERVED	48



NOTES: P = 0 if opened by priv user
S = 1 if data seg is sharable

PCLASSMASK = BIT MASK OF CLASSES THIS PROCESS HAS ENABLED
PROCQUESTOPWORD.(0:4) = PROCESS PRIORITY: 7 => L QUEUE
6 => C QUEUE
2 => D QUEUE
1 => E QUEUE
.(4:12)= REASON STOPPED: 1 => STOP SEG FAULT
2 => STOP DISC WAIT
3 => BLOCKED I/O, NON TERMINAL
4 => TERMINAL READ
5 => STOP IMPEDE
6 => STOP ACTIVE
PROCSTOPTIME = DBL WORD TIMESTAMP OF WHEN PROCESS STOPPED FOR
REASON GIVEN IN PROCQUESTOPWORD

```
 * SET TO COMMAND RECORD LENGTH WHEN COMMAND PENDING
   (I.E. COMMAND ENTERED DURING BREAK OR ENCOUNTERED
   DURING FLUSHING).

** CONTINUE FLAG VALUES
     0 = NO CONTINUE IN EFFECT
     1 = CONTINUE JUST ENCOUNTERED
     2 = CONTINUE IN EFFECT FOR THIS COMMAND
```

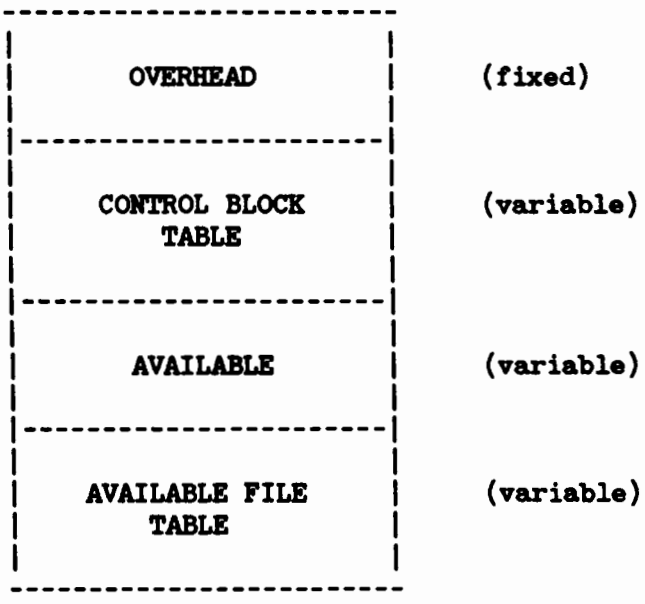
7.3.4 PXFIXED EXPANSION BITMAP

The PXFIXED bitmap and expansion area is for use in accounting of extra data segments acquired by the process.

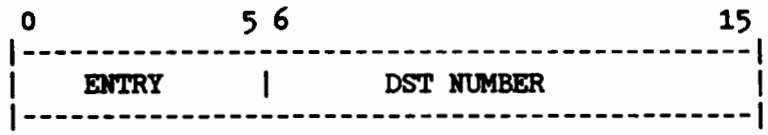
File System Section of PCBX (PXFILE)

The PXFILE area is a sub-section of the PCBX. It is a contiguous, expandable and contractable block of storage that is managed by the file system primarily for its own use. Other sybsystems, namely CS and DS, also make use of the PXFILE section. In doing so they must conform to the conventions of the file system.

The overall structure of the PXFILE area is:

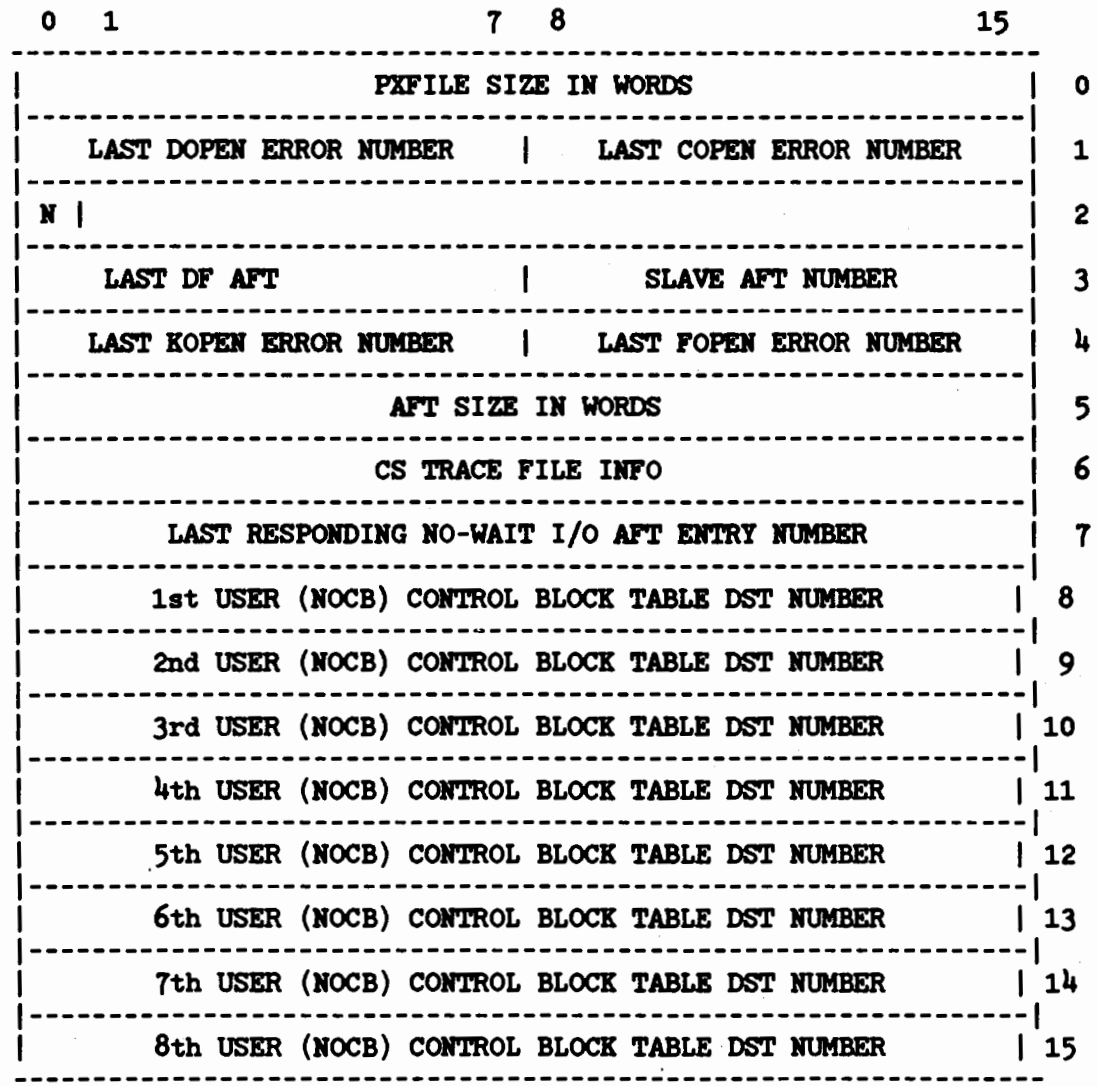


VECTOR FORMAT



Overhead (PXFILE)

The part labeled OVERHEAD contains information that is pertinent to the entire table.



In general the following identifiers are used when referring to this part of the PXFILE area:

```
DEFINE
PXFSIZE          = PXFILE#,          <<PXFILE SIZE>>
PXDSOPENERR      = PXFILE(1).(0:8)#,<<LAST DOPEN ERROR CODE>>
PXCOPENER        = PXFILE(1).(8:8)#,<<LAST COPEN ERROR CODE>>
PXFNOCB          = PXFILE(2).(0:1)#,<<NO CB'S IN PXFILE CBT?>>
PXLASTDSAFT      = PXFILE(3).(0:8)#,<<DSNUM OF LAST DS OPEN>>
PXSLAVEAFT       = PXFILE(3).(8:8)#,<<DSNUM OF SLAVE PTOP DSOPEN>>
PXFKOPEN         = PXFILE(4).(0:8)#,<<LAST KOPEN ERROR CODE>>
PXFFOPEN         = PXFILE(4).(8:8)#,<<LAST FOPEN ERROR CODE>>
PXFAFTSIZE       = PXFILE(5)#,       <<AFT SIZE IN WORDS>>
PXFCTRINFO       = PXFILE(6)#,       <<CS TRACE FILE INFO>>
OVERHEAD (CONT.)
```

```
--------

PXFLEFTOFF      = PXFILE(7)#,     <<LAST RESPONDING AFT NR.>>
PXFCBT1         = PXFILE(8)#,     <<1ST USER CBT DST NR.>>
PXFCBT2         = PXFILE(9)#,     <<2ND USER CBT DST NR.>>
PXFCBT3         = PXFILE(10)#,    <<3RD USER CBT DST NR.>>
PXFCBT4         = PXFILE(11)#,    <<4TH USER CBT DST NR.>>
PXFCBT5         = PXFILE(12)#,    <<5TH USER CBT DST NR.>>
PXFCBT6         = PXFILE(13)#,    <<6TH USER CBT DST NR.>>
PXFCBT7         = PXFILE(14)#,    <<7TH USER CBT DST NR.>>
PXFCBT8         = PXFILE(15)#;    <<8TH USER CBT DST NR.>>
```

Computer Museum

The following is an alphabetized list of the above identifiers along with a discussion of their meaning.

PXFAFTSIZE
This is the size (in words) of the Available File Table. Note that the size is in words and not in terms of number of entries. The reason for this is that it simplifies the calculation for the size of the available block.

PXFCBT1-8
These are the DST numbers of the user (NOCB) control block tables. A DST number of 0 indicates that no data segment is allocated. Note that a DST number is representable with ten bits; a full word is used to simplify the code.

PXFCOPEN
This contains the last COPEN error number. It is not used by the file system; it is included here for completeness only.

PXFCTRINFO
This contains information pertinent to the CS trace file. It is not used by the file system; it is included here for completeness only.

PXFDOPEN
This contains the last DOPEN error number. It is not used by the file system; it is included here for completeness only.

PXFDSINFO
This cell is reserved for DS. It is not used by the file system; it is included here for completeness only.

PXFFOPEN
This contains the last FOPEN error number. If it is zero then the last FOPEN completed successfully; if it is non-zero then the last FOPEN completed unsuccessfully and the number represents the file system error number. Note that only eight bits are needed to hold the error number; a full word is used to simplify the code.

OVERHEAD (CONT.)

PXFKOPEN
This contains the last "KOPEN" error number. Since KSAM is imbedded in the file system, an FOPEN failure on a KSAM file can be caused by a failure to open either the key file or the data file. This error number is used in conjunction with PXFFOPEN to determine which file caused the KSAM open failure. Note that this error number is not used by the file system; it is included here for completeness only.

PXFLEFTOFF
This is the AFT entry number of the last file/line that completed a no-wait I/O; if zero then no no-wait I/O has been completed. This cell is maintained solely by and for the IOWAIT intrinsic.

PXFNOCB
This bit is used to signify that no control blocks are to be created in the PXFILE control block table. This bit is set by the NOCB parameter to the CREATE intrinsic or the :RUN command. The reason for this feature is to permit the 3000/20 user to have as much stack space as possible; otherwise the MPE/30 file system will take away several hundred words of stack for the PXFILE control block table.

PXFSIZE
This is the size (in words) of the complete PXFILE area. It is the sum of the overhead block, the control block table, the available file table and the available block.

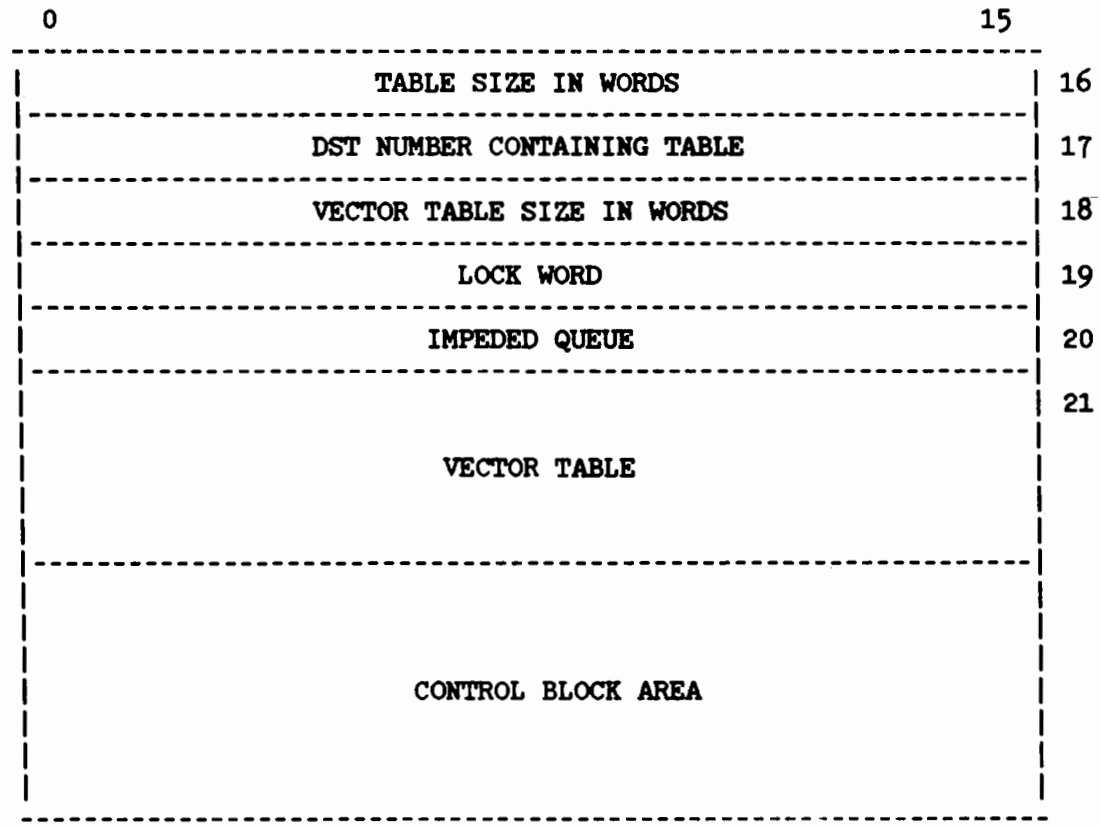
Control Block Table (PXFILE)

The part labeled CONTROL BLOCK TABLE contains a file control block table. This is a new feature with MPE/30; it is not present under MPE/20.

The format of the control block table is the same as any other file control block table. The only difference is that addressing is slightly more complicated since the table does not begin at DB+0. As a result all pointers within the table are table relative; the starting address of the table must be added to a pointer to generate a final DB-relative address. This addressing convention is consistently applied to all file control block tables. When the control block table is expanded, space is taken from

the AVAILABLE area. If no space is available then the PXFILE area is expanded and the acquired space is added to the AVAILABLE area.

The interested reader is referred to section 3.2 of chapter 6 for a more detailed description of file control block tables.



In general the following identifiers are used when referring to this part of the PXFILE area:

```
DEFINE
PXFCBTAB        = PXFILE(16)#,    <<CONTROL BLOCK TABLE>>
PXFCBTSIZE      = PXFILE(16)#,    <<TABLE SIZE IN WORDS>>
```

CONTROL BLOCK TABLE (CONT.)

```
------------------

PXFDSTX          = PXFILE(17)#,    <<TABLE DST NUMBER>>
PXFVTSIZE        = PXFILE(18)#,    <<VECTOR TABLE SIZE IN WORDS>>
PXFLOCK          = PXFILE(19)#,    <<TABLE LOCK WORD>>
PXFQUEUE         = PXFILE(20)#,    <<TABLE IMPEDED QUEUE>>
PXFVT            = PXFILE(21)#;    <<VECTOR TABLE>>
```

The following is an alphabetized list of the above identifiers along with a discussion of their meaning.

PXFCBTAB
This is the first word of the control block table. In general this is used only when referring to the entire control block table.

PXFCBTSIZE
This is the size in words of the control block table. In general this is used only when calculating the size of the available block.

PXFDSTX
This is the DST number of the data segment that contains the control block table. This is the same as the DST number of the stack. Note that the convention of referring to the DST number of the stack as zero is not used. The reason for this is that the file system may refer to a PXFILE control block table in another stack. This would result in an ambiguity since that PXFILE control block table would also have a DST number of zero.

PXFLOCK
This is the lock word for the table and has the same format as the lock word for a control block in the table.

PXFQUEUE
This is the impeded queue for the table and has the same format as the impeded queue for a control block in the table.

PXFVT
This is the first word of the vector table. It is used when referring to the vector table in general.

PXFVTSIZE
This is the size, in words, of the vector table. Note that this is the length of the table and does not reflect the number of entries used or unused.

Available Block (PXFILE)

The part labeled AVAILABLE BLOCK is used to provide space when the Control Block Table or the Available File Table is expanded. These two tables grow towards each other, and when more space is needed it is simply taken from the Available Block.

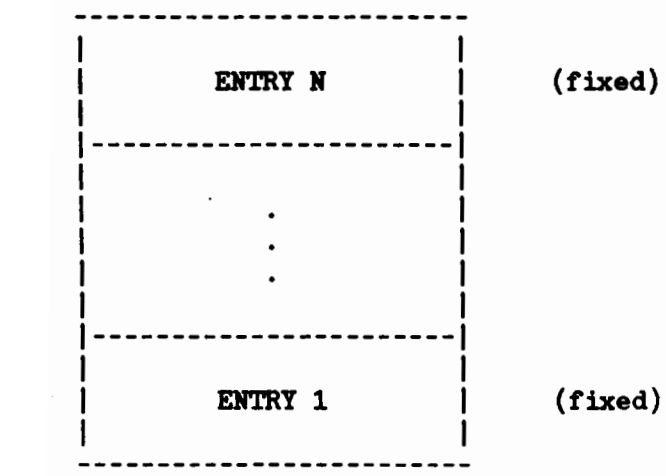
When the Available Block is exhausted, the PXFILE area is expanded, the AFT is relocated and the new space is added to the Available Block.

Note that currently the PXFILE area is only expanded; it is never contracted.

Available File Table, AFT (PXFILE)

The part labeled AVAILABLE FILE TABLE contains information used by the file system (or CS, DS, etc.) to grossly characterize the file access and, most importantly, to give the location of the control blocks.

The overall structure of the AFT is:

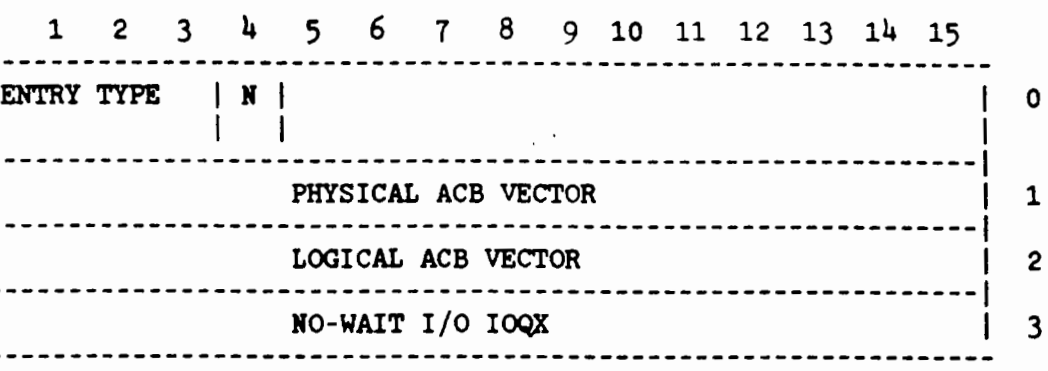


where N = PXFAFTSIZE/4.

The AFT is as long as specified by PXFAFTSIZE. Unused entries are all zero's. When the table is full it is expanded by taking space from the AVAILABLE block.

The AFT is negatively indexed by file number: the entry at DL-8 corresponds to file number 1, the entry at DL-12 corresponds to file number 2, etc.

The structure of an AFT entry is:



Note that the entry format is dependent on the entry type. The one shown above is the one used by the file system.

In general the following identifiers are used when referring to an AFT entry:

```
DEFINE
AFTTYPE         = AFT.(0:4)#,     <<ENTRY TYPE>>
AFTNULL         = AFT.(4:1)#,     <<$NULL FILE>>
AFTPACBV        = AFT(1)#,        <<PACB VECTOR>>
AFTLACBV        = AFT(2)#,        <<LACB VECTOR>>
AFTIOQX         = AFT(3)#;        <<NO-WAIT I/O IOQX>>
```

The following is an alphabetized list of the above identifiers along with a discussion of their meaning.

AFTIOQX
This is the IOQ index of the pending no-wait I/O (if any). Note that this is applicable iff the file was opened with the NOWAIT option specified. Also, CS and DS have the same capability and use this cell in a consistent manner. The reason for this is that the IOWAIT intrinsic services the file system as well as CS and DS, and is the principal user of this cell. If the cell is zero then there is no I/O pending; otherwise the cell contains the IOQ index corresponding to the pending I/O.

Exception: a nonzero value for message files specifies the accesors reply port (instead of an IOQ entry).

AFTLACBV
This is the vector of the Logical ACB (LACB) (if any). Note that this is applicable iff the file was opened with the multi-access option specified.

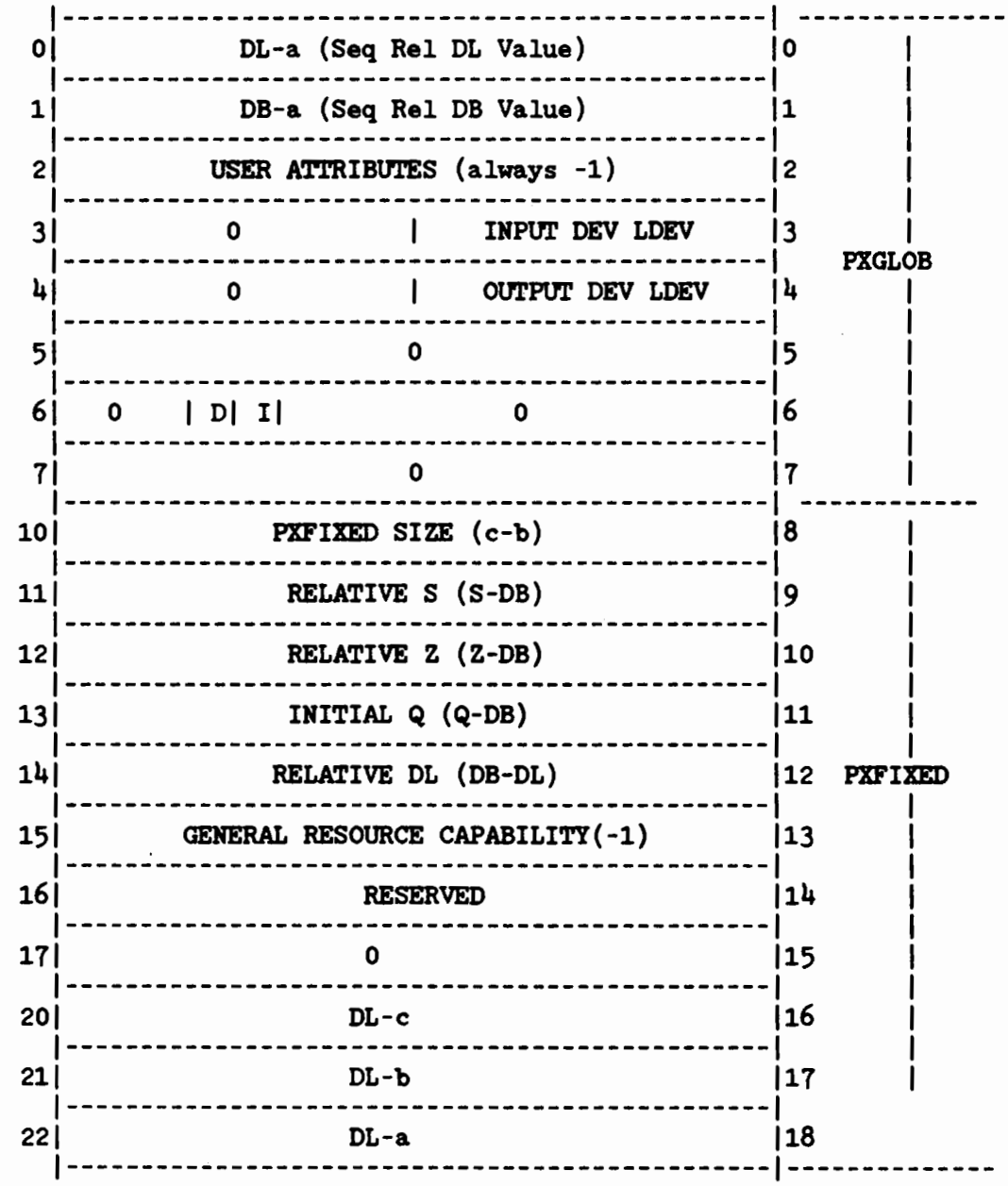
AFTNULL
This bit signifies that the file is $NULL and that there are no control blocks.

AFTPACBV
This is the vector of the Physical ACB (PACB). Note that a PACB exists for all files except $NULL.

AFTTYPE
This is the AFT entry type number. At present the following entry types are defined:

0 - file system
1 - remote file
2 - DS (no-wait I/O disallowed)
3 - DS (no-wait I/O allowed)
4 - CS
5 - CS (AUTO DIAL)
6 - KSAM
7 - 3270
8 - message file

PCBX FOR CORE RESIDENT SYSTEM PROCESS STACKS

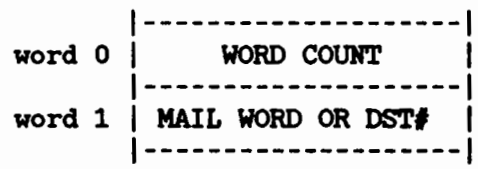


NOTES: 1. there is no PXFILE area.
2. the PXFIXED area is much smaller than a normal PCBX.

PROCESS TO PROCESS COMMUNICATION TABLE

This table is used as the communication link by which father and son processes communicate with one another via the mailbox scheme. This table contains two words per entry and is indexed by PCB# (entry index 0 is meaningless). Each two word entry of index N essentially relates where, as well as how much, mail may be found for a process N with respect to communications between N and his father process.

ENTRY FORMAT

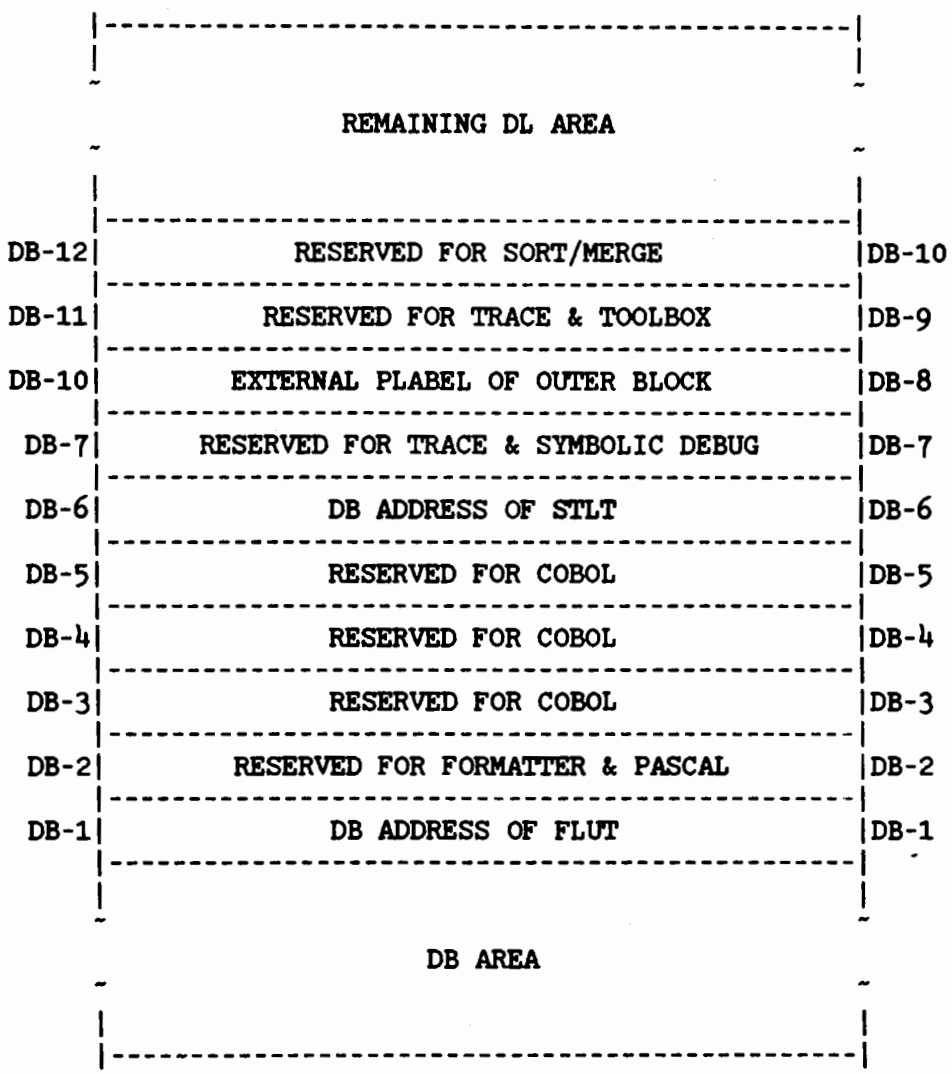


where word 0 = the # of mail words to be transferred.

word 1 = the only word of mail itself if word 0 = 1
otherwise
it contains the DST# of the extra data segment where "word count" words of mail exist.

NOTE: Assume process S is the son of process F. Then the process to process communication table index which will be used for mailbox communication between son S and father F will be that of the son (i.e. S).

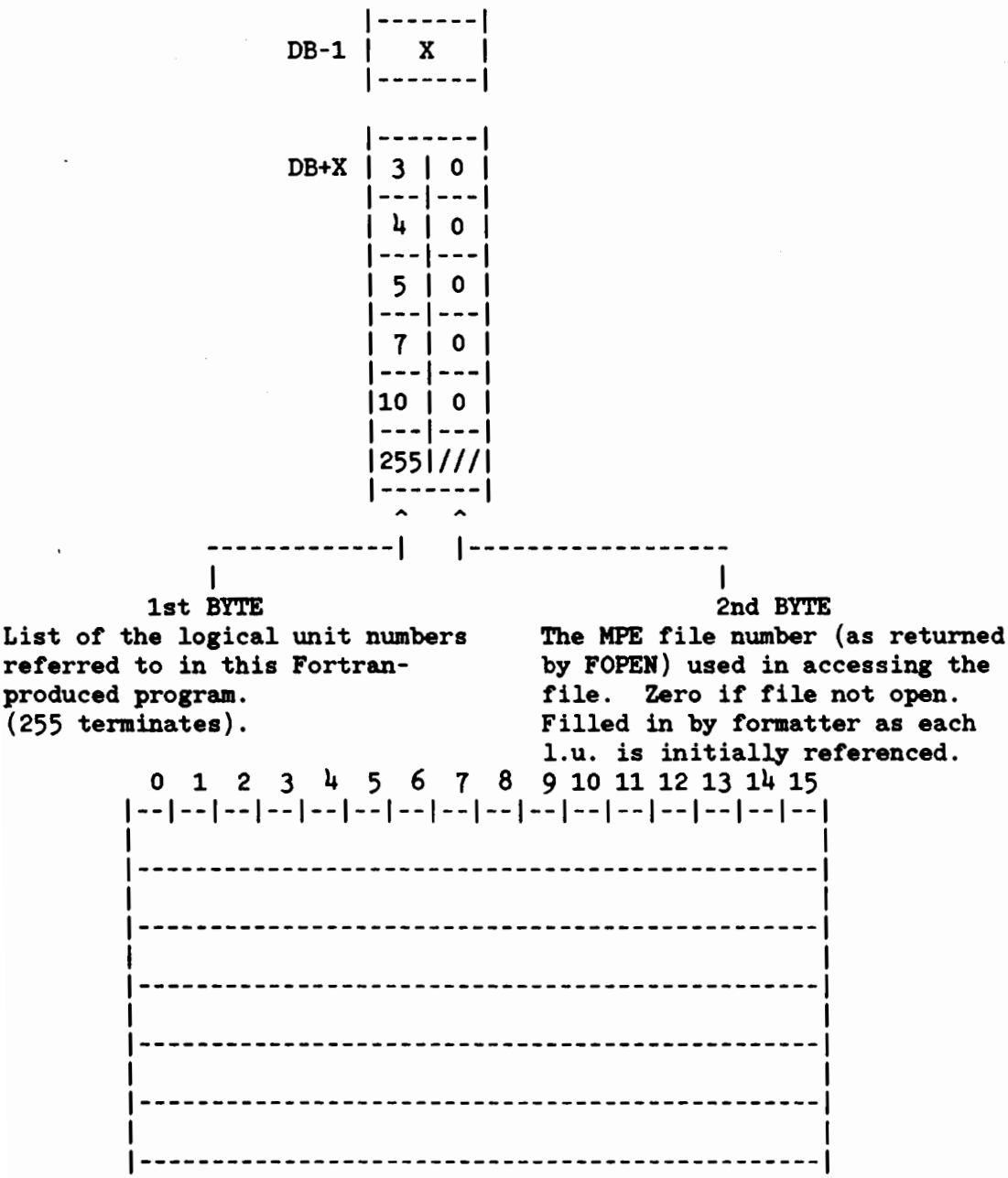
SUB-SYSTEM RESERVED DL AREA



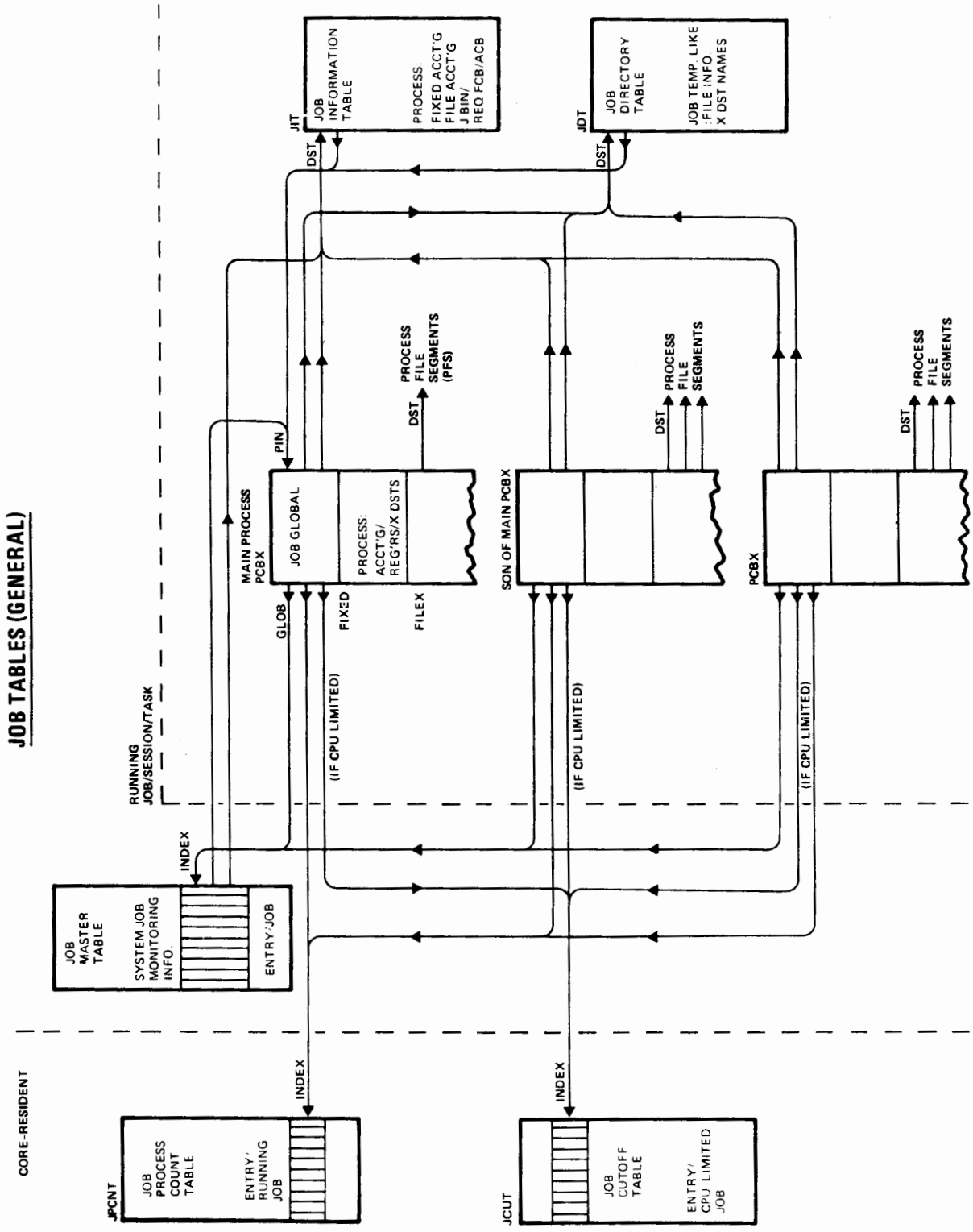
FORTRAN LOGICAL UNIT TABLE (FLUT)

The segmenter is responsible for the preparation and initialization of a Fortran logical unit table. This is done when a program is prepared if that program contains at least one program unit that references a logical unit. The location of the FLUT is in the secondary DB area and the address of this location is contained in DB-1.

The FLUT is formatted as per the following example:

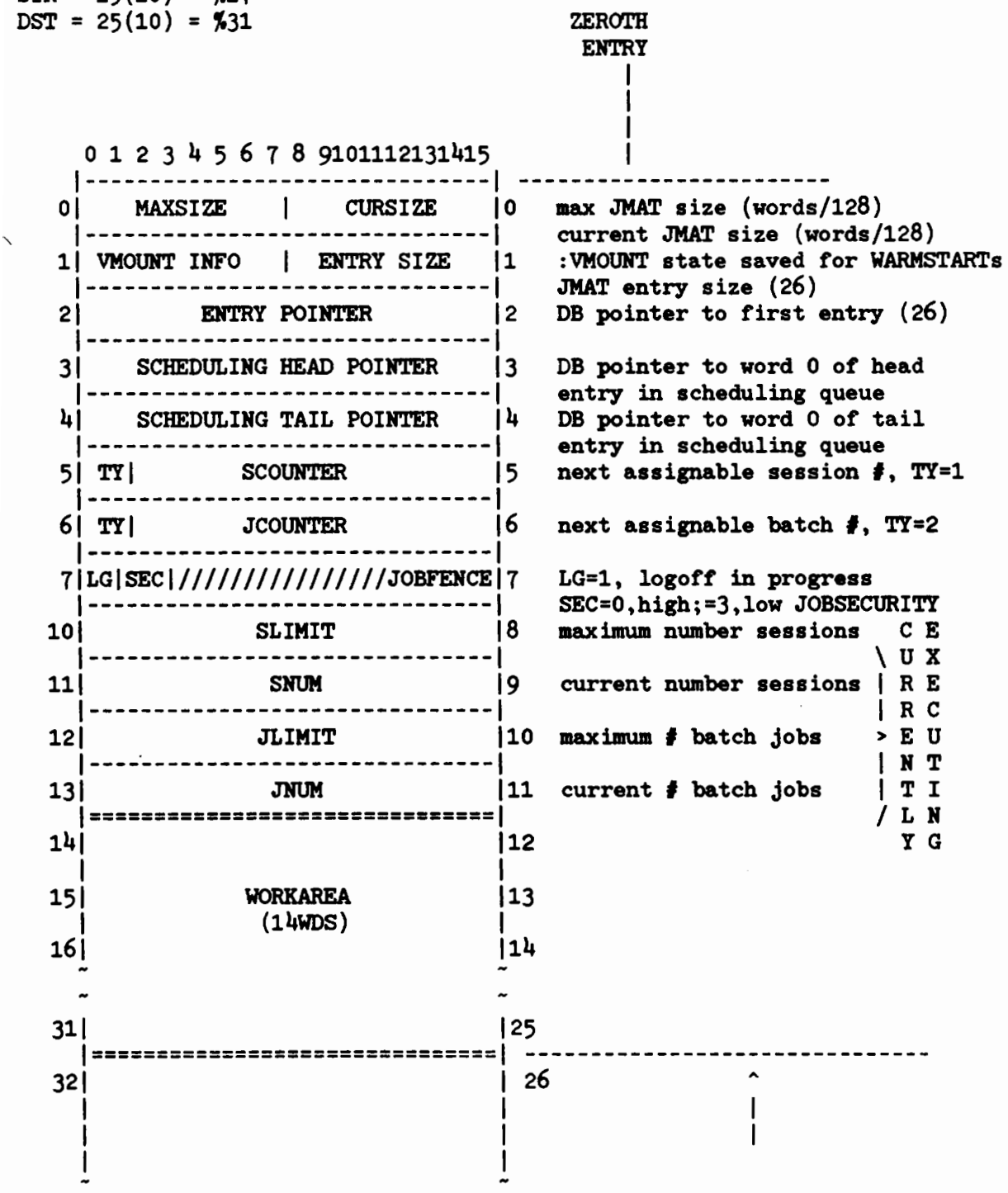


JOB TABLES OVERVIEW

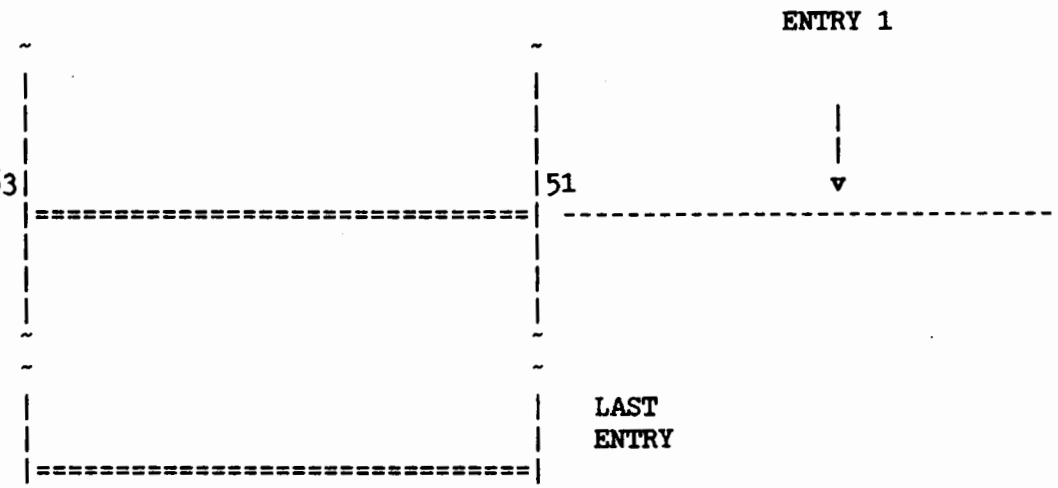


JMAT - JOB MASTER TABLE STRUCTURE

SIR = 15(10) = %17
DST = 25(10) = %31



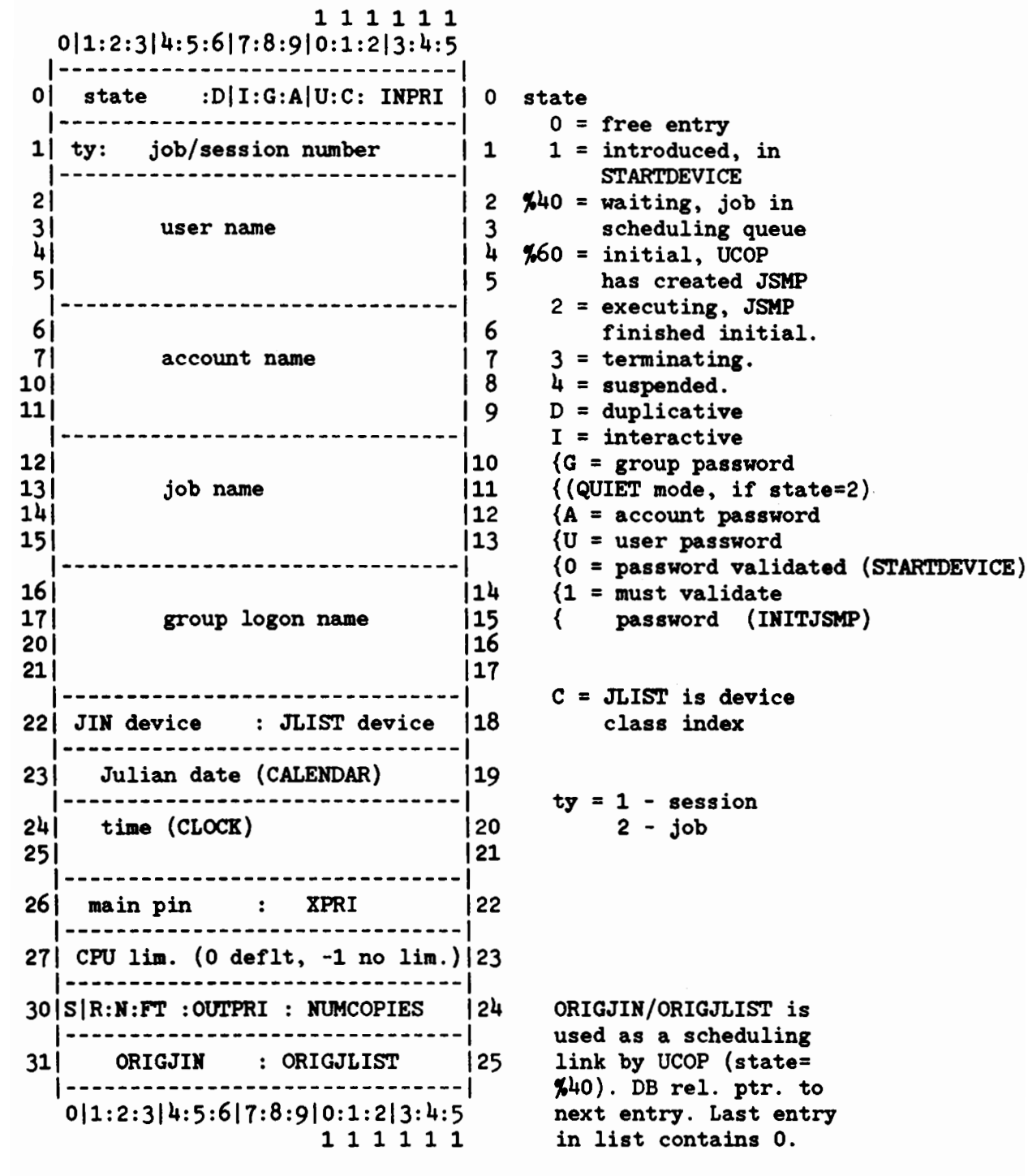
JMAT (CONT.)



SCHEDULING QUEUE

WAITING SESSIONS
FIFO WITHIN HIPRI/INPUT PRIORITY
[ERROR JOBS]
[FIFO]
WAITING JOBS
FIFO WITHIN HIPRI/INPUT PRIORITY

JMAT - Job Master Table Entry



S = ORIGJIN is spooled.
R = RESTART
N = SEQUENCED

FT = funny terminal
00 - regular term.
01 - regular term., special logon
10 - APL term.
11 - APL term.

JOB STATES

JOB STATES - JMAT ENTRY WORD 0.(0:6)

SHOWJOB - Displays job states by scanning JMAT DST (%31)

LOGON USES ALL STATES EXCEPT "SUSPEND"

STATE NO.	STATE NAME	PROCESS	SEGMENT	PROCEDURE(S)
1	INTRO	DEVREC JSMP SPOOLER	NURSERY	STARTDEVICE ->PUTJMAT ->ALLOCENTRY IN SEGMENT ALLOCUTIL
%40	WAIT	DEVREC JSMP SPOOLER	NURSERY \ SPOOLING /	STARTDEVICE ->SCHEDULEJOB SPOOLSTUFFIN ->SCHEDULEJOB
%60	INIT-IALIZAT-ION	UCOP	UCOP	LAUNCHJOB
2	EXEC	JSMP	NURSERY	INITJSMP
3	TERMIN-ATING	JSMP	MORQUE	TERMINATE ->EXPIRE -> CLEANUPJOB
0	FREE ENTRY	JSMP	MORQUE	TERMINATE ->EXPIRE -> CLEANUPJOB ->DEALLOCENTRY IN ALLOCUTIL
4	SUSP	JSMP	OPLOW	CXBREAKJOB

For states INTRO and WAIT,

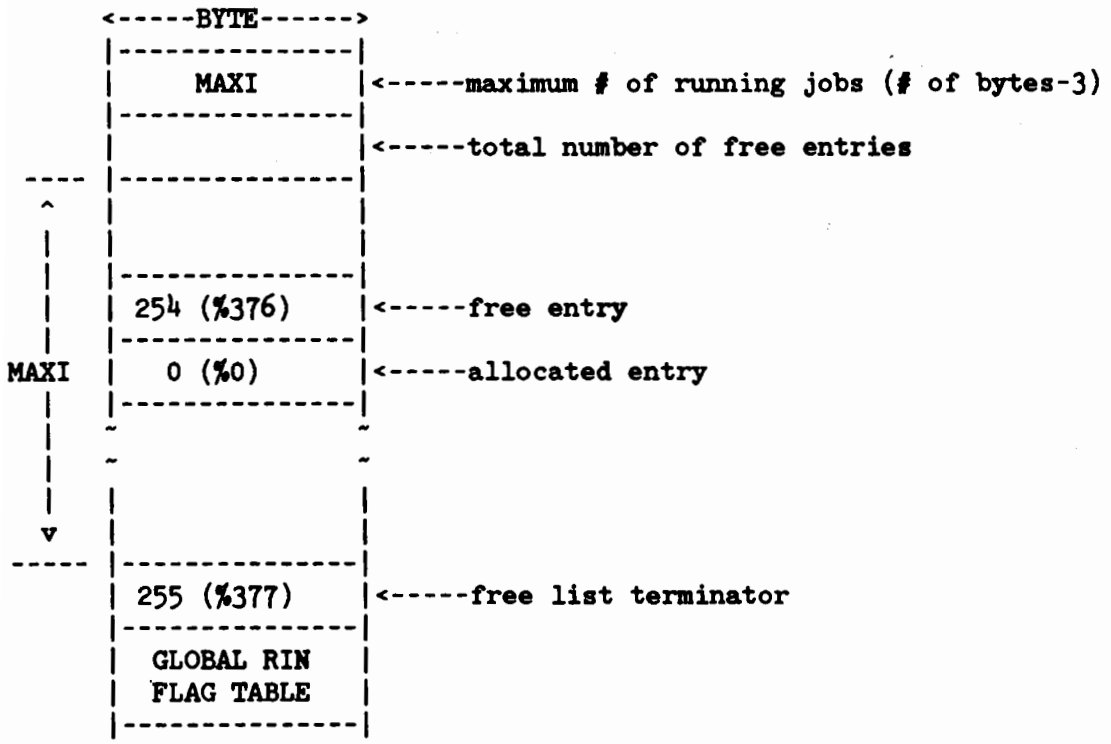
DEVREC => logon command originated on terminal or other unspooled device.
SPOOLER => logon command originated on spooled device.
JSMP => logon command is the result of the execution of a :STREAM command. (This also includes USER processes which have done programmatic :STREAMs.)

JPCNT - JOB PROCESS COUNT TABLE

(1 Entry/Running Job)

CORE RESIDENT

SYSGLOB BASE = DB+13(%15)
DST = 24(10)
SIR = 13(10)



A JPCNT entry must be allocated before the main process can be procreated.

The job SIR (PXGJSIR) = some base+JPCNT index.

NOTE: This table is completely byte oriented with each entry consisting of one byte. Entries are taken from available pool on a "first found" basis. 254 (376 octal) in a byte denotes a free entry. 255 (377 octal) denotes the end of table.

GLOBAL RIN FLAG TABLE

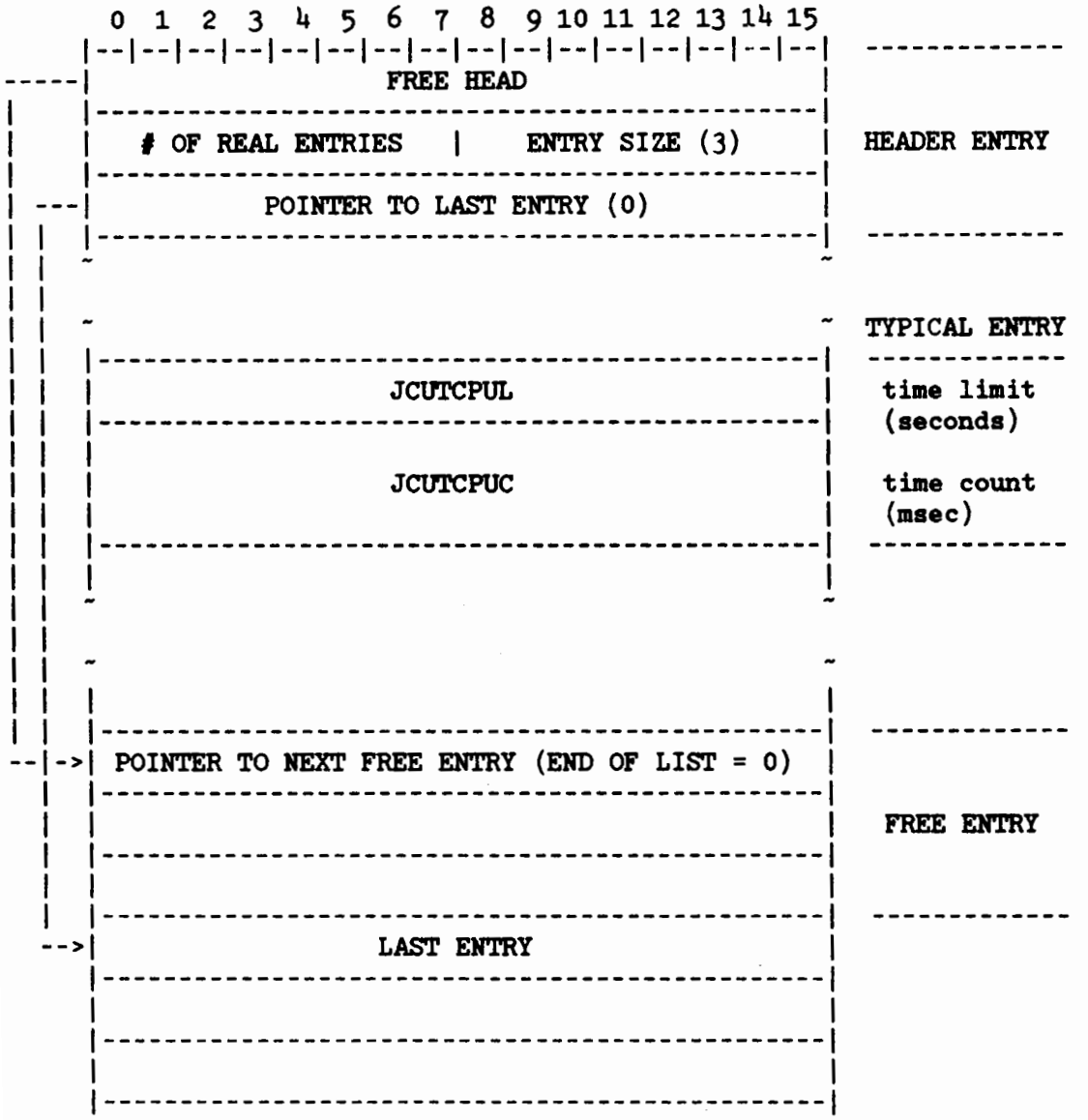
This table is a bit table which immediately follows the "free list terminator" byte. It is initialized to 0 and is indexed by JPCNT index for each job. When any process in a job/session locks a global rin, the appropriate bit is turned on.

JCUT - JOB CUTOFF TABLE

1 Entry/ CPU-limited Job

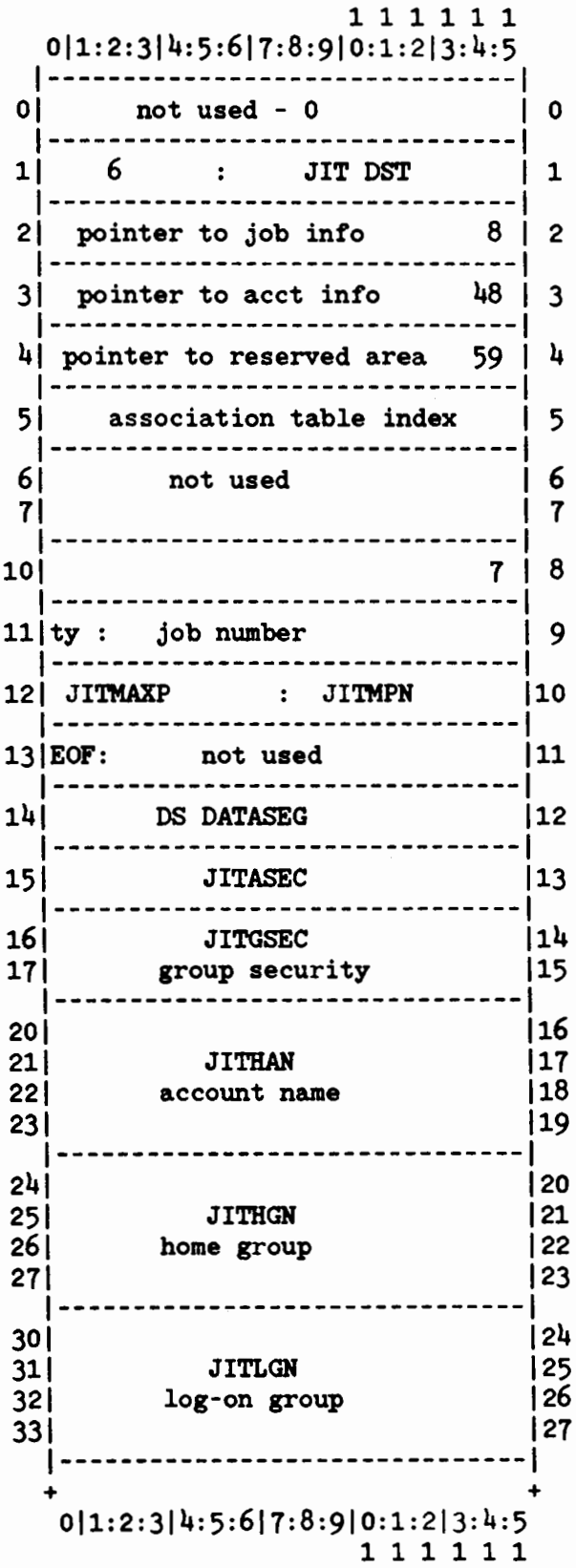
CORE RESIDENT

SYSGLOB BASE = DB+11(%13)
DST = 36(10)
SIR = 14(10)
SYSGLOB + %117 = default CPU time limit for jobs



JIT -Job Information Table

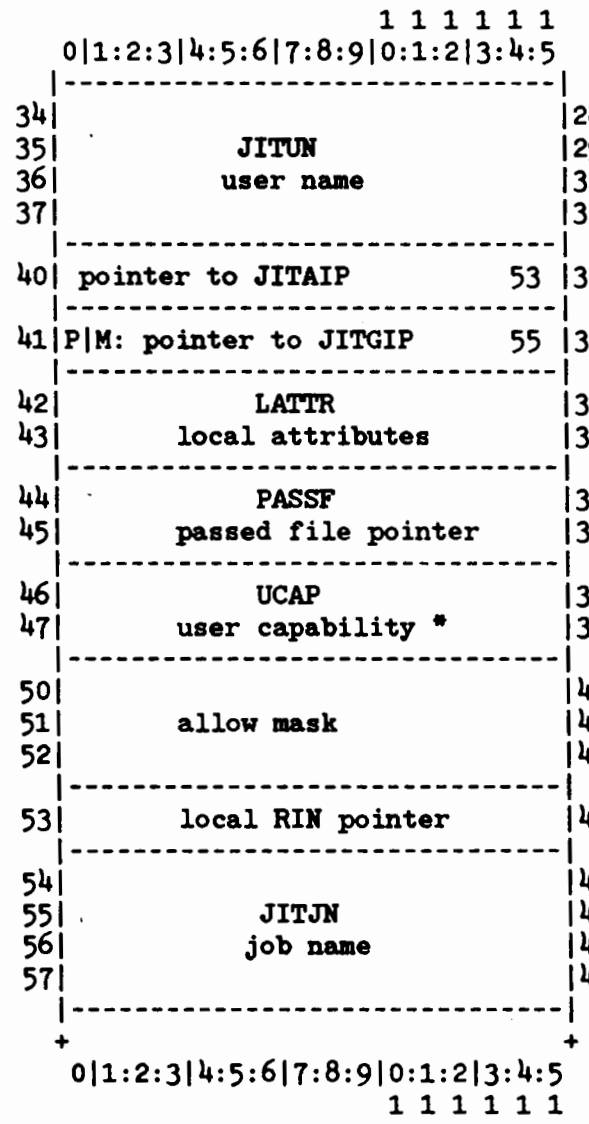
JIT DST is word 6 in PXGLOB



ty - 1 = Session
2 = Job

JITMAXP - MAXJOBPRI capability
JITMPN - Job main PIN.
JITEOF - used by FCLOSE to tell CI that a $STDIN(X) file was closed w/out encountering an EOF.
(0:1)=$STDIN, (1:1)=$STDINX

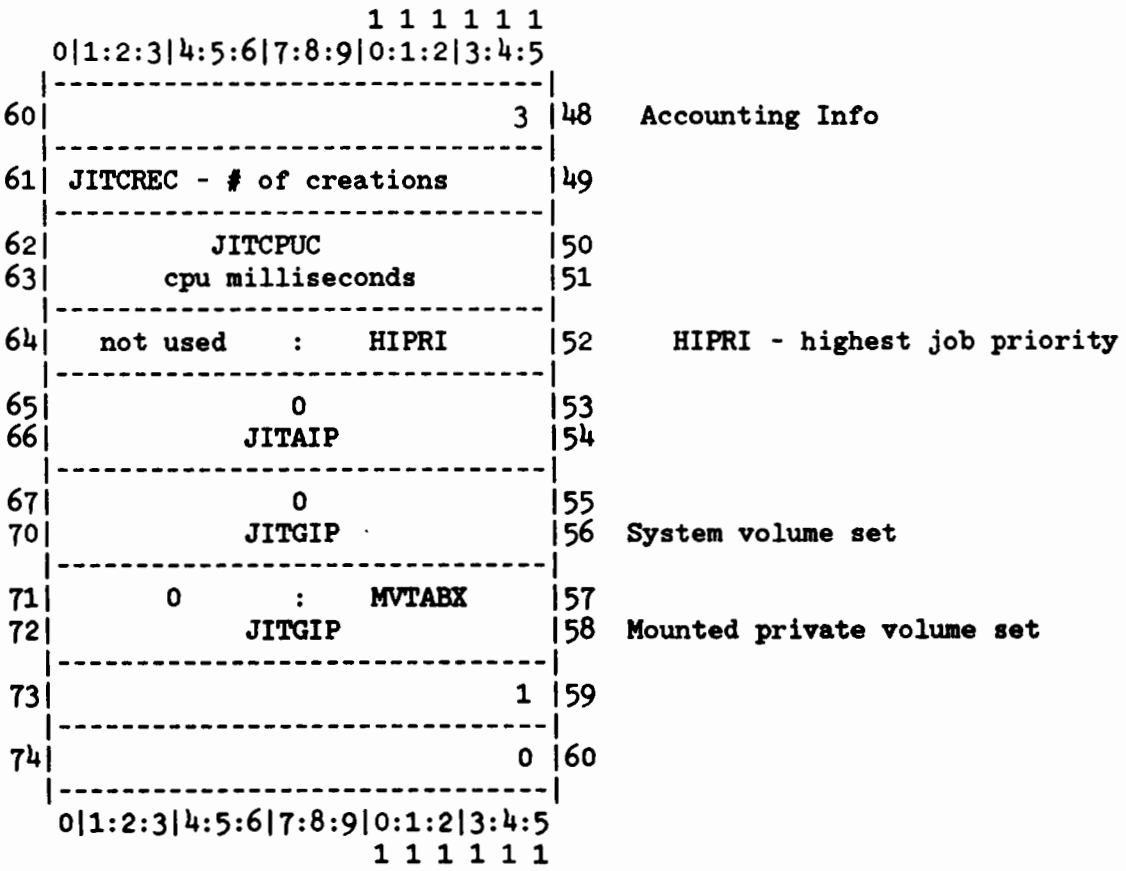
JIT - Continued



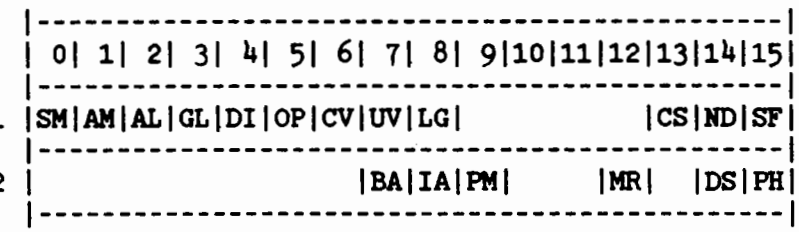
P - Group's home volume is a private volume

M - Private volume mounted (i.e. group bound to home volume set), JITGIP = 57

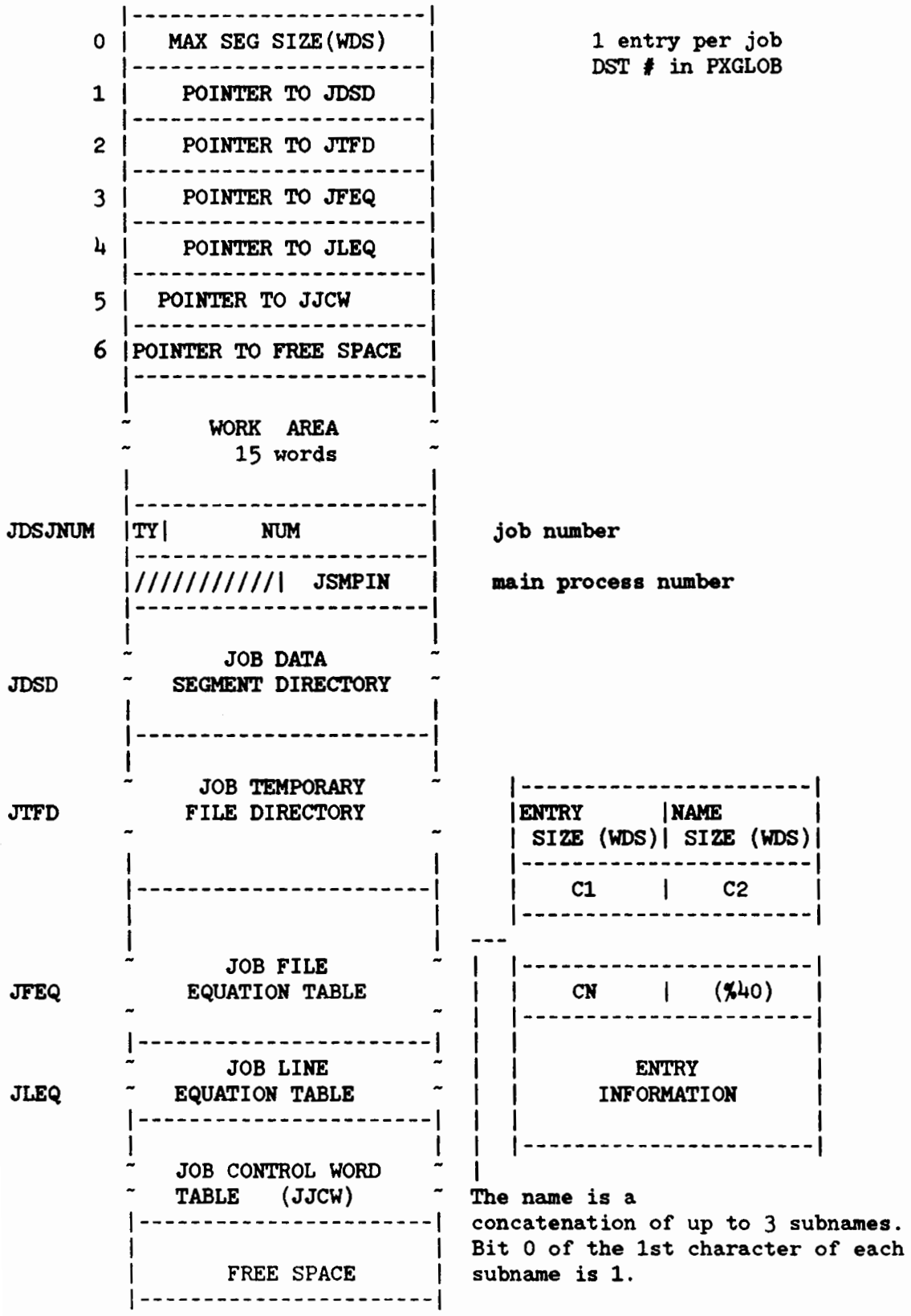
For bit mask definitions, see Allow mask format, Chapter 1.



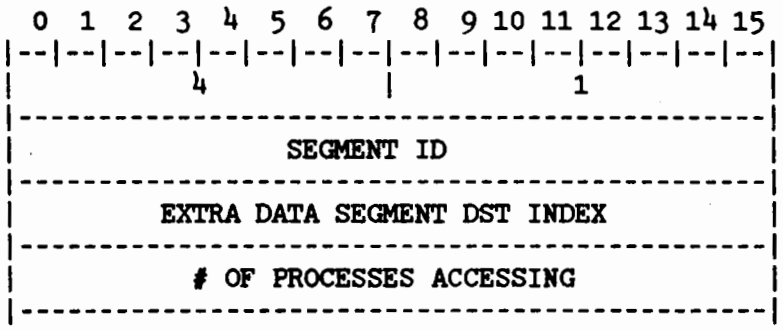
* THE FORMAT FOR UCAP (%46-47) IS AS FOLLOWS:



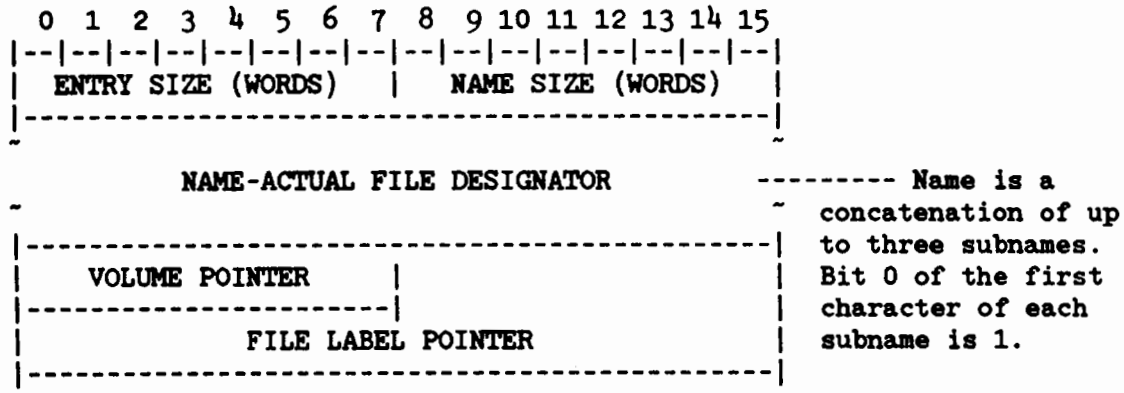
JDT - JOB DIRECTORY TABLE



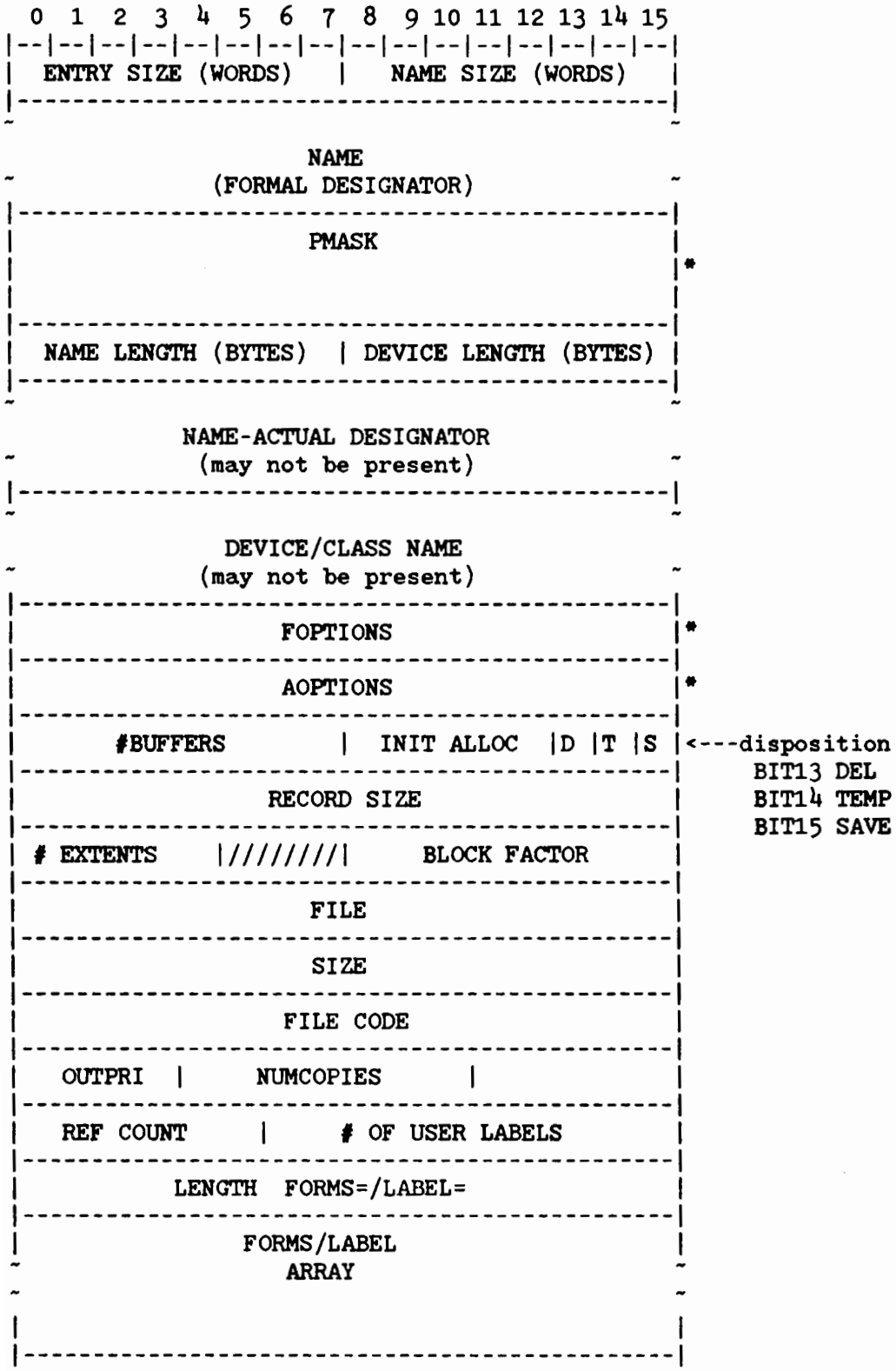
JOB DATA SEGMENT DIRECTORY ENTRY - (IN JDT)



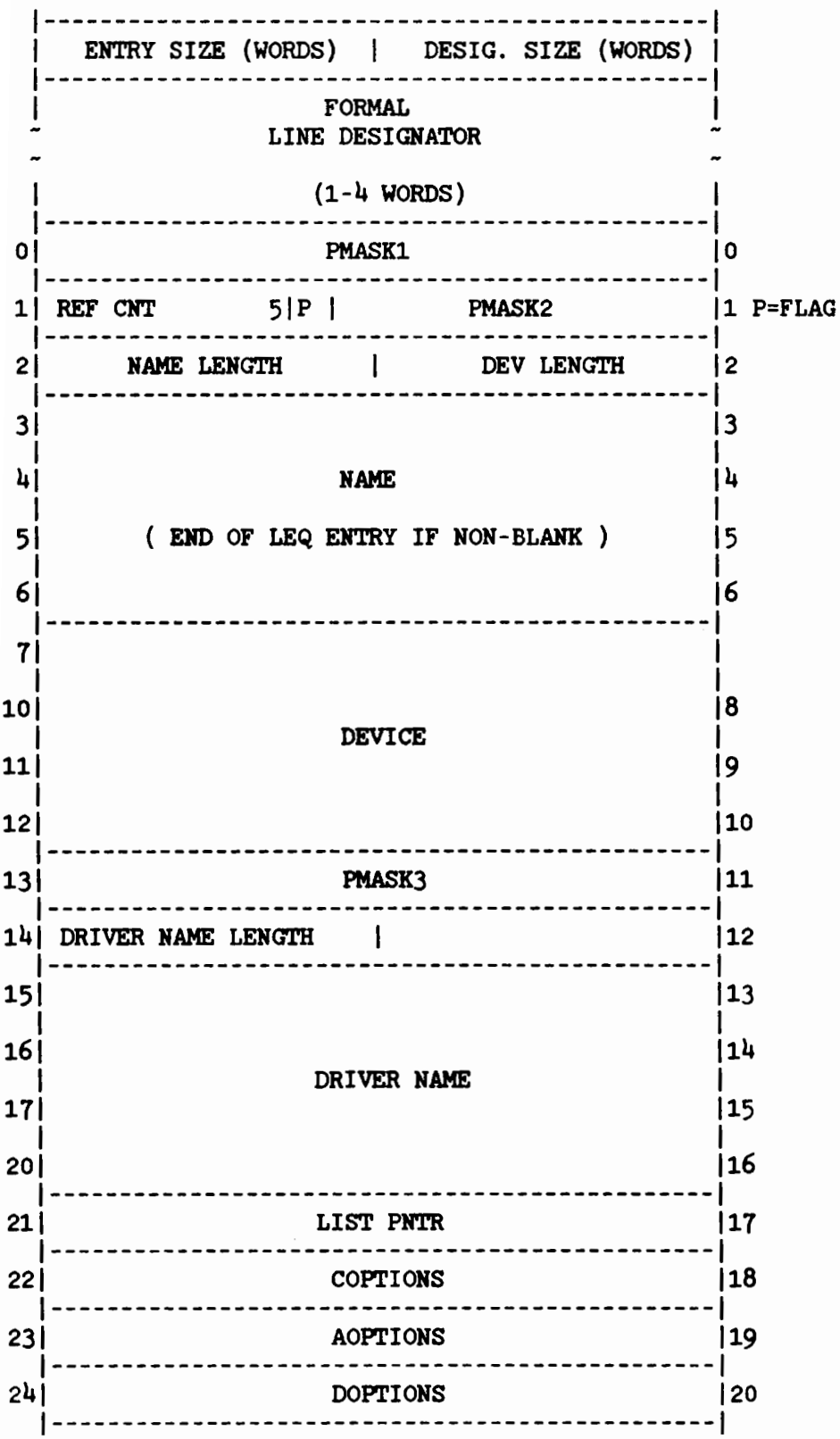
JOB TEMPORARY FILE ENTRY - (IN JDT)



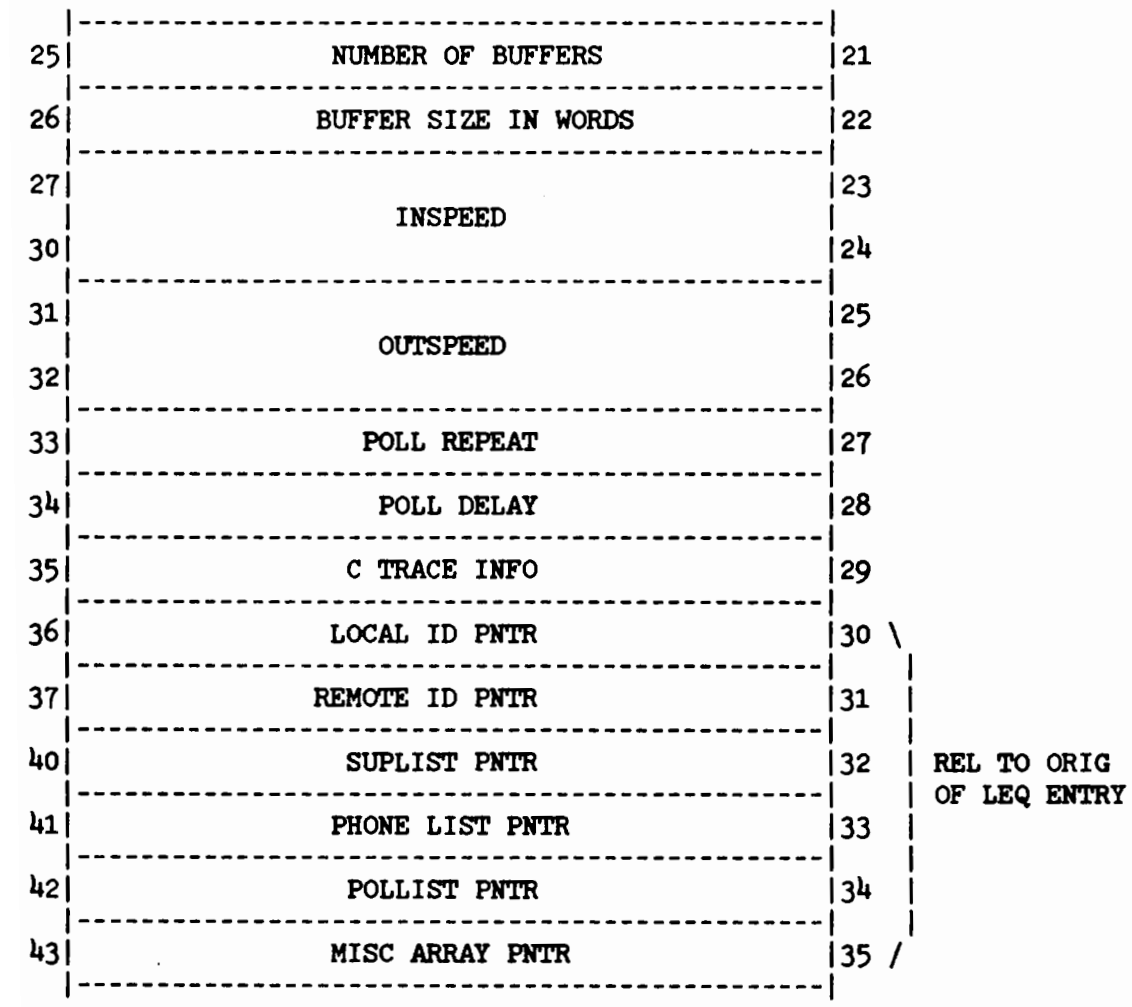
FILE EQUATION TABLE ENTRY - (IN JDT)



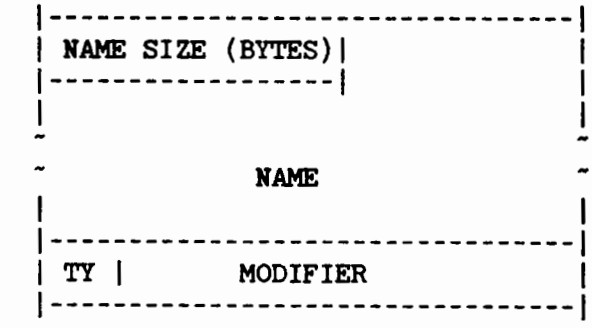
JOB LINE EQUATION ENTRY



JLEQ ENTRY (CONT.)



JJCW JOB CONTROL WORD TABLE
---- --- ------- ---- -----

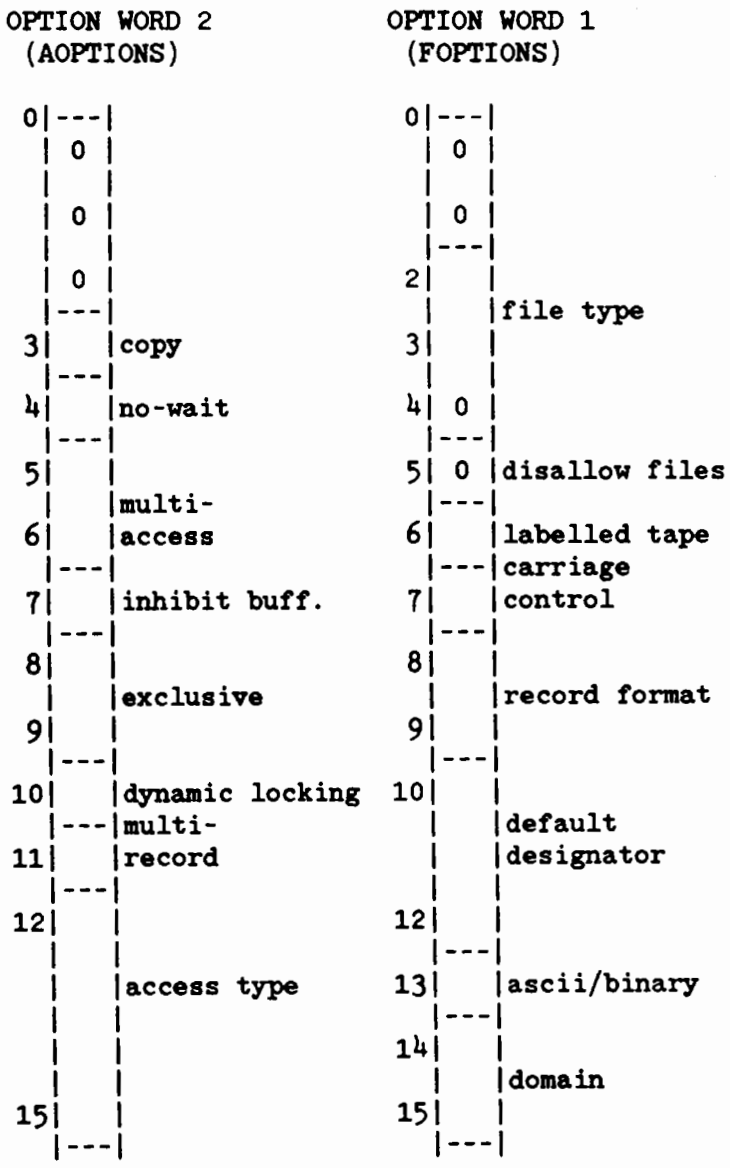


Name may be any alphanumeric string, beginning with an alpha, between 1 and 255 characters long.

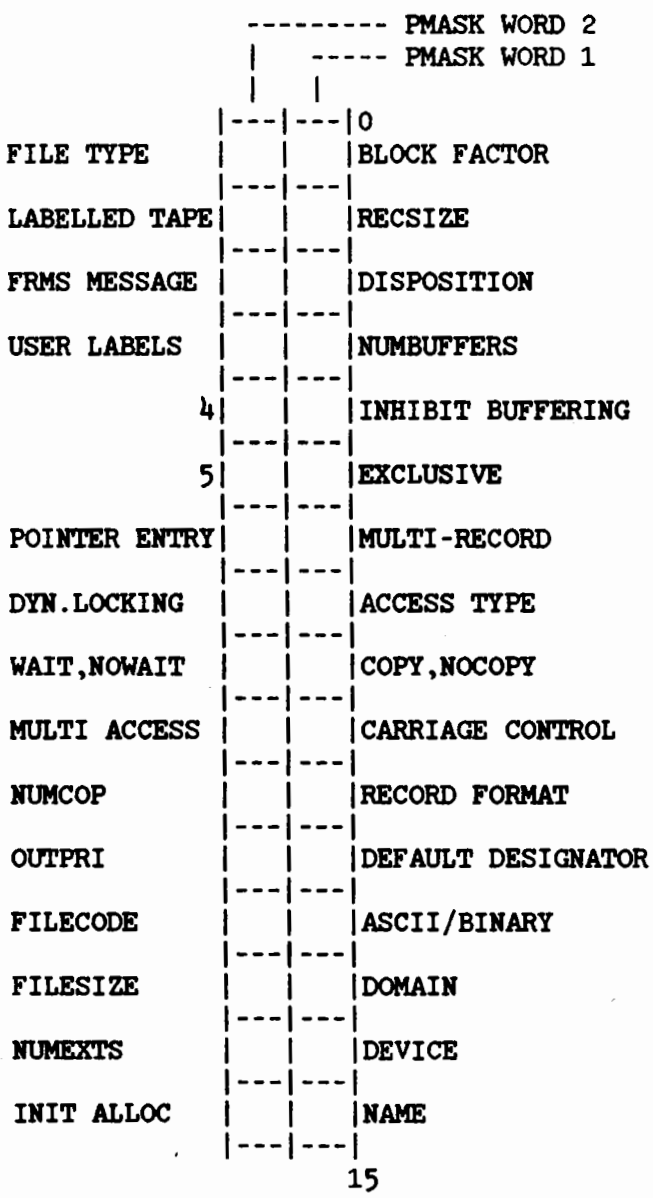
TY 00 = OK
01 = WARN
10 = FATAL
11 = SYSTEM

MODIFIER = VALUE FROM 0 TO %377777

AOPTIONS AND FOPTIONS WORD BREAKDOWN



PMASK WORD BREAKDOWN

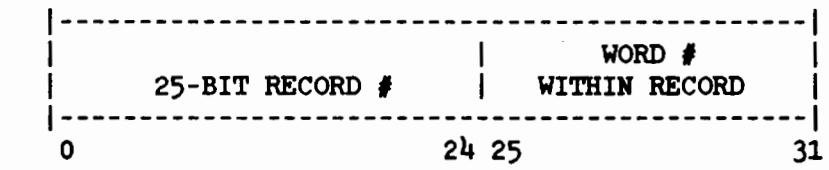


1->info present
0->info absent

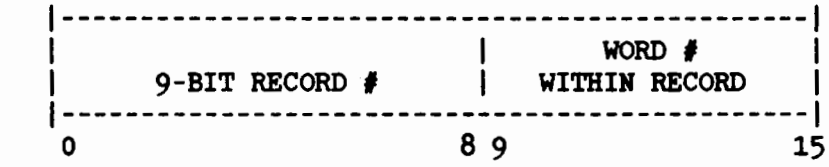
CHAPTER 9 RELOCATABLE OBJECT CODE

USL FILES - GENERAL INFO

* USL record length 128 words always.
* Layout of doubleword disc addresses

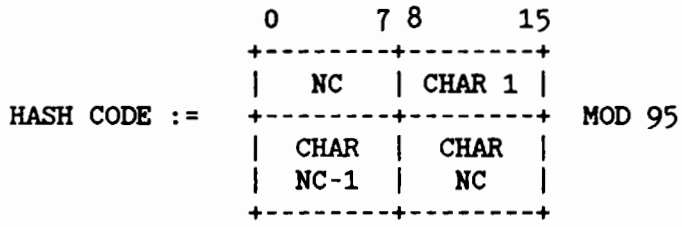


* Hash links join all entries with the same hash key regardless of type.
* Linear lists terminate with a zero link
* Circular lists containing only the list head point directly to themselves.
* Single-word disc addresses



Uninitialized fields are reserved for future use and should be set to zero.

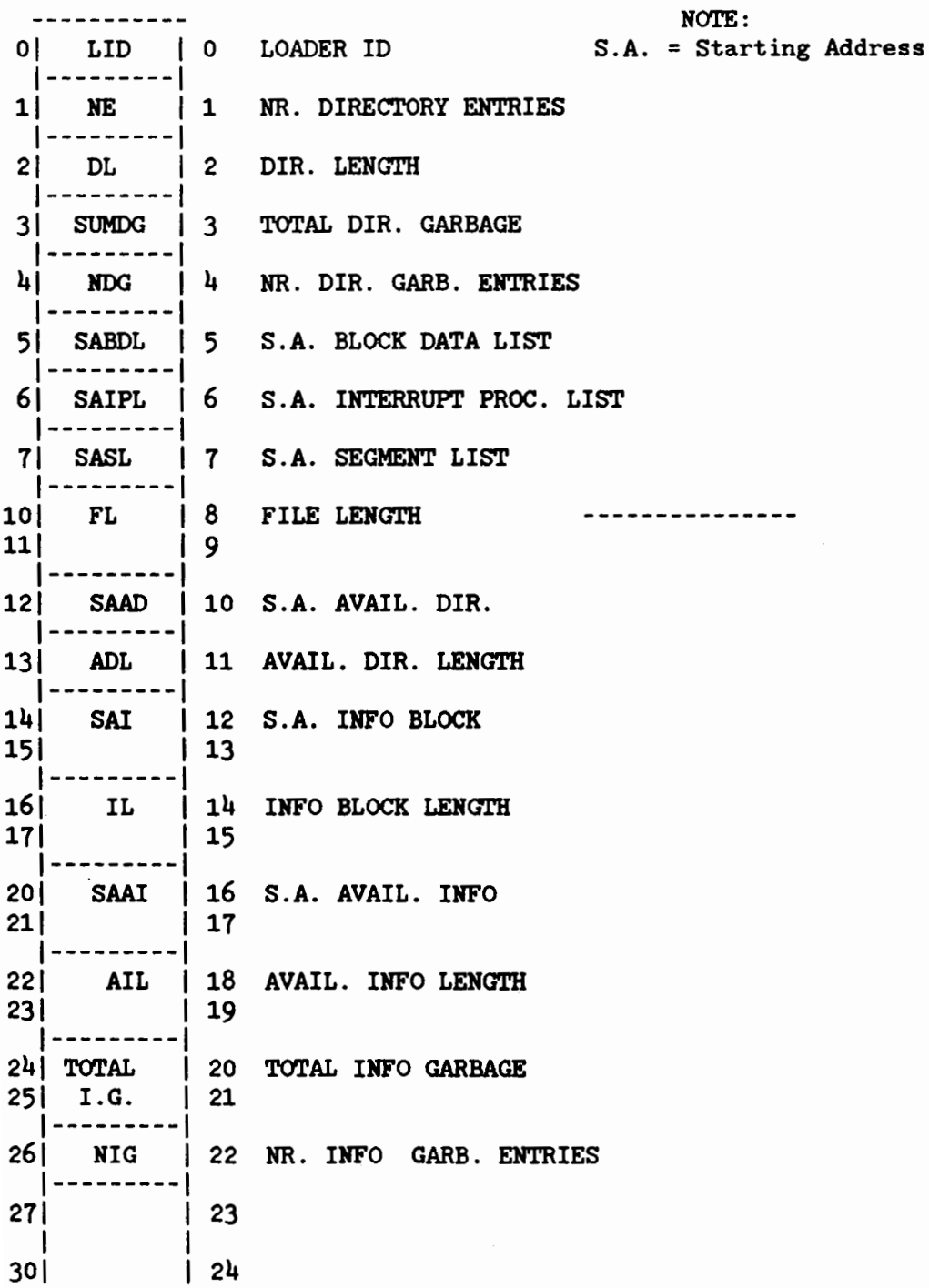
* Hash code of an identifier is a numeric value which is calculated from a double word (containing information relative to the identifier) as follows:

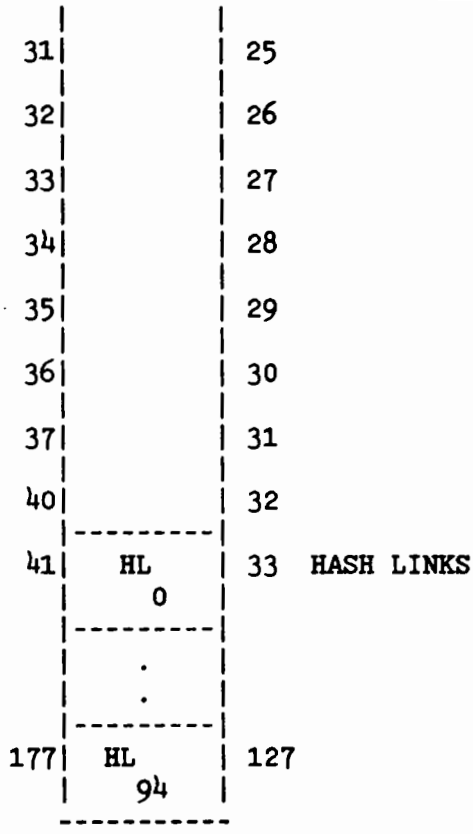


where NC = number of characters in identifier
CHAR 1 = Binary representation of first ASCII character
CHAR NC-1 = Binary representation of next to last ASCII character (set to NC for single character identifier).
CHAR NC = Binary representation of last ASCII character (=CHAR1 if single char identifier).

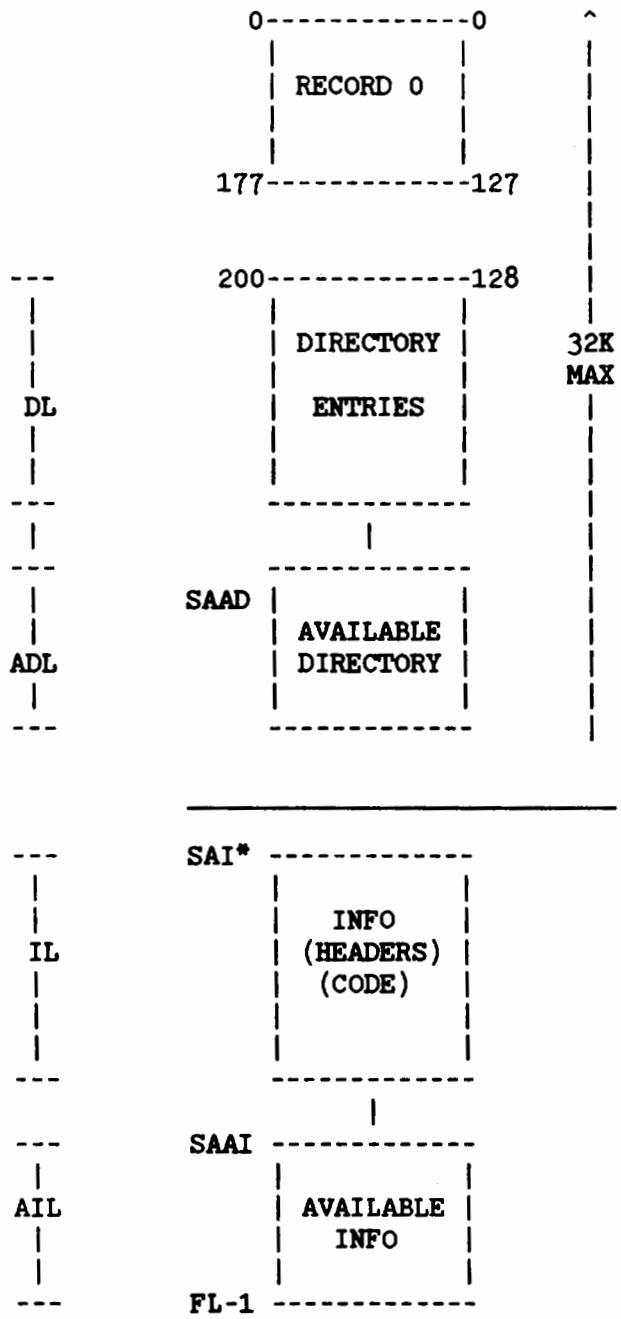
The hash code value is used as an index into the "Hash Bucket array" of record 0.

RECORD 0 AND OVERALL USL FILE FORMAT




31
25
32
26
33
27
34
28
35
29
36
30
37
31
40
32
41
HL
0
33
HASH LINKS
177
HL
94
127

USL FILES - GENERAL INFO (CONT.)

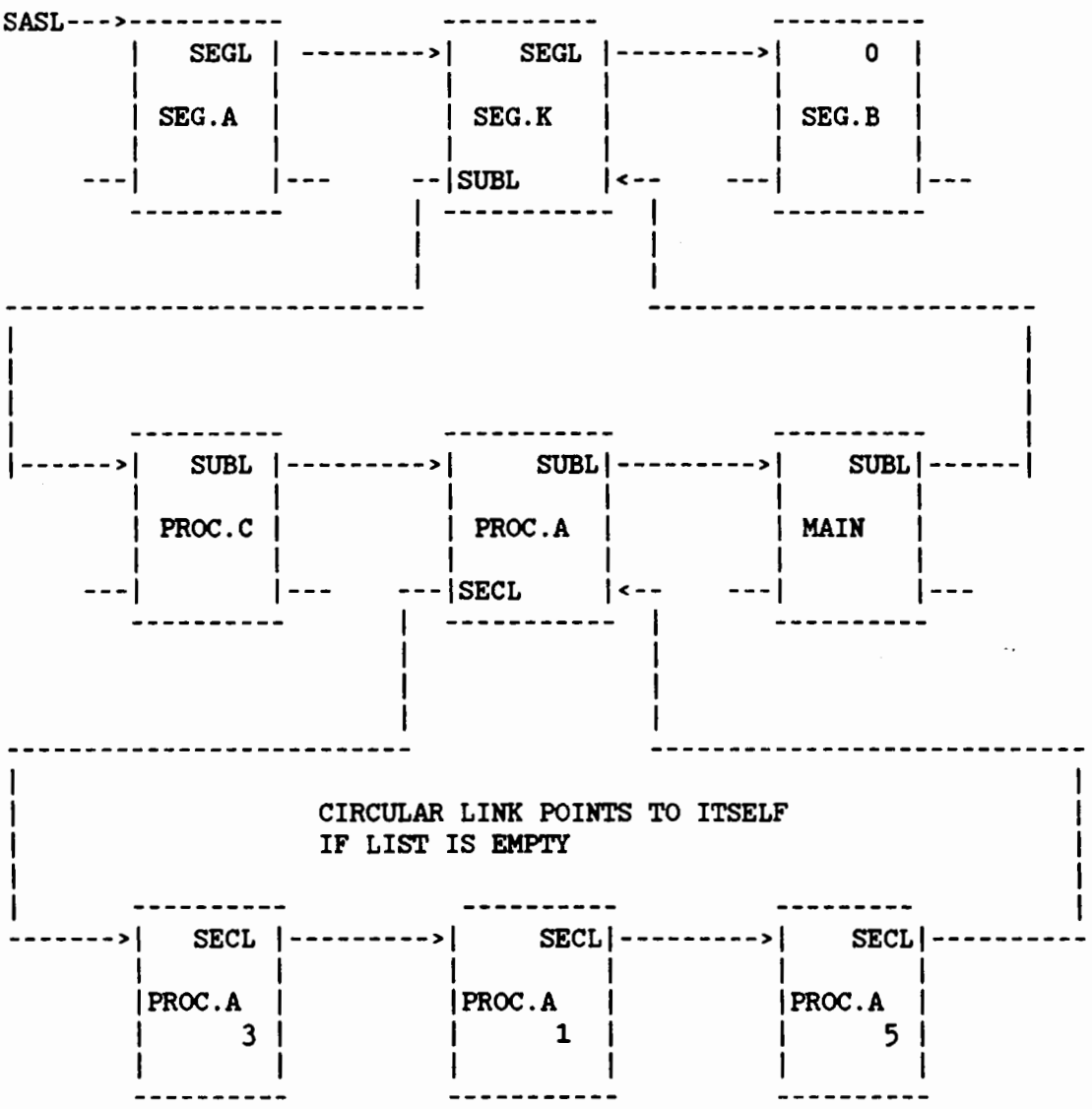


*SAI MUST BE ON A RECORD BOUNDRY

NOTE: ALL ADDRESSES IN RECORD 0 ARE WORD ADDRESSES.

USL FILES - GENERAL INFO (CONT.)

DIRECTORY ENTRY STRUCTURE

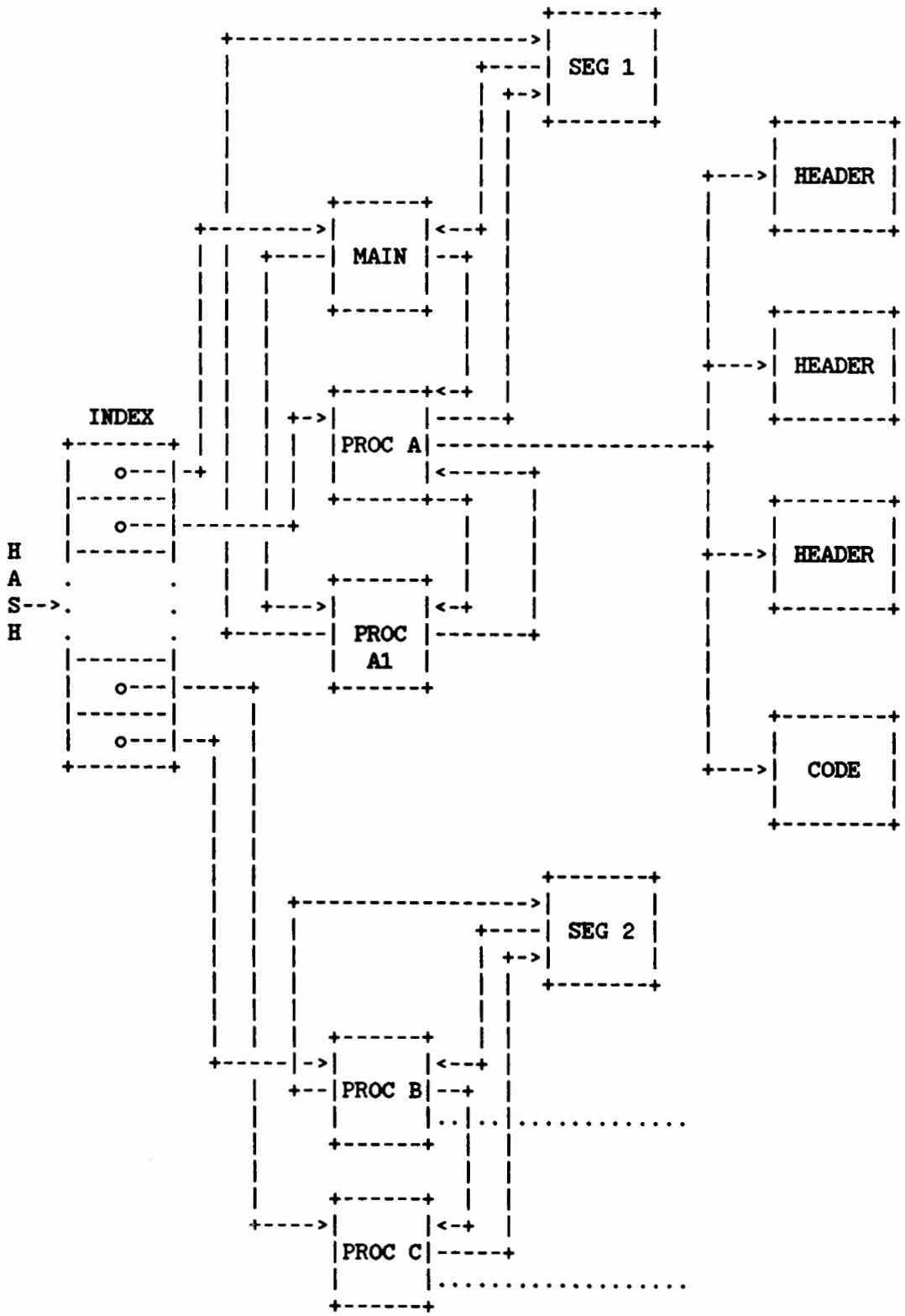


A \
K >SEGMENT NAME ENTRIES
B /

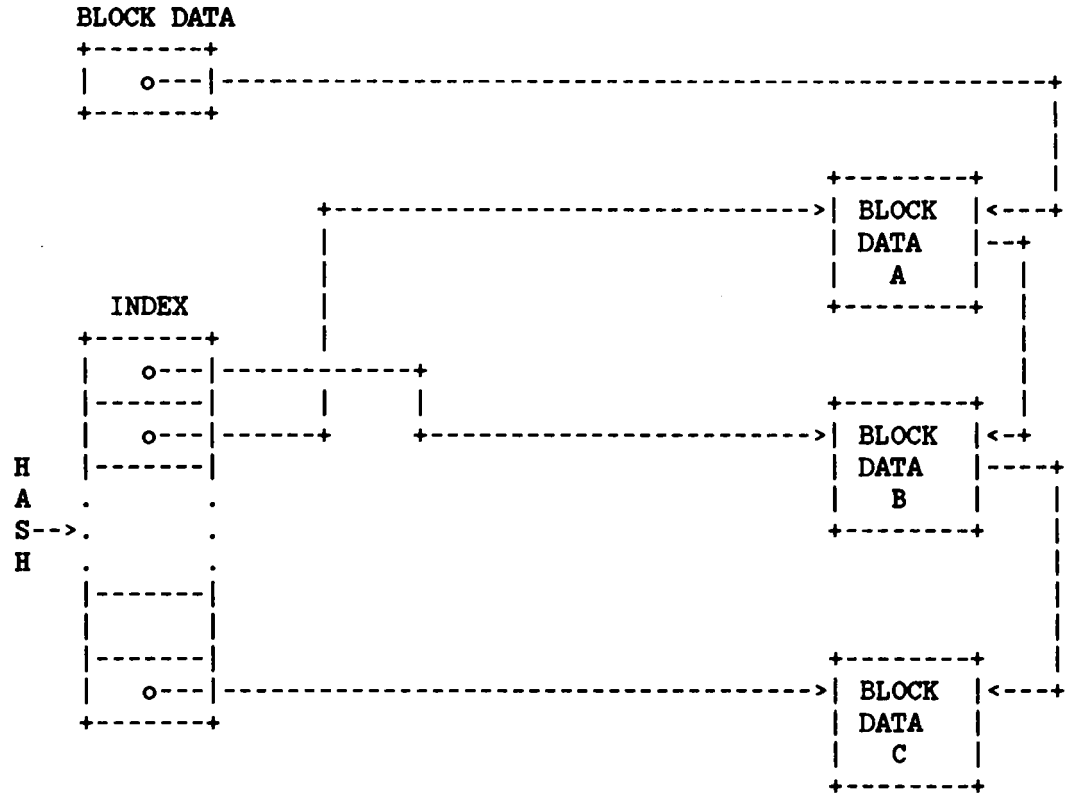
PROC C \
PROC A >SUBPROGRAM
MAIN / ENTRIES

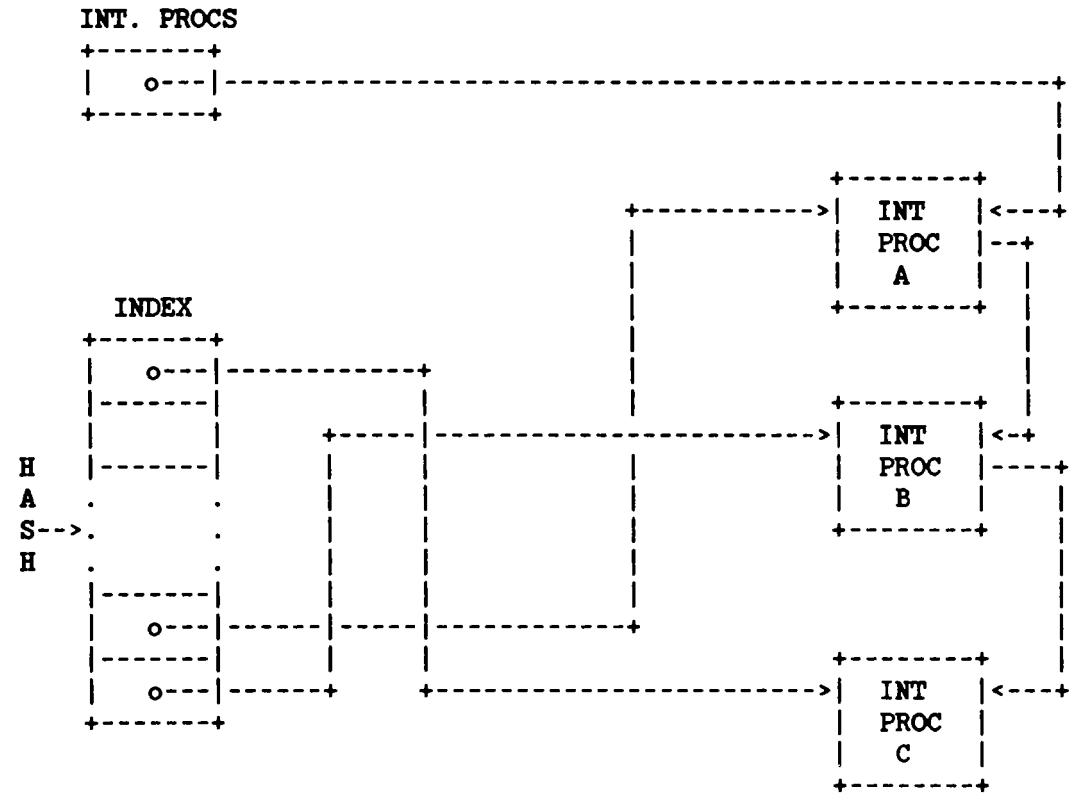
A \
3 |
A |
1 } SECONDRY ENTRY POINT ENTRIES
A |
5 /

General Entries

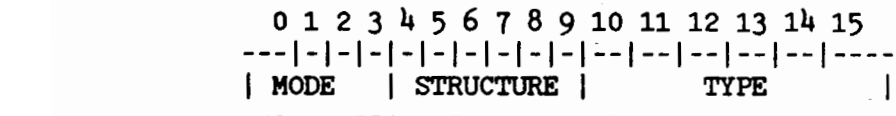


BLOCK DATA AND INTERRUPT PROCEDURE





DATA DESCRIPTORS, PASSED PARAMETERS



Computer Museum

TYPE	WORDS	CODE
NULL		0
LOGICAL	1	1
INTEGER	1	2
BYTE	1/2	3
REAL	2	4
DOUBLE	2	5
LONG	3	6
COMPLEX	4	7
LABEL (SPL)		10
CHARACTER	N/2	11
LABEL (FORTRAN)		12
UNIVERSAL (MATCHES ANY TYPE)		13

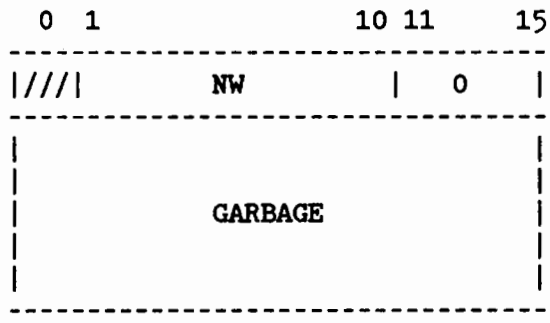
STRUCTURE	
SIMPLE VARIABLE	0
POINTER	1
ARRAY	2
PROCEDURE	3

MODE	
NULL	0
VALUE	1
REFERENCE	2
NAME	3

NOTE: A descriptor of 0 results in an automatic match.

DIRECTORY ENTRY TYPE 0

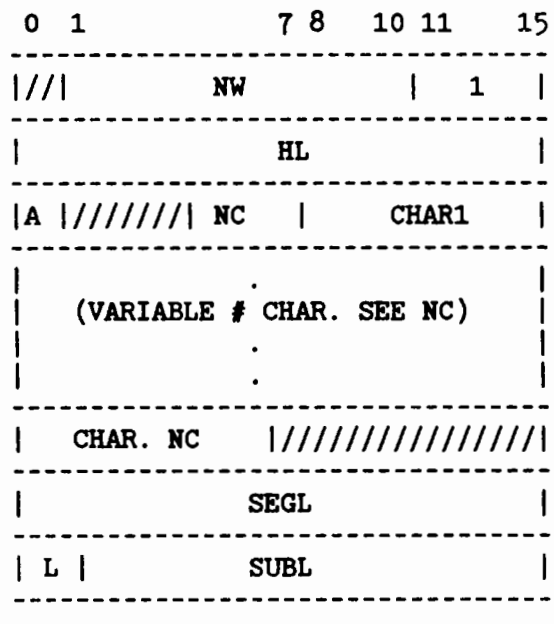
GARBAGE



NW - Number of words in this block

DIRECTORY ENTRY TYPE 1

SEGMENT NAME



NW - Number of words in entry block

HL - Hash link - points to next entry having the same hash code

A - Activity bit
0 if active
1 if inactive
(initialize to 0)

Note: An inactive segment implies that all entry points are inactive

NC - Number of characters in name. Max is 15

CHAR. 1 - First character in variable field

CHAR. NC - Last character in variable field

SEGL - Segment link - points to next segment name entry (0= End of list)

SUBL - Subprogram link - points to next entry having the same segment name

L - Last entry in list
0 if not last
1 if last

CLARIFICATION NOTES ON ENTRY TYPES 2 AND 4

WITH RESPECT TO SPL AND FORTRAN

*ENTRY TYPE 2 SPL O.B.	**ENTRY TYPE 4 SPL PROC	*ENTRY TYPE 2 FORTRAN MAIN	**ENTRY TYPE 4 FORTRAN SUB.
TPDB	0	0	0
1,5 TSDB	1 TSDB	1,2,3,4 TSDB	1,2,3,4 TSDB
NWPUST	NWPUST	NWPUST	NWPUST
5 NWSDB	NWO	NWD	NWD

WHERE:
- TPDB = Total primary DB length in words
- TSDB = Total secondary DB length in words
- NWPUST = Number of words in "TRACE" array
- NWSDB = Number of words in secondary DB array
- NWO = Number of words in own array
- NWD = Number of words in data array

Notes:
1. Does not include the length of the STLT
2. Does not include the length of the FLUT
3. Does not include the length of any common array
4. Includes the length of any DB-allocated format array
5. Are not necessarily equal

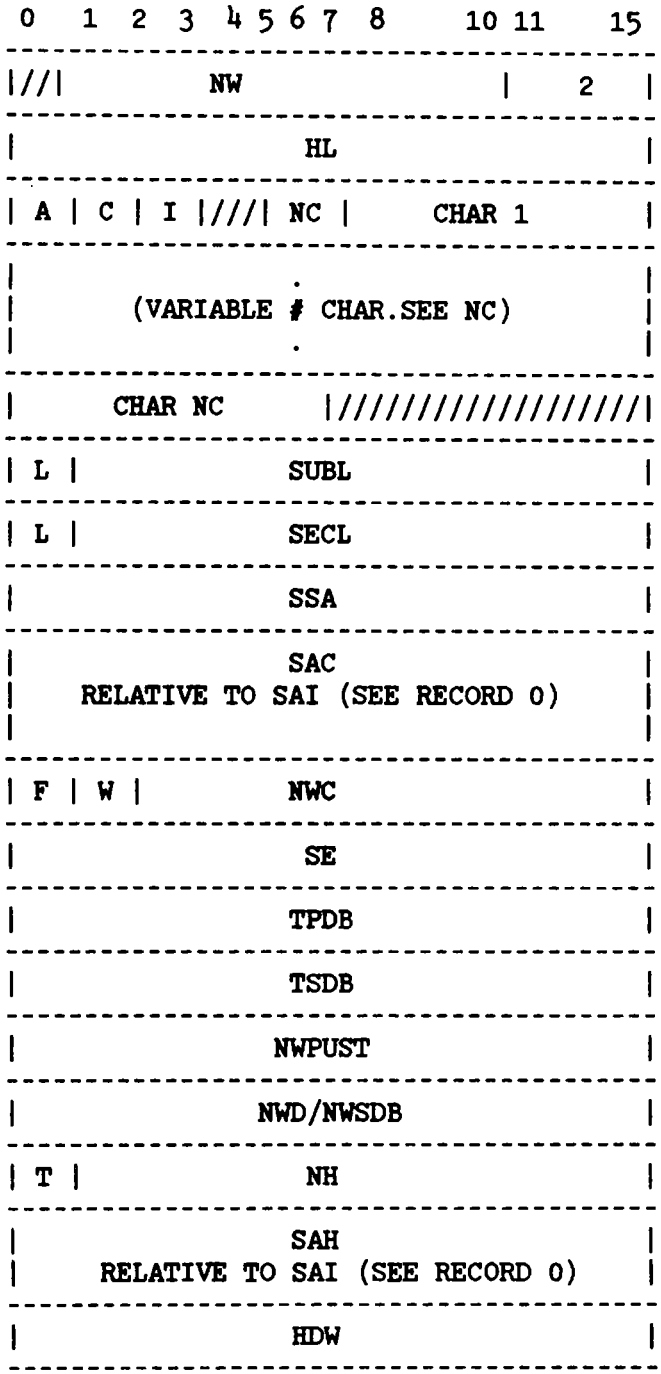
In general TPDB and TSDB are summations of storage allocated in the global area of the program's data segment. They are not, however, complete since the compilers are not aware of all storage actually allocated! The STLT and FLUT are examples of this since these tables are constructed by the segmenter. Common arrays also present a problem since their inclusion in TPDB and TSDB might cause their storage requirements to be counted more than once.

* See Entry Type 2 Format (Outer Block)

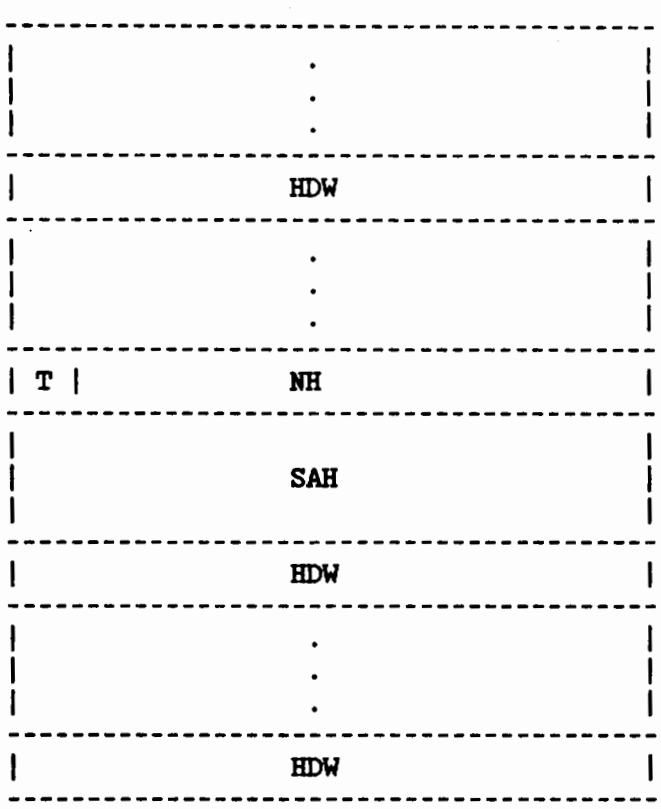
** See Entry Type 4 Format (Procedure).

DIRECTORY ENTRY TYPE 2

OUTER BLOCK



DIRECTORY ENTRY TYPE 2 (CONT.)



NW - Number of words in entry block.

HL - Hash link - points to next entry with same hash code.

A - Activity bit. 0 if active, 1 if inactive outer block.

C - Callability bit set if entry point is uncallable.

I - Priv mode bit - set if program unit is to be executed in priv mode.

NC - Number of characters in name. Max is 15.

CHAR. 1 - First character in variable field.

CHAR. NC - Last character in variable field.

L - Last entry in list.
0 if not last
1 if last

DIRECTORY ENTRY TYPE 2 (CONT.)

SUBL - Subprogram link - points to next entry having the same segment name.

SECL - Secondary entry point list link.

SSA - Program unit starting PB address.

SAC - Starting FILE address of code module

F - Set if fatal error

W - Set if non-fatal error

NWC - Number of words in code module.

SE - Stack size estimate

TPDB - Total number of words of primary DB to be allocated

TSDB - Total number of words of secondary DB to be allocated.

NWPUST - Number of words in trace array (PUST)

NWD - Number of words in data array (FORTRAN)

NWSDB - Number of words in secondary DB array (SPL)

T - Terminating bit - set if last set of headers in entry

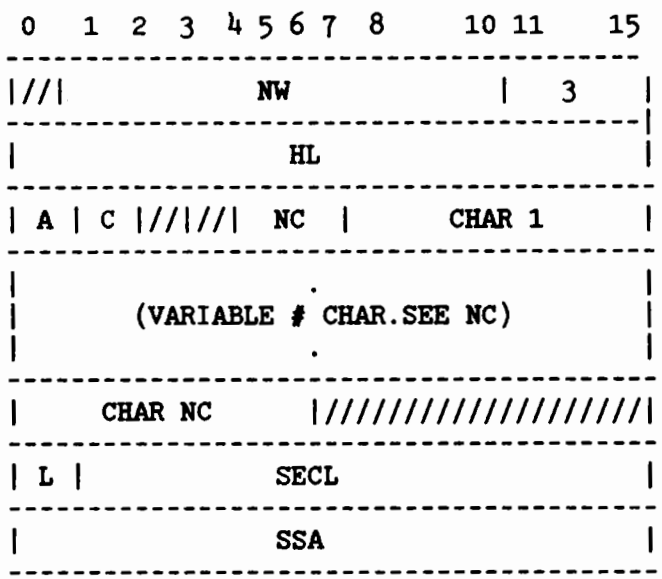
NH - Number of headers

SAH - Starting address of header (relative to SAI)

HDW - Header DESCRIPTOR (Word 0)

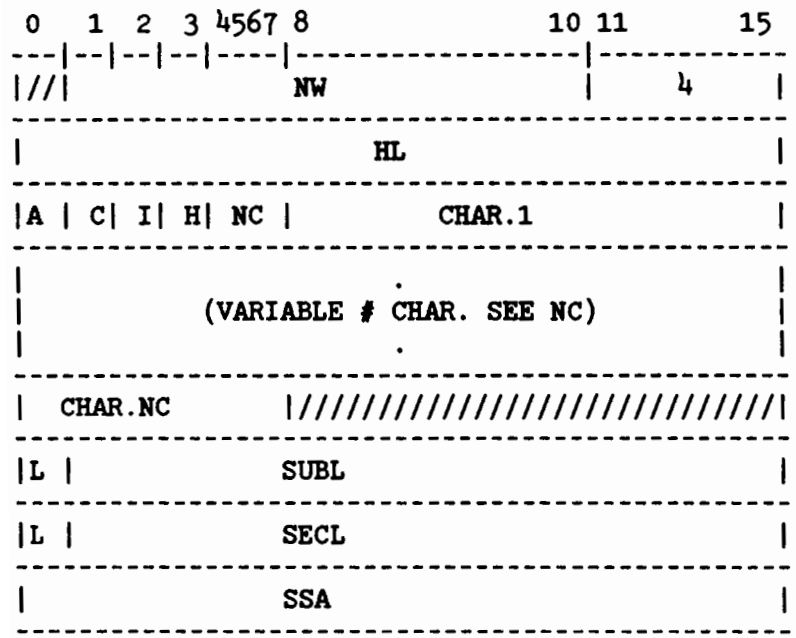
DIRECTORY ENTRY TYPE 3

OUTER BLOCK - SECONDARY ENTRY POINT

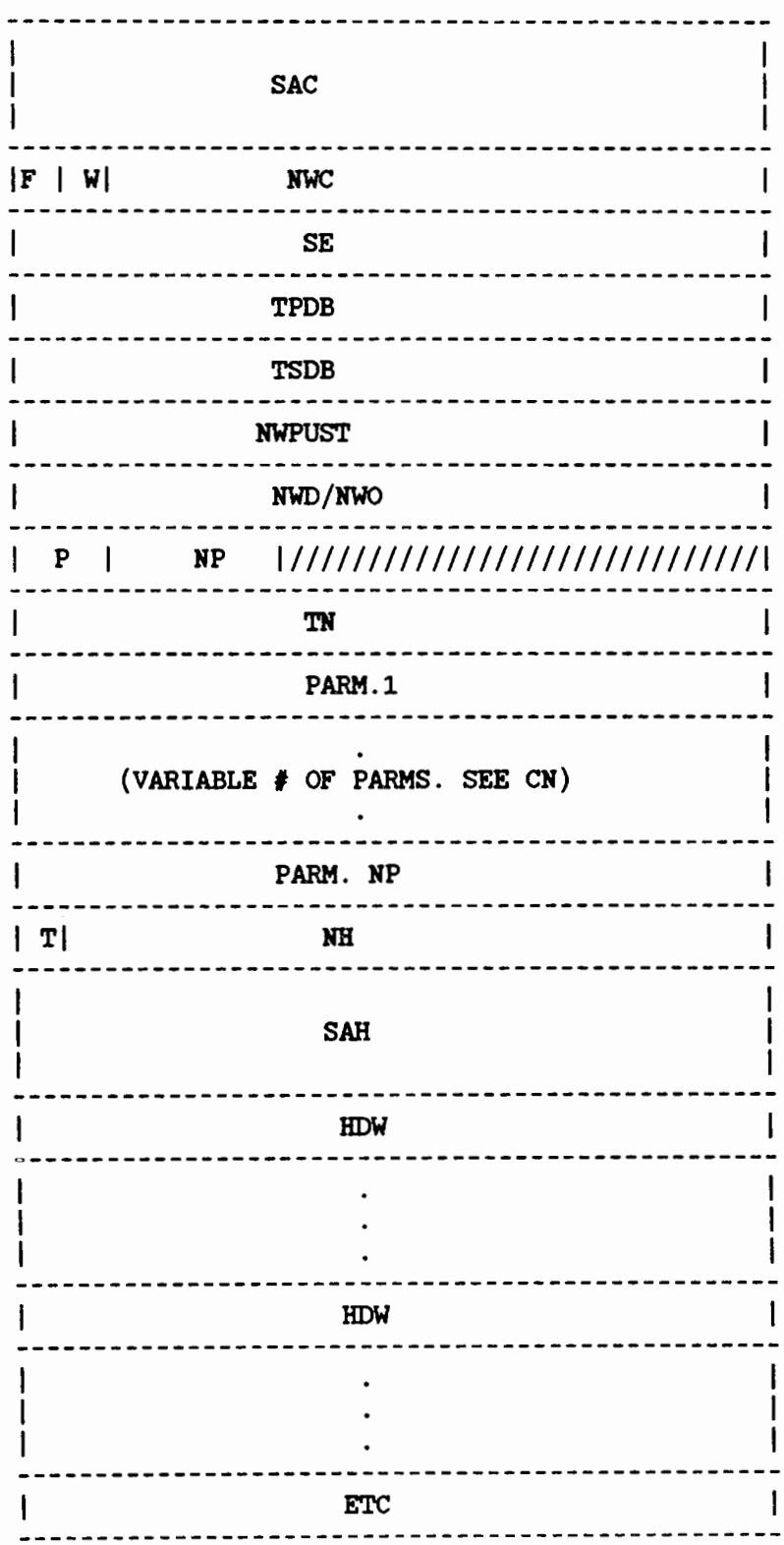


DIRECTORY ENTRY TYPE 4

PROCEDURE



DIRECTORY ENTRY TYPE 4 (CONT.)

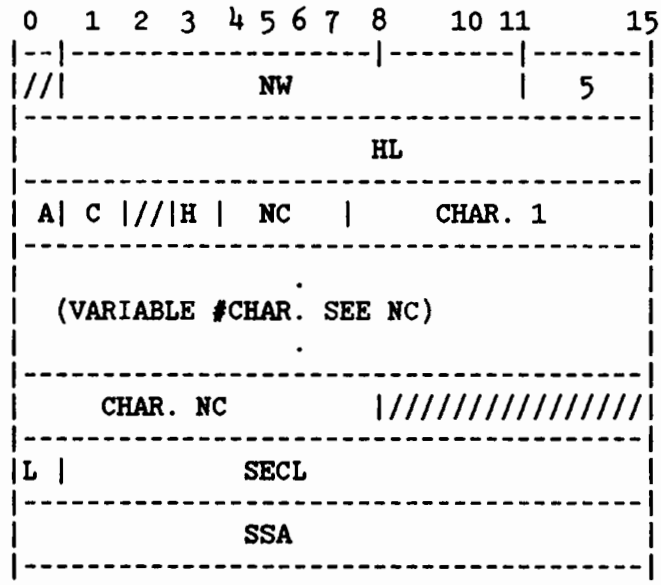


DIRECTORY ENTRY TYPE 4 (CONT.)

NW - Number of words in entry block
HL - Hash link - points to next entry with same hash code
A - Activity bit. 0 if active, 1 if inactive entry point
C - Callability bit set if entry point is uncallable
I - Priv mode bit. Set if procedure is to be executed in priv mode.
H - Hidden entry point. Set if entry point will not be in
library directory.
NC - Number of characters in name. Max is 15.
CHAR1 - First character in variable field.
CHAR NC - Last character in variable field.
L - Last entry in list
0 if not last
1 if last
SUBL - Subprogram link. Points to next entry having the same segment
Name
SECL - Secondary entry point list link.
SSA - Unit starting PB address
SAC - Starting (file) address of code module
F - Set if fatal error
W - Set if non-fatal error
NWC - Number of words in code module
SE - Stack size estimate
TPDB - Total number of words of primary DB to be allocated.
TSDB - Total number of words of secondard DB to be allocated.
NWPUST - Number of words in trace array (PUST)
NWD - Number of words in data array (FORTRAN)
NWO - Number of words in own array (SPL)
P - Parm checker
00 no checking. (Implies NP undefined, TN and PARM's absent)
01 check procedure type. (Implies NP is undefined and PARM's
absent)
10 check procedure type and number of PARM's (implies PARM's
absent)
11 check procedure type, number of PARM 's and type of each PARM.
NP - Number of PARM's
TN - Procedure Type
T - Terminating bit. Set if last set of headers in entry.
NH - Number of headers
SAH - Starting address of header
HDW - Header Descriptor (Word 0)

DIRECTORY ENTRY TYPE 5

PROCEDURE - SECONDARY ENTRY POINT



NW - Number of words in entry block

HL - Hash link - points to next entry with same hash code

A - Activity bit. 0 if active, 1 if inactive entry point

C - Callability bit set if entry point is uncallable.

H - Hidden entry point set if entry point will not be in library directory

NC - number of characters in name, max is 15

CHAR 1 - First character in variable field.

CHAR NC - Last character in variable name.

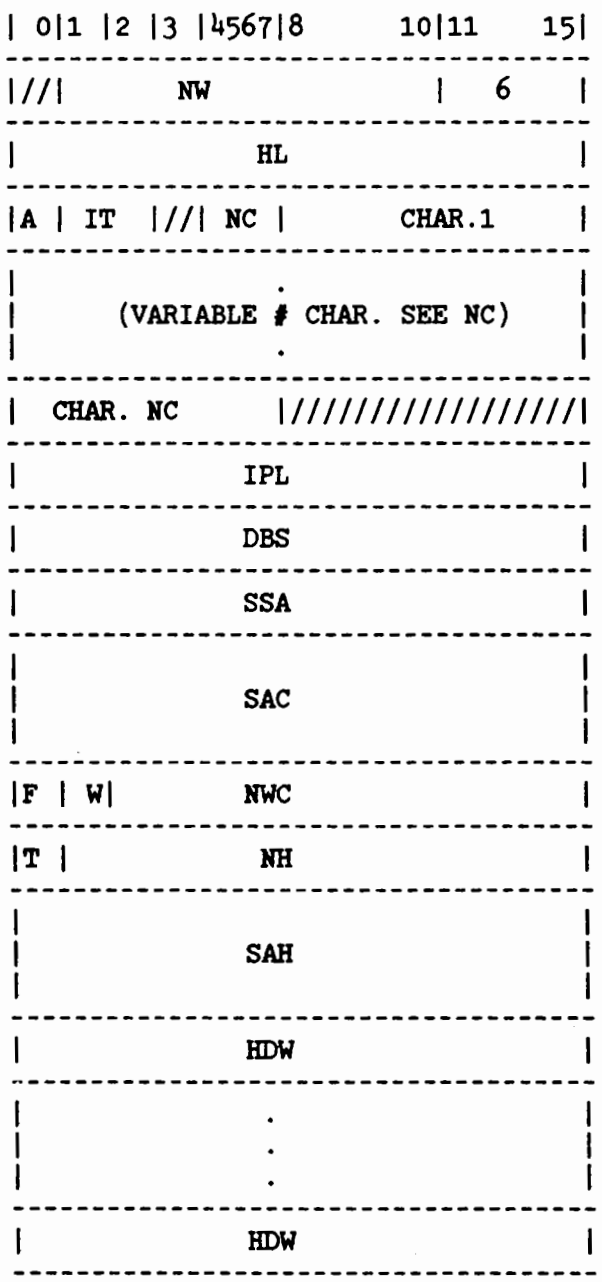
L - Last entry in list
0 if not last
1 if last

SECL - Secondary entry point list link

SSA - Unit starting PB' address

DIRECTORY ENTRY TYPE 6

INTERRUPT PROCEDURE



DIRECTORY ENTRY TYPE 6 (CONT.)

NW - Number of words in entry block

HL - Hash link. Points to next entry with same hash code

A - Activity bit. 0 if active, 1 if inactive entry.

IT - Interrupt procedure type number

NC - Number of characters in name (maximum is 15)

CHAR 1 - First character in variable field.

CHAR NC Last Character in variable field

IPL Interrupt procedure link

DBS Number of words of DB storage required.

SSA Unit starting PB' address

SAC Starting (file) address of code module.

F Set if fatal error

W Set if non-fatal error

NWC Number of words in code module

T Terminating bit. Set if last set of headers in entry.

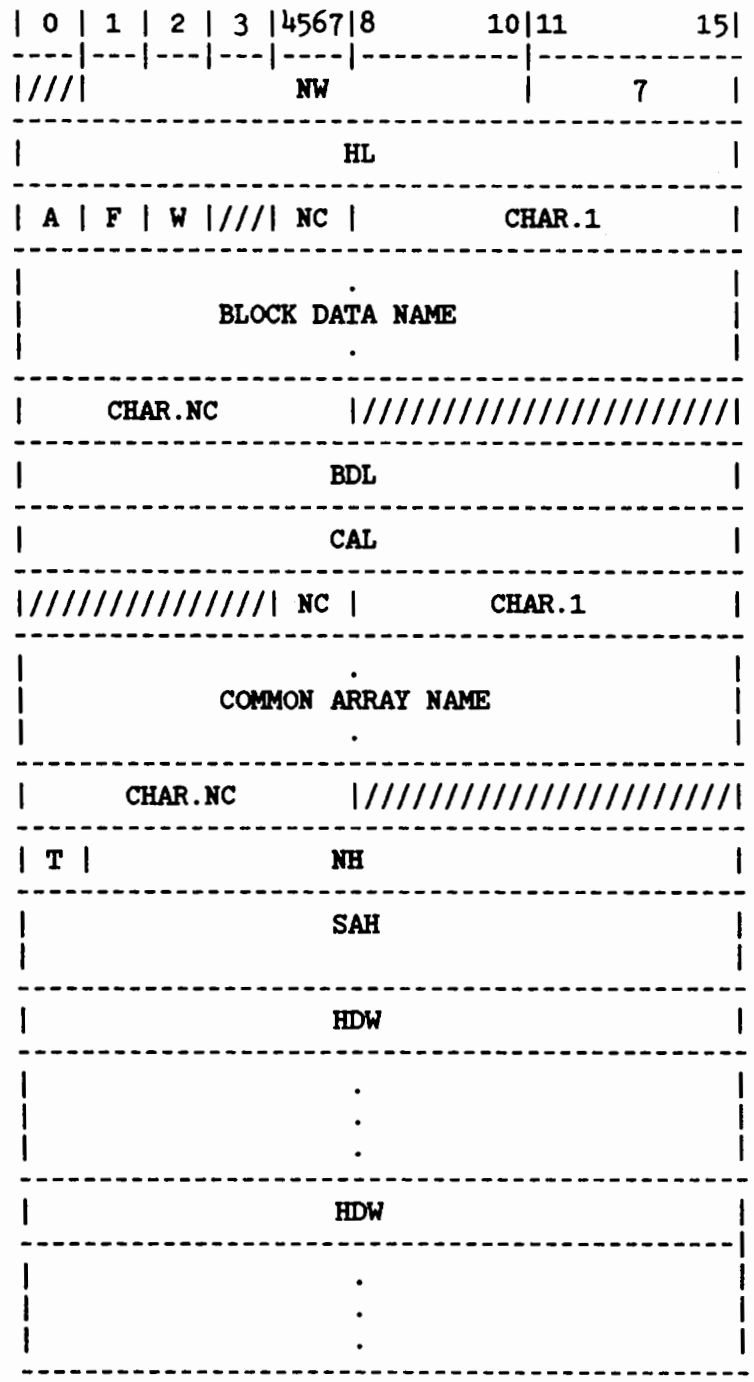
NH Number of headers

SAH Starting address of header.

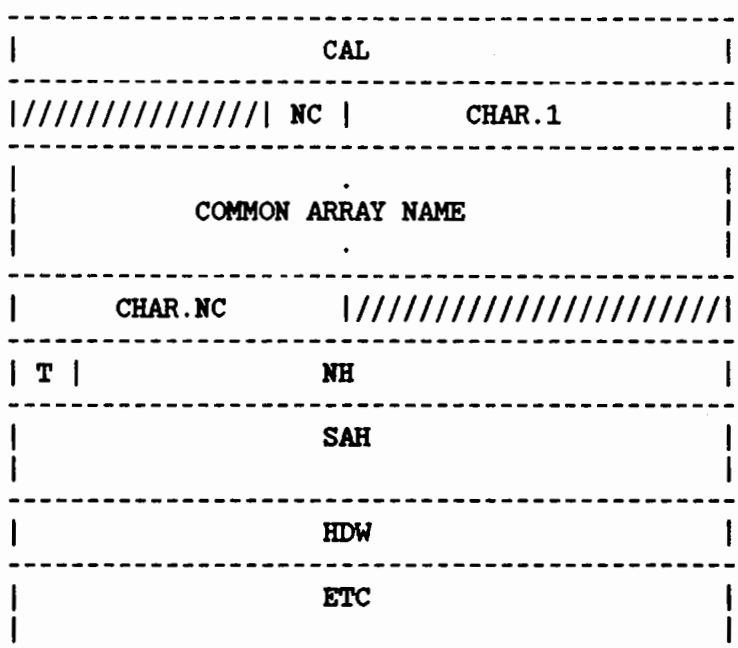
HDW Header Descriptor (Word 0)

DIRECTORY ENTRY TYPE 7

BLOCK DATA



DIRECTORY ENTRY TYPE 7 (CONT.)



NW Number of words in block

HL Hash link. Points to next entry with same hash code.

A Activity bit. 0 if active, 1 if inactive block.

F Set if fatal error.

W Set if non-fatal error.

NC Number of characters in name (max is 15).

CHAR 1 First character in variable field.

CHAR NC Last character in variable field.

BDL Block data link

CAL Common array length

T Terminating bit. Set if last set of headers in entry.

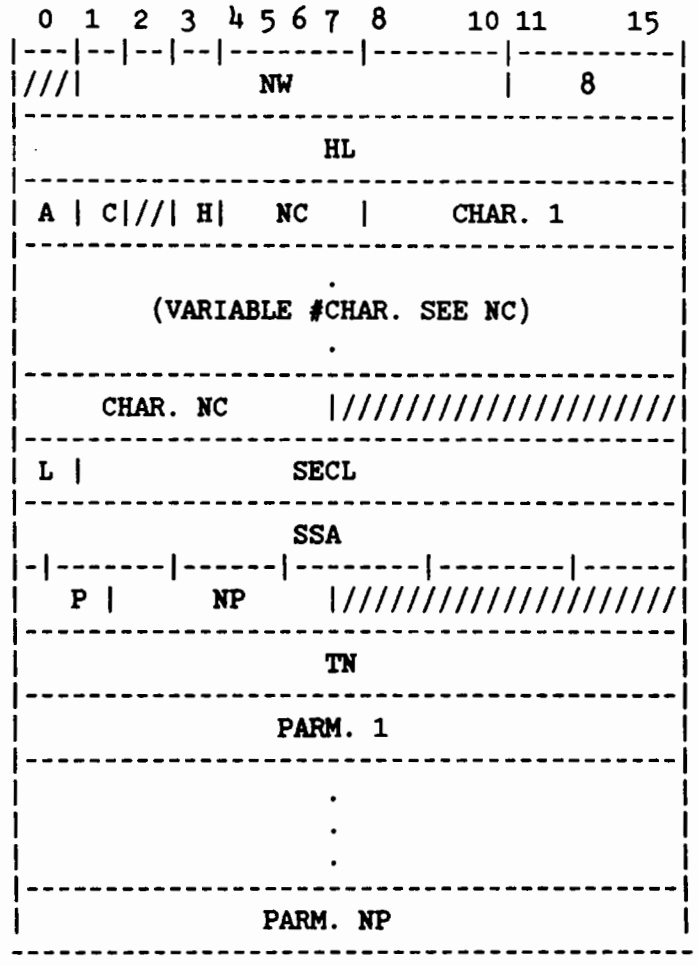
NH Number of headers.

SAH Starting address of headers.

HDW Header Descriptor (Word 0)

DIRECTORY ENTRY TYPE 8

PROCEDURE - SECONDARY ENTRY POINT



NW - NUMBER OF WORDS IN ENTRY BLOCK

HL - HASH LINK - POINTS TO NEXT ENTRY WITH SAME HASH CODE

A - ACTIVITY BIT. 0 IF ACTIVE, 1 IF INACTIVE ENTRY

C - CALLABILITY BIT SET IF ENTRY POINT IS UNCALLABLE

H - HIDDEN ENTRY POINT. SET IF ENTRY POINT WILL NOT BE IN LIBRARY DIRECTORY

NC - NUMBER OF CHARACTERS IN NAME. MAX IS 15

DIRECTORY ENTRY TYPE 8 (CONT.)

CHAR 1 - FIRST CHARACTER IN VARIABLE LIST

CHAR NC - LAST CHARTACTER IN VARIABLE
LIST

L - LAST ENTRY IN LIST
0 IF NOT LAST
1 IF LAST

SECL - SECONDARY ENTRY POINT LIST LINK

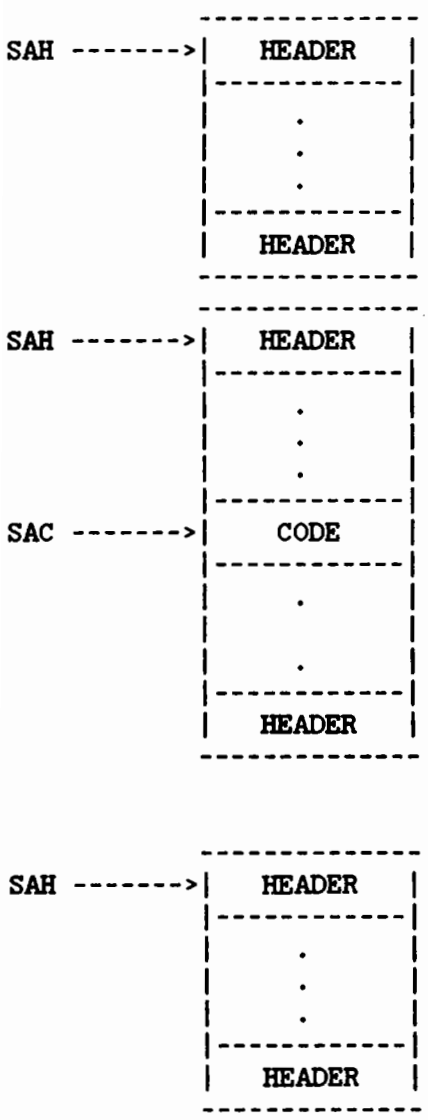
SSA - UNIT STARTING PB' ADDRESS

P - PARM CHECKER
00 NO CHECKING (IMPLIES NP UNDEFINED, TN AND PARMS ABSENT)
01 CHECK PROCEDURE TYPE (IMPLIES NP IS UNDEFINED AND PARMS ABSENT)
10 CHECK PROCEDURE TYPE AND NUMBER OF PARMS. (IMPLIES PARMS ABSENT)
11 CHECK PROCEDURE TYPE, NUMBER OF PARMS AND TYPE OF PARM.

NP - NUMBER OF PARMS

TN - PROCEDURE TYPE

ENTRY HEADER FORMAT



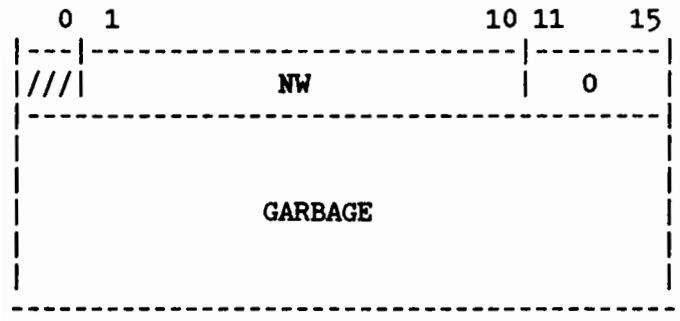
EACH ENTRY (EXCEPT SECONDARY ENTRY POINT ENTRIES) MAY DESCRIBE N> 0 SETS OF HEADERS. THE HEADERS IN EACH SET MUST BE CONTINUOUS AND IN THE SAME ORDER AS THE HOW LIST DESCRIBING THE SET.

THE CODE MODULE MAY BE PLACED IN ANY POSITION IN A HEADER SET. NOTE THAT IF THE CODE MODULE IS AT THE BEGINNING OF A SET, SAC = SAH.

IF THE ENTRY HAS NO HEADER SET, THEN NH, SAH SEQUENCE IS ABSENT.

HEADER TYPE 0

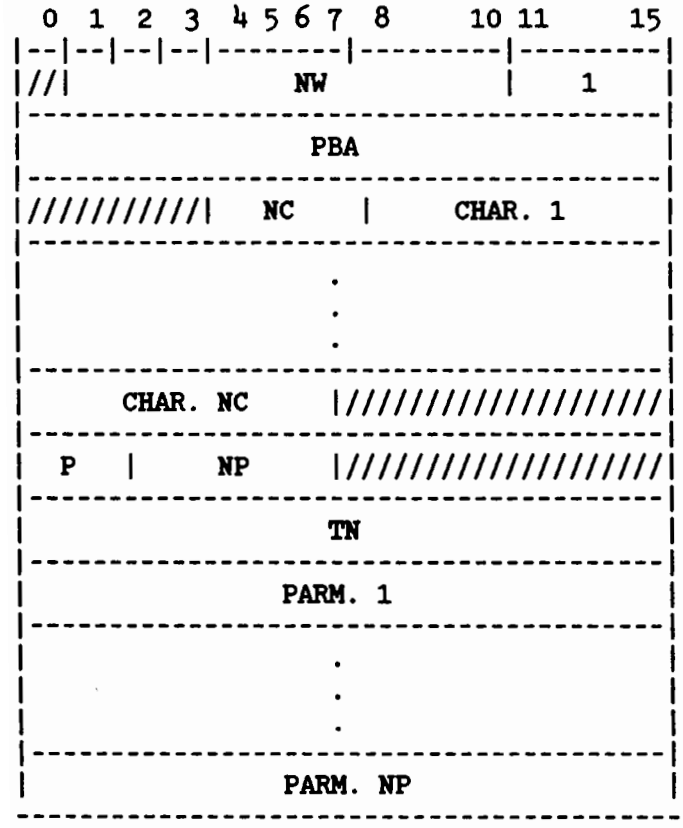
GARBAGE



Computer Museum

PCALs and LLBL

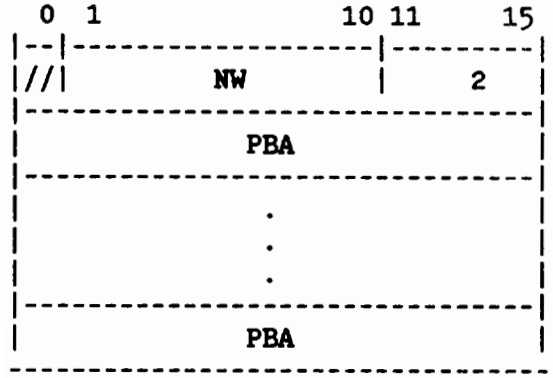
HEADER TYPE 1



PBA - PB' ADDRESS OF LINKED LIST OF PCAL or LLBL INSTRUCTIONS TO BE REPAIRED - LOWER 14 BITS USED AS NEGATIVE DISP. - BIT 0 SET MEANS THAT WORD IS A LLBL INSTRUCTION WITH A POINTER TO A SST LABEL OF ''EXTERNAL'' FORMAT - A LINK OF 0 TERMINATES THE LIST - BIT 1 SET MEANS THAT THE WORD IS TO BE INITIALIZED WITH THE PB ADDRESS OF THE PROCEDURE.

HEADER TYPE 2

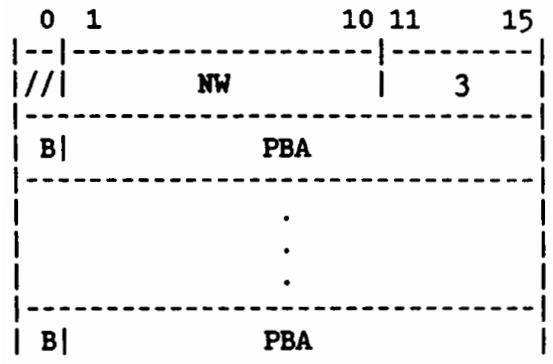
PB ADDRESSES



PBA - PB' ADDRESS OF PB ADDRESS
TO BE CORRECTED

HEADER TYPE 3

OWN/DATA VARIABLES



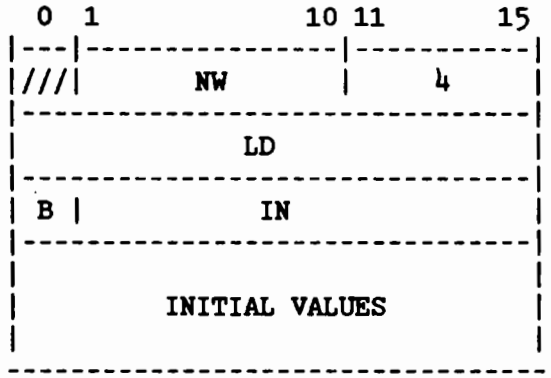
PBA - PB' WORD ADDRESS OF OWN VARIABLE
POINTER TO BE CORRECTED

B - is set =1 to mean that (PBA) is a
BYTE OFFSET.

(PBA) - Secondary DB-relative OFFSET.

HEADER TYPE 4

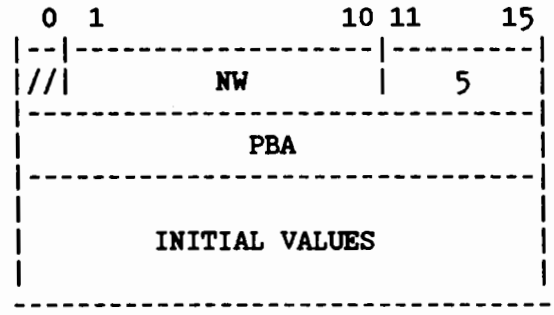
SDB/OWN/DATA/VALUES



LD - LOGICAL WORD DISPLACEMENT
IN OWN ARRAY FOR INITIAL VALUES
B - BYTE BIT-SET IMPLIES THAT LD IS A
BYTE OFFSET AND THAT THE FIRST
WORD OF THE INITIAL VALUE BLOCK
IS A COUNT OF THE NUMBER OF BYTES
IN THE INITIAL VALUE BLOCK
IN - INTERATION NUMBER - NUMBER OF
TIMES THE BLOCK OF INITIAL VALUE
IS TO APPEAR IN THE SECONDARY DB -
1->NO DUPLICATION,
2->DUPLICATION, ETC

HEADER TYPE 5

PUST

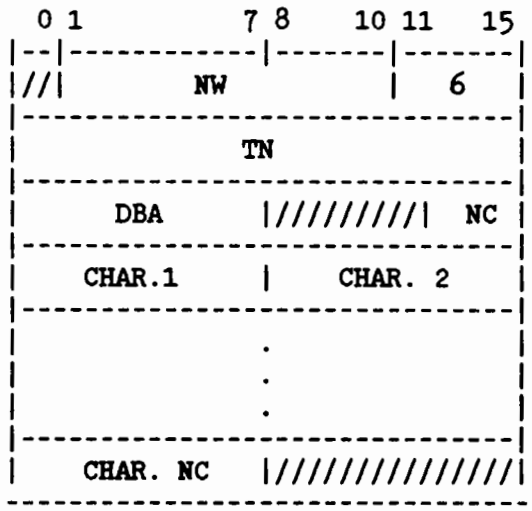


PBA - PB' ADDRESS OF LINKED LIST OF
POINTERS TO BE INITIALIZED WITH
DB ADDRESS OF PUST (SAME LIST
FORMAT AS FOR FORMAT STRINGS)
A PBA of -1 INDICATES NO FIX-UPS.

NOTE: ALL REFERENCES TO THE PUST INCLUDE THE FOUR-WORD HEADER
THAT IS APPENDED BY THE SEGMENTER. THESE WORDS ARE NOT
PRESENT IN THE HEADER; THEY ARE AUTOMATICALLY
ALLOCATED AND INITIALIZED BY THE SEGMENTER.

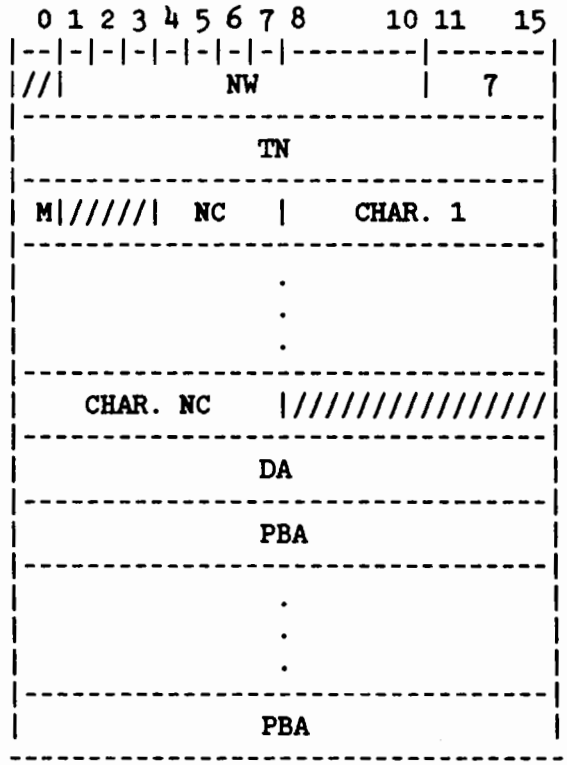
HEADER TYPE 6

GLOBAL VARIABLES



HEADER TYPE 7

EXTERNAL VARIABLES



PBA-PB' address of linked list of instructions to be repaired;lower 8 bits of inst. used as neg. displacement to next instruction;a link of 0 terminates the list.

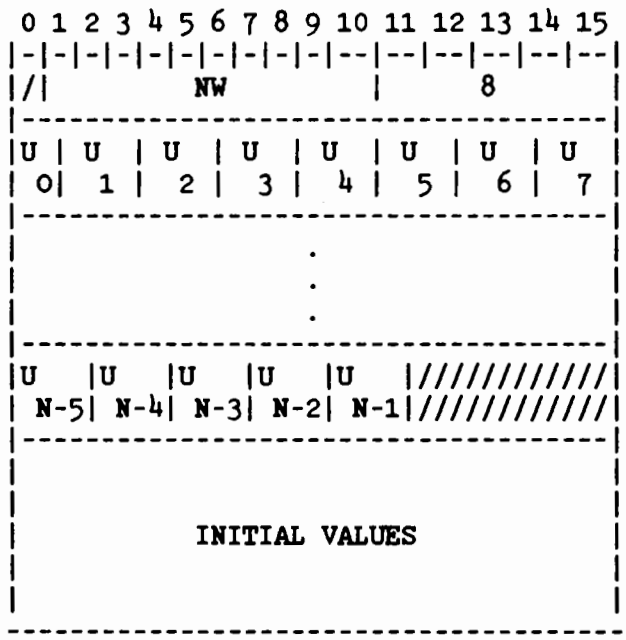
M -Monitored variable bit;set if variable is being monitored by debug.

DA -Logical word disp. in PUST; lower 8 bits of word will be init. with prim.DB address of variable;DA is present only if M=1.

NOTE:PBA of -1 implies null list

HEADER TYPE 8

PRIMARY DB



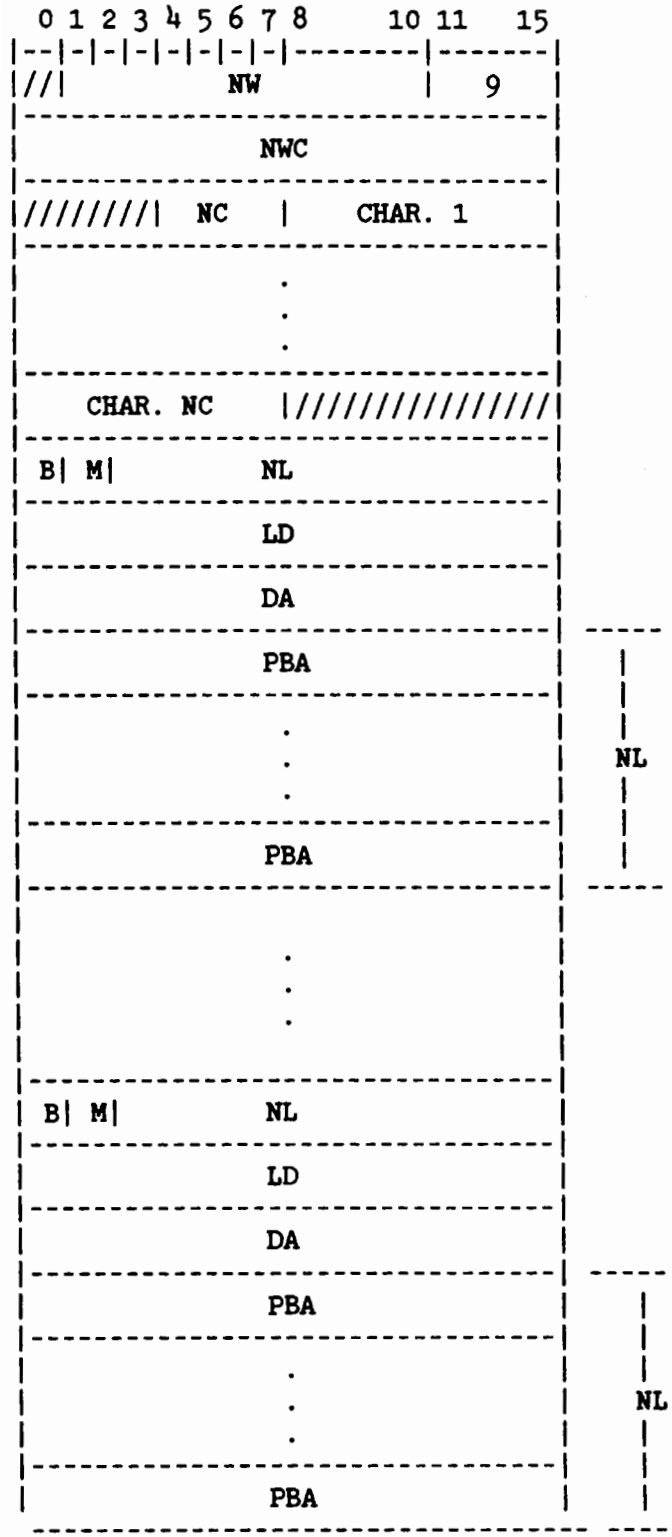
U - ADDRESS BITS
- 00 IF NO ADDRESS
- 01 IF NO ADDRESS
- 10 IF WORD ADDRESS IN SECONDARY DB
- 11 IF BYTE ADDRESS IN SECONDARY DB

N - NWPDB

NOTE: INITIAL ADDRESSES THAT ARE SECONDARY DB ADDRESSES ARE 0 RELATIVE (I.E., THEY ARE LOGICAL DISPLACEMENTS IN SECONDARY DB).

HEADER TYPE 9

COMMON VARIABLES



HEADER TYPE 9 (CONT.)

NWC - NUMBER OF WORDS IN COMMON ARRAY

NC - NUMBER OF CHARACTERS IN COMMON NAME- IF BLANK COMMON 4 COM'

DA - LOGICAL WORD DISP. IN PUST - LOWER 8 BITS OF WORD WILL BE INIT. WITH PRIM. DB ADDRESS OF VARIABLE - NOTE DA IS PRESENT only if M = 1

B - BYTE BIT
0 IF THE PRIMARY DB POINTER TO BE ALLOCATED AND INITIALIZED AND LD ARE OF TYPE WORD
1 IF TYPE BYTE

M - MONITORED VARIABLE BIT - SET IF VARIABLE IS BEING MONITORED BY DEBUG

NL - NUMBER OF ADDRESS LISTS FOR VARIABLE

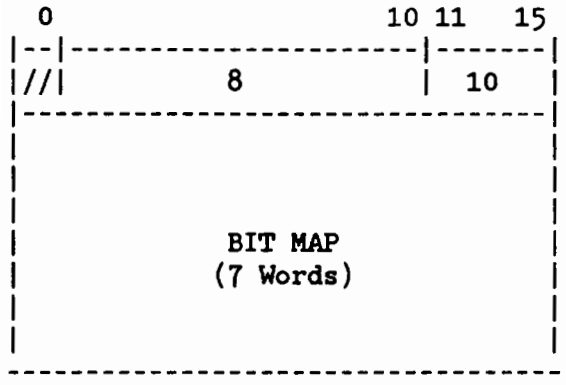
LD - LOGICAL DISPLACEMENT OF VARIABLE IN COMMON ARRAY

PBA - PB' ADDRESS OF LINKED LISTS OF INSTRUCTIONS TO BE REPAIRED
LOWER 8 BITS USED AS NEGATIVE DISPLACEMENT TO NEXT INSTRUCTION
A LINK OF 0 TERMINATES THE LIST

PBA = -1 INDICATES NO FIX-UPS

HEADER TYPE 10

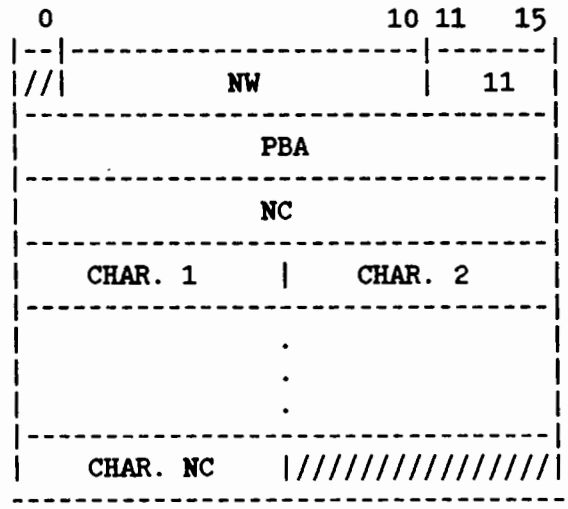
LOGICAL UNITS



BIT MAP - BIT MAP OF LOGICAL UNITS REFERENCED; BIT 0 CORRESPONDS TO LU 0, ETC. (1 LESS THAN OR EQUAL TO LU LESS THAN OR EQUAL TO 99)
1 <= LU <= 99

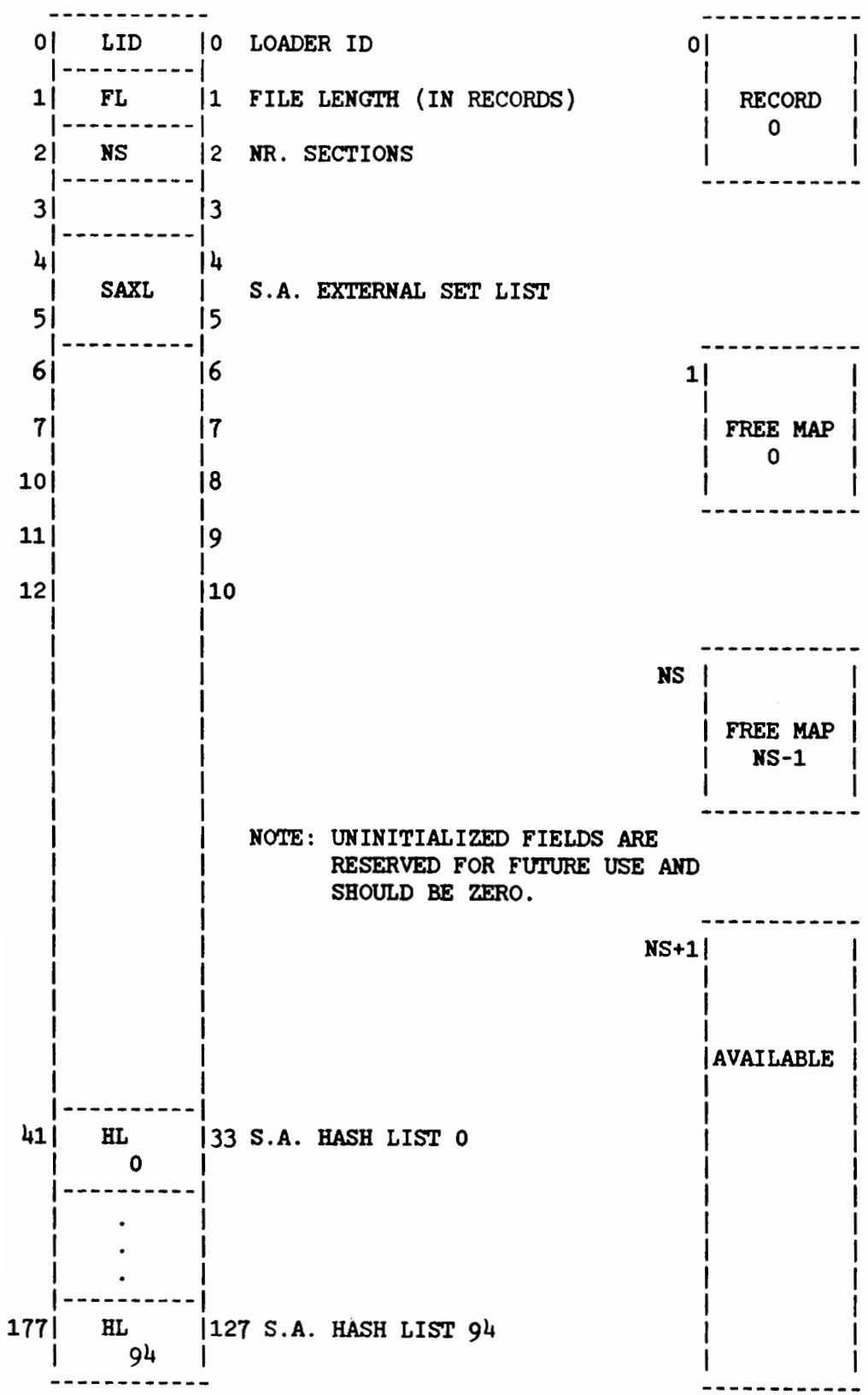
HEADER TYPE 11

FORMAT STRING



PBA - PB' ADDRESS OF LINKED LIST OF POINTERS TO BE INITIALIZED--LOWER 14 BITS OF WORD USED AS NEGATIVE DISPLACEMENT TO NEXT POINTER - BIT 0 SET MEANS THAT THE POINTER IS TO BE TYPE BYTE - A LINK OF 0 TERMINATES THE LIST.

RL FILE FORMAT

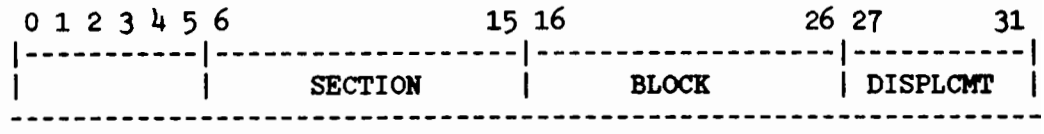


FILE SPACE IS MANAGED IN TERMS OF 32 WORD BLOCKS (4 BLOCKS PER 128 WORD RECORD).

FREE SPACE (BLOCKS) IS ACCOUNTED FOR IN A BIT MAP, WHICH IS PARTITIONED INTO RECORDS (2K BLOCKS PER SECTION). A 0 INDICATES THAT A BLOCK IS USED, A 1 INDICATES THAT IT IS FREE.

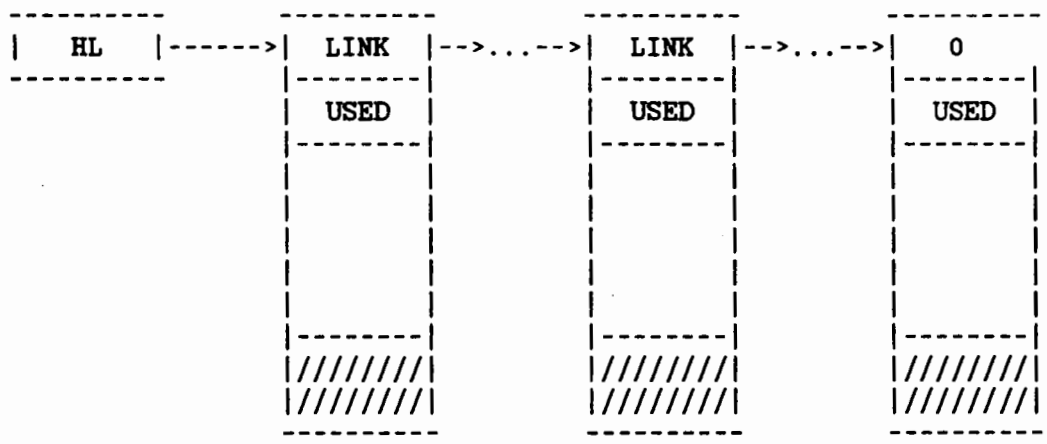
FILE SPACE IS ALSO PARTITIONED INTO 512 RECORD SECTIONS (64 MAX. SECTIONS, 2K BLOCKS PER SECTION, 1 MAP PER SECTION). THE NUMBER OF SECTIONS IN A FILE IS NS=(FL+511) & LSR(9). THE FIRST NS RECORDS FOLLOWING RECORD 0 (RECORDS 1 TO NS) ARE RESERVED FOR THE SECTION MAPS.

A COMPLETE FILE ADDRESS WOULD HAVE THE FOLLOWING CONFIGURATION:



FILE (WORD) ADDRESS
DOUBLE WORD

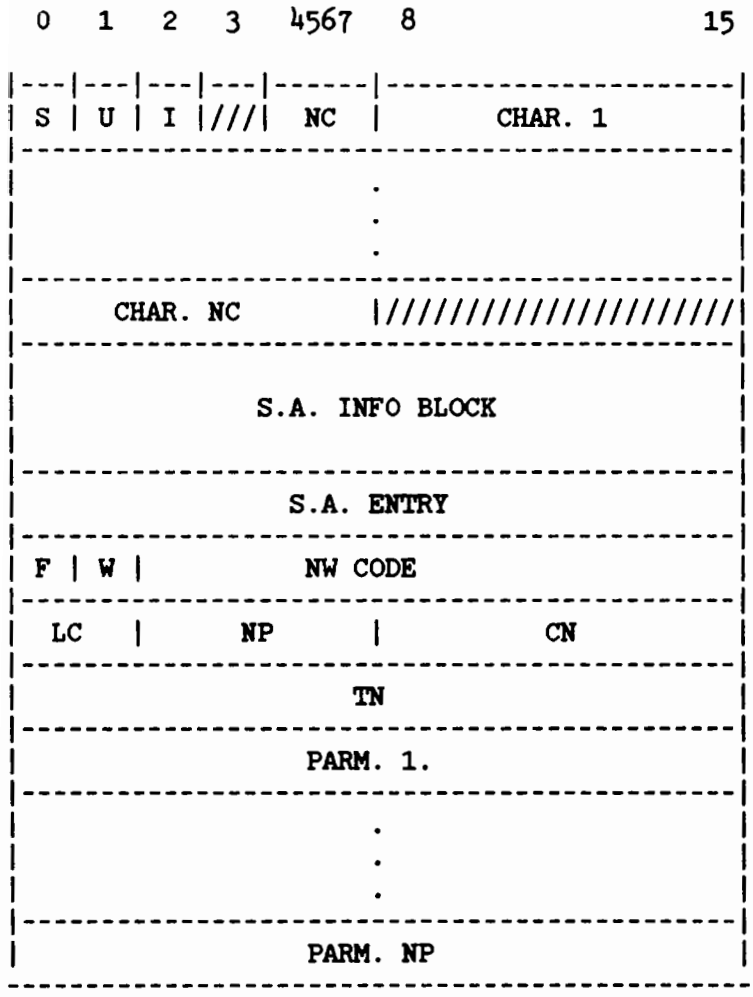
ENTRY POINT DIRECTORY



THE DIRECTORY IS PARTITIONED INTO 95 HASH LISTS (SAME HASH FUNCTION AS USL); EACH HASH LIST IS A LINKED LIST OF RECORDS.

EACH RECORD CONTAINS A SUCCESSOR LINK (RECORD #) AND A USED SPACE COUNT. A LINK OF 0 TERMINATES A LIST. WHEN A RECORD IS VOID OF ENTRIES (USED=2), ITS SPACE IS RETURNED TO THE FREE STORAGE AREA.

TYPICAL DIRECTORY ENTRY



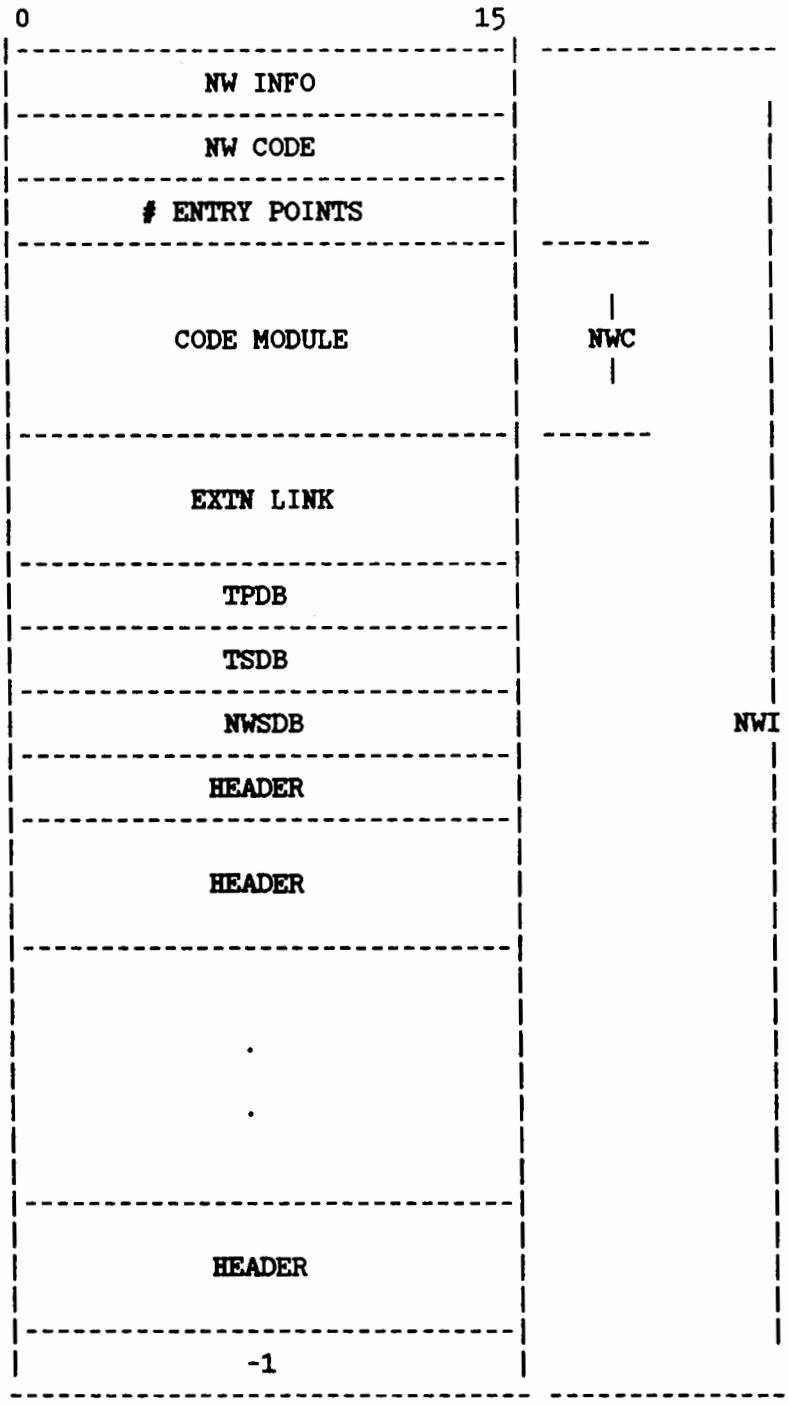
S - SECONDARY ENTRY POINT BIT - SET IF
THE ENTRY POINT WAS ORIGINALLY A
SECONDARY ENTRY POINT.

U - UNCALLABLE BIT - SET IF ENTRY POINT
IS UNCALLABLE.

I - PRIVILEGED MODE BIT - SET IF CODE
MODULE IS TO BE RUN IN PRIV. MODE.

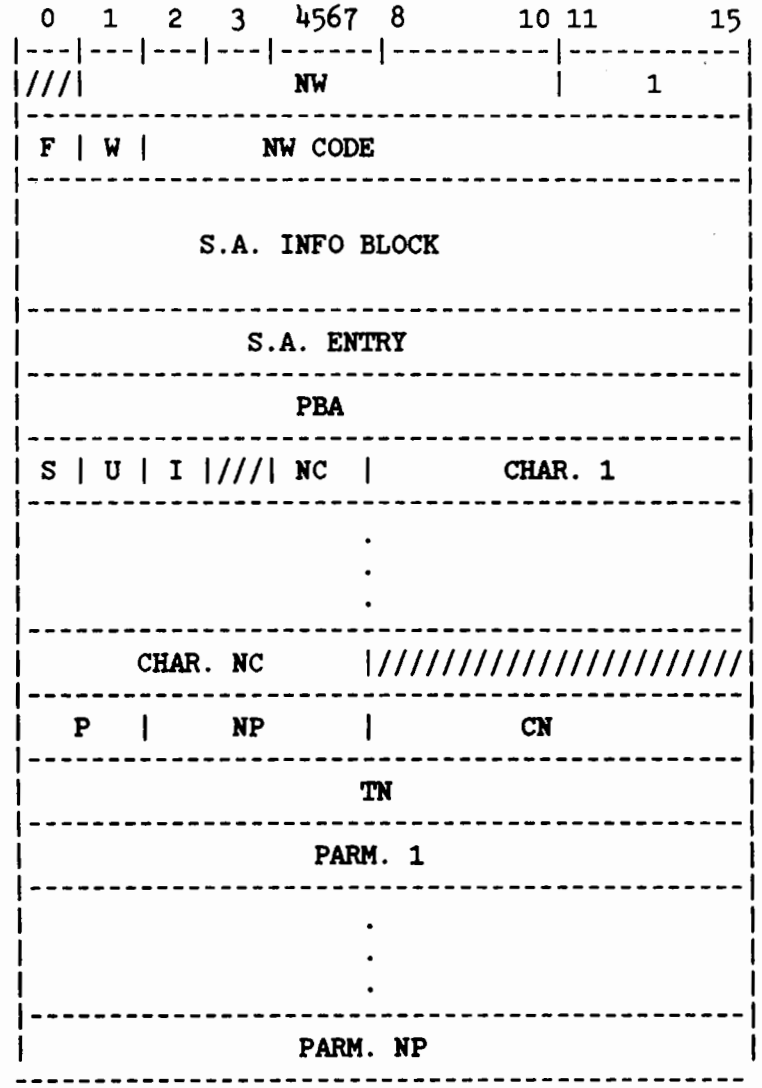
LC is (0:2)...Level of Checking
0 = No checking
1 >= Check for procedure type
2 >= Check for # parameters
3 >= Check for parameter type
NP is (2:6) is # parameters

PROCEDURE INFO BLOCK



ALL HEADERS FOR THE PROCEDURE ARE APPENDED TO THE INFO BLOCK. THE HEADER SETS (EXTERNAL LISTS) ARE LINKED BY INCREASING FILE ADDRESS; A LINK OF %17777777777D TERMINATES THE LIST.

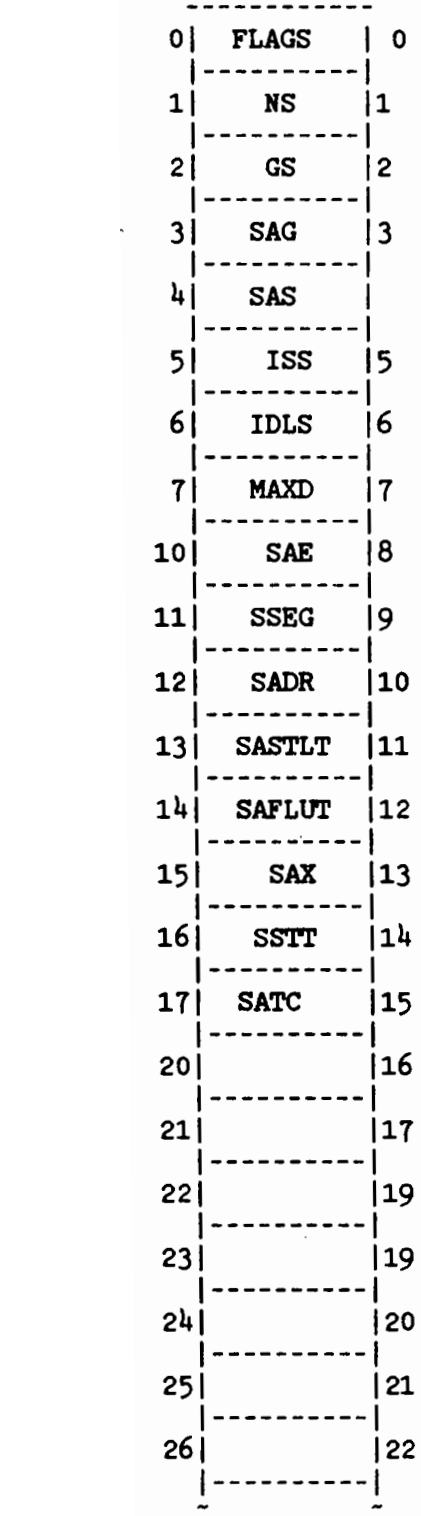
HEADERS



F - SET IF FATAL ERROR
W - SET IF NON-FATAL ERROR
S - SATISFIED BIT - SET IF EXTERNAL IS
SATISFIED WITHIN RL.
U - UNCALLABLE BIT
I - PRIVILEGED BIT

ALL HEADERS ARE THE SAME AS IN A USL EXCEPT FOR THE PCAL HEADER.

PROGRAM FILE FORMAT



NUMBER OF CODE SEGMENTS

GLOBAL SIZE (DB TO QI) IN WORDS

GLOBAL AREA RECORD #

SEGMENT SET RECORD # (EACH SEG. STARTS IN NEW RECORD)

INITIAL STACK SIZE IN WORDS

INITIAL DL SIZE IN WORDS

MAX. DATA SEGMENT SIZE (DL TO Z) IN WORDS

ENTRY POINT LIST RECORD #

STARTING SEGMENT #

PRIN. ENTRY PT PB ADDRESS

DB ADR. OF STLT (-1 IF NO STLT)
(STLT=Segment Length Table)

DB ADR. OF FLUT (-1 IF NO FLUT)

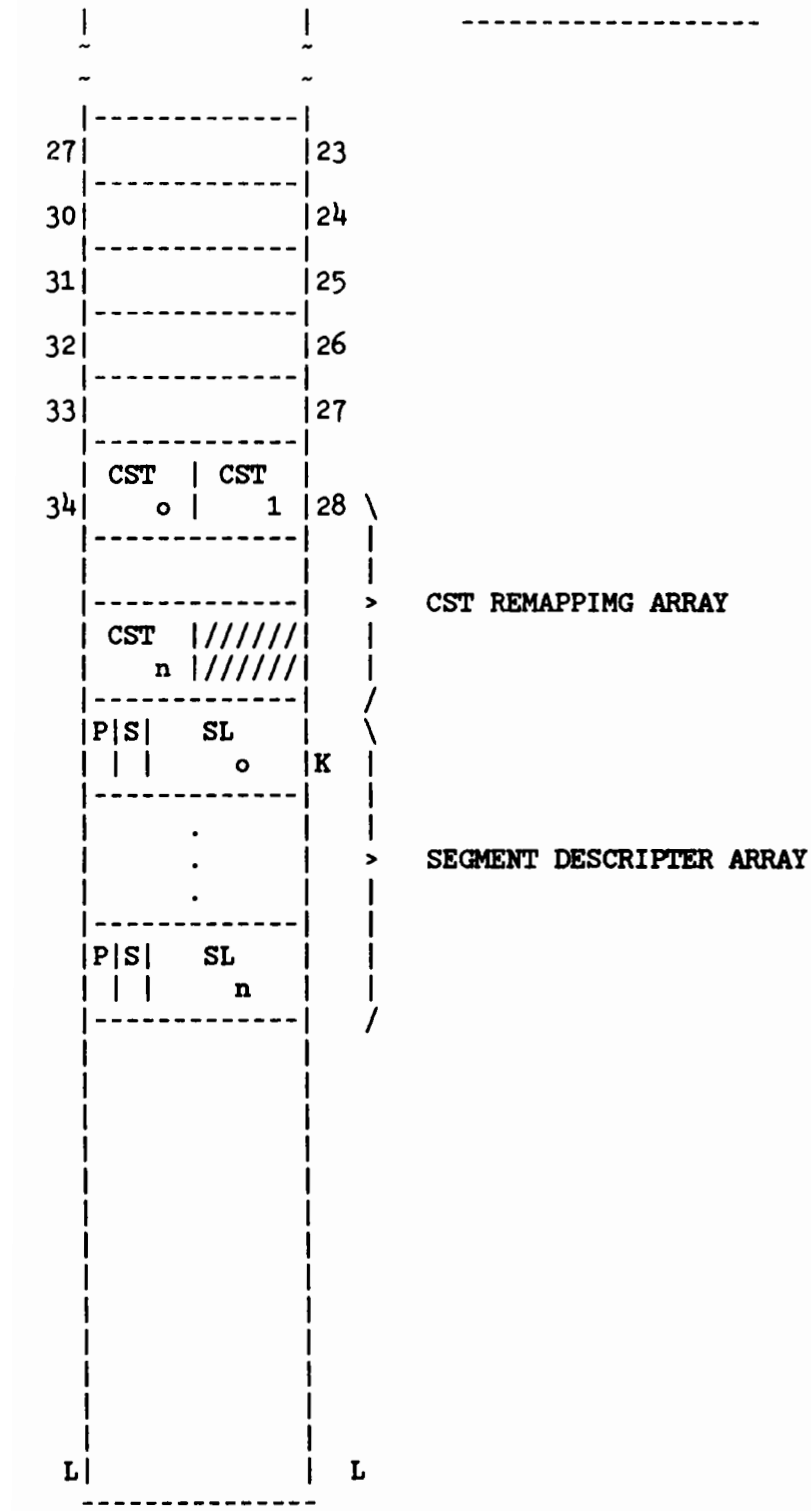
EXTERNAL LIST RECORD #

PRIN. ENTRY PT SST #

STARTING ADDRESS OF TRAPCOM'

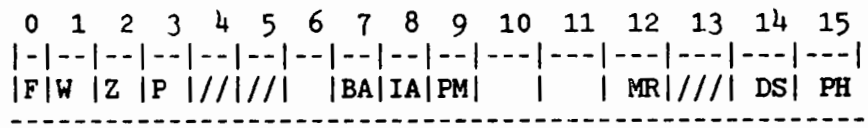
NOTE: UNINITIALIZED FIELDS ARE RESERVED FOR FUTURE USE AND SHOULD BE ZERO.

PROGRAM FILE FORMAT (CONT.)



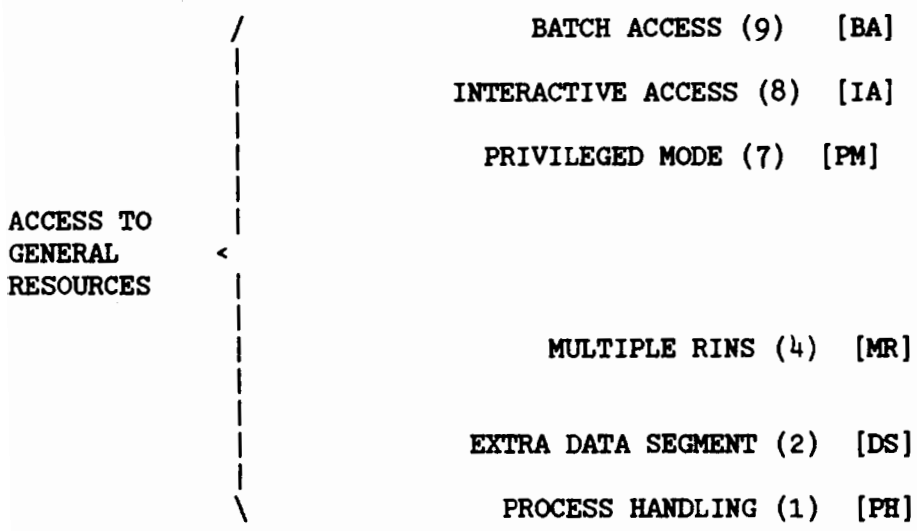
P-PRIVILEGED MODE
S-Segment STT format: 0=> old format, 1=> new (extended) format
N=NS -1
K=28 + (NS +1) & LSR (1)
L=((28 + NS + (NS + 1)&LSR(1) + 127)/128)128 - 1

FLAGS



F - FATAL ERROR IN PROGRAM
W - NON-FATAL ERROR IN PROGRAM
Z - ZERO UNIT DL AREA
P - SET IF ANY SEG IS PRIV. (IF NOT SET NORMAL= NONPRIV MODE)

CAPABILITIES



CST REMAPPING ARRAY

CONTAINS THE LAST CST NUMBERS ASSIGNED TO THE SEGMENTS; INDEXED BY SEGMENT NUMBER. WHEN A PROGRAM FILE IS PREPARED, THE ARRAY IS INITIALIZED TO 0, 1...,N. THIS ARRAY IS USED TO RE-ESTABLISH INTRA-PROGRAM LINKAGE WHEN THE PROGRAM IS LOADED.

SEGMENT DESCRIPTER ARRAY

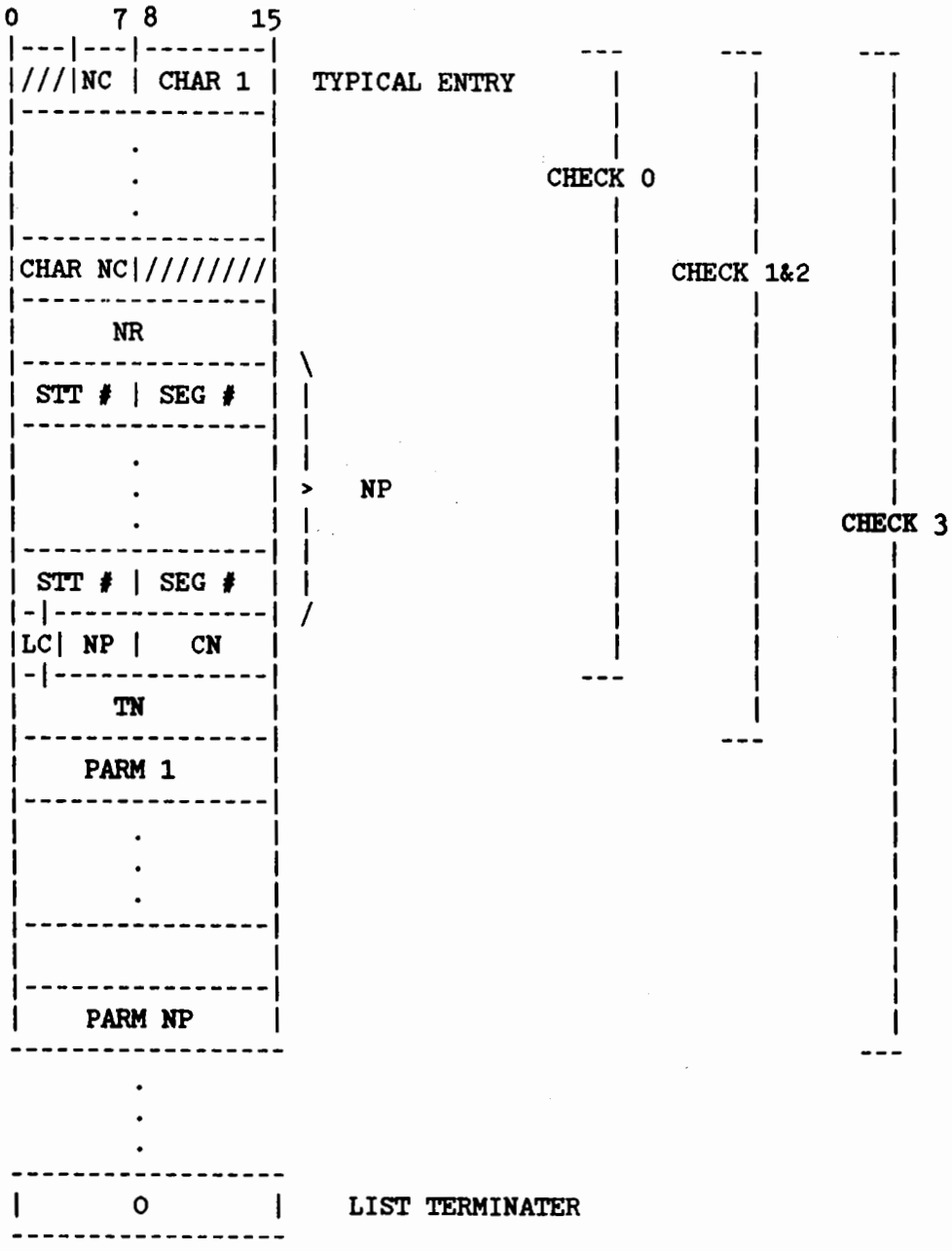
CONTAINS THE SEGMENT LENGTH AND A FLAG INDICATING IF THE SEGMENT IS TO BE LOADED IN PRIV. MODE. INDEXED BY SEGMENT NUMBER. ALL SEGMENTS BEGIN ON A RECORD BOUNDARY. THE NUMBER OF RECORDS FOR A GIVEN SEGMENT IS (SL + 127) & LSR(7). THE RECORD NUMBER, SAS, OF SEGMENT N IS

```
SAS:=0
FOR I=0 TO N-1
 BEGIN
 SAS:=SAS + (SL(I) + 127)&LSR(7)
 END
```

GLOBAL AREA FORMAT

A SET OF RECORDS CONTAINING THE INITIAL VALUES FOR THE GLOBAL AREA OF THE DATA SEGMENT. THIS SET BEGINS AT RECORD SAG (WORD 3) AND CONSISTS OF (GS + 127) & LSR(7) RECORDS.

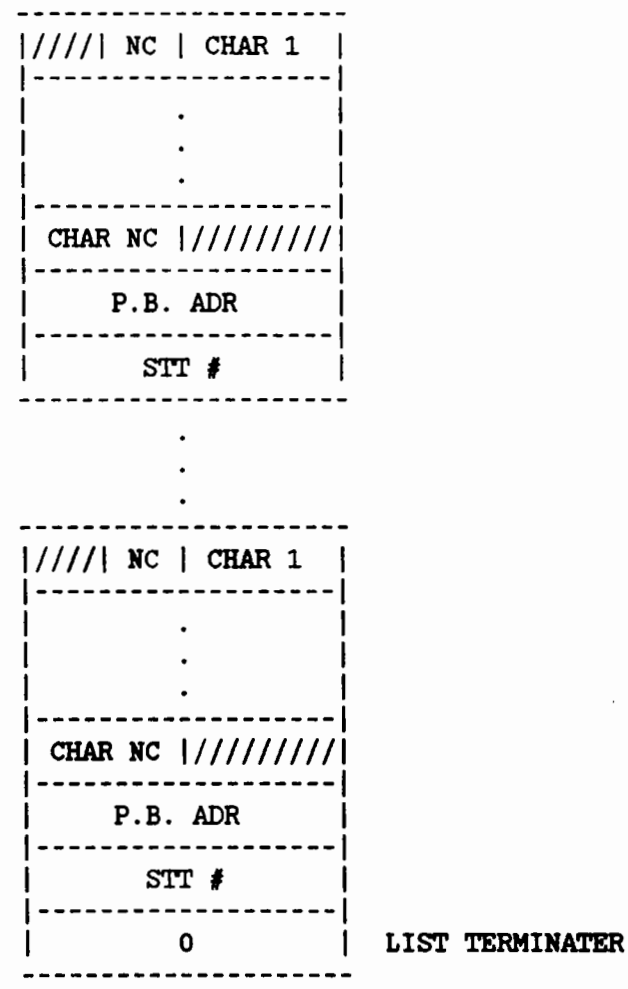
EXTERNAL LIST



LC (0:2) = LEVEL OF CHECKING
- 0 = NO CHECKING
- 1 >= CHECK FOR PROCEDURE TYPE
- 2 >= CHECK FOR # PARAMETERS
- 3 >= CHECK FOR PARAMETER TYPE

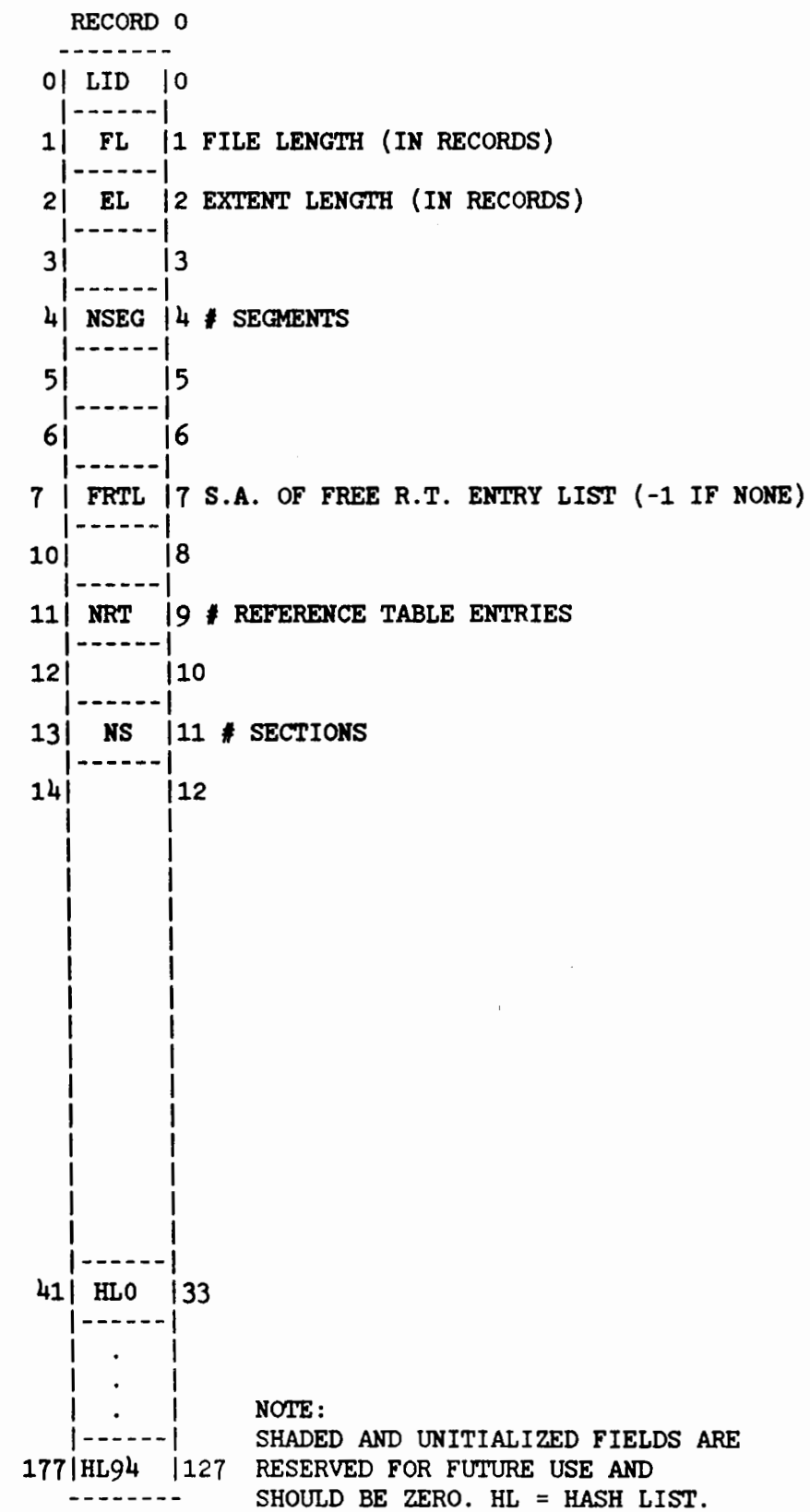
NP (2:6) IS # PARAMETERS

ENTRY POINT LIST

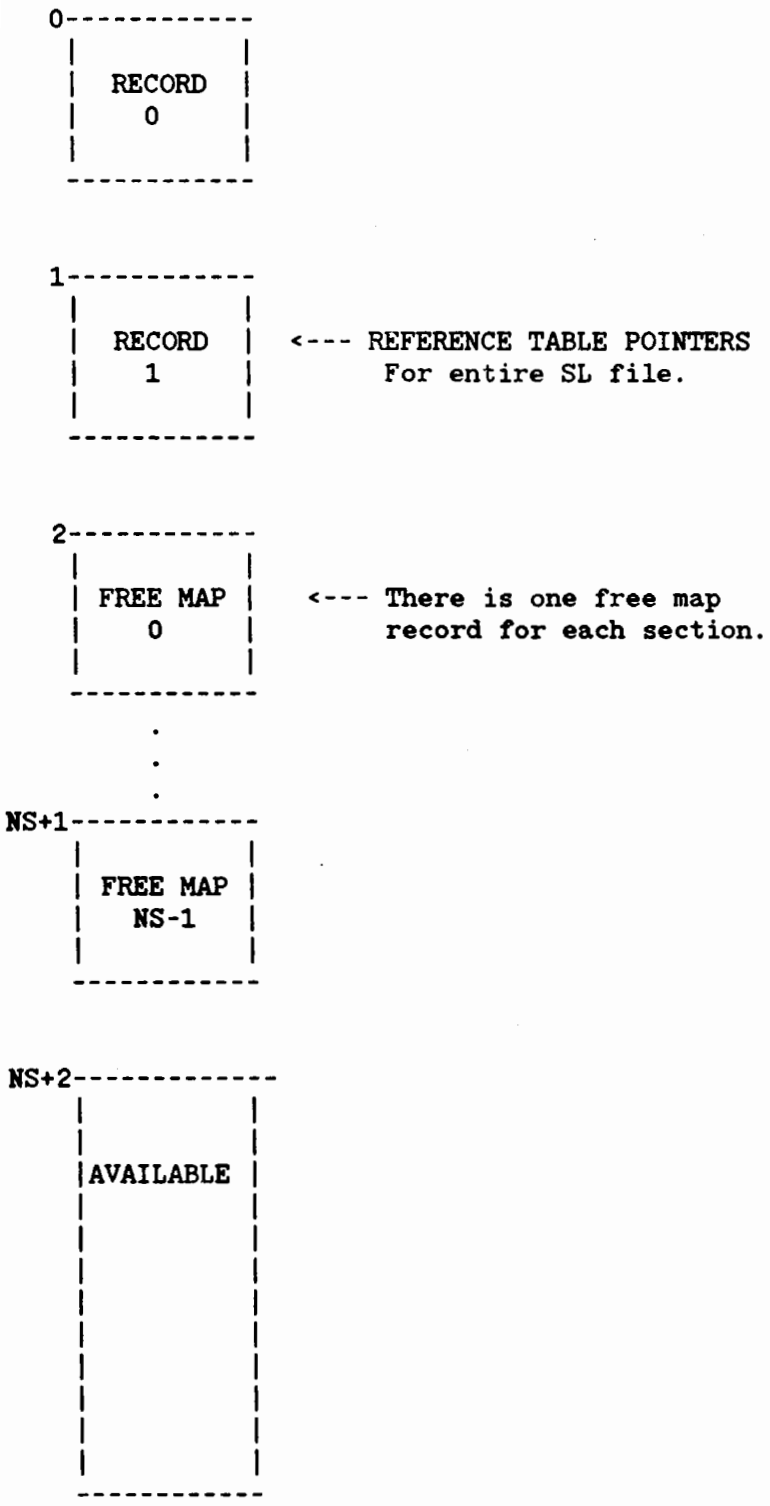


NOTE THAT THE ENTRY POINT LIST MUST IMMEDIATELY FOLLOW THE EXTERNAL LIST.

SL FILE FORMAT



SL FILE FORMAT (CONT.)



STORAGE MANAGEMENT

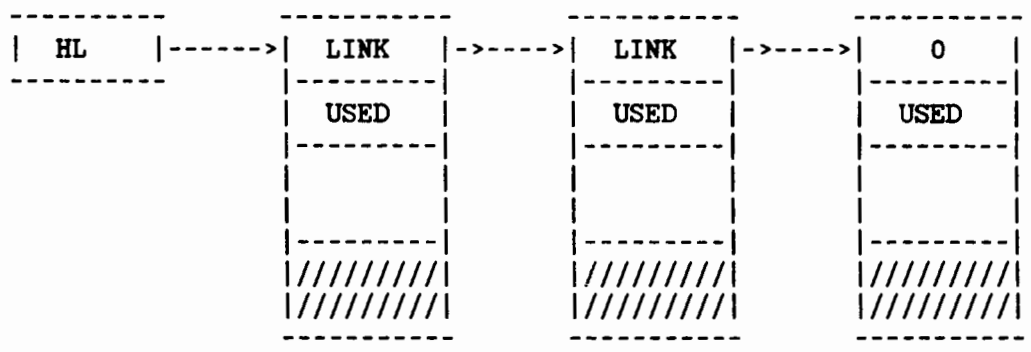
FILE SPACE IS MANAGED IN TERMS OF 128 WORD BLOCKS (1 BLOCK PER 128 WORD RECORD).

FREE SPACE (BLOCKS) IS ACCOUNTED FOR IN A BIT MAP, WHICH IS PARTITIONED INTO RECORDS (2K BLOCKS PER SECTION). A 0 INDICATES THAT A BLOCK IS USED; A 1 INDICATES THAT IT IS FREE.

FILE SPACE IS ALSO PARTITIONED INTO 2048 RECORD SECTIONS (16 MAX. SECTIONS, 2K BLOCKS PER SECTION, 1 MAP PER SECTION). THE NUMBER OF SECTIONS IN A FILE IS NS=(FL + 2047) & LSR(11). THE FIRST NS RECORDS FOLLOWING RECORDS 0, 1 (RECORDS 2 TO NS+1) ARE RESERVED FOR THE SECTION FREE MAPS.

IF THE SECTION MAPS SPECIFY MORE SPACE THAN IS POTENTIALLY AVAILABLE, THOSE RECORDS BEYOND FLIMIT ARE MARKED AS "USED".

ENTRY POINT DIRECTORY

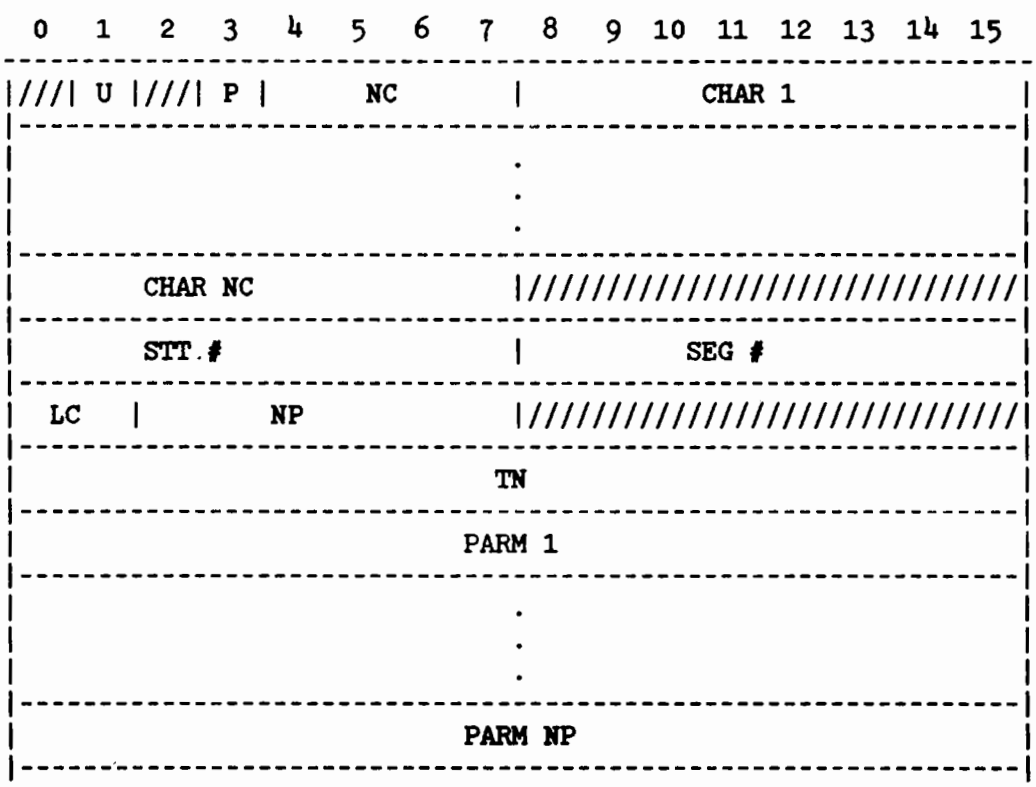


THE DIRECTORY IS PARTITIONED INTO 95 HASH LISTS (SAME HASH FUNCTION AS USL); EACH HASH LIST IS A LINKED LIST OF RECORDS.

EACH RECORD CONTAINS A SUCCESSOR LINK (RECORD #) AND A USED SPACE COUNT. A LINK OF 0 TERMINATES A LIST. WHEN A RECORD IS VOID OF ENTRIES (USED=2), ITS SPACE IS RETURNED TO THE FREE STORAGE AREA.

THE HASH LIST HEAD POINTERS (HL IN THE DIAGRAM ABOVE) ARE IN RECORD 0 WORDS %41 TO %177.

TYPICAL DIRECTORY ENTRY

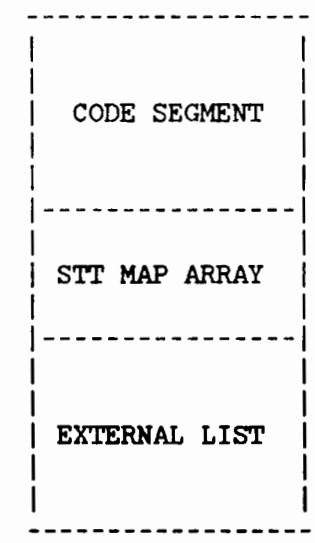


LC is (0:2)...Level of Checking
0 = No checking
1 >= Check for procedure type
2 >= Check for # parameters
3 >= Check for parameter type
NP is (2:6) is # parameters

P - 0= Not permanently allocated
1= Permanently allocated

U - Uncallable bit - set if entry point is uncallable.

CODE SEGMENT LINKAGE STRUCTURE



EACH CODE SEGMENT OCCUPIES AN INTEGRAL NUMBER OF RECORDS. THIS BLOCK OF INFORMATION CAN BE SUB-DIVIDED INTO THREE TABLES: THE CODE SEGMENT PROPER, AN STT SEGMENT MAP ARRAY, AND AN EXTERNAL LIST.

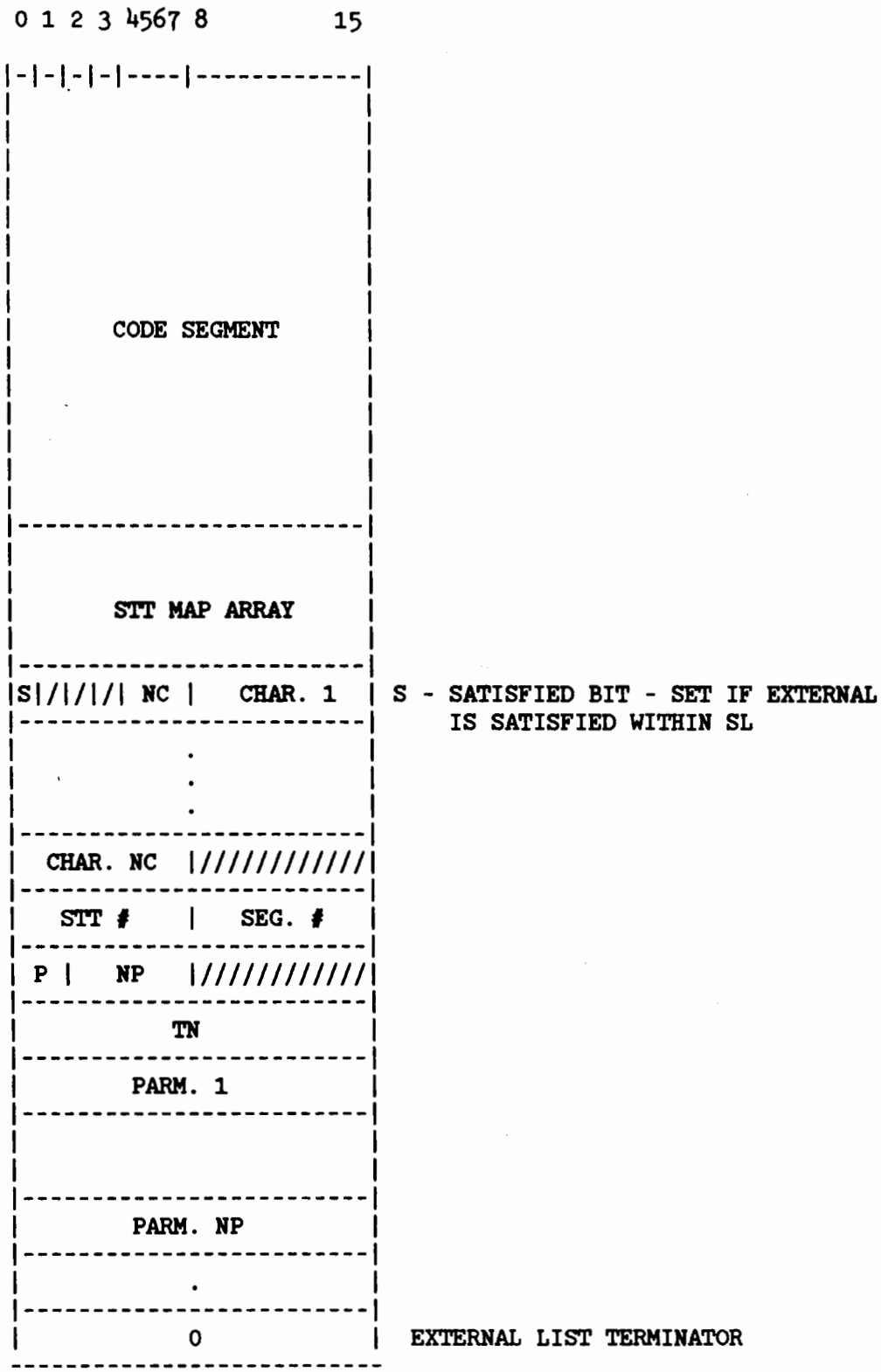
STT MAP ARRAY

A 1 BYTE X 256 BYTE ARRAY. IT IS INDEXED BY STT NUMBER AND RETURNS (IF THE STT CORRESPONDS TO AN EXTERNAL OF THE SEGMENT) THE SEGMENT NUMBER OF THE EXTERNAL AND 255 OTHERWISE. THIS ARRAY IS USED WHENEVER THE SEGMENT IS LOADED AND IS UPDATED WHENEVER THE SL IS BOUND BY THE SEGMENTER.

EXTERNAL LIST

A SYMBOLIC LIST OF THE EXTERNALS OF THE SEGMENT. EACH ENTRY CONTAINS INFORMATION ABOUT THE EXTERNAL: PARAMETER CHECKING LEVEL AND PARAMETER MATCHING INFORMATION, AND THE SEGMENT NUMBER AND STT NUMBER IF THE EXTERNAL IS SATISFIED WITHIN THE SL.

CODE SEGMENT STRUCTURE (CONT.)

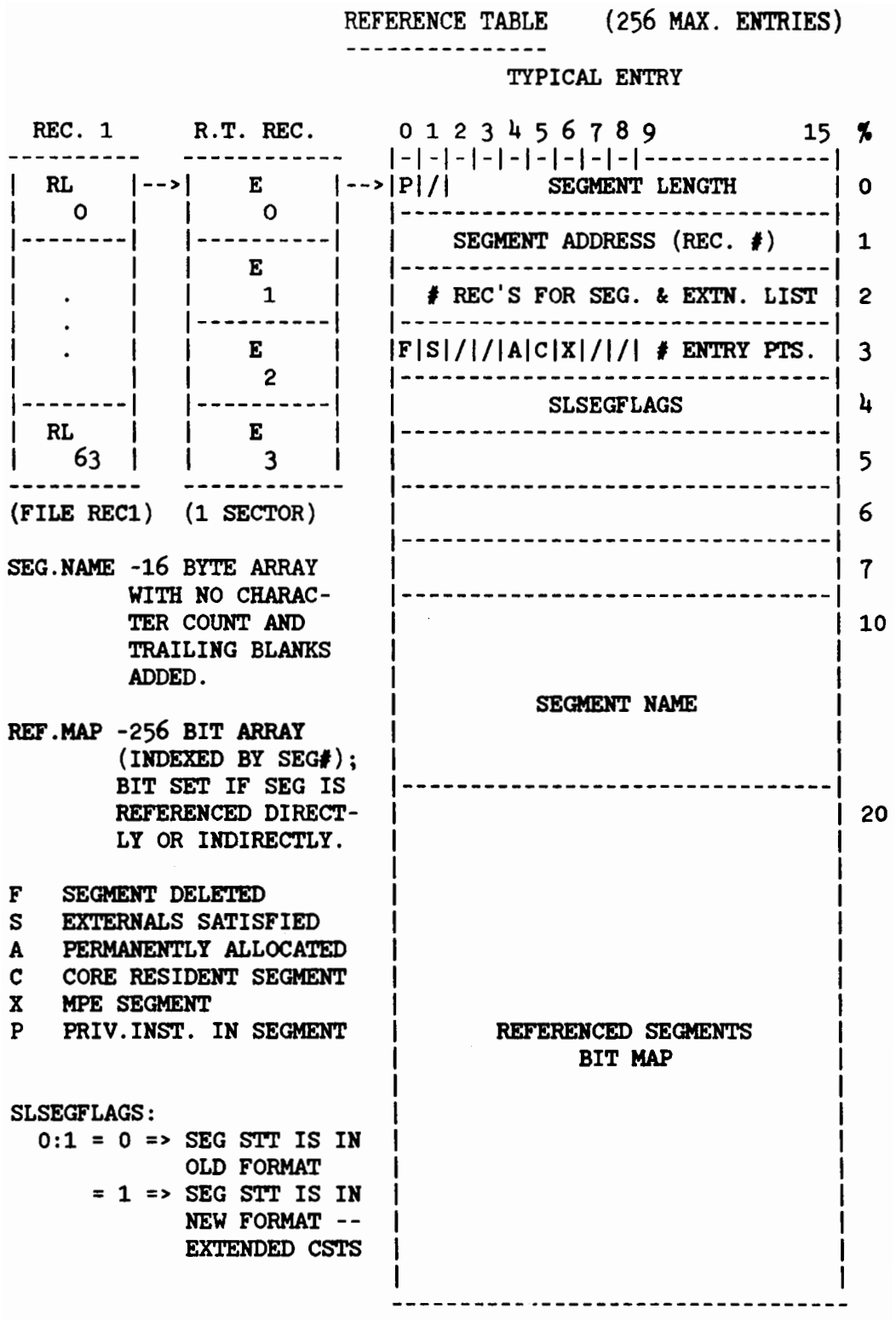


REFERENCE TABLE STRUCTURE

FOR EACH SEGMENT THERE IS A REFERENCE TABLE ENTRY OF 32 WORDS. THE REFERENCE TABLE ENTRIES ARE PACKED FOUR TO A RECORD. THE RECORDS CONTAINING THE REFERENCE TABLE ENTRIES ARE LISTED IN RECORD 1. THE RECORD CONTAINING REFERENCE TABLE ENTRY N IS REC 1 (N.(0 : 14)); THE FIRST WORD OF THE ENTRY IS REFTAB (N.(14 : 2) & LSL (5)).

WHEN A SEGMENT IS DELETED, THE REFERENCE TABLE ENTRY CORRESPONDING TO THE SEGMENT IS RELEASED. THESE FREE ENTRIES ARE LINKED TOGETHER IN A LIST; THE SEGMENT # IS USED AS A LINK AND IS PLACED IN THE FIRST WORD OF THE ENTRY; -1 TERMINATES THIS LIST --- THE LIST HEAD IS RECORD 0 (7), FRTL.

WHEN A SEGMENT IS ADDED IT IS ASSIGNED A SEGMENT NUMBER (0 LESS THAN/EQUAL TO N LESS THAN/EQUAL TO 254); THE NUMBER IS THAT OF THE FIRST FREE REFERENCE TABLE ENTRY, OR, IF NONE ARE FREE, THE NEXT AVAILABLE REFERENCE TABLE ENTRY (CAUSING SPACE ALLOCATION FOR THE ENTRY).



FLAGS:

(0:1) Segment STT format

(1:15) Reserved

CHAPTER 11 LOADER

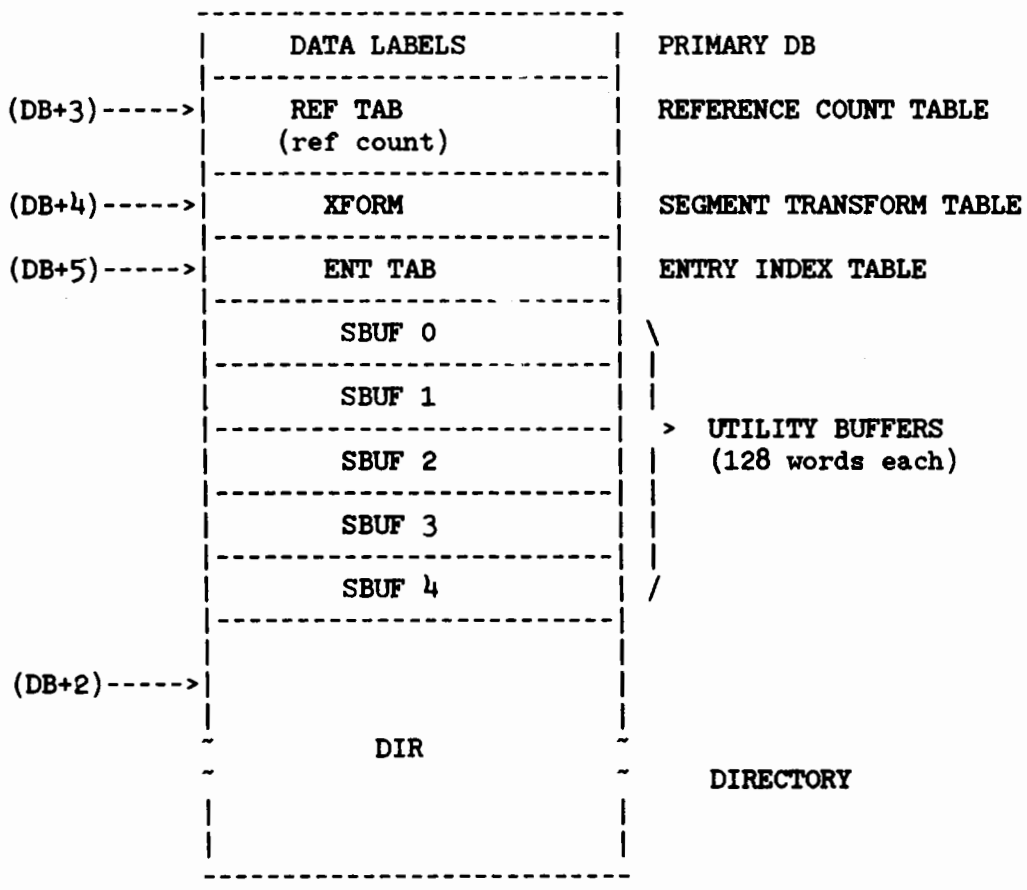
MPE LOADER

The first area of the CST, pointed to by absolute 0, contains system and library segments. Its size is configurable but it may not contain more than 191 entries. This area is assigned CST numbers 1-%277. The second area is used for programs. The total number of entries in this area is not hardware limited. This area is allocated a block at a time with one program per block. A block may contain from 1 to 63 segments, which will be assigned CST entry numbers %301-%377. The maximum number of segments in a program file is 63 and segments of different programs will have the same CST number. Thus both a block number and a CST# are required to uniquely identify a program segment. A fallout of this is that logical segment=physical CST-%301.

The loader is a system process which will do loads sequentially. If a process needs code to be loaded, it will get the load process' SIR, fill a communication data segment and then awake the loader. Upon completion, the loader will return its status through the communication data segment and then activate the waiting process.

LOADER SEGMENT ALLOCATION

The order in which storage is allocated for arrays is arbitrary, with one exception: The storage for array DIR must be last in the data segment. This allows the data segment expansion/contraction intrinsics to be applied so that DIR storage may be dynamically allocated.



LOADER SEGMENT TABLE PRIMARY DB (DST %22)

0	UTILITY INTEGER	S0
1	DIRECTORY LENGTH	DIRLEN
2	ENTRY TABLE POINTER	DIR
3	REFERENCE COUNT TABLE POINTER	REFCOUNT
4	CST TO LCST AND FLAG TABLE POINTER	XFORM
5	CST TO ENTRY INDEX TABLE POINTER	ENTTAB
6	SECONDARY ENTTAB POINTER	ENTP2
7	ENTRY POINTER	ENTP
10	SECONDARY ENTRY POINTER	ENTP1
11	SECOND RECORD DISC BUFFER POINTER	SBUF0
12	"	SBUF1
13	"	SBUF2
14	"	SBUF3
15	"	SBUF4
16	UTILITY INTEGER	SI
17	"	SJ
20	"	SK
21	"	SL
22	"	SM
23	"	SN
24	"	SP
25	"	SQ
26	"	SR
27	"	SS
30	"	ST

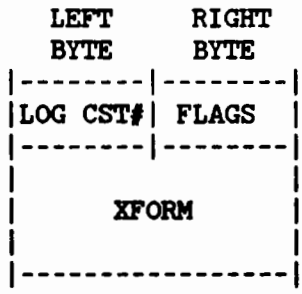
REFERENCE COUNT TABLE

(DB + 3)

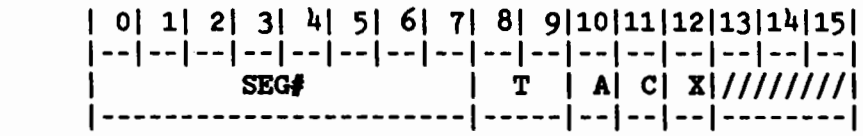
Indexed by CST number; contains the reference count for each code segment. Contains -1 if the CST entry is not allocated.

SEGMENT TRANSFORM TABLE

(DB + 4)



Indexed by CST number; contains the file-relative (logical) segment number and segment attributes.

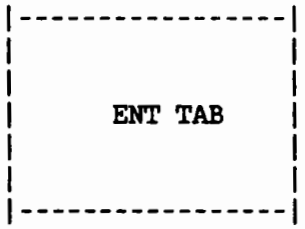


T-Segment Type:
- System SL =0
- Public SL =1
- Group SL =2
- Program Seg =3

A-Perm.Allocated Segment (1/0)
C-Core Resident Segment (1/0)
X-System (MPE) Segment (1/0)

ENTRY INDEX TABLE

(DB + 5)



Indexed by CST number; contains the directory index of the file entry corresponding to the CST number.

DIRECTORY

(DB + 2)

Accessed by entry key - contains variable length entries, each entry describing a set of CST numbers.

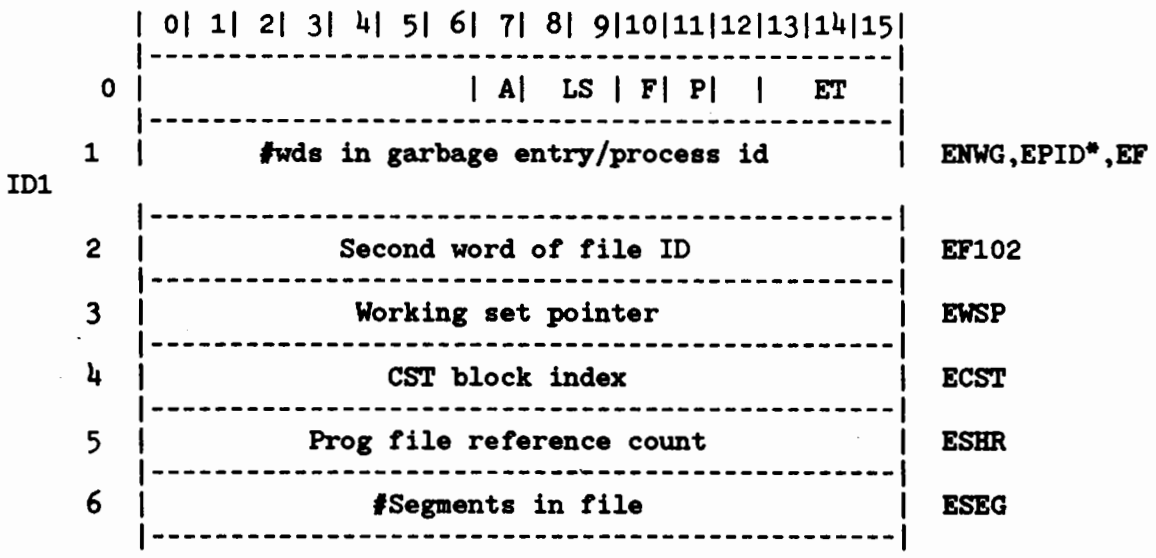
The directory is completely filled with variable length entries. The empty state is represented by a single garbage entry. It is accessed by a sequential search using a double word entry key, or by direct indexing using ENTTAB.

The first word of each entry has the same format and includes an entry type number. In addition, most entries (all entries except type garbage) have an implicit double word entry key. Those entries that have an explicit single word key have an additional word that is implicitly 0. The entry key immediately follows the entry descriptor (first) word.

For file entries, the key is the double word sector number of the file label with the first byte of the double word replaced with the logical device number. For process entries, the key is the single word PIN with the first byte of the single word replaced with the extension number (LOADPROC id number).

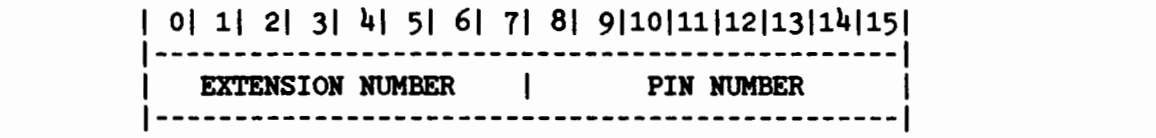
ENTRY POINTER (ENTP)

(DB + 7)



A = Program Allocated
LS = Library Search
F = File Mode
P = Program Mode
ET = Entry Type

*EPID



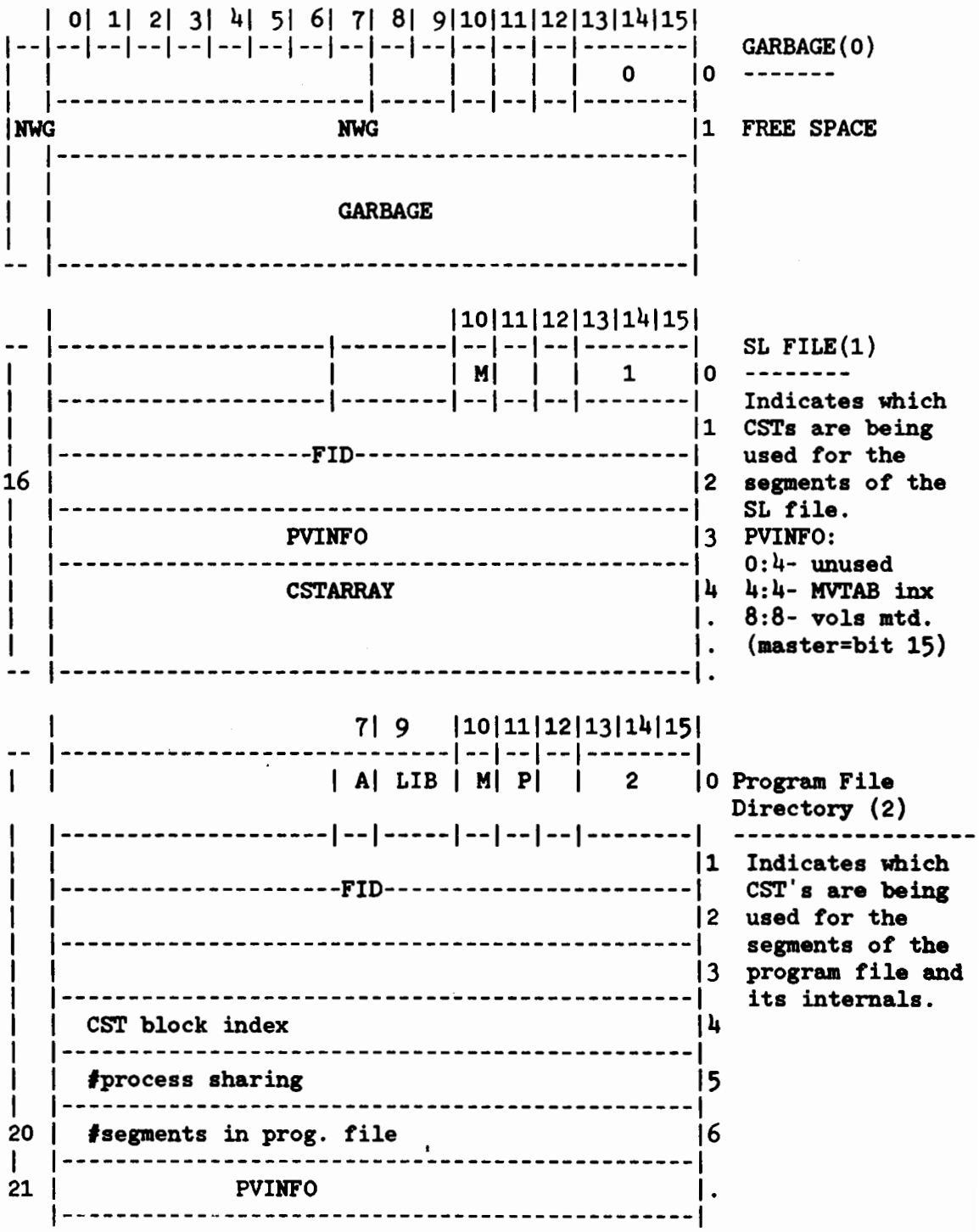
EFID1 = First word of file ID

SBUF0 (DB + 9)

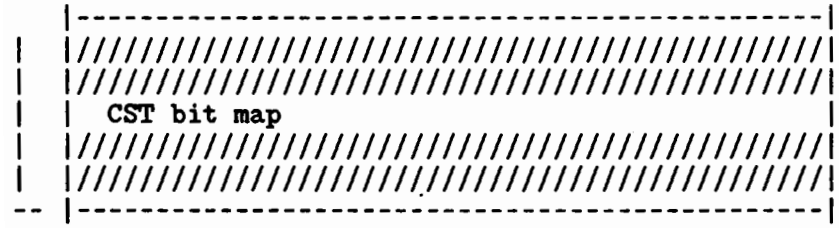
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
0	F	N	Z	//////						CAP LIST							SFAGS
1	Number segments																SNRSEGS
2	Global area size																SGLOBALSIZE
3	REC. NR. of global area																SGLOBALRECD
4	Rec. nr. of segment list																SSEGMENTRECD
5	Stack size																SSTACKSIZE
6	DL size																SDLSIZE
7	Max. data seg. size																SMAXDATA
10	Rec. nr. of entry point list																SENTRYRECD
11	Starting segment nr.																SSTARTINGSEG
12	Starting PB address																SSTARTINGADR
13	Starting address of STLT																SSASTLT
14	Starting address of FLUT																SSAFLUT
15	Rec. Nr. of external list																SEXTERNALRECD
16	Starting SST Nr.																SSTARTINGSST
17	Starting address of trapcom.																SSATRAPCOM

F = Fatal Error
N = Non-Fatal Error
Z = Zero DB

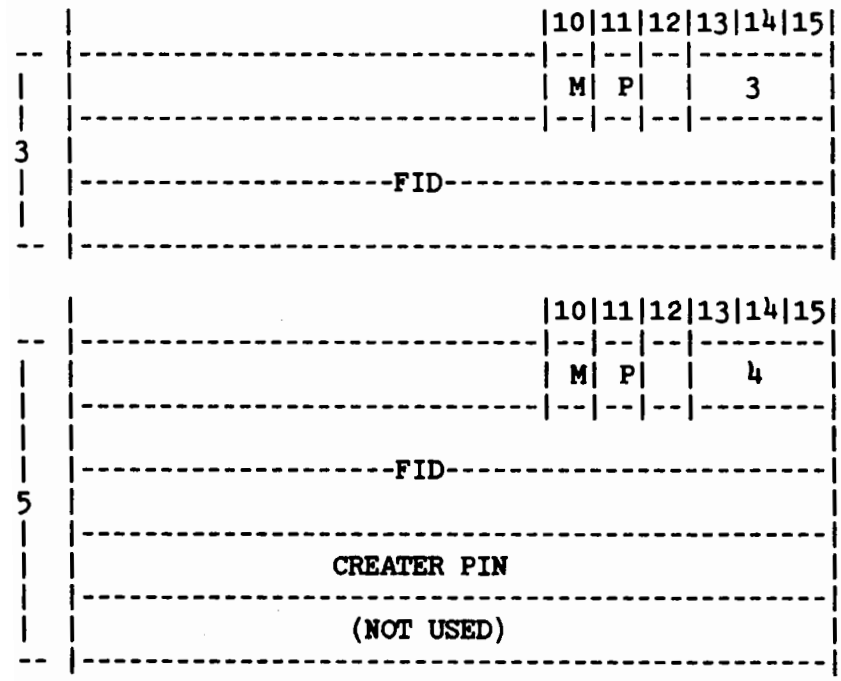
DIRECTORY ENTRIES



DIRECTORY ENTRIES (CONT.)



A: set if program file is allocated

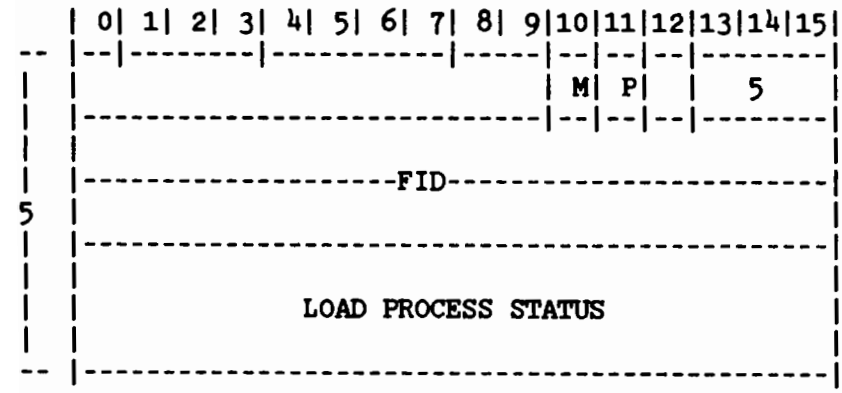


LOADING (3)

Indicates that the program file is being loaded.

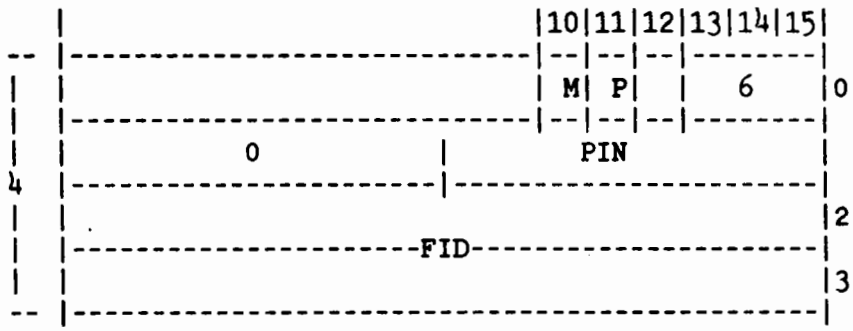
WAITER(4)

Indicates that a process is waiting for the program file to be loaded.



LOADED(5)

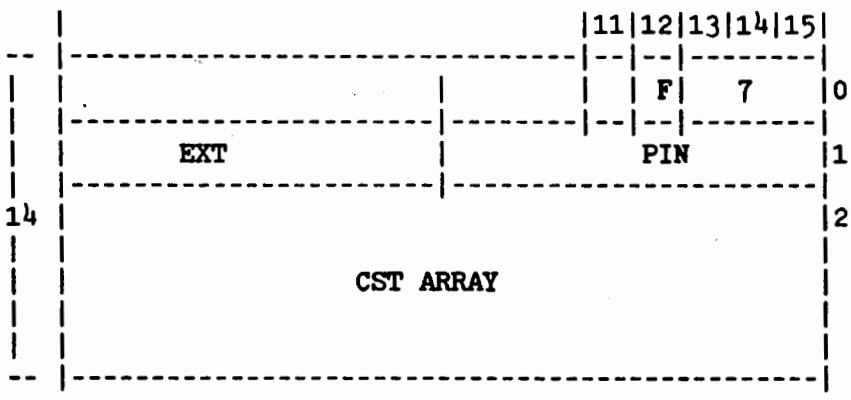
Indicates that a program file has been loaded



SHARER(6)

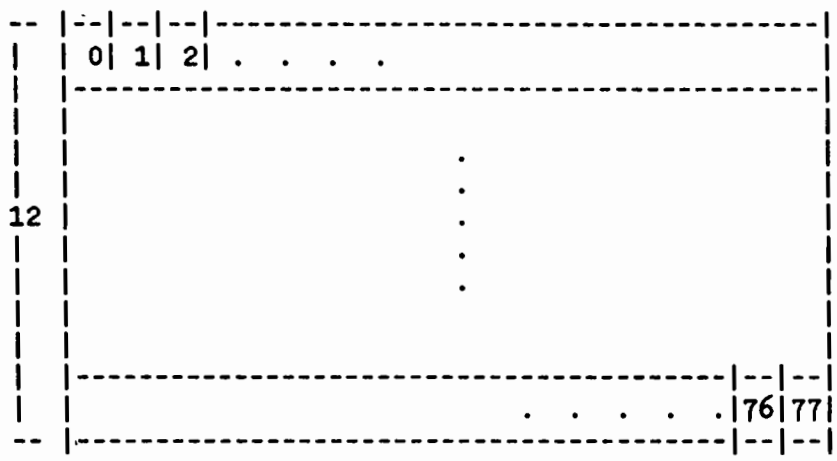
Indicates that a process is running the program file.

DIRECTORY ENTRIES (CONT.)



EXTENSION(7)

Indicates that a process has loadproced a procedure.



CST ARRAY(BIT MAP)

DEFINITIONS

NWG - #words in garbage entry.

FID - file ID.

word 1-(0:8)=log dev#
word 1-(8:8)=msb of disc address
word 2-=lsb of disc address

LIB - 0=SSL, 1=PSL, 2=GSL.

F - CST array format (0=list, 1=bit map)

M - executing mode. indicates whether the segments for the file have been copied onto the system disc (1=fast) or not (slow).

DEFINITIONS (CONT.)

T - entry type

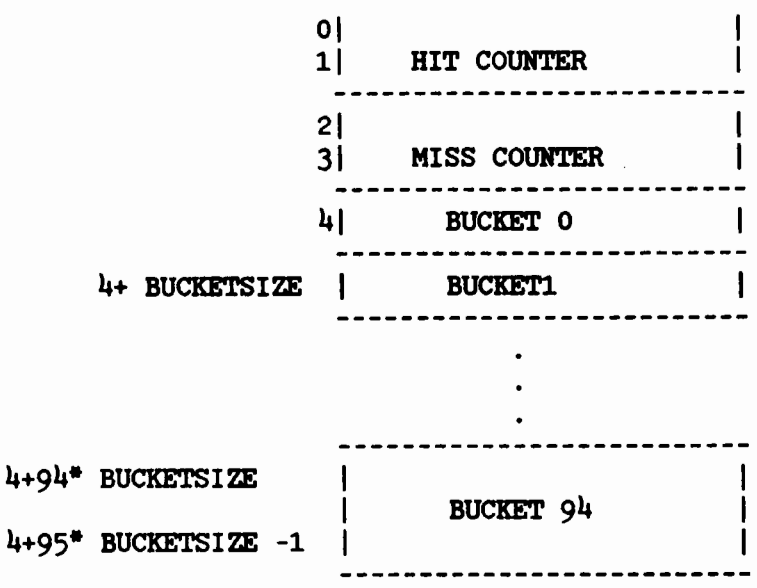
0	GARBAGE	self explanatory
1	SL	indicates which CST's are being used for segments of the file. Currently F=1 and M=0 for all SL entries.
2	PROGRAM	indicates which CST's are being used for segments of the file and all its externals. Currently M=0 for all program entries.
3	LOADING	indicates that a program file (FID) is being loaded on behalf of a process (PIN).
4	WAITING	indicates that a process (PIN) is waiting for a program file (FID) to be loaded.
5	LOADED	transformed entry of type 4 that is used to return status of load.
6	SHARER	indicates that a process (PIN) is currently running a program file (FID).
7	EXTENSION	indicates that a process (PIN) has LOADPROCed a procedure (1<=EXT<=225).

P - program mode bit=0 (normal) everything that should be in priv is in priv mode and likewise for non-priv mode.
=1 (NOPRIV) everything in non-priv mode.

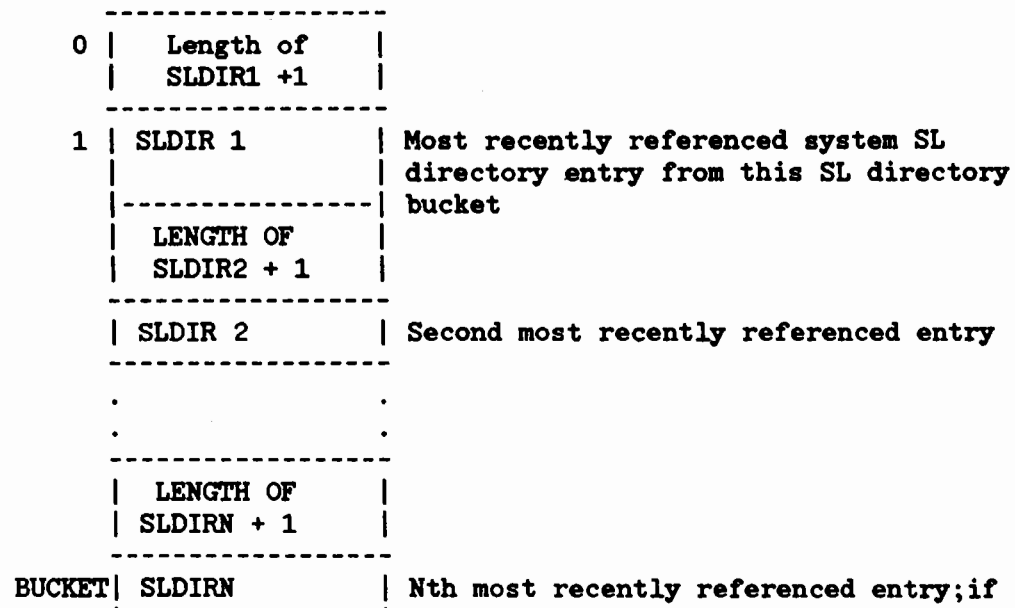
LOADER CACHE

SYGLOB extension area + %72 contains DST number of cache
BUCKETSIZE = %52

CACHE DATA SEGMENT FORMAT



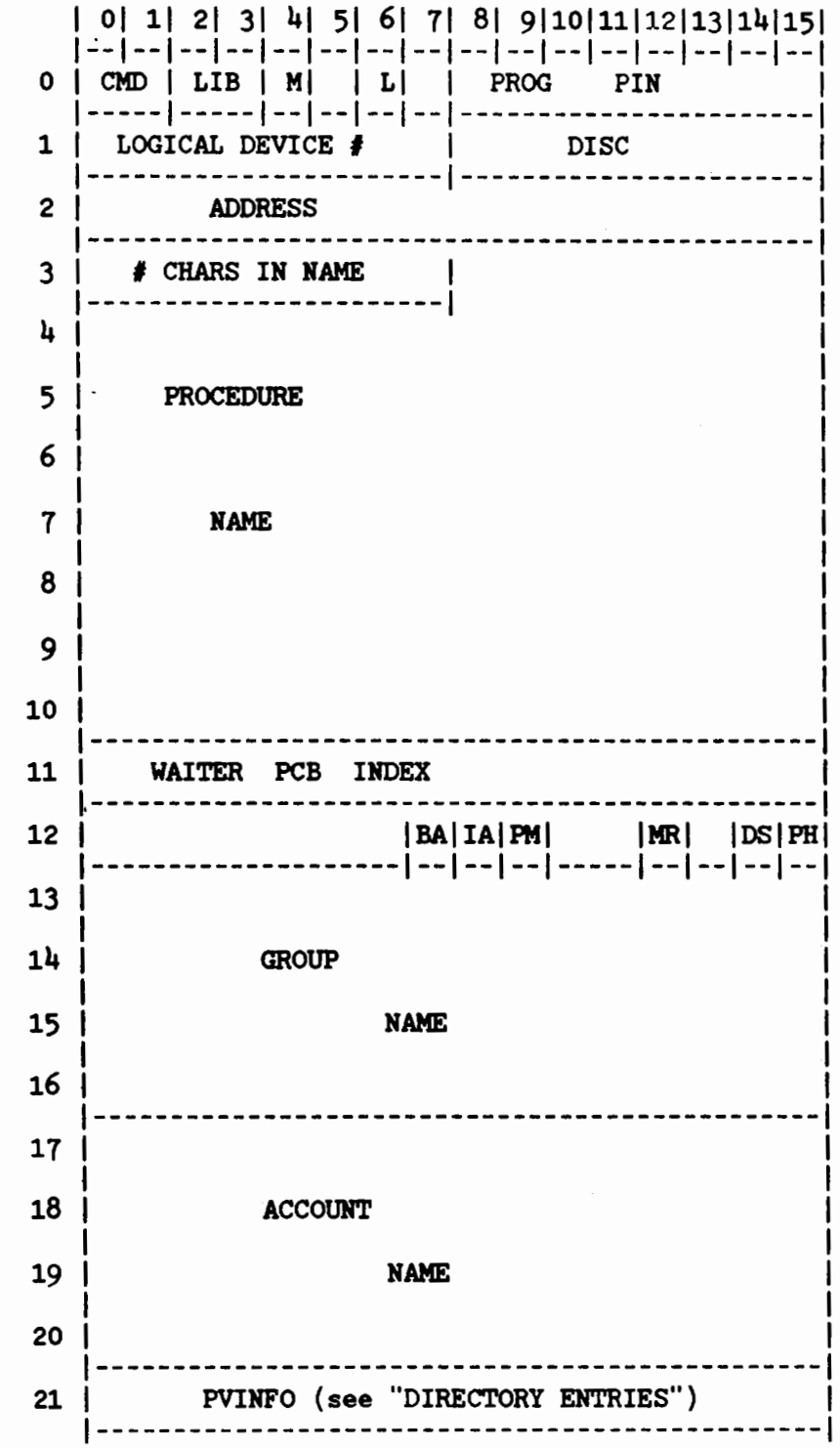
BUCKET FORMAT



All bucket words are initalized to BUCKETSIZE +1, indicating no entries.

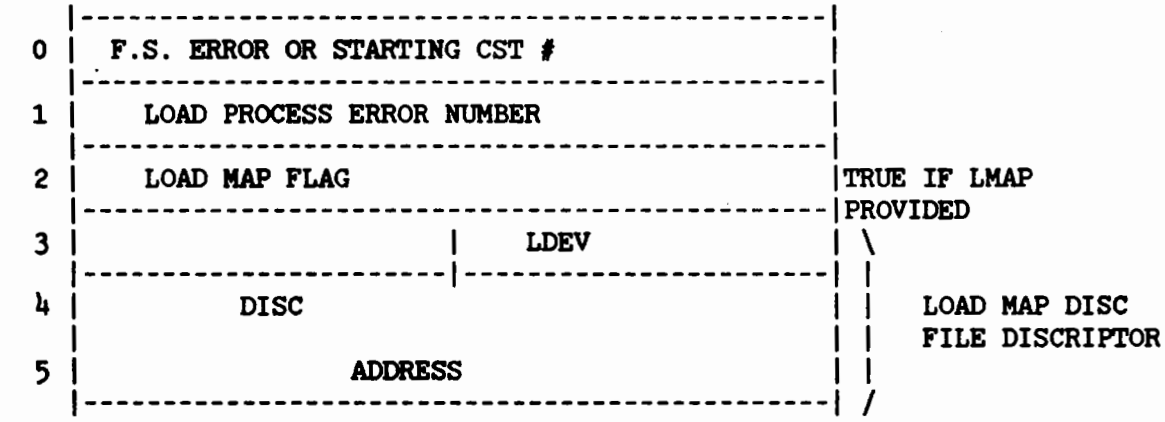
LOADER COMMUNICATION TABLE (LCT) SYSDB + %220

Form incoming to Loader

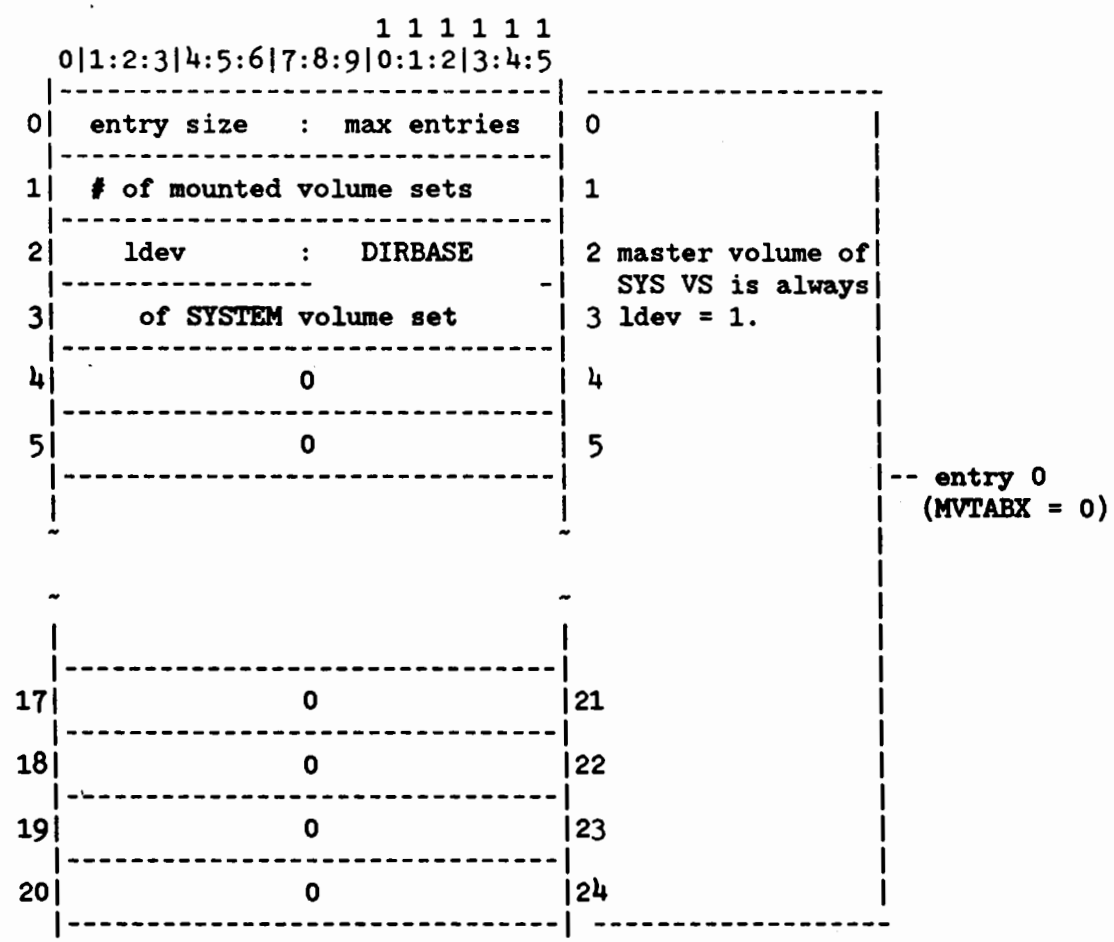


LCT (CONT.)

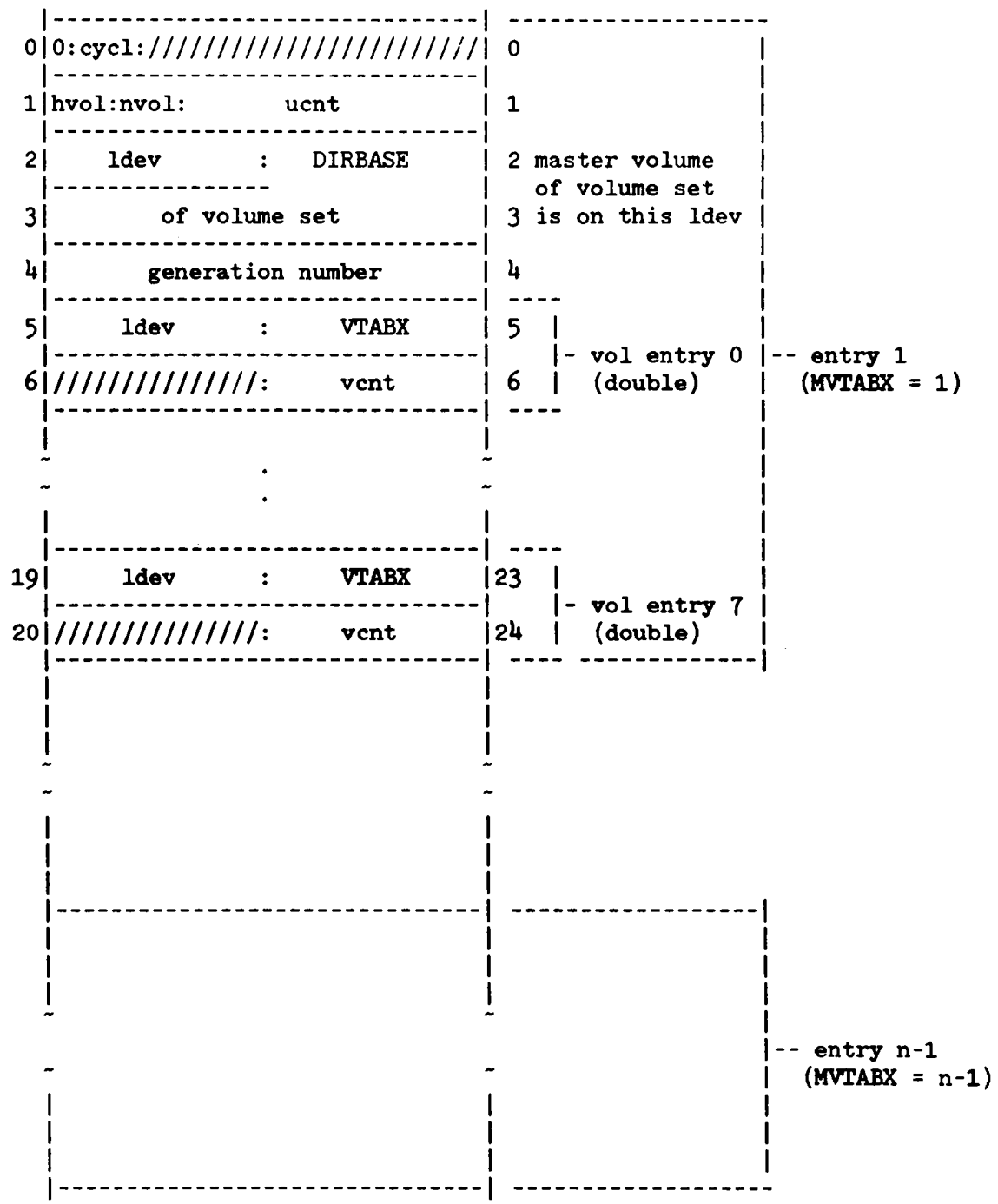
Form returned to WAITER



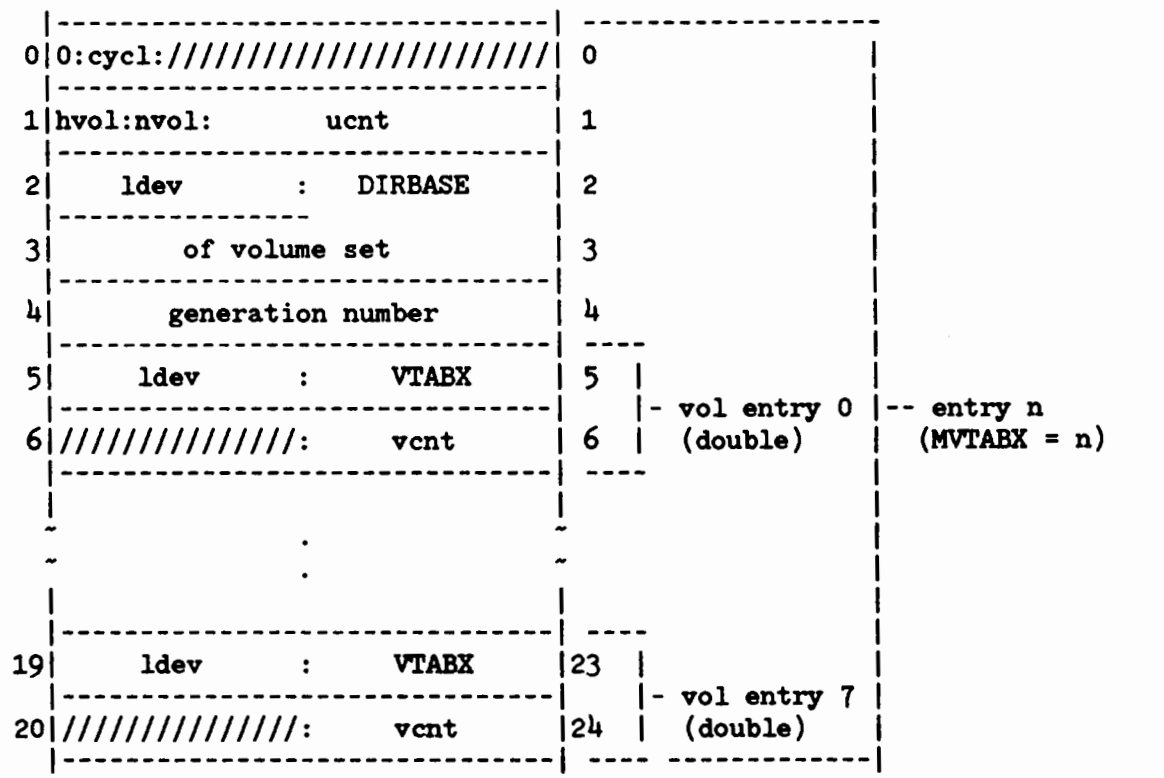
MVTAB (Mounted Volume Table) DST %65



MVTAB (CONT.)


0 0:cycl:////////////////////////
1 hvol:nvol: ucnt
2 ldev : DIRBASE
3 of volume set
4 generation number
5 ldev : VTABX
6 ////////////////: vcnt
19 ldev : VTABX
20 ////////////////: vcnt
0
1
2 master volume of volume set
3 is on this ldev
4
5
6
vol entry 0 (double)
entry 1 (MVTABX = 1)
23
24
vol entry 7 (double)
entry n-1 (MVTABX = n-1)

MVTAB (CONT.)



cycl - cyclical volume index (local VTABX) for disc space allocation

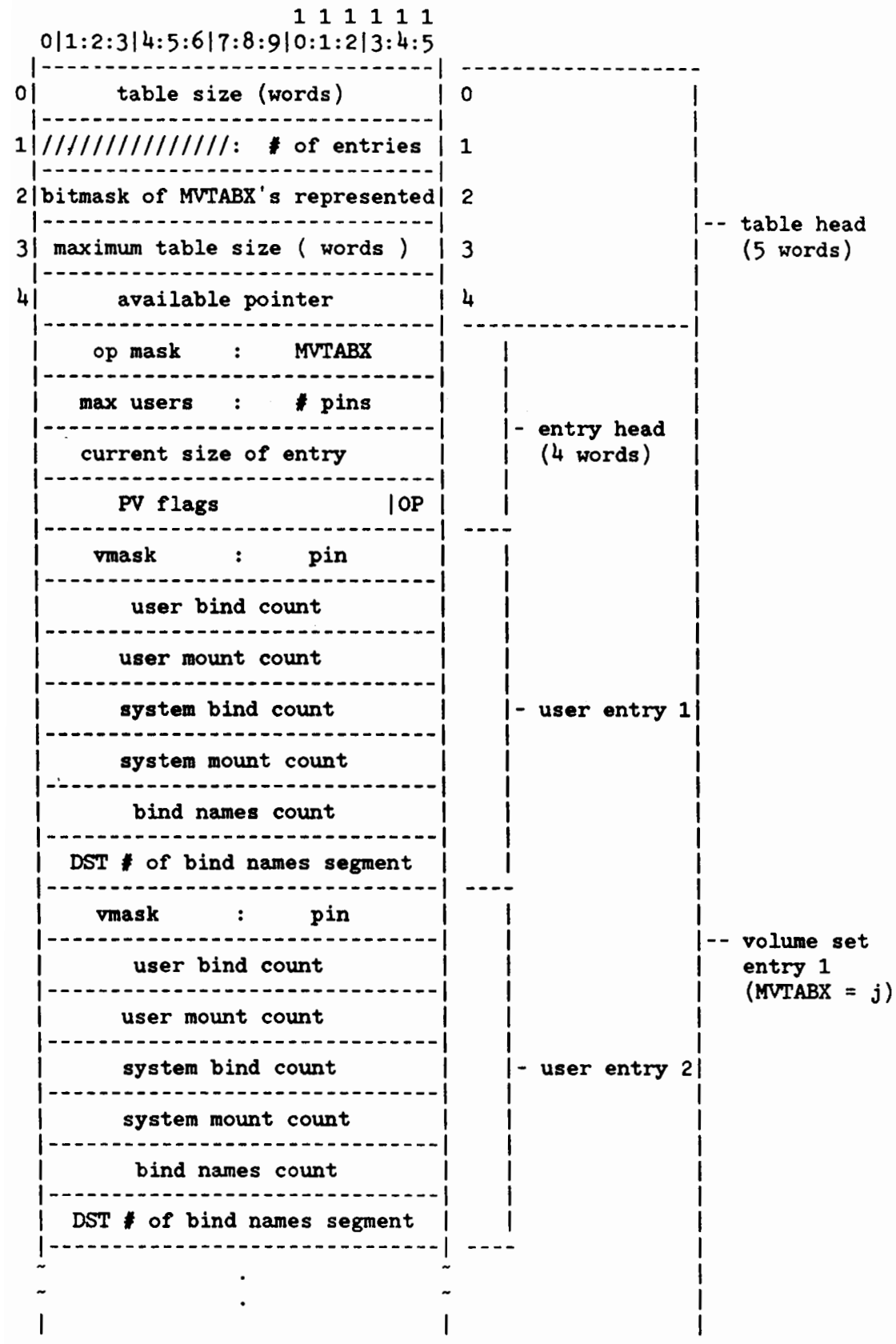
hvol - highest (ordinal) volume index (volume index being the volume set's local VTABX) of a mounted member of the volume set(class).

nvol - # of volumes mounted for the volume set(class).

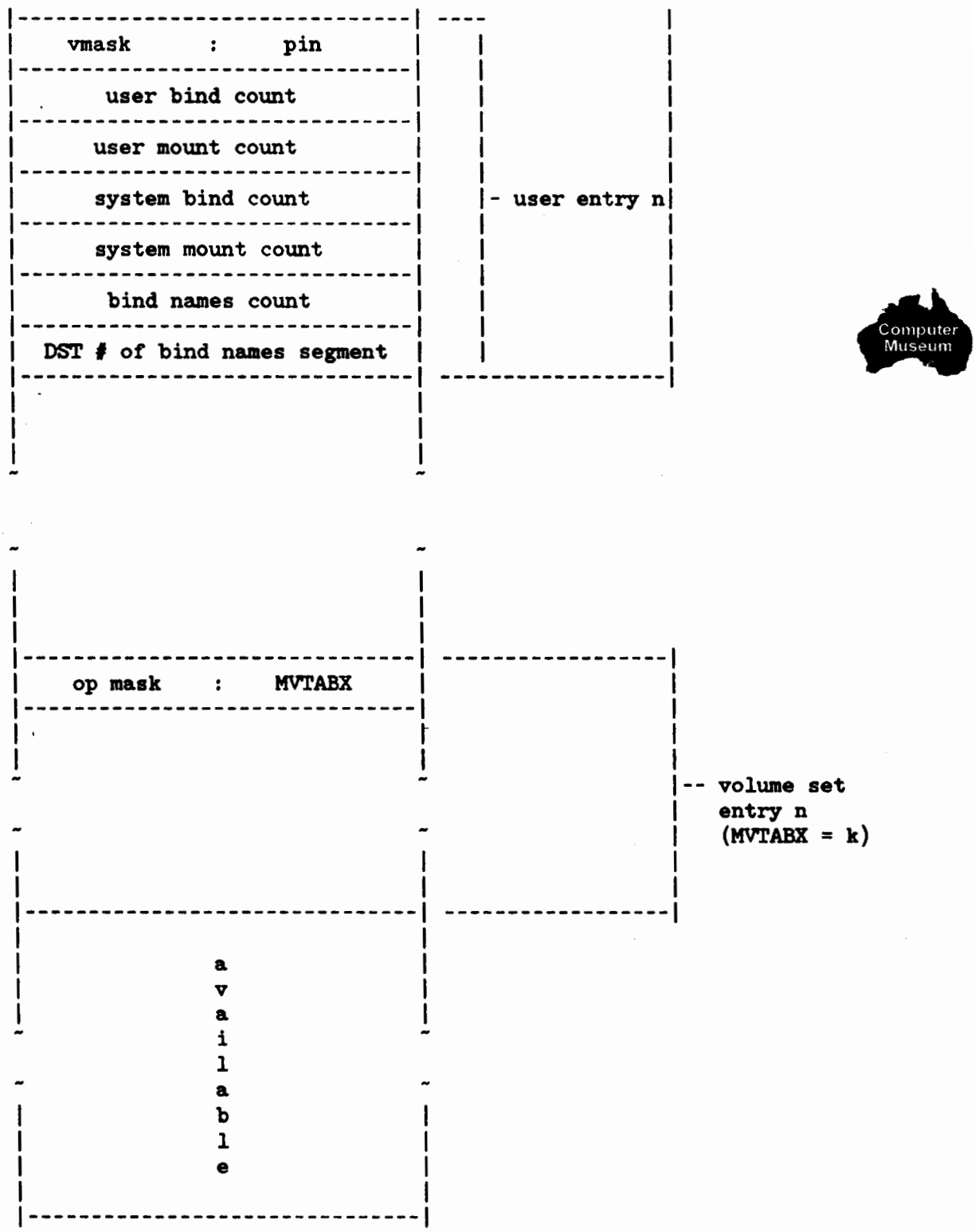
ucnt - # of users having mounted the volume set.

vcnt - # of users having mounted the volume.

PVUSER (Private Volume User Table) DST %66



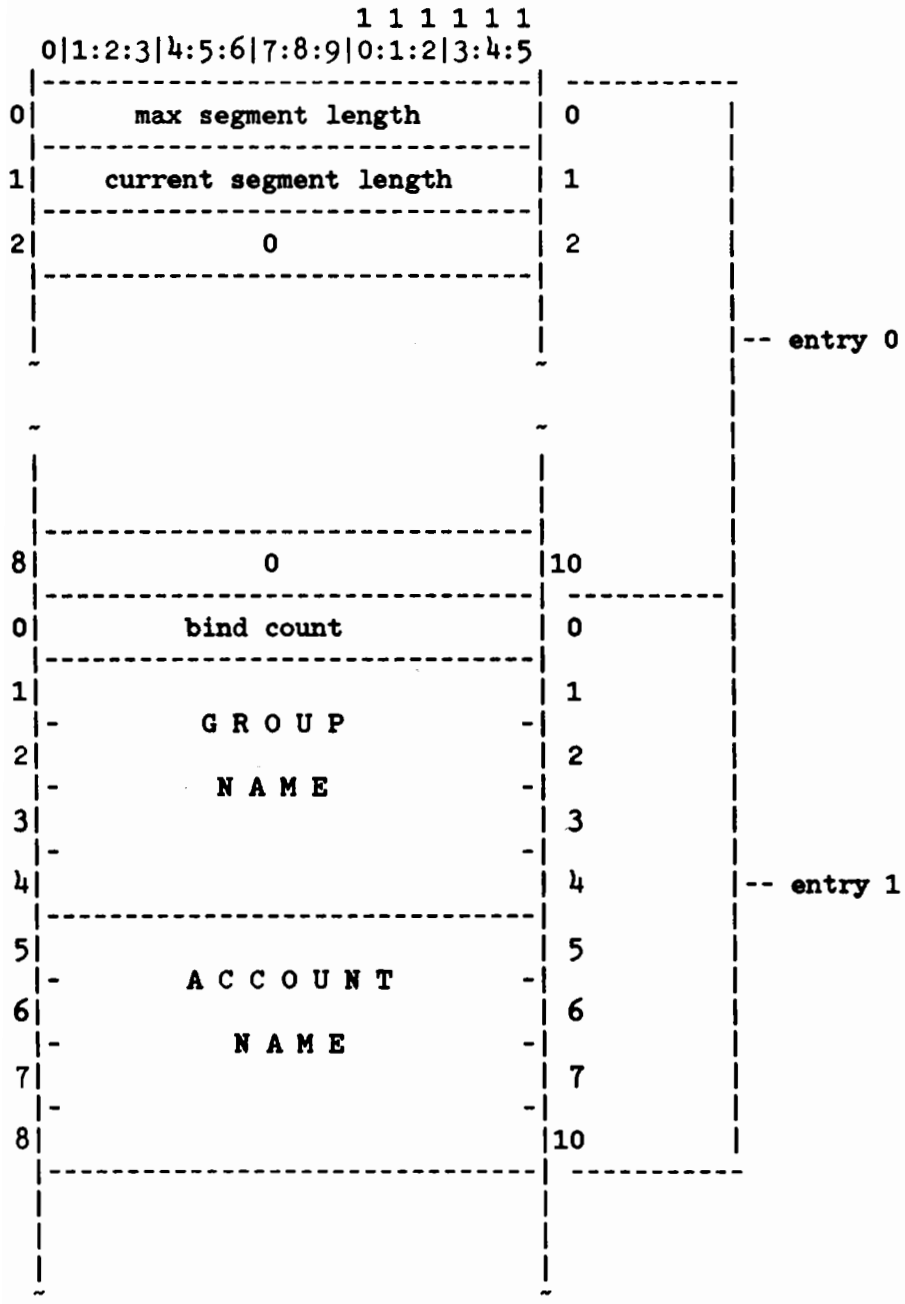
PVUSER (CONT.)



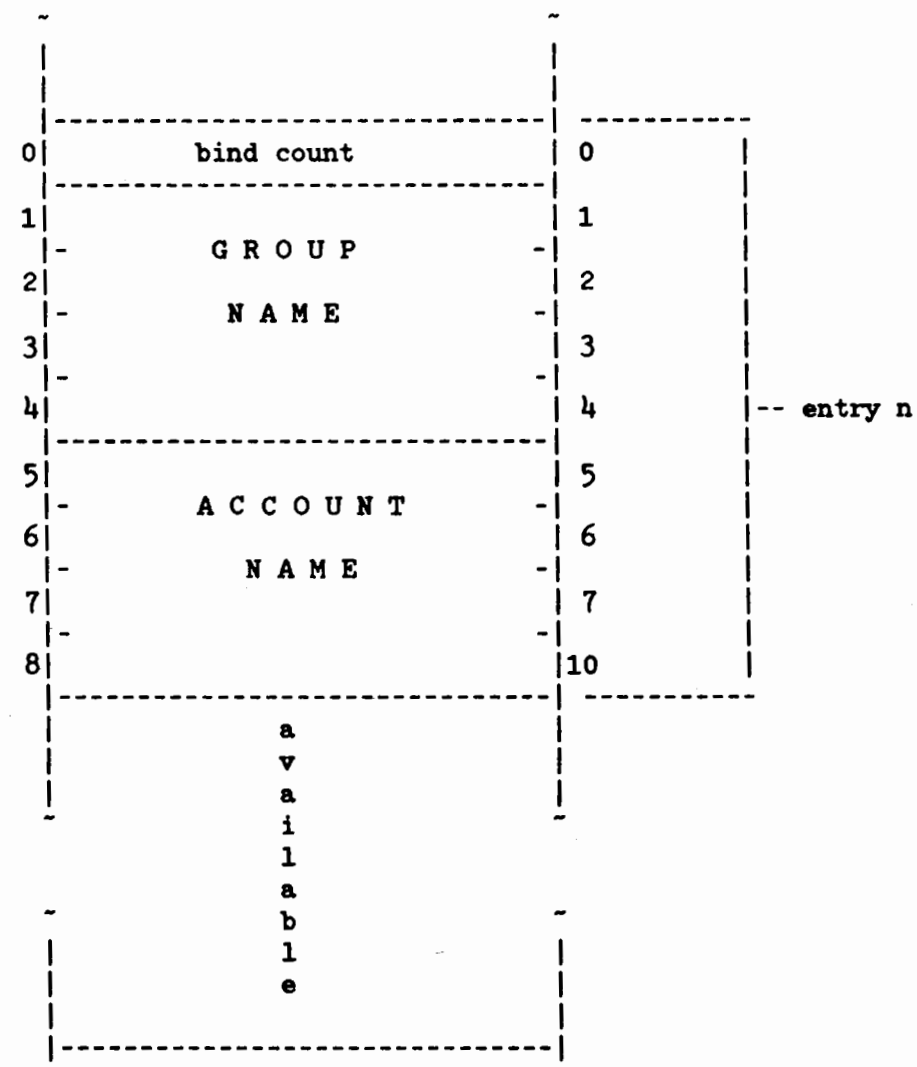
Computer Museum

Bind Names Data Segment

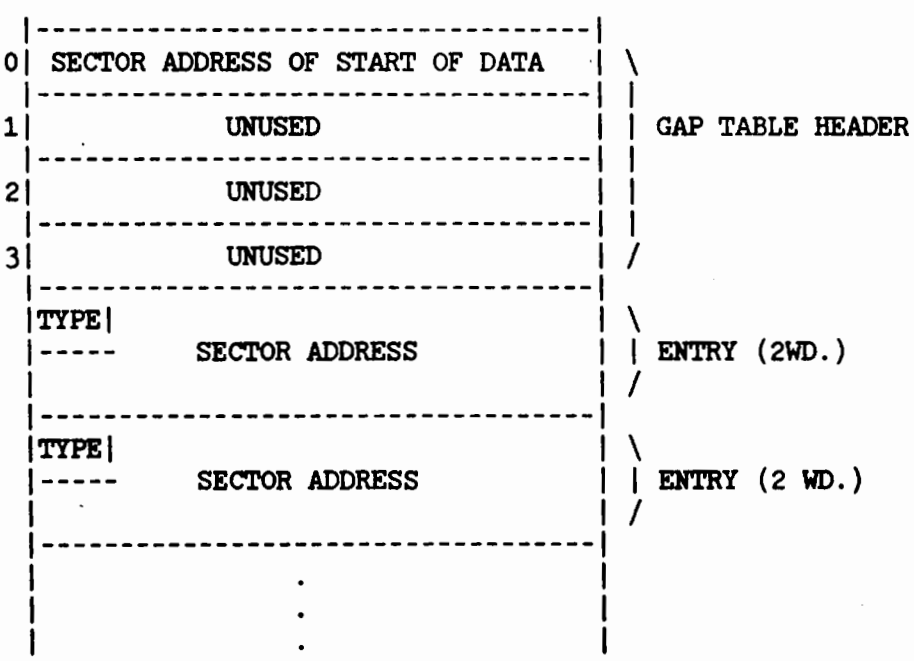
(Created and managed via PVUSER Table)



BIND NAMES DATA SEGMENT (CONT.)



SERIAL DISC GAP TABLE



TYPE:

0 - END OF FILE MARK
1 - LAST RECORD PHYSICALLY WRITTEN

2 - START SECTOR OF "HOLE"

3 - END SECTOR OF "HOLE"

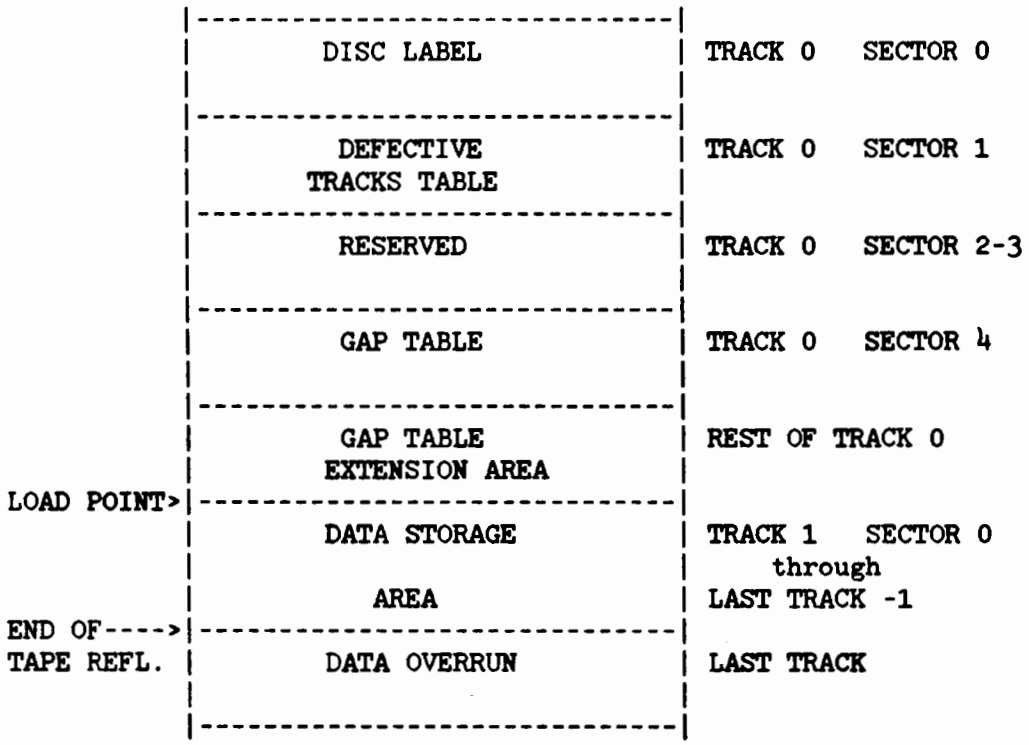
4 - START SECTOR OF "CONTIGUOUS BLOCK"

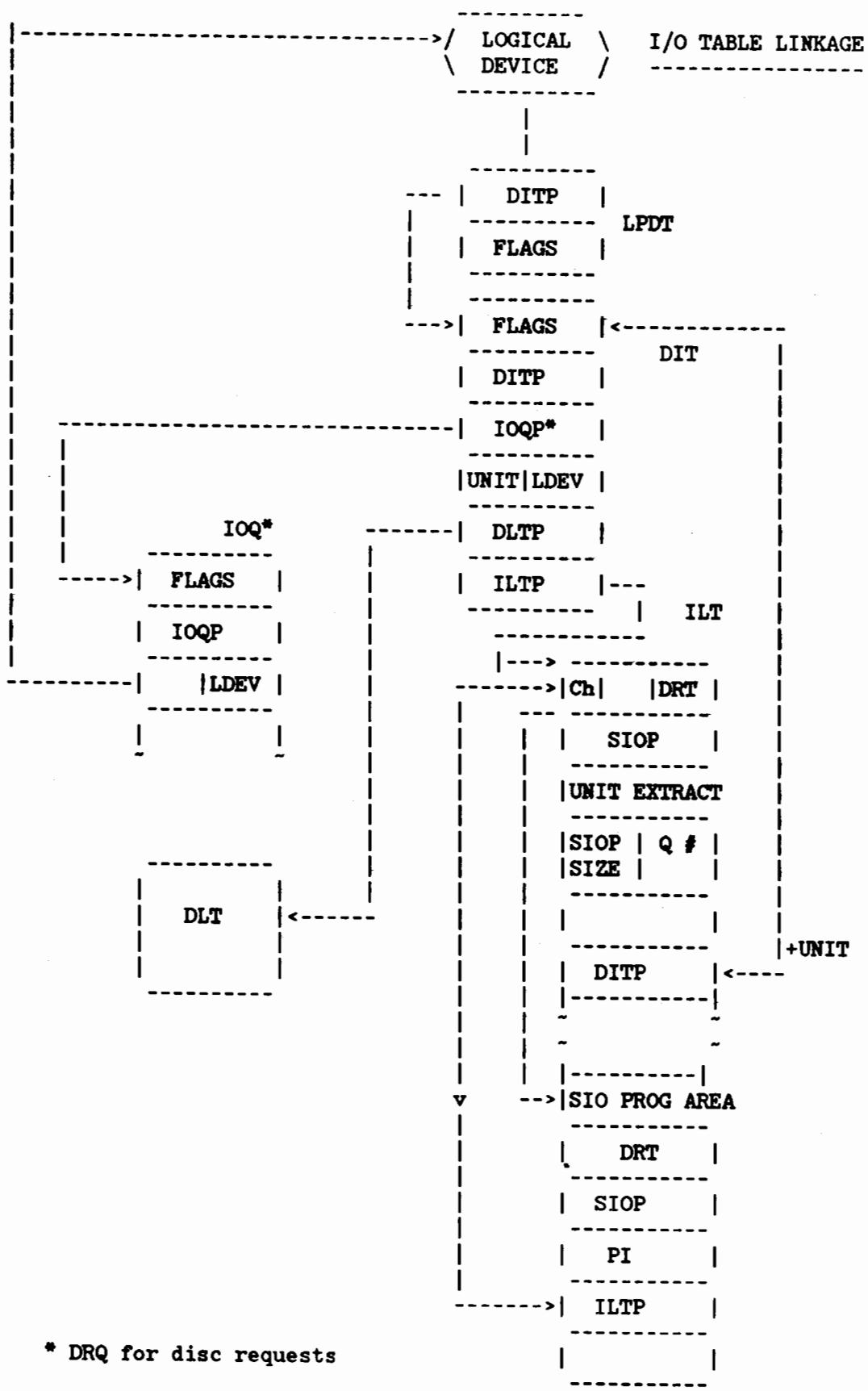
5 - END SECTOR OF "CONTIGUOUS BLOCK"

6 - END OF TAPE MARK

7 - END OF TABLE MARKER

SERIAL DISC PACK FORMAT

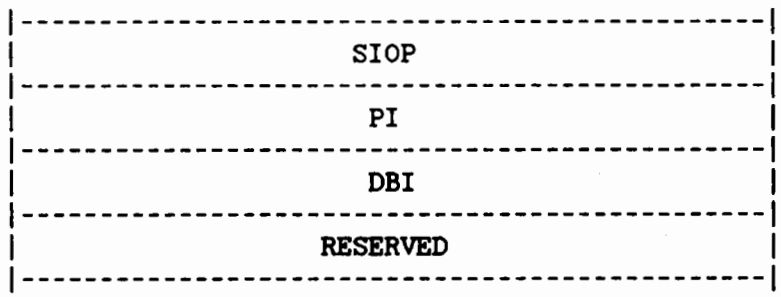




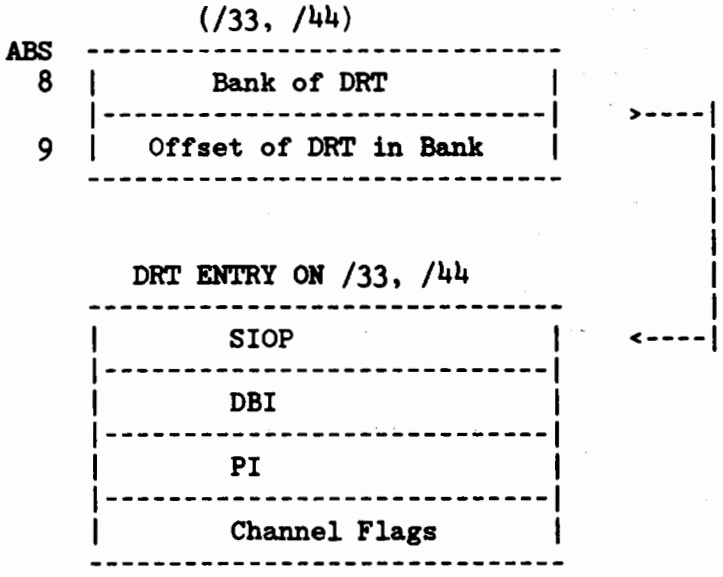
* DRQ for disc requests

DEVICE REFERENCE TABLE (DRT)

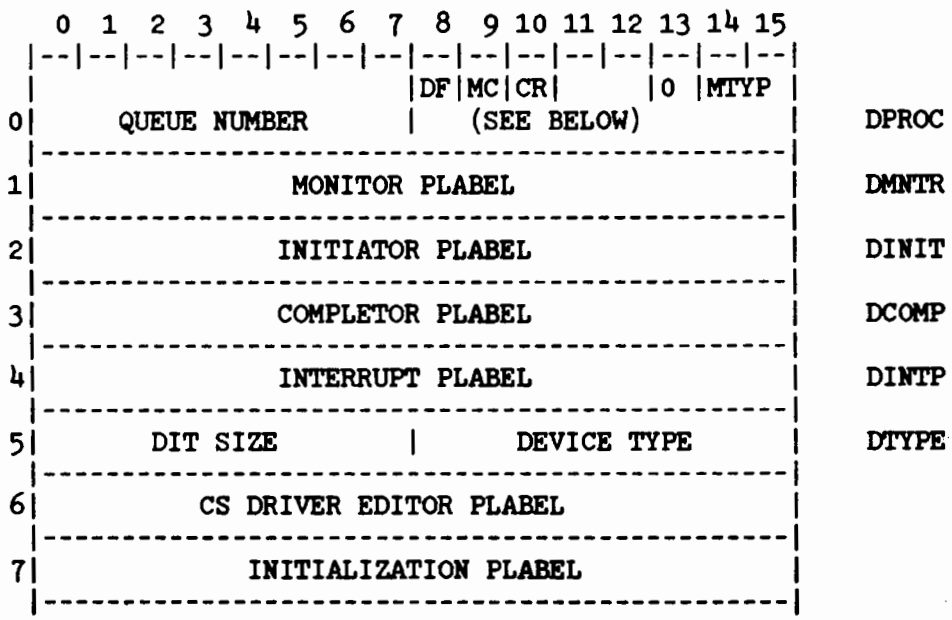
(SERIES II/III)



SIOP - absolute address of SIO program
PI - interrupt handler plabel
DBI - this is the absolute address of the ILT



DRIVER LINKAGE TABLE (DLT) DST %17



There is one DLT for each type of driver. A pointer in the DIT allows different devices on a controller to have different drivers and interrupt handlers.

DPROC.QNUMB - This field contains the I/O process request queue number for type 2 drivers. Zero for all other types.

.(8:1).DRVRFRZN (DF) - Driver code frozen. Set by MAM when then the driver code segment has been made present and frozen from a request from SIODM.

.(9:1).MAMERRORC (MC) - MAM Error on Code Makepresent

.(10:1).CORERES (CR) - If set both initiator and completor code are core resident.

.(14:2).DRVRTYPE (MTVP) - DRIVER/MONITOR TYPE

0 - not used
1 - driver can be executed on any stack
2 - driver can be executed in the user process or in the I/O process identified by IDNUMB
3 - run only in process whose PCB number is in IDNUMB

DMNTR - I/O Monitor Plabel.

DINIT - Driver Initiator Procedure Plabel.

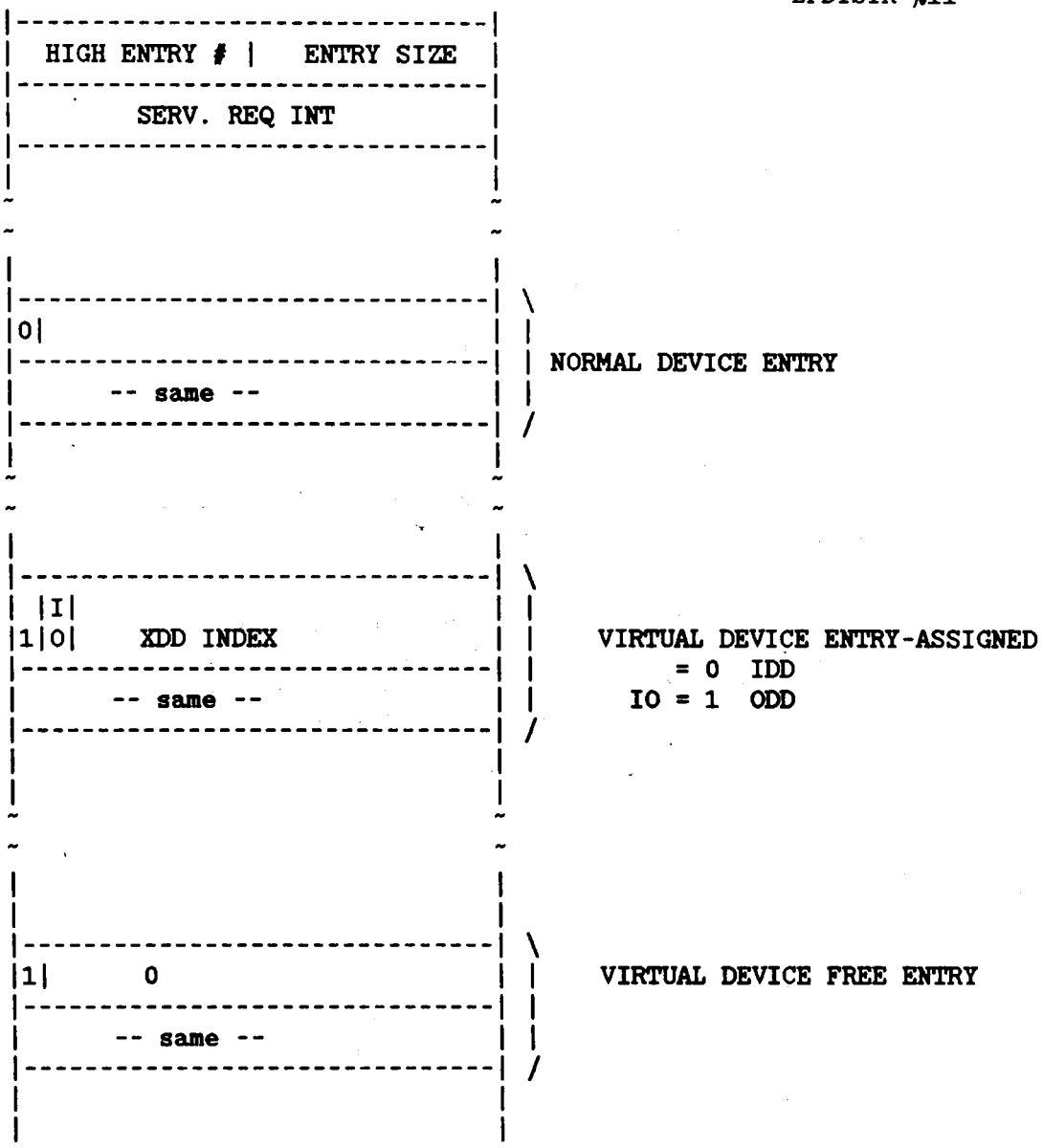
DCOMP - Driver Completor Procedure Plabel.

DINTP - Special interrupt hanler Plabel. This procedure is called by GIP if ISPEC is set DFLAG. No other action is taken by GIP except to set the Interupt Status in DSTAT.

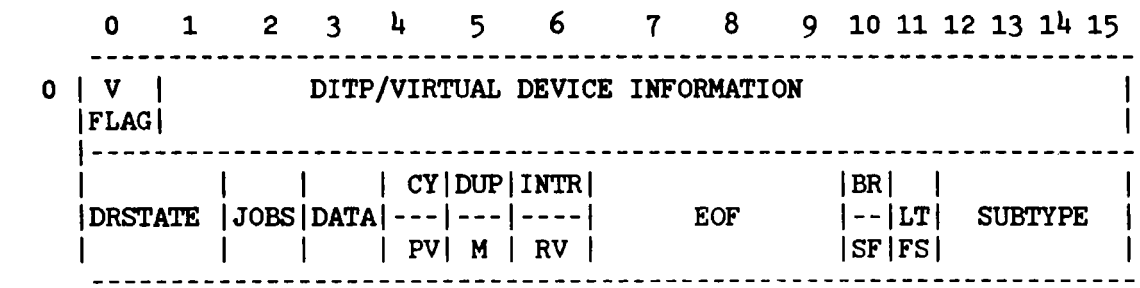
DTYPE.DITSIZE - The length of the DIT in words for this driver.

LOGICAL PHYSICAL DEVICE TABLE (LPDT)

LPDTDST=%15
LPDTSIR=%11



LPDT ENTRY



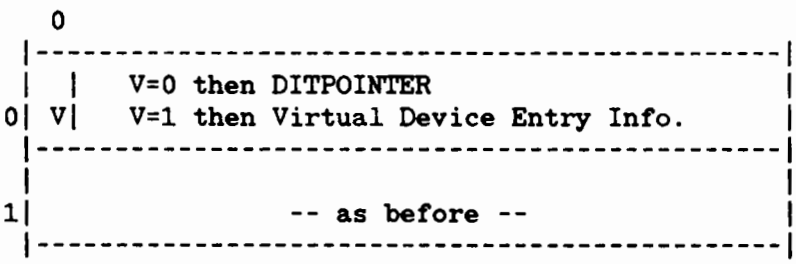
LPDT (CONT.)

There is one two-word entry in the LPDT for each Logical Device.

The base of the entry for a given Logical Device is equal to the Logical Device number multiplied by two. The physical device characteristics are maintained in the DIT and ILT.

```
VFLAG     - If set then a virtual device.
DITP      - SYSDB relative pointer to the DIT.
DRSTATE   - Device Recognition State
            0-Not owned
            1-Owned or recognized
            2-Service requested-set by driver upon unexpected inter-
                                  rupt and awake DEVREC
            3-Service granted-set by DEVREC
              (sequence for logon:0-2-3-1)
JOBS      - Accepting Jobs or Sessions
DATA      - Accepting Data
CY        - Control Y is allowed and has been detected.
PV        -PRIVATE VOLUME
DUP       - Duplicative
M         -MOUNTED VOLUME
INTR      - Interactive
RV        -RESERVED VOLUME FOR MULTIPLE PACK MOUNT REQUIREMENT
EOF       - End of File condition
            0-No EOF
            1-HARDWARE EOF
            2-:DATA
            3-:EOD
            4-:HELLO
            5-:BYE
            6-:JOB
            7-:EOJ
BREAK     - Break detected or ignore break if main running
SF=1      -SERIAL OR FOREIGN DISC PHYSICALLY AND LOGICALLY MOUNTED
LT        -LABELED TAPE
FS        -IF SF=1, THEN:    FS=0- SERIAL DISC
                             FS=1- FOREIGN DISC
SUBTYPE   - Device Subtype
```

LPDT (CONT.)

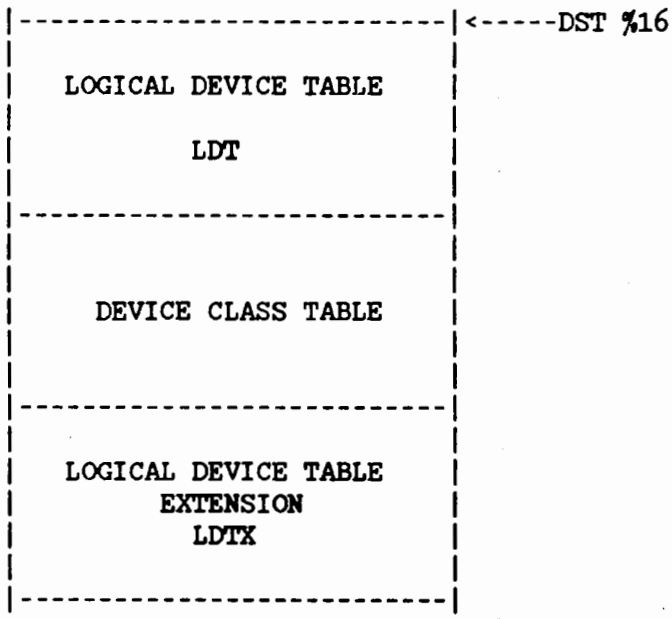


The first word of each entry in the LPDT has changed to reflect the addition of Virtual Devices.

A "real" logical device (ie. one on which an ATTACHIO call may be performed) has the sign bit set to "zero".

A "virtual" logical device has the sign bit set to "one". Thus anyone who loads the DIT pointer for use must check this sign bit.

OVERVIEW OF DEVICE TABLES

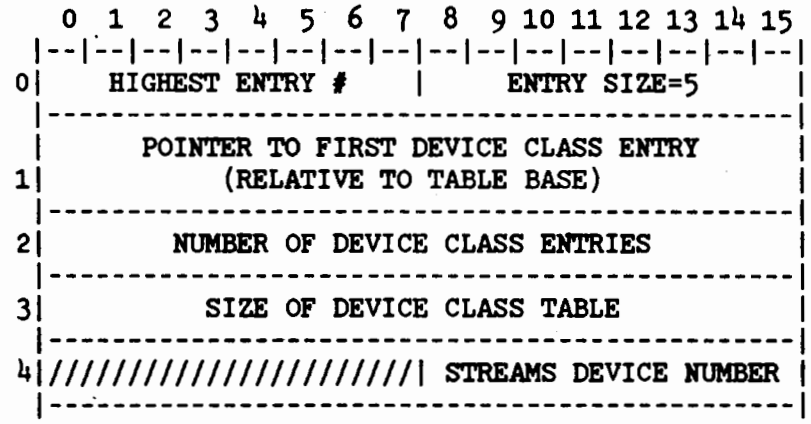


LOGICAL DEVICE TABLE

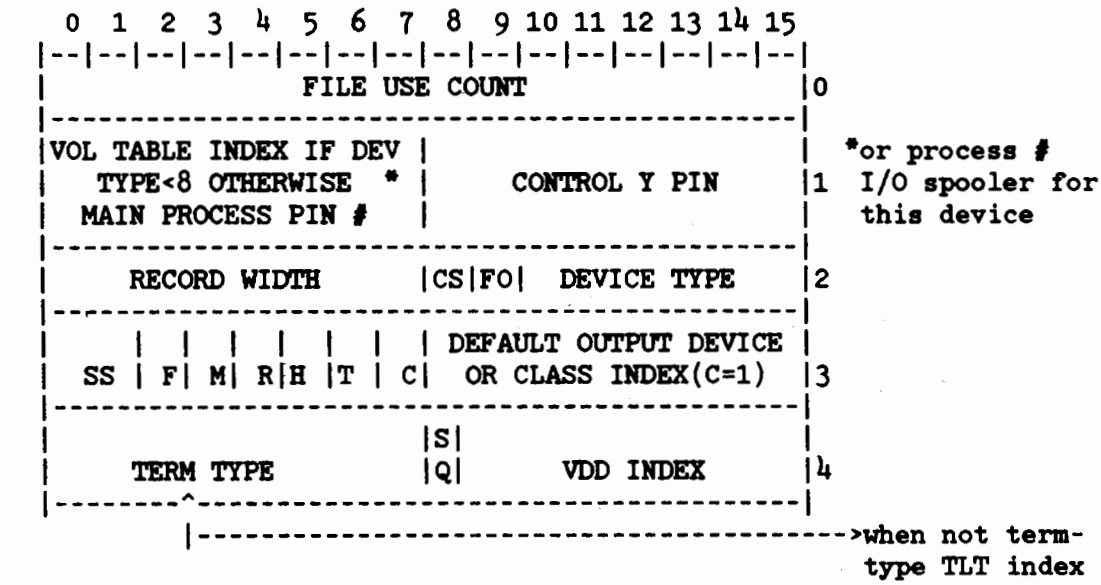
(Indexed by Log Dev#)

DST 16(8) = 14(10)
SIR 12(8) = 10(10)

ZERO ENTRY FORMAT



TYPICAL ENTRY FORMAT



SS. . . spool state
0 not spooled — reserved
1 spooled input — for
2 spooled output — spooling

SQ = 1 SPOOLING ENABLED

C . . . default device is class index
F . . . avail to system
M . . . avail to diagnostics
R . . . =down requested
D . . . duplicative
I . . . interactive

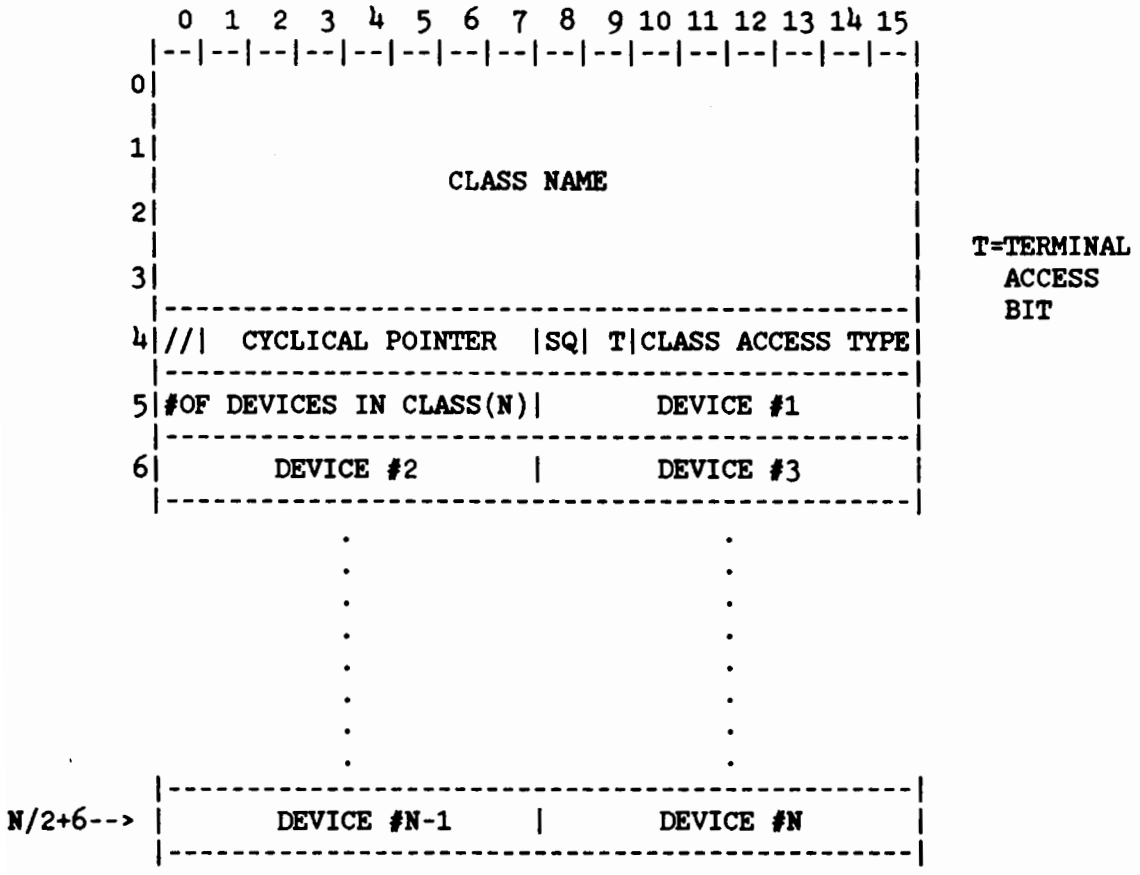
CS . . . CS device
FO . . . Special Forms
H . . . Header on/off
T . . . Trailer on/off

TERM TYPE. . . default used when not specified in hello command.

DEVICE CLASS TABLE

(Sequentially Organized)

TYPICAL ENTRY FORMAT



SQ = Spool Queue bit

NOTE: The device class table is in the same data segment (DST 16(8) as the LDT. ie., the LDT consists of three separate tables.

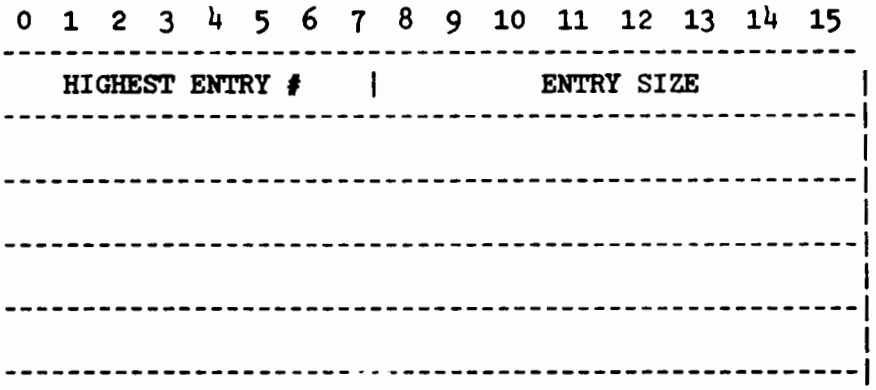
1. logical device table and
2. device class table
3. LDT Extension

LOGICAL DEVICE TABLE EXTENSION

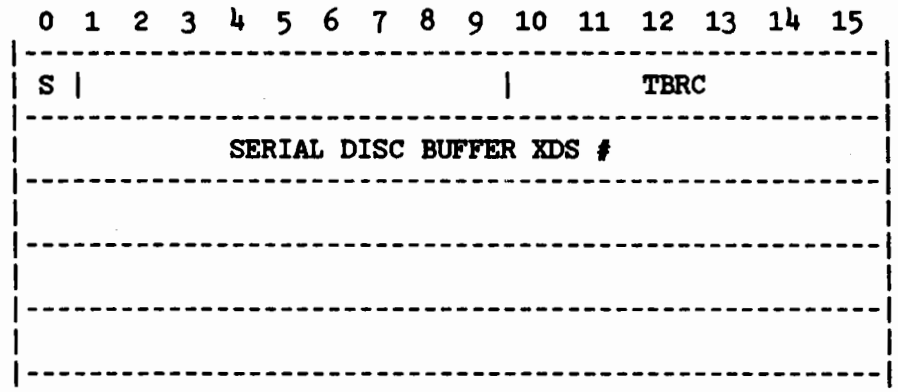
DST 16 = 14
8 10

SIR 12 = 10
8 10

ZERO ENTRY

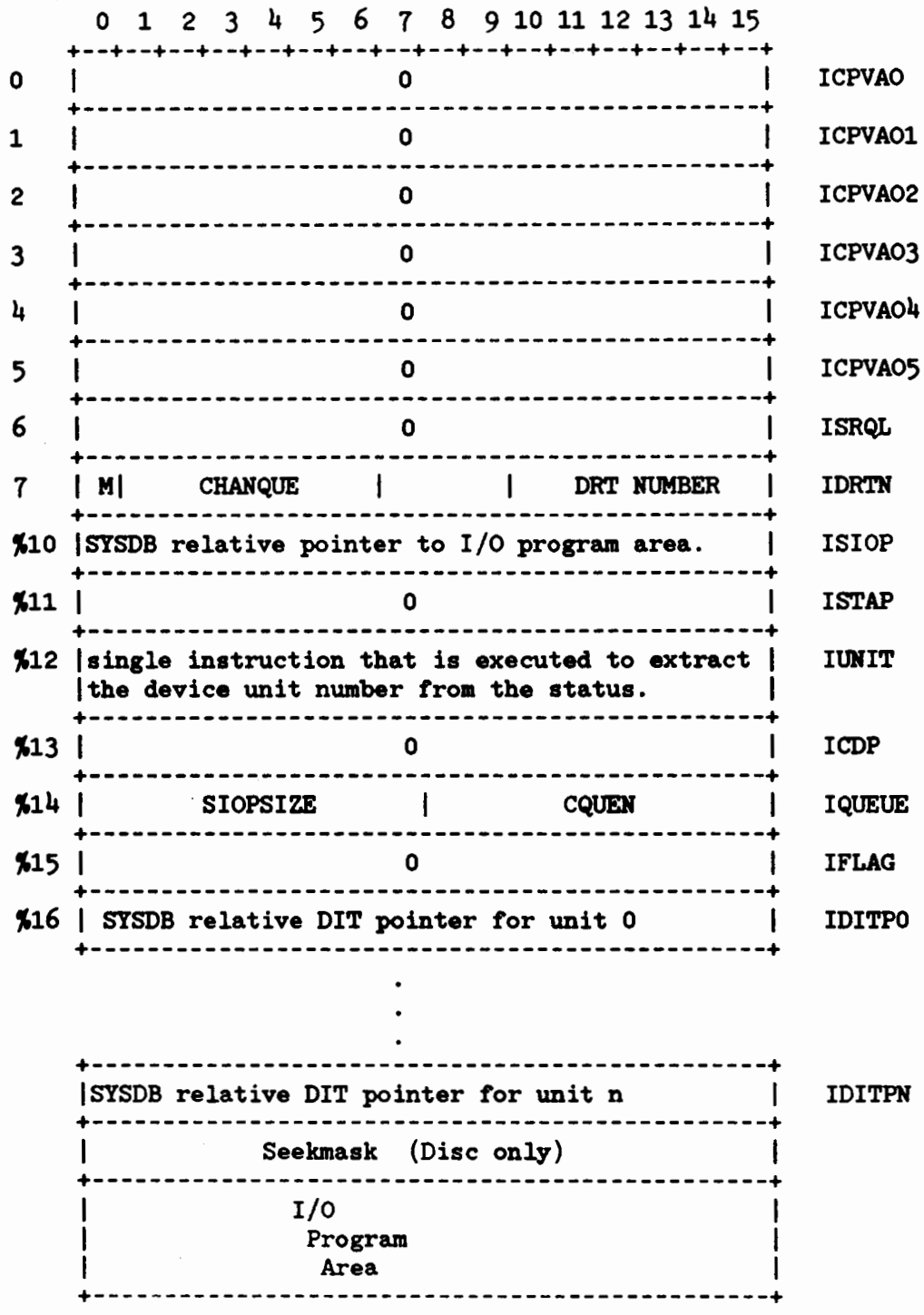


TYPICAL ENTRY



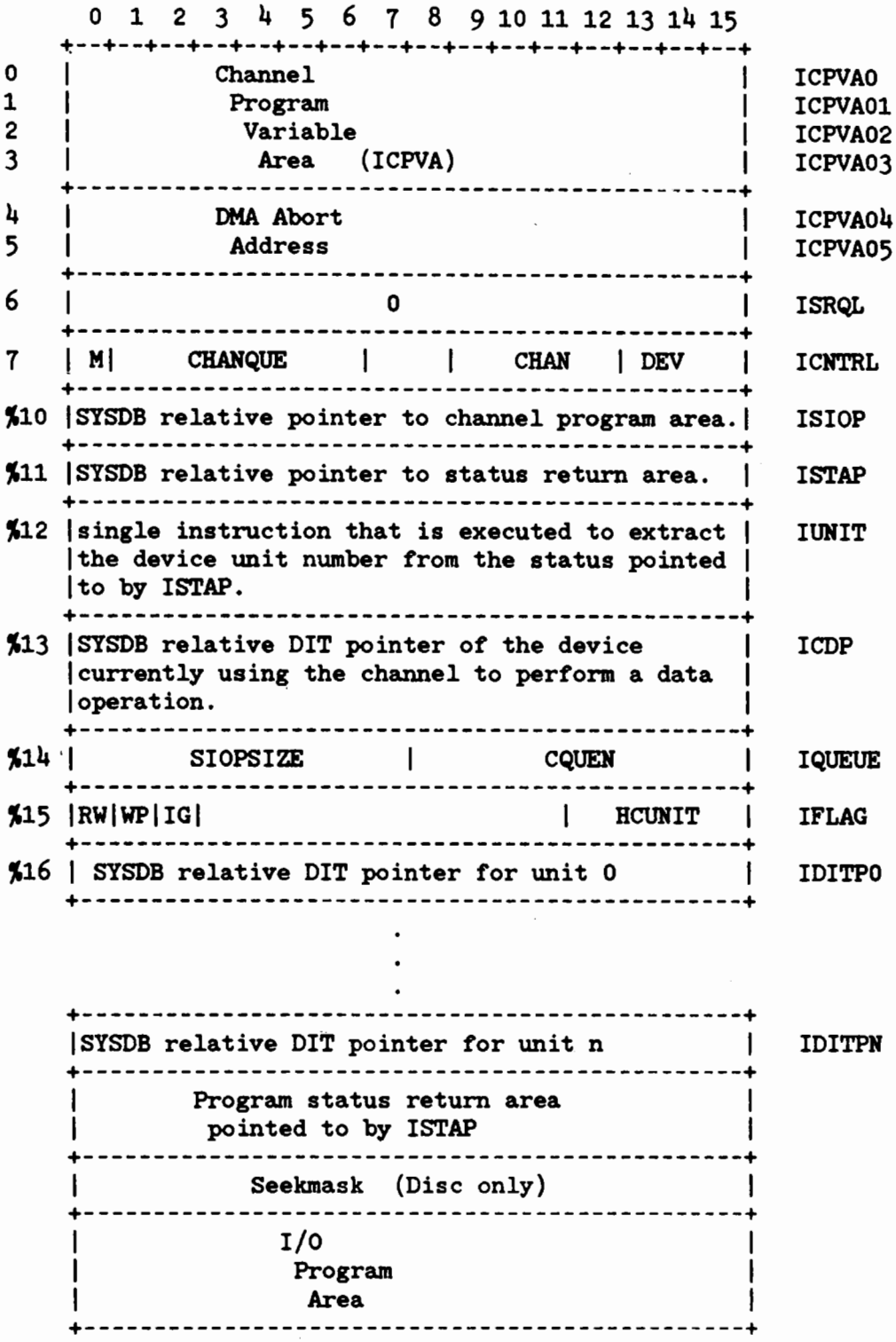
S.....Seek ahead enable/disable flag.
TBRC....Terminal's baud rate code

ILT FOR SERIES II/III



SIOPSIZE - SIO PROGRAM SIZE / 2.

ILT FOR SERIES 30/33/44 & SERIES II/III (HP-IB)



IPCVA - These four words comprise the channel program variable area where information is stored concerning a channel program Interrupt instruction or abort. CPVA0 should be used only for channel program aborts.

ICPVA4 - Words 4 and 5 contain DMA address, when channel program aborts during DMA transfer.

ISRQL - Serial poll request queue length. Series 33 currently does not support any serial poll devices. This should always be zero.

ICNTRL - Contains controller information.

.M If set, the controller is sharing a software channel resource in order to limit bandwidth.

.CHNQ The software channel resource number.

.DRTN The DRT number for a Series 33 device is equivalent to:
.CHAN - channel number (4 most significant bits of DRTN)
.DEV - device number (3 least significant bits of DRTN)

IFLAG - Used for controller flags.

.RW Runwait flag. An idle channel program should be started when there are no active requests to process.

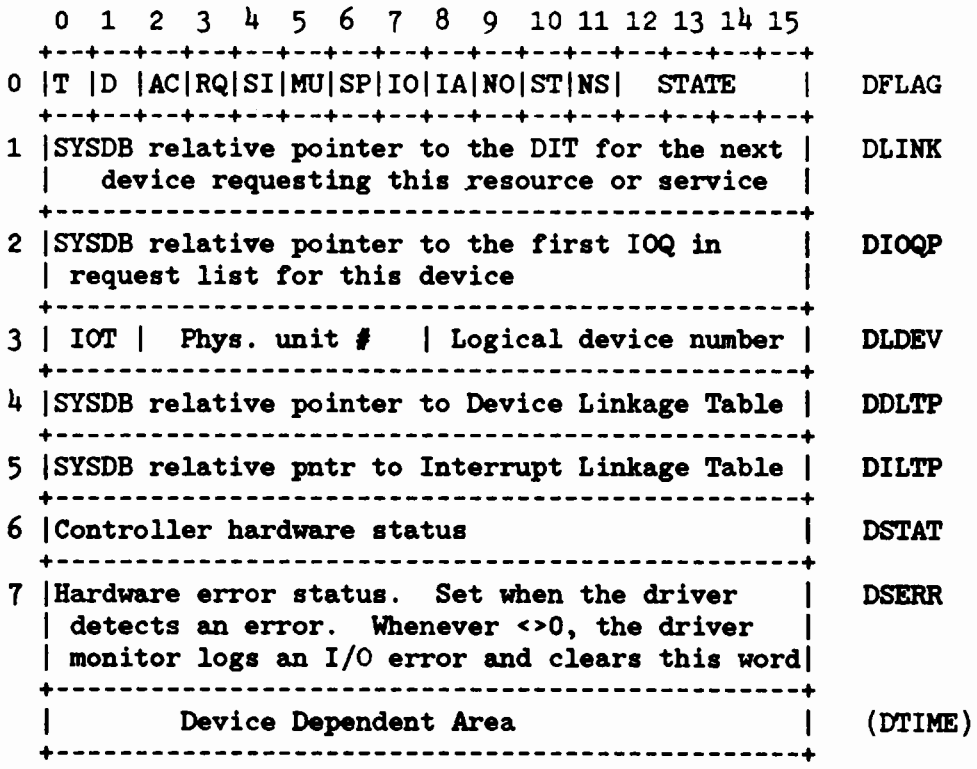
.WP Waitprog flag. An idle channel program has been started for this controller. This bit is reset by an interrupt.

.IG Ignorehi flag. An HIOP instruction has been issued against this controller, but the channel program was not in a wait statement. Therefore, ignore the interrupt generated by the channel code when this program halts.

.HCUNIT Highest configured unit number for this controller.

There is one DIT per physical device. If a physical device represents represents more than one logical device, the logical device number is obtained from the I/O queue element.
Although details of DIT's vary with device, the following structure is common to all:

DIT for Series II/III

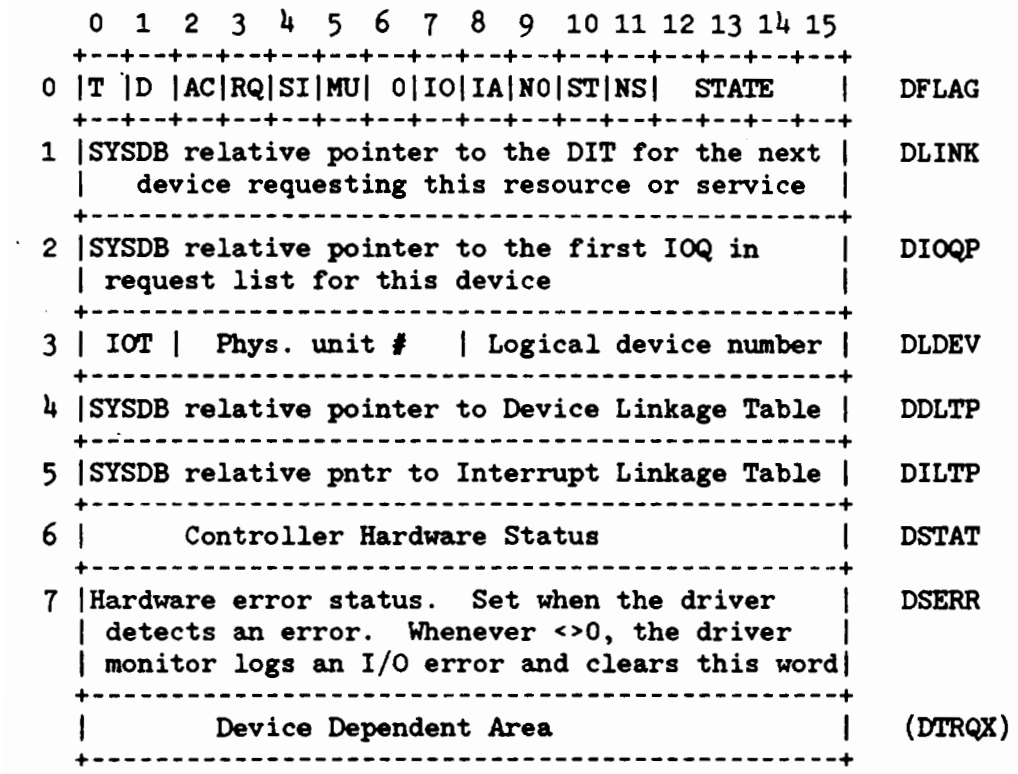


DFLAG - DEVICE RELATIVE FLAGS

T	SET IF DEVICE IS A TERMINAL.
D	SET IF DEVICE IS A DISC.
AC	ACTIVE BIT. 1 IMPLIES A MONITOR CURRENTLY SERVICING THIS DEVICE.
RQ	REQUEST BIT. 1 IMPLIES SERVICE REQUESTED WHILE MONITOR IS ACTIVE.
MU	IF SET, MULTIPLE UNIT CONTROLLER.
IO	IF SET, THEN A CHANNEL PROGRAM IS CURRENTLY EXECUTING.
IA	IF SET, AN INTERRUPT OR RESPONSE HAS OCCURRED.
NO	IF SET, DEVICE IS IN A NOT READY OR OPERATOR WAIT.
SI	SPECIAL INTERRUPT HANDLER
SP	SIO PREEMPTION
ST	START WAIT CHANNEL PROGRAM
NS	DO NOT SHORT WAIT THIS DISC
STATE	CURRENT DRIVER STATE AS DEFINED BY THE MONITOR. ALLOWABLE STATES ARE:

0 - START REQUEST
1 - NOT USED (BUT RESERVED)
2 - CALL DRIVER INITIATOR
3 - CALL DRIVER COMPLETOR
4 - NOT USED (BUT RESERVED)
5 - COMPLETE REQUEST
6 - UNEXPECTED INTERRUPT OCCURED
7 - START OPERATOR INTERVENTION WAIT
%10 - WAITING (ON OPERATOR). RESTART AT 0
%11 - WAITING (DATA MAKEPRESENT/FREEZING)
%12 - WAITING (INITIATOR CODE MAKEPRESENT/FREEZE)
%13 - WAITING (FOR COMPLETION INTERRUPT)
%14 - WAITING (FOR DEVICE CONTROLLER AVAILABILITY)
%15 - NOT USED (BUT RESERVED)
%16 - WAITING (INITIATOR CODE MAKEPRESENT)
%17 - WAITING (COMPLETOR CODE MAKEPRESENT)

IOT - I/O System type 0-Series II/III I/O System
1-HP-IB
2-unused
3-unused



DTRQX Used by some device drivers, it denotes timer request index.

DFLAG - DEVICE RELATIVE FLAGS

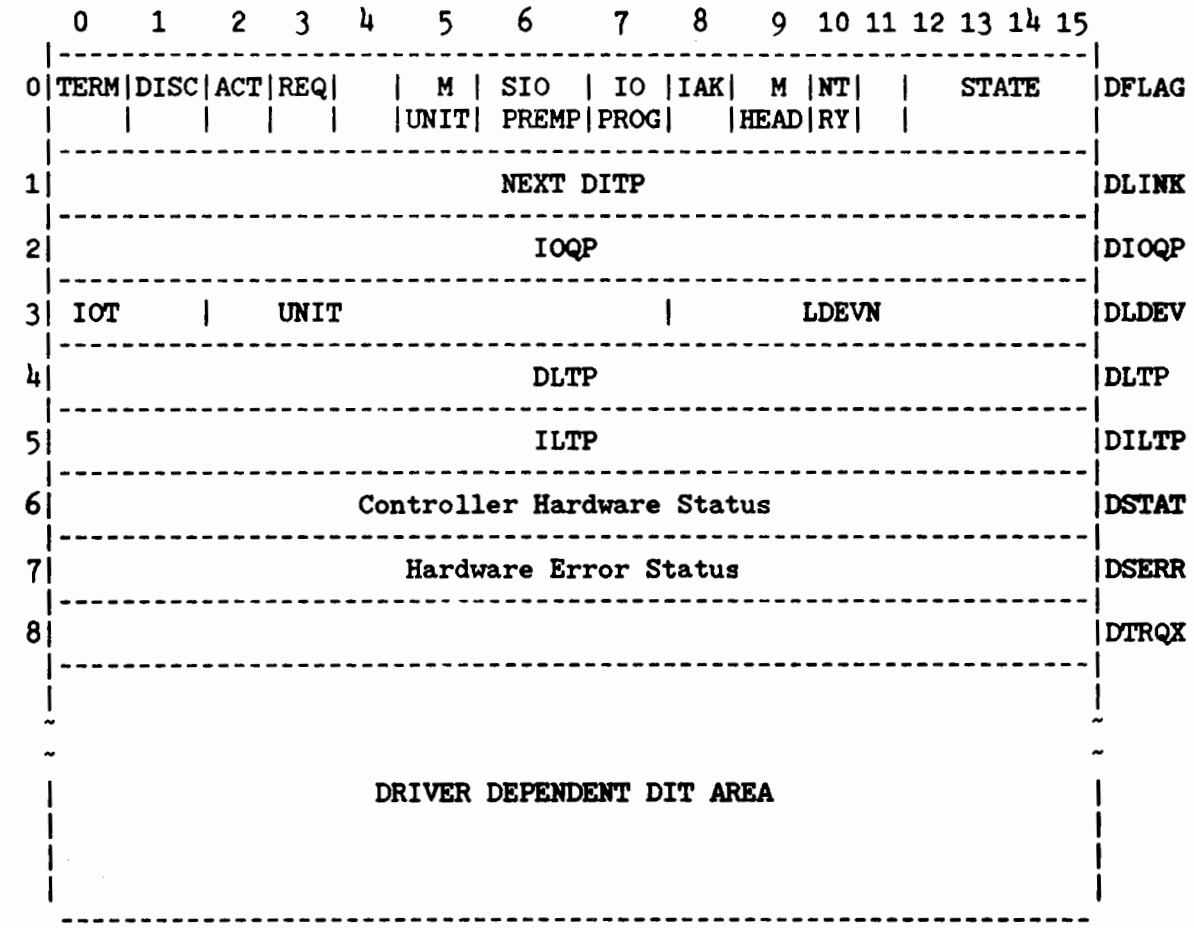
T	SET IF DEVICE IS A TERMINAL.
D	SET IF DEVICE IS A DISC.
AC	ACTIVE BIT. 1 IMPLIES A MONITOR CURRENTLY SERVICING THIS DEVICE.
RQ	REQUEST BIT. 1 IMPLIES SERVICE REQUESTED WHILE MONITOR IS ACTIVE.
MU	IF SET, MULTIPLE UNIT CONTROLLER.
IO	IF SET, THEN A CHANNEL PROGRAM IS CURRENTLY EXECUTING.
IA	IF SET, AN INTERRUPT OR RESPONSE HAS OCCURRED.
NO	IF SET, DEVICE IS IN A NOT READY OR OPERATOR WAIT.
ST	IF SET, AN IDLE CHANNEL PROGRAM SHOULD BE STARTED FOR THIS DEVICE.
SI	SPECIAL INTERRUPT HANDLER
NS	DO NOT SHORT WAIT THIS DISC
STATE	CURRENT DRIVER STATE AS DEFINED BY THE MONITOR. ALLOWABLE STATES ARE:

0 - START REQUEST
1 - NOT USED (BUT RESERVED)
2 - CALL DRIVER INITIATOR
3 - CALL DRIVER COMPLETOR
4 - NOT USED (BUT RESERVED)
5 - COMPLETE REQUEST
6 - UNEXPECTED INTERRUPT OCCURED
7 - START OPERATOR INTERVENTION WAIT
%10 - WAITING (ON OPERATOR). RESTART AT 0
%11 - WAITING (DATA MAKEPRESENT/FREEZING)
%12 - WAITING (INITIATOR CODE MAKEPRESENT/FREEZE)
%13 - WAITING (FOR COMPLETION INTERRUPT)
%14 - WAITING (FOR DEVICE CONTROLLER AVAILABILITY)
%15 - NOT USED (BUT RESERVED)
%16 - WAITING (INITIATOR CODE MAKEPRESENT)
%17 - WAITING (COMPLETOR CODE MAKEPRESENT)

IOT - I/O System type 0-Series II/III I/O System
1-HP-IB
2-unused
3-unused

Computer Museum

DIT for SIO Devices



DFLAG.TERMINAL - Device is a terminal
.DISC - Device is a Disc (Bit 0 = 0)
.ACTIVE - A monitor is currently servicing this device
.REQUEST - Service requested while monitor was active

.MUNIT - device controller servicing multiple units
.SIOPREMPT- If set then a preemptive request has been queued for this device. Preempt code is set in IOQ.
.IOPROG - I/O program in progress. Decrement SIOCOUNT and check for multi-channel when complete
.IAK - Interrupt or Response has occurred.
.M HEAD -Moving head disc
.NT RDY -Not ready for SIO. SIODM holds off next SIO until ALLOWPOLL is done.

DTRQX - Used by some device drivers, it denotes timer request index.

DIT FOR SIO DEVICES (CONT.)

DFLAG.STATE - this quantity specifies the next action to be taken in servicing the request.

0-new - start request.
1-not used.
2-call Driver Initiator Procedure
3-call Driver Completor Procedure
5-complete request
6-device recognition
7-start operator intervention wait (%10)
%10-restart request on interrupt
%11-wait for data to be frozen then state 2
%12-wait for driver code to be frozen then state 2
%13-call completor on interrupt
%14-wait for device controller
%15-not used
%16-wait for initiator make present then state 2
%17-wait for completor make present then state 3

DLINK - SYSDB relative pointer to the DIT for the next device requesting this resource or service.

DIOQP - SYSDB relative pointer to the first IOQ in the request list for this device

DLDEV.LDEVN - Logical Device Number

.UNIT - unit number of the physical device.

.IOT - IO type 0=> Series III I/O, 1=> HPIB I/O

DDLTP - SYSDB relative pointer to the DLT.

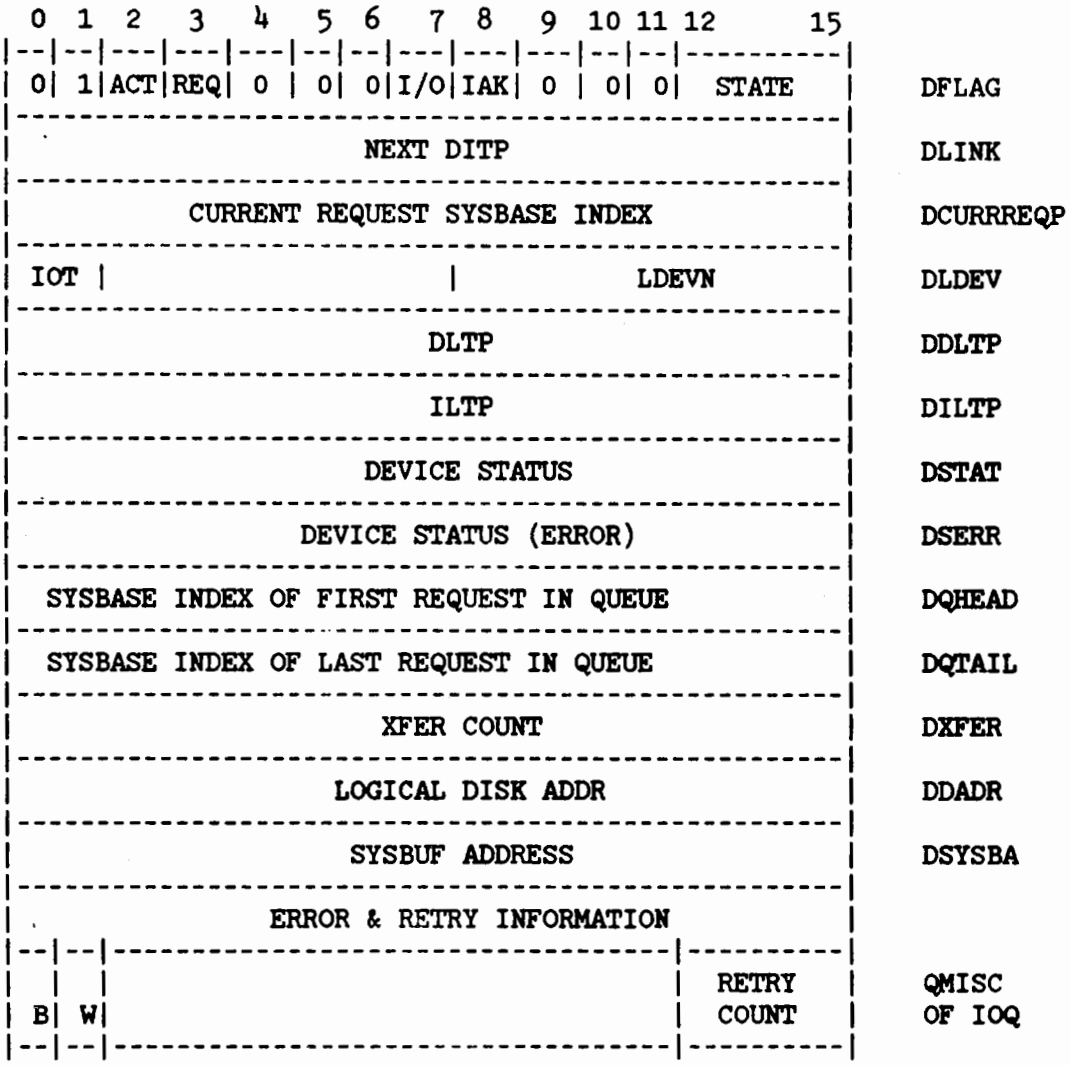
DILTP - SYSDB relative pointer to the ILT.

DSTAT - interrupt status for this device. Set each time the device interrupts.

DSERR - Hardware Device Controller Status. Set when the driver detects an error. whenever not zero SIODB logges an I/O error and clears this word.

DTIME - time out completed flags. If a timeout occurs in response to a timer request type %20 (I/O request), the sign bit is set in this word. The IA bit in DFLAG is also set, and the monitor for this device is awakened. (Only used if timer services are requested. Must be word #8 if timer services are requested.)

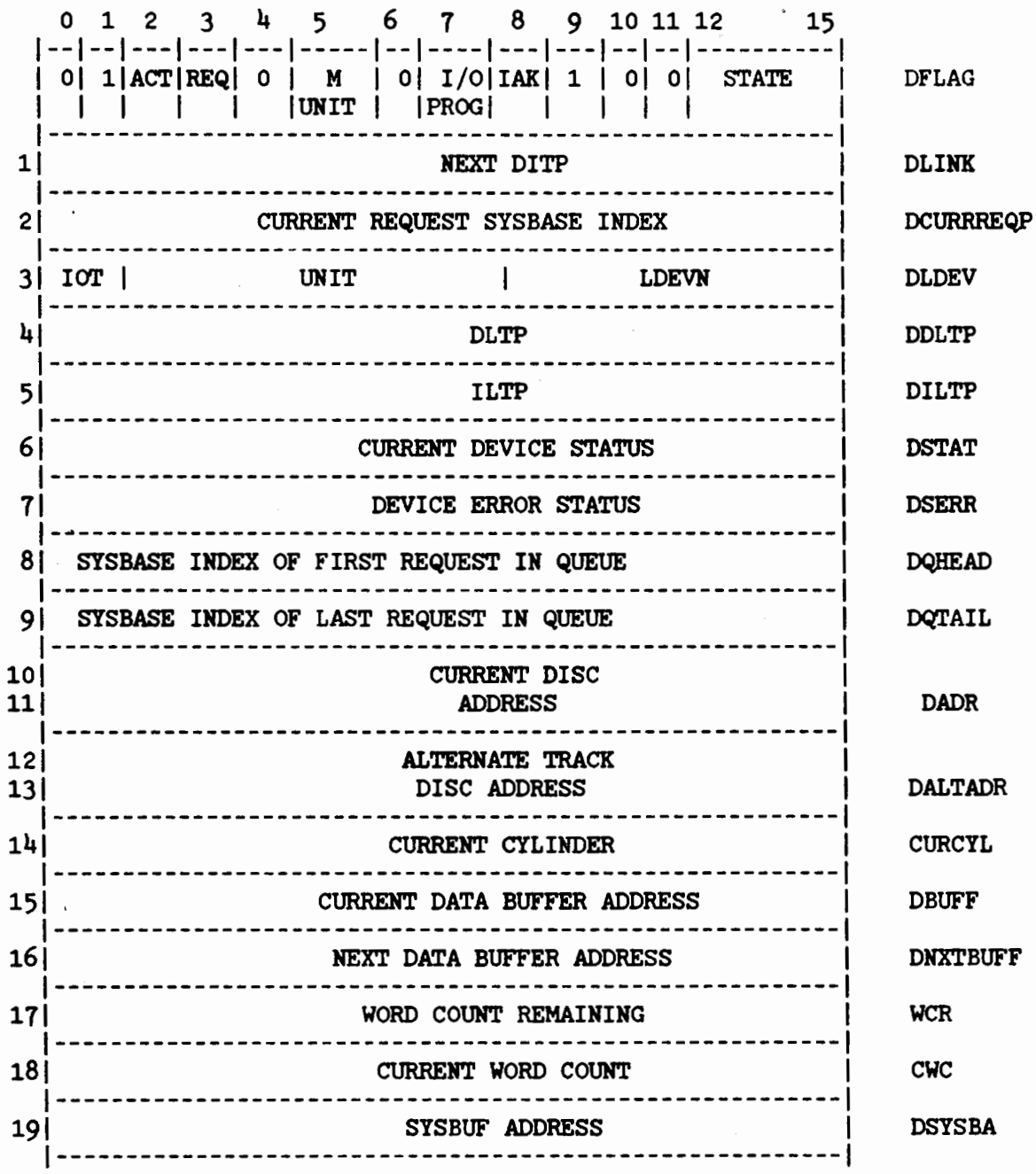
DIT FOR FIXED HEAD DISK



IOT - I/O Devices
- 0 - Series II/III
- 1 - HP-IB
- 3 - unused
- 4 - unused

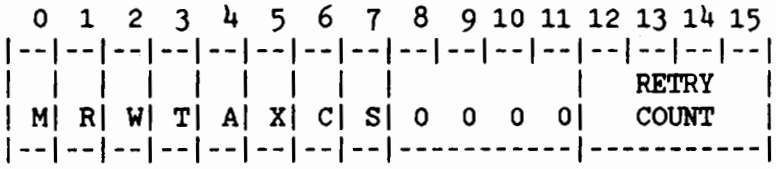
B - modify bad track table
W - write bad track table

DIT FOR 7900A & 2888A MOVING HEAD DISC



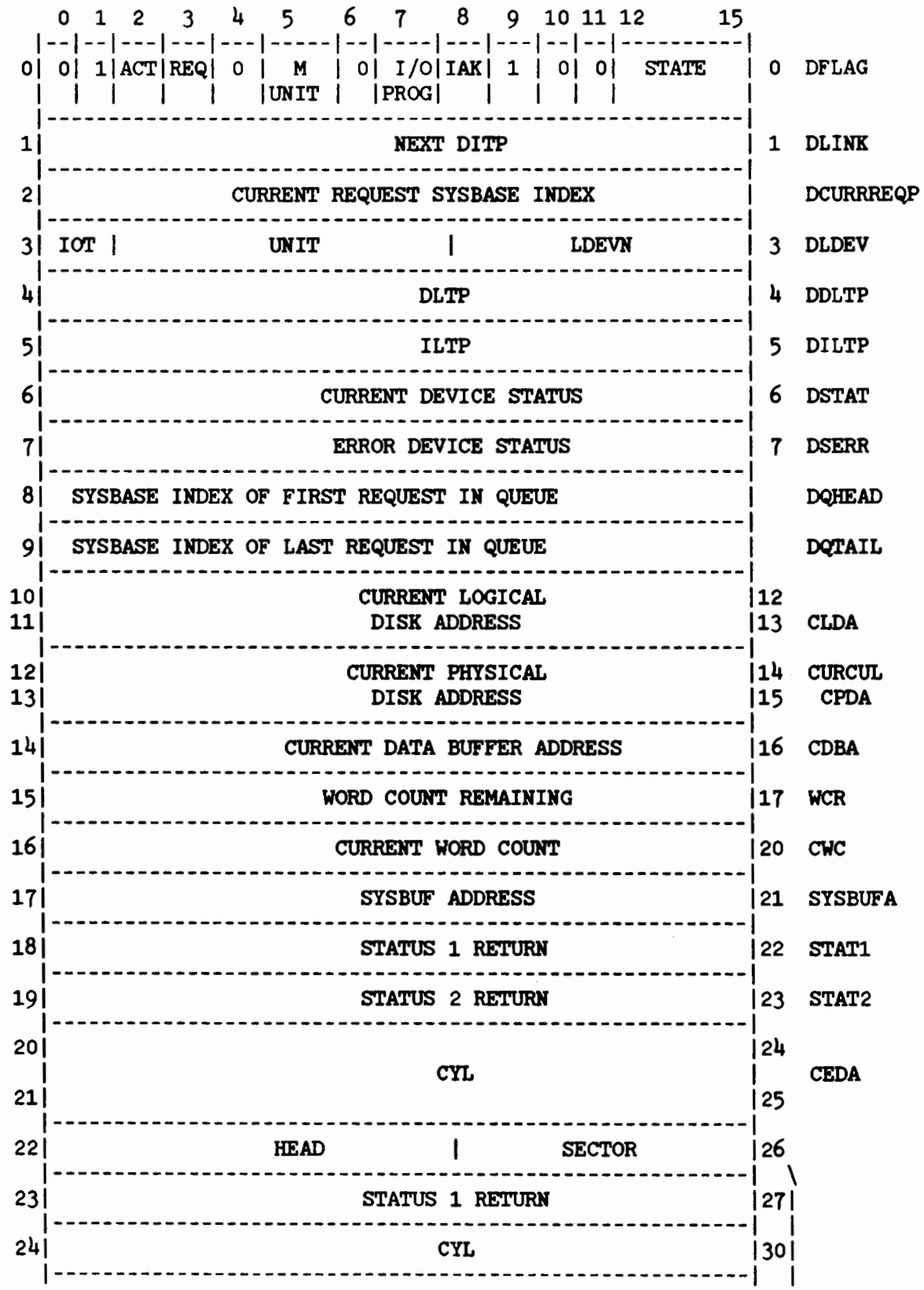
IOT - I/O Devices
0 - Series II/III
1 - HP-IB
3 - unused
4 - unused

ERROR & RETRY INFORMATION

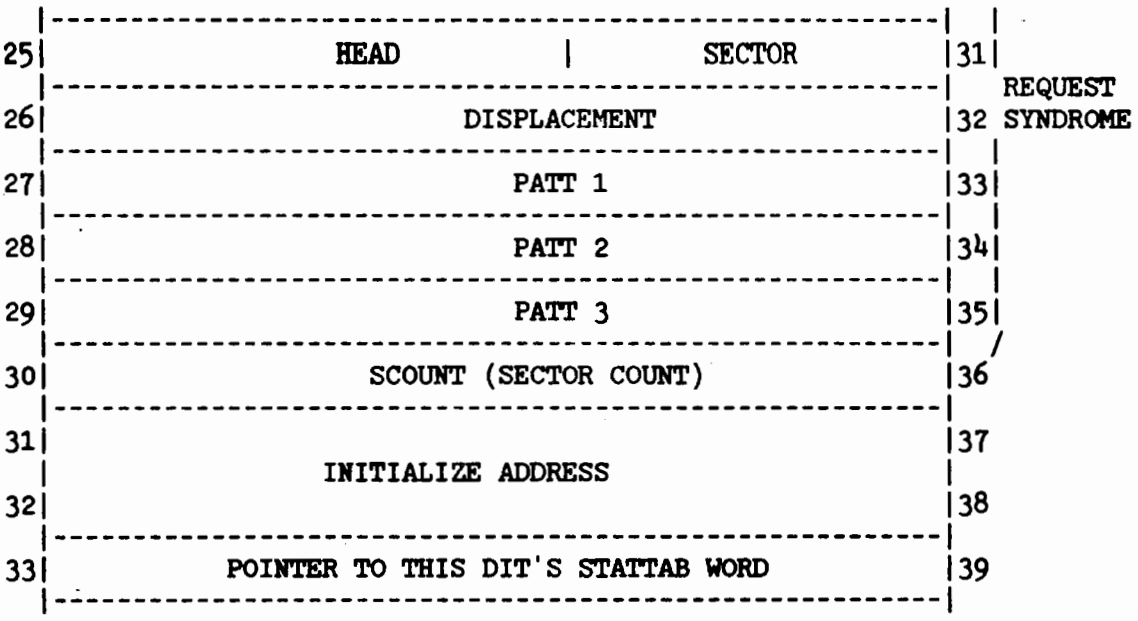


M - handling defective track map
R - read defective track map
W - write defective track map
T - track to track xfer
A - reading alternate track
X - xfer from alt. track
C - recalibration done
S - seek or recal in progress

DIT FOR 7905/7906/7920/7925

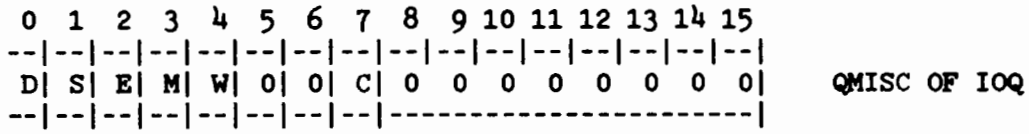


DIT FOR 7905/7906/7920/7925 (CONT.)



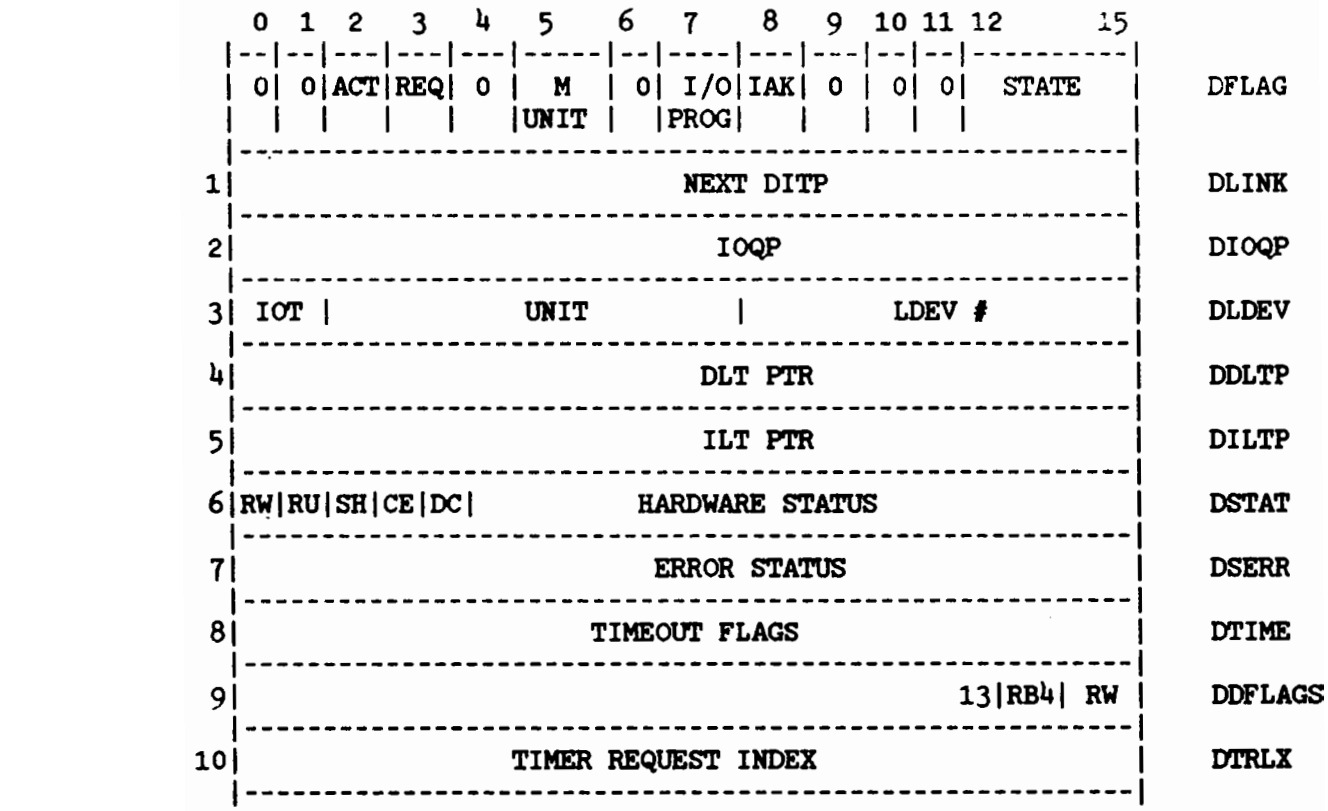
IOT - I/O Devices
- 0 - Series II/III
- 1 - HP-IB
- 3 - unused
- 4 - unused

ERROR & RETRY INFORMATION



D - retry determination
S - request syndrome
E - request error info
M - update track map
W - writing track map
C - issued a recalibration

DIT FOR 7970 MAG TAPE

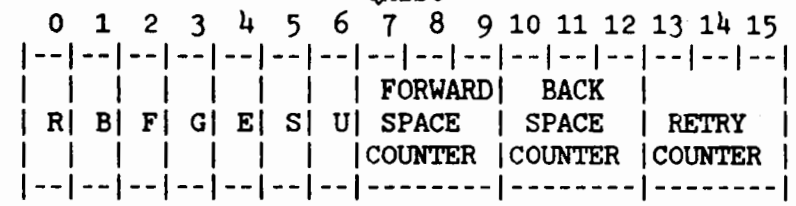


IOT - I/O Devices
- 0 - Series II/III
- 1 - HP-IB
- 3 - unused
- 4 - unused

DSAVE - Device processing flags
- RW RWBIT - Indicates tape has been rewound.
- RU RWUNLD - Indicates that a rewind/unload was performed to allow a write-ring mount.
- SH SHORT - A short read is in progress. After completion of read, EOF is checked for and if not present, the requested bytes are transfered from the short-read buffer to the user's buffer.
- CE CESTAT - Channel parity error processing is in progress.
- DC DSFLAG - Transfer used data chaining - used for computing the transmission log.

RW - (DDFLAGS, bit 15) if set, tape is rewound
RB4 - (bit 14) if set, need to rewind tape before next write

QMISC

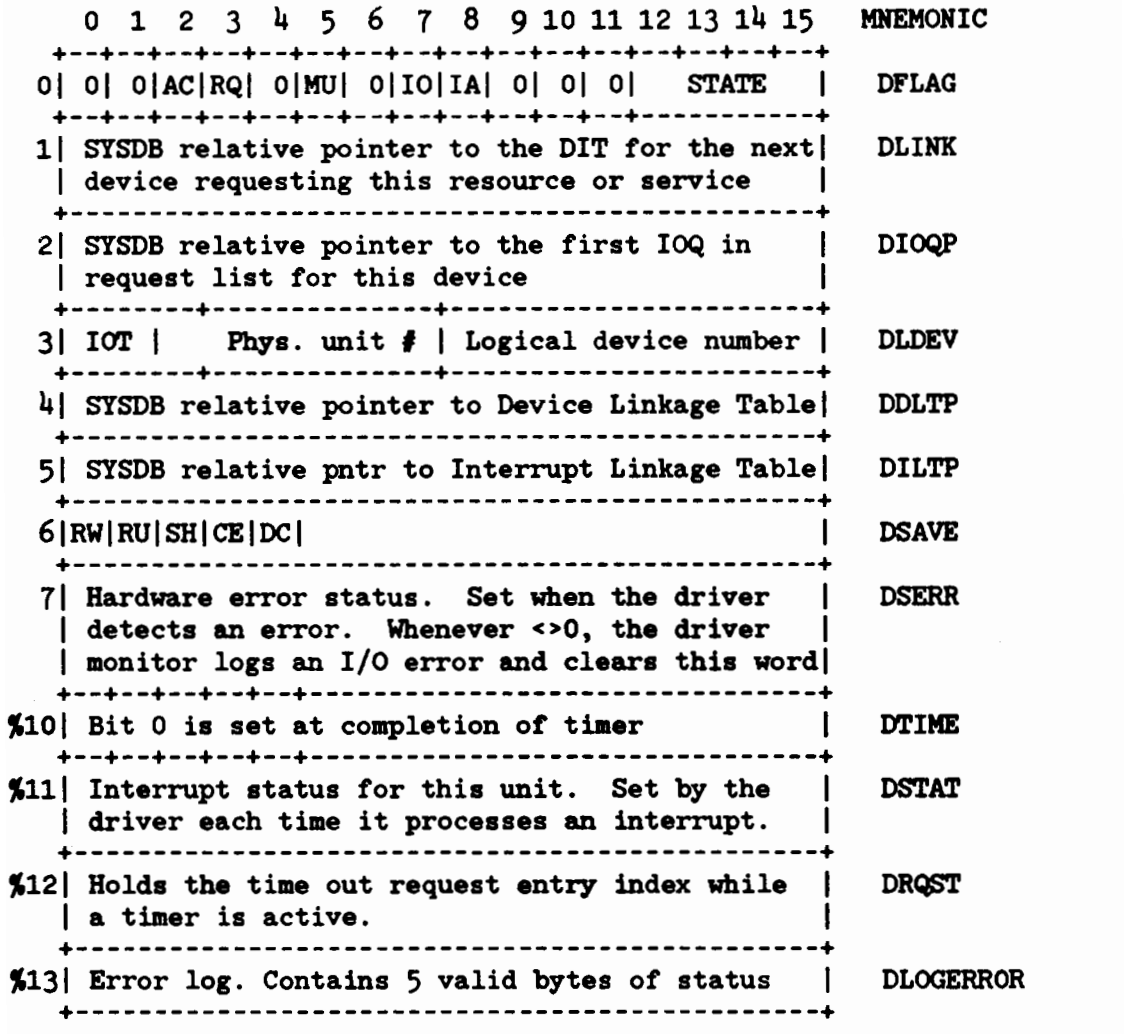


Where

- **R - retry in progress**
- **B - backspace in progress**
- **F - forward space in progress**
- **G - gap in progress**
- **E - backspace on data end-of-file**
- **S - short read in progress**
- **U - unload tape for write ring installation**

DIT for 7976 Magnetic Tape

There is one DIT per physical device. If a physical device represents more than one logical device, the logical device number is obtained from the IOQ element. The following diagram shows the DIT used for the mag tape driver.



DFLAG - Flags and request state

AC	ACTIVE	- A monitor is currently servicing this device.
RQ	REQUEST	- A service request is pending while the monitor is active.
MU	MUNIT	- This device is on a multi-unit controller.
IO	IOPROG	- An I/O Channel Program is running for this device.
IA	IAK	- An interrupt or response has occurred for this device.
NO	NOTRDY	- Go to state %10 after Idle Channel Program is started.
ST	STWAIT	- The device monitor is starting an Idle Channel Program for this device. There is no IOQ associated with this type of request.

STATE - State of the device monitor. Specifies the next action to be taken in SIODM in servicing the request:

- 0 - start new request
- 1 - not used
- 2 - call driver initiator procedure
- 3 - call driver completor procedure
- 4 - not used
- 5 - process request completed
- 6 - initiate device recognition sequence
- 7 - start operator intervention wait
- %10 - wait for interrupt (operator intervention) restart at state 0
- %11 - wait for data segment freeze, then state 2
- %12 - wait for driver initiator to be frozen, then allocate controller (state 2)
- %13 - wait for I/O completion interrupt, then state 3
- %14 - wait for controller, then call driver initiator
- %15 - not used
- %16 - wait for initiator make present, then state 2
- %17 - wait for completor make present, then state 3

DLDEV

IOT - I/O Devices

- 0 - Series II/III
- 1 - HP-IB
- 3 - unused
- 4 - unused

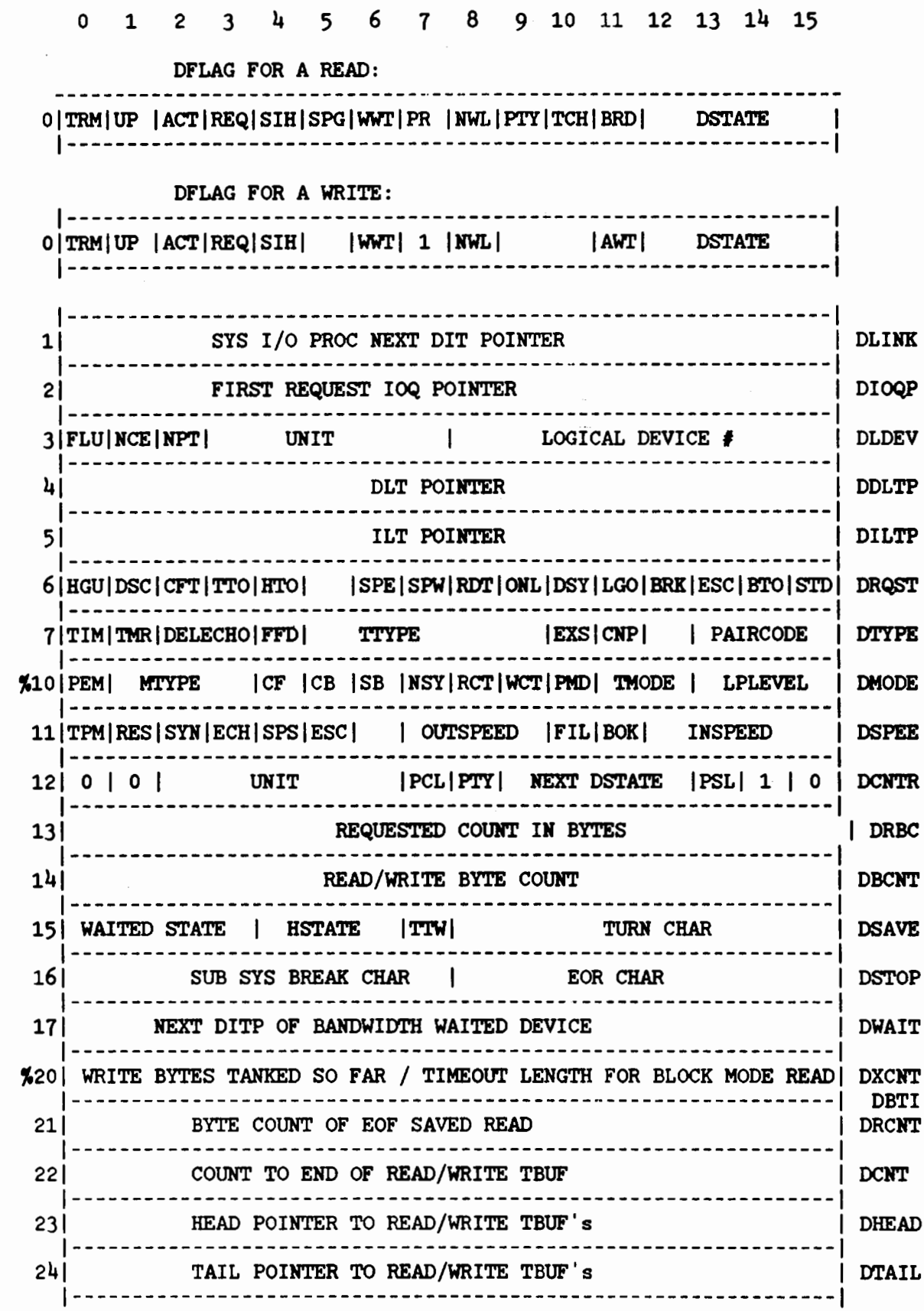
DSAVE - Device processing flags

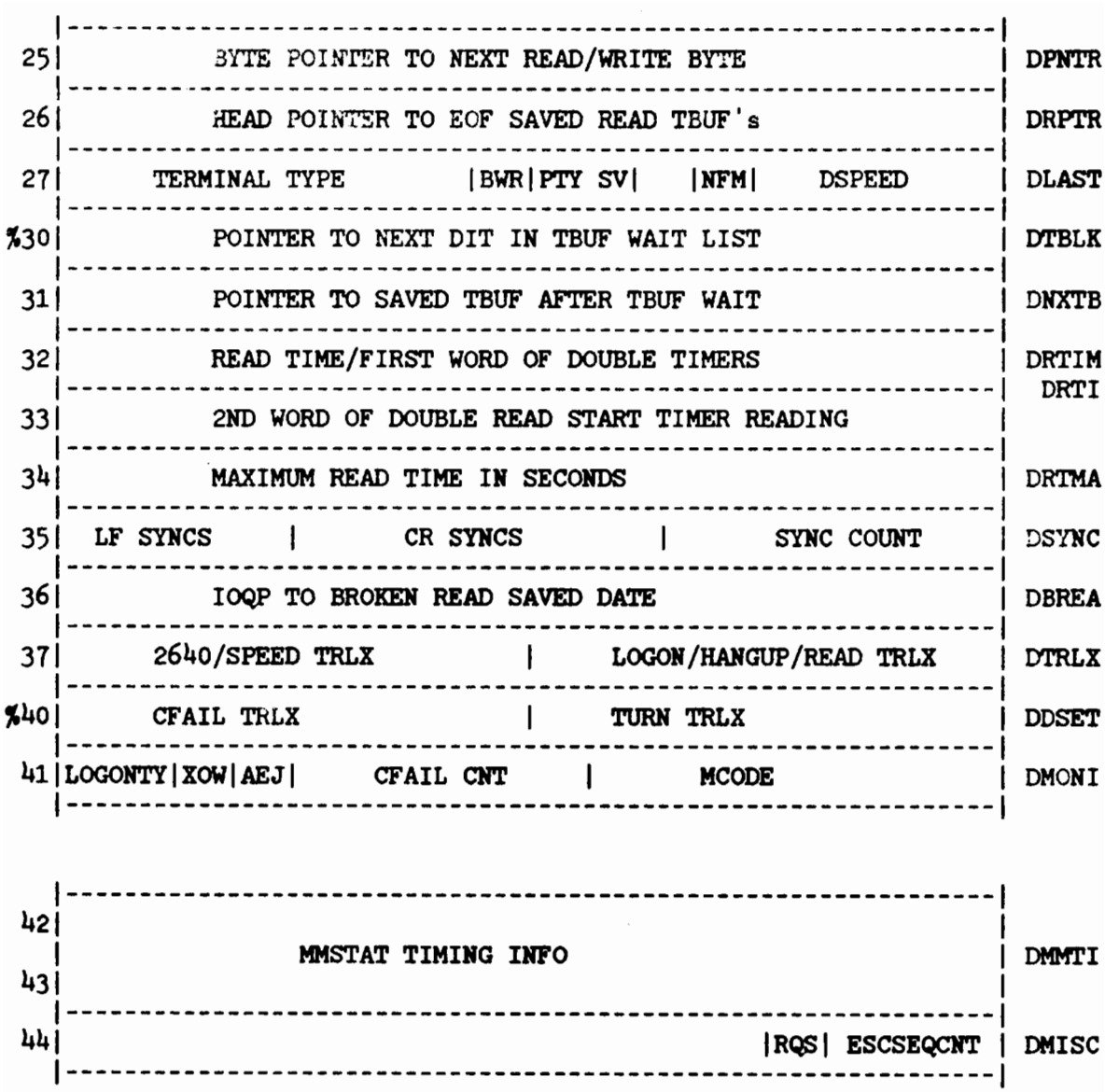
RW	RWBIT	- Indicates tape has been rewound.
RU	RWUNLD	- Indicates that a rewind/unload was performed to allow a write-ring mount.
SH	SHORT	- A short read is in progress. After completion of read, EOF is checked for and if not present, the requested bytes are transfered from the short-read buffer to the user's buffer.
CE	CESTAT	- Channel parity error processing is in progress.
DC	DSFLAG	- Transfer used data chaining - used for computing the transmission log.

DSTAT - Mag tape controller status

BITS	USE	
0	END OF FILE	
1	BEGINNING OF TAPE	
2	END OF TAPE	
3	SINGLE TRACK ERROR (NOT LOGGED FOR READS)	
4	COMMAND REJECT	
5	FILE PROTECT	
6	MULTIPLE TRACK ERROR	
7	UNIT ONLINE	
8	GCR (6250 BPI DENSITY)	
9	UNIT NUMBER (MSB)	
10	UNIT NUMBER (LSB)	
11	TIMING ERROR	
12	TAPE RUNAWAY	
13	REWINDING	*
14	UNIT BUSY	** (REPORTED AS UNIT NOT READY)
15	INTERFACE BUSY	*

TERMINAL DIT




25 BYTE POINTER TO NEXT READ/WRITE BYTE DPNTR
26 HEAD POINTER TO EOF SAVED READ TBUF's DRPTR
27 TERMINAL TYPE BWR PTY SV NFM DSPEED DLAST
%30 POINTER TO NEXT DIT IN TBUF WAIT LIST DTBLK
31 POINTER TO SAVED TBUF AFTER TBUF WAIT DNXTB
32 READ TIME/FIRST WORD OF DOUBLE TIMERS DRTIM
DRTI
33 2ND WORD OF DOUBLE READ START TIMER READING
34 MAXIMUM READ TIME IN SECONDS DRTMA
35 LF SYNCS CR SYNCS SYNC COUNT DSYNC
36 IOQP TO BROKEN READ SAVED DATE DBREA
37 2640/SPEED TRLX LOGON/HANGUP/READ TRLX DTRLX
%40 CFAIL TRLX TURN TRLX DDSET
41 LOGONTY XOW AEJ CFAIL CNT MCODE DMONI
42
MMSTAT TIMING INFO DMMTI
43
44 RQS ESCSEQCNT DMISC

TERMINAL DIT FIELDS AND DEFINITIONS

DFLAG - FLAGS AND DEVICE STATE

TERMINAL	Device is a terminal
UP	If set, device is on line, has been speed sensed or has been initialized and can do I/O. If clear then in speed sense mode.
ACTIVE	If set, monitor is currently active servicing this device.
REQUEST	Service for this device was requested while the monitor was active.
SPECIH	Use special interrupt handler.
SPOOLING	Input has been requested through the PTAPE procedure.
WRTWAIT	A character or sync is in the process of being output and a completion interrupt is expected.
PAIR	Pair is set whenever no read is in progress or when the action on the next character is dependent on the previous character input or the previous state. See paircode for details on the various pair conditions.
NEWLINE	A linefeed was the last character input or output. Used to determine if a CR/LF is necessary on mode changes or at FOPEN time.
PTYCHK/ 2645K FLAG	Read data is to be checked for correct parity, and if incorrect a parity error indication is to be returned to the caller.
TERMCHAR	A special read termination character has been specified. The read data is to be checked and if the termination character is found the read will be terminated and the character set in the buffer. If the binaryread bit is set then this bit indicates a "transparent" read is in progress with sub system break and EOR characters in DSTOP. Both a termchar and a transparent read may be in progress simultanously if the termchar field of QPAR2 is not zero.

BINARYREAD A binary or transparent read was specified. If TERMCHAR is clear then a binary read is in progress. All 8 bits are transferred and no editing takes place. A binary read is teminated only when the count is satisfied. If termchar is set, then a transparent read is in progress. No editing takes place but only 7 bits are transferred. An EOR and sub system break character are held in DSTOP.

ACKWAIT An ENQ was sent to a 2640/44. Waiting for an ack or time out before continuing the write. Has this meaning during write operations only.

DSTATE Device state. Specifies the current device activity and is used to detemine the next state.

- 0 - null or no activity.
- 1 - writing.
- 2 - reading.
- 3 - XON write, reading next.
- 4 - turning 202 modem to write state, next state in NXTD STATE.
- 5 - wait for less terminal activity to start read/write
- 6 - end of record (EOR) LF in progress, null state next.
- 7 - EOR CR in progress, EOR CR state next.
- %10 - EOR sync in progress, EOR CR state next.
- %11 - write being waited for a break allowed check by term.
- %12 - delete LF or delete echo character being written or start read next. Send XON to start read next.
- %13 - delete CR being written, delete LF state next.
- %14 - "!!!" or syncs being written. Next state is delete CR or saved in WAITEDSTATE if sync set.
- %15 - 1st character of a termtype 11 read is being echoed.
- %16 - have TIP start a read operation.
- %17 - finish up read then do DSTATE operation held in NXTDSTATE.

DLINK - Link word for linked list of the devices waiting for service by the system IO process. If not zero or -1 (end of list) then a DIT pointer to the next device waiting.

DIOQP - SYSDB relative pointer to the first IOQ element in the request list for this device.

DLDEV - Logical device number and unit number.

FLUSH This flag is set whenever a break has been detected and accepted. While it is set, writes are returned completed without any I/O being done. Reads are returned with an unusual condition status, %173.
It also holds off any further break service requests.
It is reset with a function code 25 operation.

TERMINAL DIT (CONT.)

NO'CX'ECHO — if set, then "!!!" is not to be echoed when a control X is detected to delete a line.

.NO PTY — Termtype is 8 bit in nature.(no pty set or check allowed)

UNIT — unit number of device.

LDEVN — Logical device number.

DDLTP - SYSDB relative pointer to driver linkage table (DLT).

DILTP - SYSDB relative pointer to interrupt linkage table (ILT).

DRQST - Monitor service request flags. The requests are serviced in a left to right order. The bit position determines the priority with which the request is serviced.

HANGUPTO — Hangup timeout has been completed.

DISCNCT — Dataset has disconnected (dataset ready has dropped).

CFAILTO — Timeout started when carrier failed has completed. If 103 then hangup else try to turn 202 around again.

TURNTO — CB or SB is not true 5 seconds after starting the read to write turnaround on the 202. Hangup device.

HP2640TO — An ACKWAIT from an ENQ to 2640/44 has timed out. The ACKWAIT is terminated and the write restarted.

SPOOLEND — A control Y has been detected terminating PTAPE input.

SPOOLSW — Switch PTAPE input buffers.

READTO — A read operation has been timed out.

ONLINE — A colon has been input and the device speed sensed. If not connected through a dataset, initiate a log on time out.

DSETRDY — Dataset ready has been detected. Initiate a log on time out.

LOGONTO — A log on time out has occurred. The caller has not logged on. The device is hungup.

BRK — A break has been detected or SB has dropped while writing.

ESC — A control Y has been detected.

BLOCK TO — Block mode read has timed out before completion. Read is returned with IO timeout code.

STAT DONE — Logical write and associated status request have been completed for 2631B.

DTYPE - Terminal type and other flags.

TIMING — A request to measure the time taken to complete a read operation has occurred and the time at the initiation of the read has been saved in DRTIMED. When the read is completed, the time taken will be saved in DRTIME.

TIMEREAD — The time required to complete a read operation is to be monitored and saved in DRTIME.

DELECHO — This field contains a code which specifies the character to be output when a delete character (control H) is input. Different characters are output if the word count is zero to keep the carriage at the proper place.

CODE	INPUT<>0	INPUT=0	COMMENT
0	nothing	space	terminal backspaces
1	"/"	nothing	hard copy no backspace
2	line feed	space	hard copy backspaces
3	control Y	nothing	2600 control Y backspaces

FORMFEED — If set then a form feed is output when the form feed character (%14) is to be output. If clear a LF is output in place of the form feed character. In either case, the character is preceeded by an XOFF and carriage return. Usually clear for terminals which do not respond to a form feed.

TTYPE — terminal type as specified in the MPE ERS.

0 - ASR 33	9 - mini bee (HP2615)
1 - ASR 35	10 - HP2640/44
2 - ASR 37	11 - HP2640/44 & auto enter cap
3 - execuport	12 - HP2645K Katakana/Roman data
4 - datapoint	13 - term connected to switching
5 - Memorex	network or other computer
6 - terminet	14 - Multipoint terminal
7 - 2741 call 360	15 - HP2635A print term (8 bit)
8 - 2741 PTTC/EBCDIC	16 - HP2635A print term (7 bit)

ETXSENT End of Text (ETX) character has been sent to a 2640X on a 202 to stop the terminal from listening. Carrier may now be dropped.

CONSTRNTRPT.(11:1) If set then Control A on the Console will cause PROGEN to be awoken. If clear, then Control A is ignored.

PAIRCODE when the action to be taken on the next character is dependant on the previous state or character input then this field contains a code specifying the previous character or condition.

- 0 - no read in progress
- 1 - XOFFPAIR. Last character input was an XOFF during a tapemode read on a terminet. EOR has been returned and if the next char is a CR then ignore it.
- 2 - DELETEPAIR. A LF was echoed on a char delete. No LF echo is needed if next char is a control H.
- 3 - ESCPAIR. Last character was an escape. Check next character for an escape sequence.
- 4 - NODATAYET. A "NONSYNC" terminal read has been started with echo on but no data has been input yet. If the first character is a DC2 then paircode is set to enter (the DC2 is not saved) othewise process as a regular character.
- 5 - NOECHO. A termtype 11 read has been started with echo off. If first char is a DC2 then set paircode to enter (1st char not saved) otherwise write character.
- 6 - CRWAIT. A 2640/44 block mode read has been satisfied and stopped and waiting for a CR to complete the read. No Control X checks are made to restart read.
- 7 - CRWAITLF. Same as CRWAIT but an LF is to be echoed if requested after the CR is detected. Continue read with echo on.
- 8 - ENTER. First character of a noecho read was a DC2. If next character not a CR then set Data Lost status, else set PRIMED and if Reading then restart read to input data.
- 9 - DC2PAIR. Last character read was a DC2 from a 2640/44. If the next character is a CR then set primed, delete all data input and restart read.

DMODEM - Modem state and control flags

PREMPT	When set indicates that at least one request is preemptive. In this case a scan of the request list is made to determine which request should be processed first and if the current request is to be stopped.
MTYPE	Modem Type 0 - hardwired 2 - 202S 1 - 103 3 - 2002 4-7 -- Same as 0-3 except no speed sensing is done.
CF	Carrier detected status from dataset.
CB	Clear to send status from dataset. Request to send delayed.
SB	Secondary receive status. Senders CB when writing.
NOSYNC	If set specifies that no delays are used by this teminal. Instead an ENQ is sent after 80 characters and the write doesn't continue until an ACK is received or a timeout occurs. Set for 2640/44 terminals.
RDCOUNTED	When set, indicates the "number of terminals doing block mode reads counter" has been incremented and when this operation completes the counter is to be decremented.
WRTCOUNTED	When set, indicates that the "number of terminals doing writes" has been incremented and when this unit completes its operation the counter is to be decremented.
PRIMED	When set indicates an "ESC D" sequence has been written or a DC2 has been received by a NOSYNC terminal. Before any read operation is initiated to a primed terminal to do a block mode read, the number of terminals doing I/O must be less than 13. If it is greater then a request to start the read is queued.
TMODE	Terminal Mode. 0 - normal 1 - break mode 2 - console mode 3 - console mode and return to break mode
LPLEVEL	Preempt level of last request. If preempt level of new request is higher then generate a CR/LF. 0 - normal request 1 - Not Used 2 - normal request with terminal in console mode 3 - soft prempt (preempt reads with no input yet) 4 - hard preempt (preempt all requests)

DSPEED - Multiplexor speed and other flags.

TAPEMODE — Input from paper tape. No characters are emitted in response to delete commands or at end of record.

RESTART — If set indicates that a write completion interrupt has occurred while the terminal buffers were being filled. The filling procedure restarts the write by issuing a SYNC. During a read if this bit is set, the read is to be restarted when a CR is detected because a control X deleting the line was detected.

TERMINAL DIT (CONT.)

SYNC — If set and DSTATE=Repeating then SCOUNT contains the number of SYNC characters to be output after the completion of the current operation. If clear and DSTATE =Repeating, then SCOUNT contains the number of "!" remaining to be output in response to a Control X.

ECHO — If set specifies that characters read during input are to be echoed if the device is operating full duplex.

SPDSENSING — If set indicates that the device is in the speed sensing mode. When in the speed sensing mode a control has been sent to the multiplexor connecting the main channel to the diagnostic channels.

ESC — Control Y breaks have been enabled through an FCONTROL call.

OUTSPEED — A code used to determine the baud rate and character size of the data output.

0 - 240 CPS or not determined	4 - 30 CPS
1 - 240 characters per second (CPS)	5 - 15 CPS
2 - 120 CPS	6 - 10 CPS
3 - 60 CPS	7 - 14 CPS

FILLING — Set when IOTERMO is putting data into TBUFS. If the last TBUF is to be returned by TIP when this flag is set then the write is waited and DCNT is set to -2 by TIP to indicate TIP is waiting.

BRKOK — If set then break is allowed otherwise break is ignored. Set and cleared through FCONTROL calls.

INSPEED — A code used to determine the baud rate and character size to be used to input data. The codes have the same meaning as those specified in outspeed above.

DCNTRL - This is a control word output to the multiplexor board to send control and data to the particular channel. It also contains other information in the unused areas.

PCL - Parity Control bit. If set, parity is enabled. If it is zero, parity is disabled.

PARITY — This bit is ORED into the eighth bit position on all characters output. If the eighth bit is zero it represents the parity of the character output if the parity control option is selected, otherwise it represents the sense of the eighth bit output. Also represents the parity expected during a read. Set when speed sensed or by function 21.

NXTDSTATE — This is the next DSTATE to be set after a 202 modem turnaround is completed. Also contains the next DSTATE after a FINISHREAD (DSTATE=%17) operation is completed.

PRESPLAST If set then the last write operation was a PRESPACE. If next write is a postspace and newline is not set then a CR/LF is output to clean up the carriage.

DRBCT - For read and write request, this word holds the requested transfer count in bytes.

DBCNT - During reads this word contains the number of characters input. During writes it contains the number of characters remaining to be written, including any already written from the current TBUF.

DSAVE - Holds next DSTATE after waiting and repeating DSTATEs and also the next byte to be output after a 202 turnaround is completed.

WAITEDS Holds the current DSTATE when a break is detected and an operation is suspended in order that term may check that break is allowed. It also holds the next DSTATE after "SYNC's" are output in the repeating DSTATE.

HSTATE Hangup state.
- 0 - null or hungup
- 1 - on line or normal operating condition
- 2 - log on time out in progress
- 3 & 5 - INITWAIT. speed sense failed, disconnected speed
- 4 - DCLOSE issued, disconnect next.
- 6 - hangup turn to read is in progress. the 202 dataset needed to be put in read state before hanging up.
- 7 - hang up settling timeout is in progress. sensing delay, then reinitialize channel.

TURNTOWRT If DSTATE is TURN202, then if set indicates a turn to write else the turn is a turn to read.

TURNCHAR Holds the character to be output after the 202 is turned around from read to write.

DSTOP - Holds the subsystem break and end of record characters if not zero indicating no editing is to be applied to a read. If not zero then no editing is to be applied to the characters input except for the following characters.

BREAKCHAR Detection of this character causes the same action as the detection of control Y for a normal read.

EORCHAR Detection of this character terminates input. if the device is in tapemode or 264X doing block mode input, the read is not terminated until a CR is detected.

DWAIT - Link word for a liked list of the devices waiting to be started when the terminal activity decreases. If not zero then a DIT pointer of the next device waiting. If -1 then signifies that this device is the last one in the list.

DXCNT - Holds the number of bytes transferred so far to the TBUFs during a spacing or user's data transfer operation. Used to restart the TBUF fill operation after a wait because more than 270 bytes have already been tanked. (Valid for write.)

DBTIME- Contains the timeout length for block mode read. (Valid for read. This is the same word of the DIT as DXCNT.)

DRCNT - When read data has been saved because an EOF was returned this word contains the byte count of the saved data.

DCNT - During a write, this word contains the number of characters remaining to be written from the current TBUF. During a read it contains the number of characters remianing to fill the current TBUF or to satisfy the read count. Set to -2 to indicate a write completed during a fill operation. When -1 then new TBUF need to get next byte from.

DHEAD - A SYSDB relative pointer to the current TBUF being written from or the first TBUF of a linked list during a read.

DTAIL - A SYSDB relative pointer to the current TBUF being read into or the last TBUF of a linked list during a write.

DPNTR - A SYSDB relative byte index to the last byte written or to last byte read. During a read if a new buffer is to be gotten to save the current byte input then this pointer is set to -1.

DRPTR - When not zero, this word points to a linked list of TBUFs
-----   which contain the data saved from a read which returned an
        EOF requesting the read to be saved.

DLAST - Holds the default terminal type, parity save data and
-----   preconfigured speed code.

TERMT   Default terminal type. The terminal is set to this type
            when it is speed sensed.

BWRITE — If set the last write was in binary mode and PTYSAVE contains the original parity control and sense bits.

PTYSAVE — Holds the PTYCNTRL and parity bits during a binary write when parity generation is disabled and the parity sense is set to zero.

NEWFORM — Last carriage control was a form feed.

DSPEED — Preconfigured default speed code. See OUTSPEED for definition.

DTBLK - Link word for a linked list of the devices waiting for a TBUF to be available. If not zero or -1 (end of list) then a DITP pointer of the next device waiting.

DNXTB - Holds the pointer to a TBUF allocated to a device which has been waiting. Used to insure that a waiting device gets at least one TBUF when it comes to the top of the TBUF waiting list.

DRTIME- During a times read, this is the reading of the timer at the initiation of the read. After a timed read is completed, the time in 1/100 of a second is saved in DRTIME as a single word. If it is -1 then the time was greater than 32K.

DRTMAX- When a read operation time out is requested, this quantity represents the maximum time in seconds allowed for the read to be completed.

DSYNC - CR and LF SYNC counts and the current SYNC count

LFSYNC — Contains the number of SYNCs to be issued after a carriage return is output. If >7, then actual count will be (N-6)*5

CRSYNC — Contains the number of SYNCs to be issued after a carriage return is output. If >7, then actual count will be (N-6)*5.

SCOUNT — SYNC COUNTER. Represents the number of SYNCs remaining to be issued after the current SYNC character is completed. This field also holds the number of "!"'s remaining to be echoed after a control X is input.

NOTE - Holds 80 minus the number of characters written since the last read or ENQ for 2640/44 terminals. When this count goes to zero, an ENQ is inserted in the write stream.

DBREAK- On broken reads, this word holds a pointer to an IOQ element which contains the count, head, tail and DPNTR pointers used to restart the broken read.

DTRLX - Holds read and data set time out request indexes.

2640TRLX — holds the timer request index for 2640/44 block mode reads and ENQ/ACK time outs.

READTRLX — holds logon, hangup and read time out request indexes.

DDSET - Holds the TRLX indexes for the timeouts associated with the data set control operations.

CFAILTRLX — Holds the TRLX index to time out loss of carrier detect

TURNTRLX — Holds the TRLX index to time out turn the 202 to write

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DMONTR        Hold monitoring control code.
------
 .LOGONTYPE- indicates type of logon type to this terminal
            0= :DATA
            1= :JOB
            2= :HELLO
 .XONWAIT  - XOFF has been received during write, waiting for XON
             to continue.  This bit is set when a write is paused
             by a CONTROL S.
 .AUTOEJECT- 2631B will skip over perforations.
 .CFAILCNT - carrier fail detect count
 .MCODE    -  Monitor function and control code.
              .(13:5) - Function
                        0 - Null or no monitoring
                        1 - Call help
                        2 - Monitor activity
                        3 - Form Delta time histogram
                        7 - Monitor calls/counts/initiations
              .(10:1) - Apply above to DSET1,DSET2 and DSETCONTROL
              .(11:1) - Apply above to TIP
              .(12:1) - Apply above to TERM

DMMTIM  - 2 words used for timing statistics
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TERMINAL DIT (CONT.)

DMISC - miscellaneous bit fields:

.REQSTAT - requesting 2631B status
.ESCSEQCNT- index into excape sequence for 2631B and VIEW

During PTAPE reads, several of the DITP words are used for different purposes than those in a normal read. The words and their use are listed below.

DBCNT - A 16 bit logical quantity representing the total number of characters input during this PTAPE read.

DCNT - SYSDB relative pointer to the base of the SBUF currently being used to hold the data as it is input.

DHEAD - SYSDB relative pointer to the base of the SBUF to be written to virtual, memory or the pointer to the buffer to be used when the current one is full.

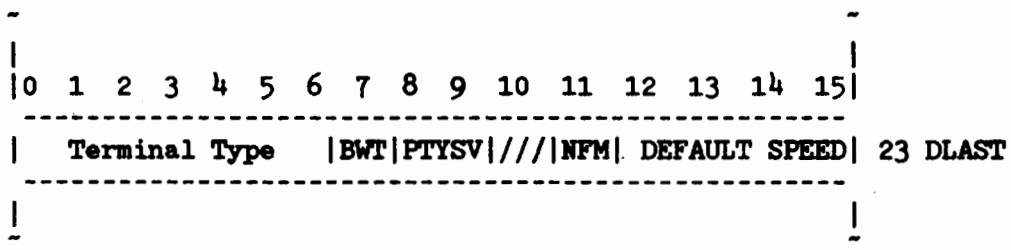
DTAIL/
DPNTR- Double word logical disc address to the area where the next SBUF is to be written in virtual memory when it is full or the PTAPE read is terminated.

TERMINAL SPEED ENCODING

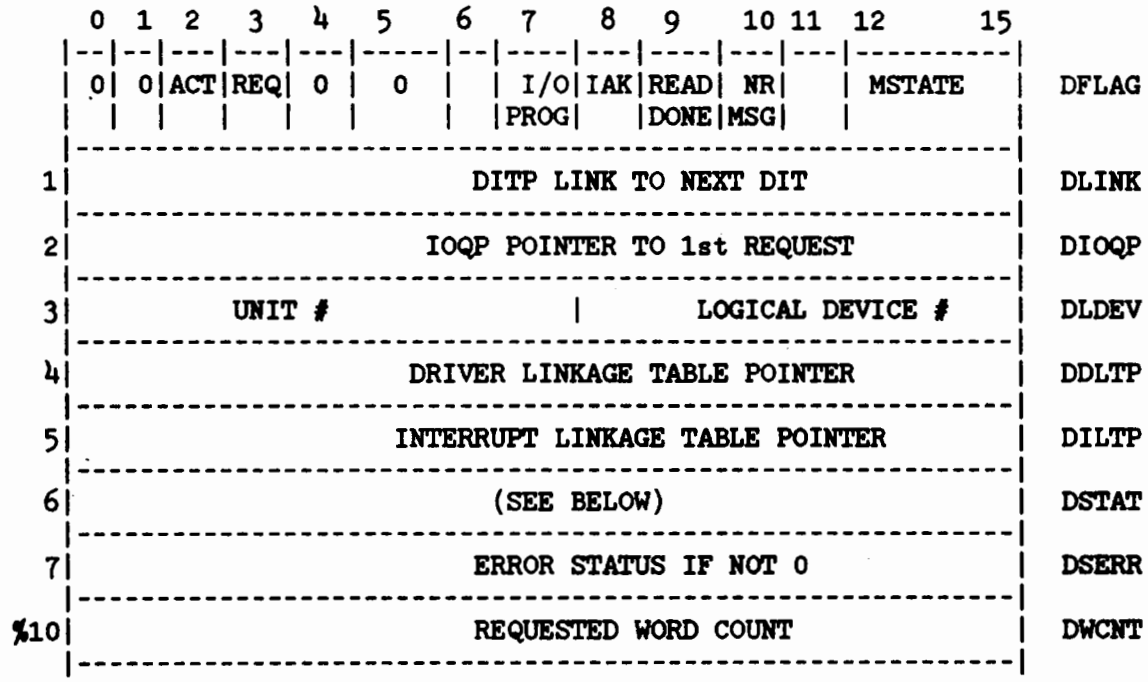
The default speed code set in the DIT will be used to initialize both the input and output speeds. This parameter will be used to determine the speed when an FCONTROL 37 (Allocate Terminal) is issued which does not specify a speed.

CODE (Future rel)	SPEED (Baud)	CODE (SERIES II/III)
0	Undefined	0
1	Externally Clocked	
2	50	
3	75	
4	110	6
5	134.5	7
6	150	5
7	200	
8	300	4
9	600	3
10	1200	2
11	4800	1
13	7200	
14	9600	
15-63	Reserved for future expansion	

The default speed code will be set in word %27 bits 10 thru 15 of the terminal DIT.



CARD READER DIT



DSTAT bits:

BIT0=SIO OK
BIT1=0
BIT2=INT PENDING
BIT3=TIMING ERROR
BIT4=LIGHT DARK CHECK
BITS 5-6 = 00 COLUMN BINARY MODE
01 UNUSED
10 PACKED BINARY MODE
11 HOLLERITH-TO-ASCII MODE
BIT7=COMPARE ERROR
BIT8=EOF DETECTED
BITS 9-10 = 00 NORMAL
01 HOPPER EMPTY
10 UNUSED
11 STACKER FULL
BIT11=INVALID HOLLERITH
BIT12=PICK FAIL OR MOTOR CHECK
BIT13=TEST
BIT14=TROUBLE
BIT15=NOT READY

CARD READER DIT FIELD DEFINITIONS

DFLAG - Flags and device state

ACTIVE — Monitor is currently active servicing this device.

REQUEST — Service for this device was requested while the monitor was active.

IOPROG — SIO program in progress.

IAK — Interrupt occurred or request aborted or preempted.

READDONE — Previous read resulted in an EOF with a backup save requested. The data has been saved in an auxiliary buffer and will be passed back on the next read request.

NRMESSAGE — Set when a not ready message has been issued, and cleared when the reader is found ready. Used to prevent multiple Not Ready messages when power is turned on.

MSTATE — Monitor State. See SIODM specifications for details.

DLINK - SYSDB relative ponter to the DIT for the next device requesting service for this resource.

DIOQP - SYSDB relative pointer to the first IOQ element in the request list for this device.

DLDEV - Logical device number and unit number.

UNIT — Unit number of device.

LDEVN — Logical device number.

DDLTP - SYSDB relative pointer to driver linkage table (DLT).

DILTP - SYSDB relative pointer to interrupt linkage table (ILT).

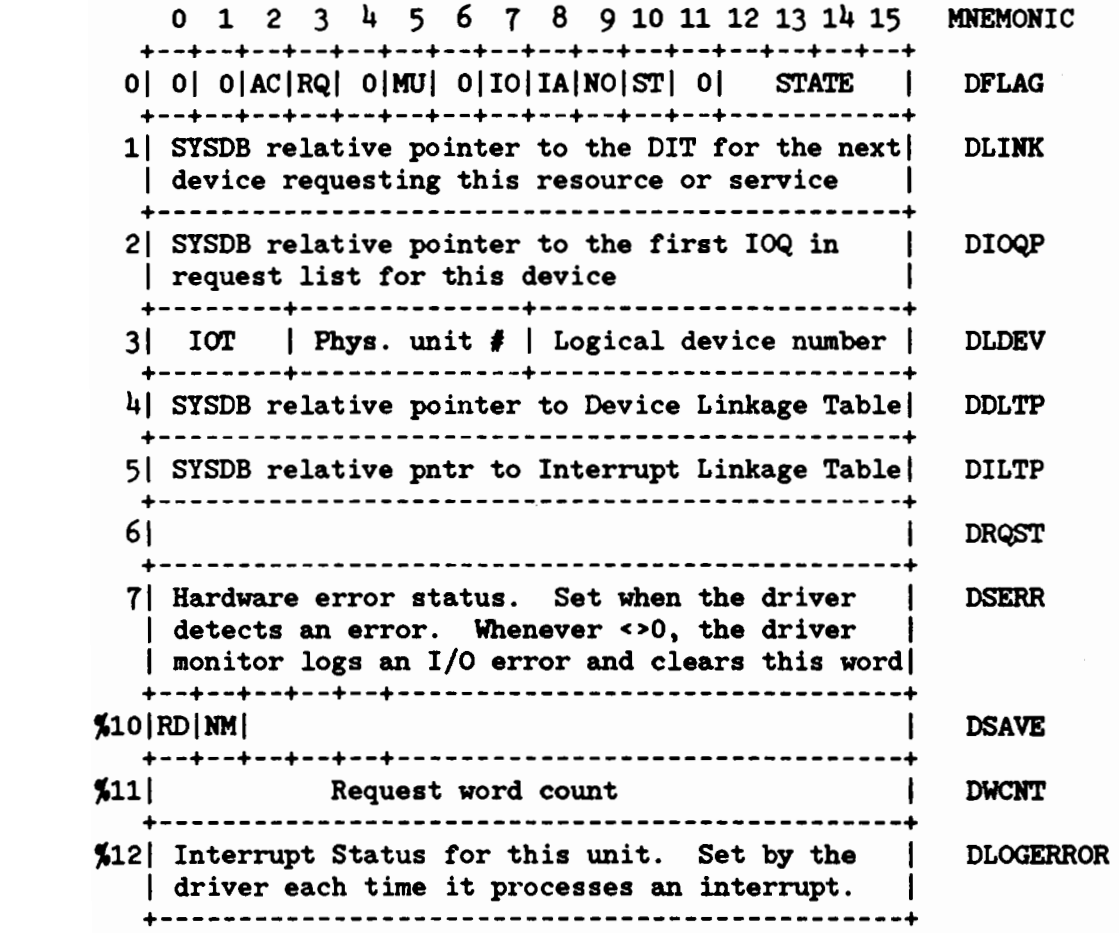
DSTAT - Device interrupt status. Contains the device interrupt status at the last interrupt. See hardware ERS for details.

DSERR - Device interrupt error status. If not zero, then holds the device interrupt status from an operation with an erroneous completion status. Causes SIODM to log an error.

DWCNT - Holds the requested transfer count in words.

Device Information Table for HPIB Card Reader

There is one DIT per physical device. If a physical device represents more than one logical device, the logical device number is obtained from the IOQ element. The following diagram shows the DIT used for the card reader driver.



DFLAG - Flags and request state

AC	ACTIVE	- A monitor is currently servicing this device.
RQ	REQUEST	- A service request is pending while the monitor is active.
MU	MUNIT	- This device is on a multi-unit controller.
IO	IOPROG	- An I/O Channel Program is running for this device.
IA	IAK	- An interrupt or response has occurred for this device.
NO	NOTRDY	- Go to state %10 after Idle Channel Program is started.
ST	STWAIT	- The device monitor is starting an Idle Channel Program for this device. There is no IOQ associated with this type of request.

STATE - State of the device monitor. Specifies the next action to be taken in SIODM in servicing the request:

- 0 - start new request
- 1 - not used
- 2 - call driver initiator procedure
- 3 - call driver completor procedure
- 4 - not used
- 5 - process request completed
- 6 - initiate device recognition sequence
- 7 - start operator intervention wait
- %10 - wait for interrupt (operator intervention) restart at state 0
- %11 - wait for data segment freeze, then state 2
- %12 - wait for driver initiator to be frozen, then allocate controller (state 2)
- %13 - wait for I/O completion interrupt, then state 3
- %14 - wait for controller, then call driver initiator
- %15 - not used
- %16 - wait for initiator make present, then state 2
- %17 - wait for completor make present, then state 3

DLDEV - Device logical device number

IOT I/O TYPE - I/O System type

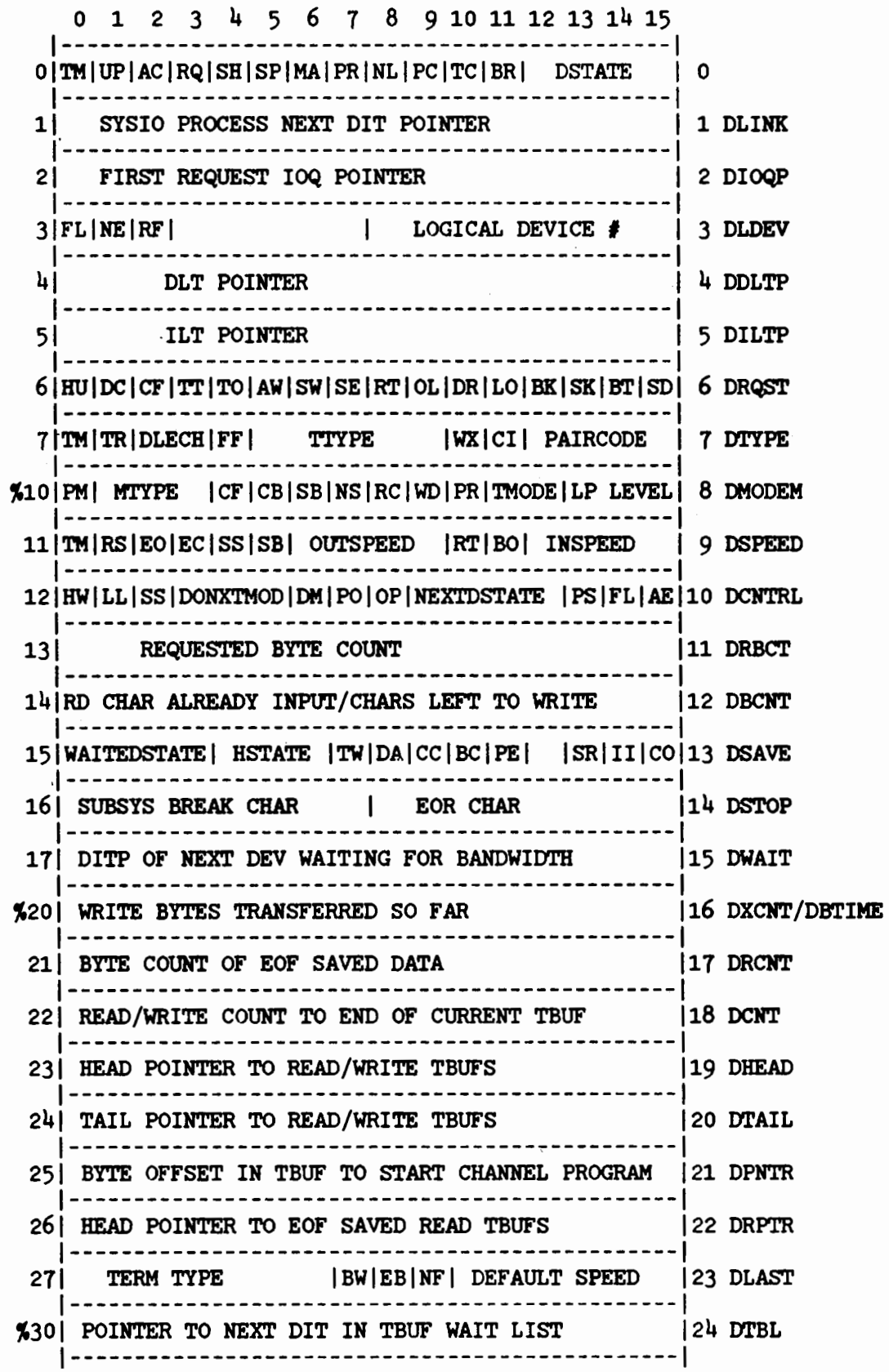
- 0 = Series II / III I/O system
- 1 = HP-IB
- 2 = unused
- 3 = unused

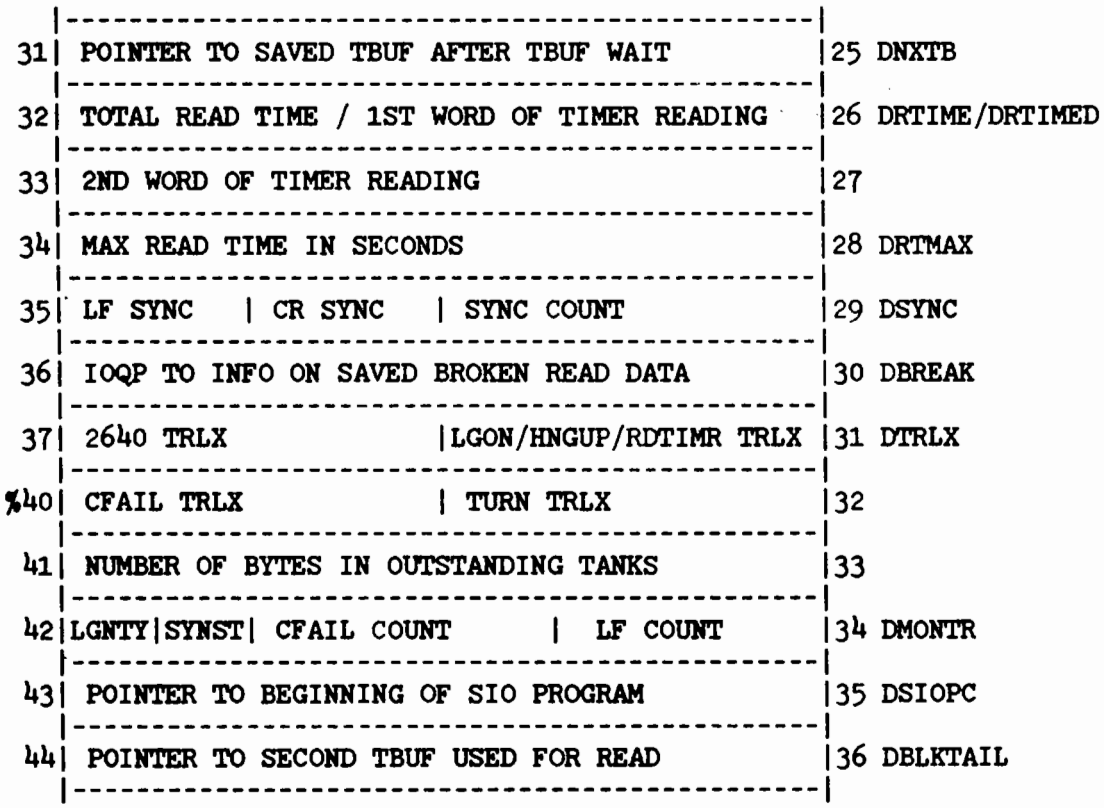
DSAVE - Device processing flags

RD READDONE - A card has already been read.

NM NRMESSAGE - Indicates if not ready message has been issued to the operator's console.

ADCC DIT /30,/33,/44




31 POINTER TO SAVED TBUF AFTER TBUF WAIT 25 DNXTB
32 TOTAL READ TIME / 1ST WORD OF TIMER READING 26 DRTIME/DRTIMED
33 2ND WORD OF TIMER READING 27
34 MAX READ TIME IN SECONDS 28 DRTMAX
35 LF SYNC CR SYNC SYNC COUNT 29 DSYNC
36 IOQP TO INFO ON SAVED BROKEN READ DATA 30 DBREAK
37 2640 TRLX LGON/HNGUP/RDTIMR TRLX 31 DTRLX
%40 CFAIL TRLX TURN TRLX 32
41 NUMBER OF BYTES IN OUTSTANDING TANKS 33
42 LGNTY SYNST CFAIL COUNT LF COUNT 34 DMONTR
43 POINTER TO BEGINNING OF SIO PROGRAM 35 DSIOPC
44 POINTER TO SECOND TBUF USED FOR READ 36 DBLKTAIL

DIT INFORMATION
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0 - DFLAG

.TERM (0:1) - SET IF DEVICE IS A TERMINAL

.UP (1:1) - SET IF DEVICE IS ON LINE AND HAS BEEN SPEED SENSED, OR HAS BEEN INITIALIZED (BY ALLOCATING TERMINAL) AND READY TO DO IO

.ACTIVE (2:1)- SET IF IOTERM0 IS CURRENTLY ACTIVE SERVICING THIS TERMINAL

.REQUEST (3:1)- SET IF SERVICE FOR THIS TERMINAL IS REQUESTED WHILE IOTERM0 IS ACTIVE

.SPECIH (4:1) - SET IF SPECIAL INTERUPT HANDLER IS USED, NOT APPLICABLE

.SPOOLING (5:1) - A READ OERATION TO USE SYSBUF HAS BEEN REQUESTED THROUGH THE PTAPE PROCEDURE

.MODACTIVE (6:1) - SET IF SIO PROGRAM TO CONTROL MODEMS IS CURRENTLY ACTIVE

.PAIR (7:1) - SET (1) WHEN NO READ IS IN PROGRESS, OR (2) DURING READING, THE NEXT CHARACTER INPUT MAY REQUIRE SOME SPECIAL ACTION, SEE PAIRCODE FOR DETAILS

.NEWLINE (8:1) - SET IF THE LAST CHARACTER OUTPUT IS A LF, USED TO DETERMINE IF A CR/LF IS NECESSARY DURING MODE CHANGES OR AT FOPEN TIME

.PTYCHK (9:1) - SET IF PARITY CHECKING/GENERATION IS ENABLED, ODD/EVEN PARITY IS DETERMINED BY ODDPTY IN DCNTRL

.TERMCHAR (10:1) - SEE BINREAD

.BINREAD (11:1) --

TERMCHAR	BINREAD	
0	0	REGULAR READ
0	1	BINARY READ IN PROGRESS, THE READ IS ONLY TERMINATED WHEN THE REQUESTED BYTE COUNT IS SATISFIED
1	0	SPECIAL EOR CHARACTER IS SPECIFIED IN QP2 TO TERMINATE READ
1	1	TRANSPARENT READ IN PROGRESS, NO EDITING IS PERFORMED ON INPUT DATA, READ IS TERMINATED BY EOR CHARACTER SPECIFIED IN DSTOP OR QP2 OR SUBSYS BREAK CHARACTER IN DSTOP

.ENQACKWAIT (11:1) - DURING WRITE, BIT 11 IS SET WHEN THE CURRENT CHANNEL PROGRAM SUSPENDS THE WRITE BY SENDING AN ENQ AND THEN WAITS FOR AN ACK FROM THE TERMINAL

.DSTATE(12:4) - DEVICE STATE OF THE TERMINAL, SPECIFIES THE CURRENT ACTIVITY AND DETERMINES THE NEXT STATE

- 1 - WRITING
- 2 - READING
- 4 - TURN202; CURRENTLY TURNING AROUND THE 202 MODEM TO DO READ OR WRITE, NEXT DSTATE IS IN DCNTRL.NXTDSTATE
- 6 - EORLF; END OF RECORD CARRIAGE CONTROL IN PROGRESS, NULL STATE NEXT
- 7 - SPDSENSW -- SPEED SENSE SIO IN PROGRESS
- %10 - EORSYNC
- %11 - WAITED; READ OR WRITE OPERATION BEING SUSPENDED, WAITING FOR IOTERM0 TO CHECK IF BREAK IS ALLOWED
- %14 - REPEATING; "!!!" BEING WRITTEN AFTER CONTROL X IS DETECTED, EORLF NEXT TO OUTPUT CR/LF
- %16 - MODEMSIO; CHANNEL PROGRAM CURRENTLY ACTIVE IN SETTING UP THE ADCC MODEM CONTROL LOGIC. WHEN THE CHANNEL PROGRAM COMPLETES, IF DCNTRL.DOMOD IS SET, A NEW CHANNEL PROGRAM IS STARTED TO SET THE MODEM LOGIC TO A NEW SET OF CONDITIONS. THE NEXT DSTATE IS IN NXTDSTATE.
- %17 - FINREAD; FINISH UP READ OPERATION AND PERFORM THE DSTATE INDICATEDIN NXTDSTATE.

1 - DLINK

LINK WORD FOR A LINKED LIST OF DEVICES WAITING FOR SERVICE BY THE SYSTEM I/O PROCESS.

0 => NONE WAITING

-1 => LAST DEVICE ON LINKED LIST

DITP -- A POINTER TO THE DIT OF THE NEXT WAITING DEVICE

2 - DIOQP

SYSDB RELATIVE POINTER TO THE 1ST IOQ ELEMENT IN THE SERVICE REQUEST LIST FOR THIS DEVICE

3 - DLDEV

.FLUSH (0:1) - SET WHEN A BREAK HAS BEEN DETECTED AND ACCEPTED. AS LONG AS IT REMAINS SET, ALL WRITE REQUESTS ARE RETURNED AS COMPLETED WITHOUT ANY ACTUAL I/O BEING PERFORMED. READS ARE RETURNED WITH AN UNUSUAL CONDITION STATUS, %173.

.NOCXECHO (1:1) - IF SET, THEN "!!!" IS NOT ECHOED WHEN A CONTROL X TO DELETE A LINE HAS BEEN DETECTED

.RDFLUSH (2:1) - NO TBUFS; FLUSH READ, WAIT FOR EOR

.LDEVN (8:8) - LOGICAL DEVICE NUMBER

.ABORWRT (5:1) - WRITE SIO HAS BEEN ABORTED

4 - DDLTP

SYSDB RELATIVE POINTER TO THE DRIVER LINKAGE TABLE (DLT)

5 - DILTP

SYSDB RELATIVE POINTER TO INTERRUPT LINKAGE TABLE (ILT)

6 - DRQST
REQUESTS FOR IOTERMO SERVICE THAT HAVE BEEN GENERATED BY TIP.
THE REQUESTS ARE SERVICED IN A LEFT TO RIGHT ORDER, SO THE BIT
POSITION DETERMINES THE REQUEST PRIORITY.
.HANGUP (0:1) - DATASET HANGUP TIMEOUT HAS BEEN COMPLETED
.DISCNCT (1:1) - DATASET HAS BEEN DISCONNECTED (CC HAS DROPPED)
.CFAILTO (2:1) - TIMEOUT FOR CARRIER FAIL HAS BEEN COMPLETED,
HANGUP A 103 MODEM OR TRY TO TURNAROUND A 202.
.TURNTO (3:1) - CB OR SB FROM THE 202 MODEM DID NOT RISE 5 SECONDS
AFTER STARTING THE "READ TO WRITE TURNAROUND",
HANG UP THE DATASET.
.2640TO (4:1) - A 10 SECOND TIMEOUT TO WAIT FOR AN ACK FROM THE
TERMINAL HAS EXPIRED, TERMINATE THE WAIT AND
RESTART THE WRITE OPERATION
.SPOOLSW (6:1) - ONE OF THE TWO SYSBUFS USED FOR PTAPE READ HAS
BEEN FILLED, SWITCH THEM SO THAT IT CAN BE EMPTIED
ONTO DISC.
.SPOOLEND (7:1) - A CONTROL Y TO TERMINATE PTAPE READHAS BEEN
DETECTED
.READTO (8:1) - A READ OPERATION HAS BEEN TIMED OUT
.ONLINE (9:1) - ALSO SPFOUND, A CR HAS BEEN INPUT AND SPEED
SENSED, INITIATE A LOG ON TIMEOUT
.DSETRDY (10:1) - DATASET READY (CC) HAS BEEN DETECTED, INITIATE
A LOGON TIMEOUT
.LOGONTO (11:1) - A LOGON TIMEOUT HAS EXPIRED AND THE CALLER STILL
HAS NOT LOGGED ON; HANGUP THE DEVICE
.BRK (12:1) - A BREAK HAS BEEN DETECTED, OR SB FROM THE DATASET HAS
DROPPED DURING A WRITE OPERATION
.SSBRK (13:1) - A SUBSYSTEM BREAK HAS BEEN DETECTED
.BLOCKTO (14:1) - BLOCK MODE READ HAS TIMED OUT
.STATDONE (15:1) -
7 - DTYPE
.TIMING (0:1) - SET IF THE TIME REQUIRED TO DOMPLETE THE CURRENT
READ OPERATION IS TO BE RECORDED, THE STARTING
TIME HAS BEEN RECORDED IN DRTIME, WHEN THE READ
IS COMPLETED, THE ELAPSED TIME WILL BE SAVED IN
DRTIME
.TIMEREAD (1:1) - SET WHEN THERE IS A REQUEST TO MEASURE THE TIME
REQUIRED TO COMPLETE A READ OPERATION, CAUSES
TIMING TO GET SET WHEN THE READ IS INITIATED.
.DELECHO (2:2) - THIS FIELD CONTAINS A CODE WHICH SPECIFIES THE
REQUIRED ACTION WHEN A CONTROL H IS DETECTED
.FORMFEED (4:1) - SET FOR TERMINALS THAT RESPOND TO A FORMFEED, IF
CLEAR, A LF IS SENT IN PLACE OF THE FF CHARACTER;
THE CHARACTER TO BE OUTPUT (FF OR LF) IS PRECEDED
BY A XOFF AND CR.
.TTYPE (5:5) - TERMINAL TYPE, A SUBSET OF THE SERIES III TERM TYPES
.WAITXON (10:1) - WAITING FOR XON
.CONSINTRPT (11:1) - SET IF CONTROL A CAN BE ACKNOWLEGED WHEN THE
TERMINAL IS USED AS A SYSTEM CONSOLE

.PAIRCODE (12:4) - WHEN THE NEXT INCOMING CHARACTER MAY REQUIRE SPECIAL ACTION, THIS FIELD CONTAINS A SPECIAL CODE SPECIFYING THE CONDITIONS AND ACTIONS TO BE TAKEN:

0 - NO READ IN PROGRESS
1 - CRWAIT; A BLOCK MODE READ HAS BEEN SATISFIED AND STOPPED, NOW WAITING FOR A CR TO COMPLETE THE READ
2 - CRWAITLF; SAME AS CRWAIT BUT AFTRE THE CR IS DETECTED, A LF IS TO BE ECHOED IF REQUESTED
3 - NOECHO; A TERMTYPE 11 READ HAS BEEN STARTED WITH ECHO OFF, IF THE FIRST INCOMING CHARACTER IS A DC2, THEN A BLOCK MODE READ IS ABOUT TO BEGIN, OTHERWISE THE CHARACTER IS TO BE ECHOED BACK TO THE TERMINAL AND ECHO TO BE TURNED BACK ON.
4 - DC2PAIR; THE LAST CHARACTER READ WAS A DC2, IF THE NEXT CHARACTER IS A CR AND IF OWN DC1/DC2 HANDSHAKE IS ENABLED, THE READ OPERATION WILL BE COMPLETE; IF THE NEXT CHARACTER IS A CR AND OWN DC1/DC2 HANDSHAKE DISABLED, THEN THE CR IS IGNORED AND READ WILL CONTINUE.
5 - NODATAYET; A REGULAR READ HAS BEEN STARTED WITH ECHO ON.

8 - DMODEM

.PREMPT (0:1) - WHEN SET BY ATTACHIO, AT LEAST ONE PENDING REQUEST IS PREEMPTIVE

.MTYPE (1:3) - MODEM TYPE:

0 - HARDWIRED TERMINAL
1 - 103 MODEM
2 - 202C MODEM
3 - 2002 MODEM
4-7 => SAME AS 0-3, BUT NO SPEED SENSING (6&7 NOT CURRENTLY SUPPORTED)

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.CF (4:1) - CURRENT CARRIER DETECT STATUS FROM MODEM

.CB (5:1) - CURRENT CLEAR TO SEND STATUS FROM MODEM

.SB (6:1) - CURRENT SECONDARY RECEIVE STATUS FROM MODEM

.NOSYNC (7:1) - SET FOR HP263X, HP264X TERMINALS; INDICATES THAT NO DELAYS BETWEEN CHARACTERS ARE NECESSARY FOR THIS TERMINAL, INSTEAD, AN ENQ IS SENT AFTER EVERY 80 CHARACTERS AND THE WRITE OPERATION IS SUSPENDED UNTIL AN ACK IS RECEIVED OR A 10 SECOND TIMEOUT OCCURS.

.PRIMED (10:1) - INDICATES THAT A DC2 HAS BEEN RECEIVED FROM THE TERMINAL DOING A FAST READ. A BLOCK MODE READ IS IN PROGRESS.

.TMODE (11:2) - TERMINAL MODE:

0 - NORMAL
1 - BREAK MODE
2 - CONSOLE MODE
3 - CONSOLE MODE AND RETURN TO BREAK MODE

.LPLEVEL (13:3) - PREEMPT LEVEL OF LAST REQUEST, IF PREEMPT LEVEL OF THE NEW REQUEST IS HIGHER, CR/LF IS TO BE OUTPUT TO THE TERMINAL:

0 - NORMAL REQUEST
2 - NORMAL REQUEST WITH TERMINAL IN CONSOLE MODE
3 - SOFT PREEMPT (PREEMPT READ OPERATION THAT HAS NOT INPUT ANY DATA YET)
4 - HARD PREEMPT (PREEPMT ALL READS)

9 - DSPEED

.TAPEMODE (0:1) - CURRENT INPUT IS FROM PAPER TAPE, INCOMING CHARACTERS ARE TRANSPARENT

.RESTART (1:1) - WHEN THE TERMINAL IS IN TAPEMODE OR BLOCK MODE READ AND A CONTROL X HAS BEEN DETECTED, PAIRCODE IS SET TO CRWAIT TO WAIT FOR A CR T TERMINATE THE READ, AT WHICH TIME THE READ IS TO BE RESTARTED

.ECHOON (2:1) - ECHO WAS TURNED OFF, REENABLE IT FOR CURRENT OPERATION

.ECHO (3:1) - IF SET, ALL INCOMING CHARACTERS ARE TO BE ECHOED IF OPERATING IF FULL DUPLEX MODE

.SPDSENSING (4:1) - SET IF CURRENTLY IN SPEED SENSE MODE, THE FIRST PORTION OF A POSSIBLE CR HAS BEEN IDENTIFIED AND WAITING TO RECEIVE THE REST OF THE CHARACTER.

.SSBRKOK (5:1) - SUBSYSTEM BREAKS HAVE BEEN ENABLED VIA A FCONTROL CALL.

.OUTSPEED (6:4) - CONTAINS AN ADCC CODE FOR THE CURRENT OUTPUT BAUDRATE; ADCC CODES FOR DIFFERENT BAUDRATES:

% 7 - 240 CPS
%10 - 960 CPS
%11 - 480 CPS
%13 - 120 CPS
%15 - 30 CPS
%16 - 15 CPS
%17 - 10 CPS

.RESTARTSPDS (10:1) - RESTART IDLE WAIT OR SPEEDSENSE AFTER CURRENT CHANNEL PROGRAM COMPLETES.

.BRKOK (11:1) - BREAK IS ALLOWED IF SET, OTHERWISE IGNORED. SET AND CLEARED VIA FCONTROL CALLS.

.INSPEED (12:4) - CANTAINS AN ADCC CODE FOR THE CURRENT INPUT BAUDRATE

10 - DCNTRL

.HIOPWAIT (0:1) - THE ACTIVE CHANNEL PROGRAM CANNOT BE HALTED IMMEDIATELY WHEN AN HIOP INSTRUCTION WAS EXECUTED; A SUBSEQUENT INTERRUPT WILL OCCUR AND SOFTWARE IS TO IGNORE IT.

.LFLAST (1:1) - A POSTSPACE LF HAS BEEN TANKED INTHE WRITE TBUF'S

.SPDSIO (2:1) - SET WHEN AN IDLE WAIT CHANNEL PROGRAM IS ACTIVE, WHEN THE TERMINAL IS NOT ACTIVE DOING READ/WRITE, AN IDLE WAIT PROGRAM IS STARTED TO LISTEN TO THE KEYBOARD.

.DONXTMOD (3:3) - AN ATTEMPT TO START A CHANNEL PROGRAM TO CONTROL THE ADCC MODEM LINES FAILED BECAUSE A PREVIOIUS MODEM CONTROL PROGRAM IS STILL ACTIVE. THIS FIELD CONTAINS A CODE SPECIFYING THE CONTROL TO BE DONE WHEN THE PREVIOUS CHANNEL PROGRAM COMPLETES AND THE NEW ONE CAN BE STARTED.

.DOMOD (6:1) - ATTEMPT TO START A MODEM CONTROL CHANNEL PROGRAM FAILED BECAUSE A PREVIOUS ONE IS STILL ACTIVE; WHEN IT COMPLETES, START THE MODEM CONTROL CHANNEL PROGRAM AS SPECIFIED IN DONXTMOD

.PTYON (7:1) - SPECIFIES PARITY GENERATION ON WRITE DATA AND PARITY CHECKING ON READ DATA

.ODDPTY (8:1) - IF SET, ODD PARITY IS USED FOR GENERATION AND CHECKING, OTHERWISE EVEN PARITY IS USED.

.NXTDSTATE (9:4) - CONTAINS THE NEXT DSTATE TO BE USED WHEN A 202 MODEM TURNAROUND IS COMPLETED, ALSO CONTAINS THE NEXT DSTATE WHEN A FINISHREAD (DSTATE=%17) OPERATION IS COMPLETED.

.PRESPLAST (13:1) - INDICATES THAT THE LAST WRITE OPERATION WAS A PRESPACE WRITE, IF THE NEXT WRITE IS POSTSPACE AND NEWLINE IS NOT SET THEN A CR/LF IS OUTPUT TO START WRITING A NEW LINE.

.FILLING (14:1) - INDICATES THAT IOTERM0 IS CURRENTLY TRANSFERRING WRITE DATA FROM THE CALLER'S STACK INTO A TBUF.

.ADDENQ (15:1) - IOTERM0 IS CURRENTLY PUTTING AN ENQ INTO THE TBUF AFTER 80 BYTES OF WRITE DATA HAVE BEEN TANKED.

11 - DRBCT
HOLDS THE REQUESTED READ/WRITE BYTE COUNT

12 - DBCNT
DURING A READ OPERATION, IT SPECIFIES THE NUMBER OF BYTES THAT HAVE BEEN READ. DURING A WRITE OPERATION, IT SPECIFIES THE NUMBER OF BYTES REMAINING TO BE WRITTEN.

13 - DSAVE

.WAITEDSTATE (0:4) - HOLDS THE CURRENT DSTATE WHEN A BREAK IS DETECTED AND THE CURRENT OPERATION SUSPENDED SO THAT IOTERM0 MAY CHECK THAT BREAK IS ALLOWED, IF DISALLOWED, THE CURRENT DSTATE WILL BE RESUMED.

.HSTATE (4:3) - THE MODEM HANGUP STATE:
0 - NULL OR HUNGUP
1 - ON LINE OR NORMAL OPERATION
2 - LOGGINGON; LOG ON TIMEOUT IN PROGRESS
4 - DCLOSE ISSUED, DISCONNECT NEXT
6 - HANGUPTURN; HANGUP TURNAROUND TO READ IN PROGRESS, THE 202 MODEM NEEDS TO BE IN A READING STATE BEFORE HANGUP
7 - HANGUP SETTLING TIMEOUT IN PROGRESS

.TURNTOWRT (7:1) - WHEN THE 202 MODEM IS BEING TURNAROUND (DSTATE=TURN202), A 1 INDICATES TURNAROUND TO WRITE, A 0 INDICATES TURNAROUND TO READ.

.DELACK (8:1) - AN ENQ HAS JUST BEEN SENT DURING A WRITE WHEN A BREAK WAS DETECTED, DELAY THE NEXT WRITE FOR 0.5 SECOND TO AVOID OVERRUNNING THE TERMINAL.

.CC (9:1) - THE CURRENT DATASET READY STATUS FROM MODEM

.BLOCKRD (10:1) - DURING A READ OPERATION, 2 CHANNEL PROGRAMS, EACH WITH ITS OWN TBUF, ARE USED TO SERVICE INCOMING DATA; THIS BIT IS SET IF THE 2ND CHANNEL PROGRAM IS CURRENTLY ACTIVE RECEIVING DATA.

.AUTOEJECT (11:1) - 2631B WILL SKIP OVER PERFORATIONS

.REQSTAT (13:1) - REQUESTING 2631B STATUS

.ININ (14:1) - INITIALIZING TERMINAL PORT

.CCON (15:1) - CC ALWAYS ON

14 - DSTOP
IF NOT ZERO, CONTAINS THE USER SPECIFIED SUBSYSTEM BREAK AND END OF RECORD CHARACTERS. IF THEY ARE SPECIFIED, THEN NO EDITING IS DONE TO THE INCOMING DATA DURING A READ.
.BRKCHAR (0:8) - DETECTION OF THIS CHARACTER DURING READING CAUSES THE SAME ACTION AS THAT OF A CONTROL Y.
.EORCHAR (8:8) - DETECTION OF THIS CHARACTER TERMINATES THE READ AND IS INCLUDED WITH THE REST OF THE READ DATA TO BE TRANSFERED TO THE CALLERS STACK

15 - DWAIT
LINK WORD FOR A LINKED LIST OF DIT'S WAITING TO DO I/O WHEN THE TERMINAL ACTIVITY DECREASES,
0 - NONE WAITING
-1 - THIS DIT IS THE LAST ONE ON THE LIST
OTHER - A DIT POINTER TO THE NEXT DEVICE WAITING

16 - DXCNT(WRITE)/DBTIME(READ)
DXCNT (VALID DURING WRITES) INDICATES THE NUMBER OF BYTES TRANSFERRED SO FAR INTO TBUF'S WHEN CARRIAGE CONTROL BYTES OR DATA BYTES ARE BEING TANKED. USED TO RESTART THE FILL TBUF OPERATION WHEN 540 BYTES HAVE ALREADY BEEN TANKED AND THE FILL OPERATION HAS TO BE SUSPENDED.
DBTIME (VALID DURING READ) - TIMEOUT PERIOD FOR BLOCKMODE READ.

17 - DRCNT
CONTAINS THE BYTE COUNT OF THE READ DATA SAVED WHEN AN EOF WAS DETECTED.

18 - DCNT
DURING A WRITE, IT INDECATES THE NUMBER OF CHARACTERS TO BE WRITTEN BY THE CURRENT EXECUTION OF THE CHANNEL PROGRAM. DURING A READ, IT INDECATES THE NUMBER OF CHARACTERS TO BE READ BY THE CURRENT CHANNEL PROGRAM. WHEN=-2, IT INDECATES THAT ALL TANKED DATA HAS BEEN WRITTEN OUT AND THAT IOTERM0 IS INTHE MIDDLE OF FILLING A TBUF. FILLING A TBUF.

19 - DHEAD
A SYSDB RELATIVE POINTER TO
(1) DURING WRITE, THE CURRENT TBUF CONTAINING DATA TO BE WRITTEN,
(2) DURING READ, THE 1ST TBUF ON THE LINKED LIST OF INPUT DATA.

20 - DTAIL
A SYSDB RELATIVE POINTER TO
(1) DURING WRITE, THE LAST TBUF ON THE LINKED LIST OF TANKED DATA,
(2) DURING READ, THE CURRENT TBUF USED FOR RECEIVING DATA.

21 - DPNTR
A WORD POINTER USED DURING WRITES TO INDICATE THE OFFSET WITHIN A TBUF OF THE 1ST BYTE OF DATA TO BE WRITTEN BY THE CURRENT CHANNEL PROGRAM.

22 - DPNTR
A SYSDB RELATIVE POINTER TO A LINKED LISTOF TBUF'S CONTAINING THE DATA SAVED WHEN AN EOF WAS DETECTED.

23 - DLAST
.TERMTYPE (0:7) - THE DEFAULT OR CONFIGURED TERM TYPE. WHEN THE TERMINAL IS SPEED SENSED, THIS IS THE TERM TYPE USED.
.BINWRT (7:1) - SET IF THE LAST WRITE OPERATION WAS IN BINARY MODE.
.EIGHTBITS (8:1) - SET IF THE 8-BIT PROTOCOL IS USED AND PARITY GENERATION/CHECKING IS DISALLOWED. USED FOR TERM TYPES 12 AND 15.
.NEWFORM (9:1) - LAST CARRIAGE CONTROL WAS A FORM FEED.
.DEFAULTSPEED (10:6) - THE ADCC CODE OF THE DEFAULT OR CONFIGURED TERMINAL BAUDRATE.

24 - DTBLK
A DIT POINTER TO THE NEXT TERMINAL WAITING FOR A TBUF.

25 - DNXTB
A POINTER TO A TBUF ALLOCATED TO A TERMINAL WHICH HAS BEEN WAITING; THIS IS TO INSURE THAT A WAITING TERMINAL GETS AT LEAST ONE TBUF WHEN IT COMES TO THE TOP OF THE TBUF WAITING LIST.

26, 27 - DRTIME
DURING A TIMED READ OPERATION, THIS IS THE READING OF THE TIMER AT THE INITIATION OF THE READ. AFTER THE READ IS COMPLETED, THE TOTAL ELAPSED TIME IN 1/100 OF A SECOND IS SAVED INDRTIME AS A SINGLE WORD. IF IT IS -1 THEN THE ELAPSED TIME WAS GREATER THAN 32K.

28 - DRTMAX
WHEN A TIME LIMIT ON A READ OPERATIONIS REQUESTED, THIS QUANTITY REPRESENTS THE MAXIMUM TIME (SECONDS) ALLOWED FOR THE READ OPERATION TO COMPLETE; IF THIS LIMIT IS EXCEEDED, THE READ OPERATION WILL BE TERMINATED.

29 - DSYNC
.LFSYNC (0:4) - CONTAINS THE NUMBER OF SYNC CHARACTERS TO BE SENT AFTER A LF IS OUTPUT
.CRSYNC (4:4) - CONTAINS THE NUMBER OF SYNC CHARACTERS TO BE SENT AFTER A CR IS OUTPUT
.SYNBCCOUNT (8:8) - SPECIFIED THE NUMBER OF DATA CHARACTERS THAT CAN BE TANKED BEFORE AN ENQ HAS TO BE INSERTED IN THE TBUF. FOR WRITE OPERATIONS TO A 264X TERMINAL, AFTER 80 CHARACTERS HAVE BEEN SENT SINCE THE LAST ENQ OR THE LAST READ OPERATION, AN ENQ HAS TO BE SENT AND THE WRITE SUSPENDED UNTIL AN ACK IS RECEIVED.

30 - DBREAK
WHEN A BREAK WAS DETECTED DURING A READ OPERATION, THE DATA ALREADY INPUT IS SAVED AND THIS WORD CONTAINS A POINTER TO AN IOQ USED TO STORE THE BYTE COUNT, TBUF HEAD AND TAIL OF THE SAVED DATA.

31,32 - DTRLS
HOLDS TIMEOUT REQUEST INDICES
.2640TRLX (0:8) - HOLDS THEN INDEX OF A 10 SECOND TIMEOUT REQUEST FOR THE ENQ/ACK HANDSHAKE/BLOCK MODE TIMEOUT
.RREADTRLX (8:8) - HOLDS THE LOGON, HANGUP AND TIMED READ TIME-F OUT REQUEST INDICES
.CFAILTRLX (0:8) - HOLDS THE INDEX OF A TIMEOUT REQUEST DUE TO LOSS OF CARRIER DETECT FROM THE DATASET.
.TURNTRLX (8:8) - HOLDS THE INDEX OF A TIMEOUT REQUEST FOR A LINE TURNAROUND ON A 202 DATASET.

33 - DTANKB
A COUNT OF THE BYTES TANKED IN THE LINKED TBUF'S; THIS COUNT IS USUALLY GREATER THAN DBCNT, THE COUNT OF BYTES REMAINING TO BE OUTPUT, BECAUSE THE DATA IN A TBUF IS SENT OUT IN BLOCKS SEPARATED BY AN ENQ.

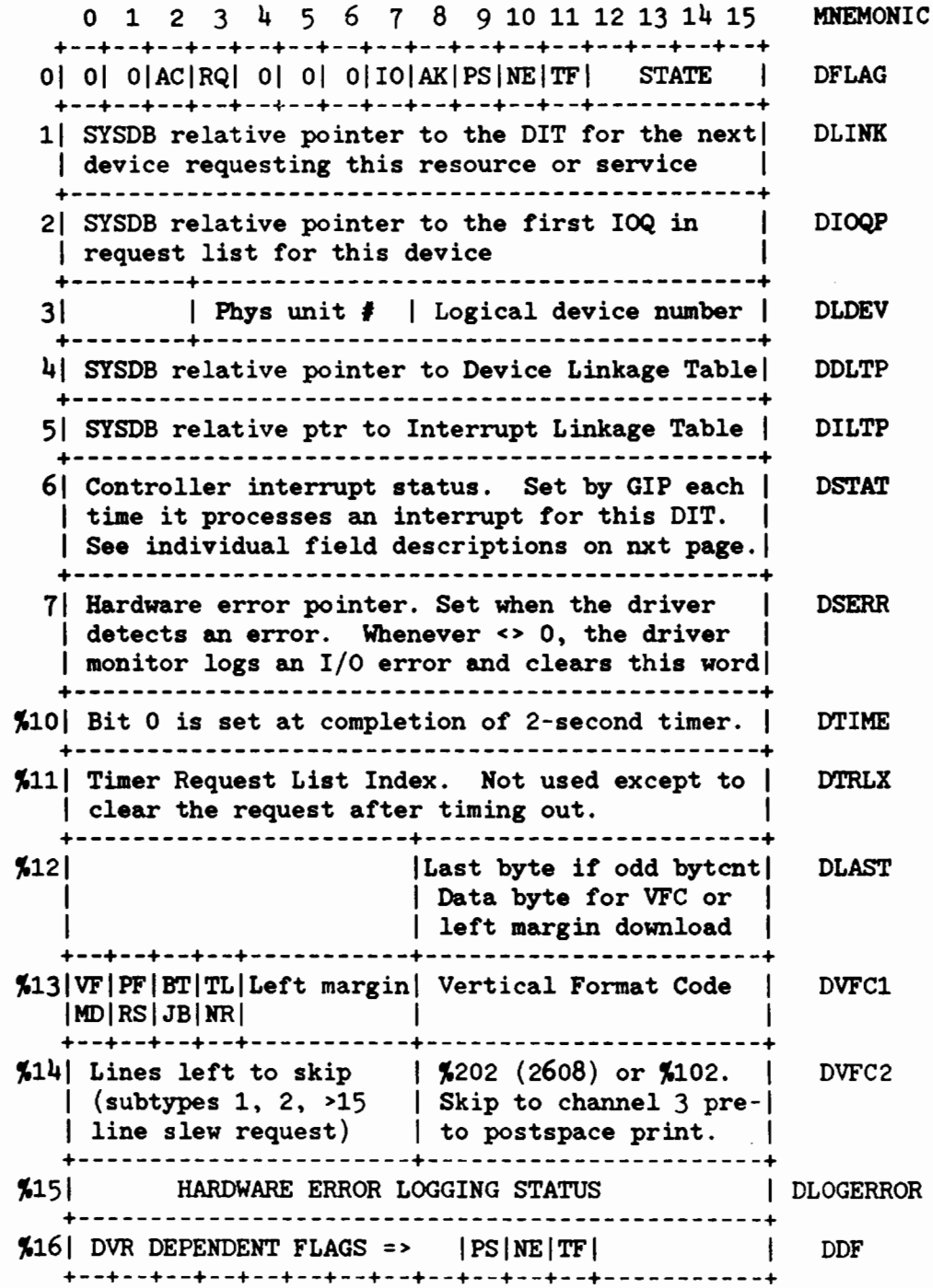
34 - DMONTR
.LOGONTYPE (0:2)
.SYNCSTATE (2:2) STATE OF TANKING LF/SYNC
0 => TANK XOFF/CR; 1=> DETERMINE LF'S TO TANK
2 => TANK LF/SYNC
.CFAILCNT (4:6) - A COUNT OF THE TIMES WHEN LOSS OF CARRIER DETECT FROM THE DATASET IS DETECTED DURING A READ OPERATION; WHEN THE COUNT EXCEEDS 50, THE USER IS HUNG UP AND THE DATASET DISCONNECTED
.LFCOUNT (10:6) - NUMBER OF LF'S FOR %2NN CARRIAGE CONTROL

35 - DSIOPC
STORES THE POINTER TO THE CHANNEL PROGRAM WHICH IS TO BE STARTED WHEN A DATASET LINE TURNAROUND IS COMPLETE; THE CHANNEL PROGRAM TO BE STARTED IS EITHER FOR A READ OR WRITE OPERATION.

36 - DBLKTAIL
POINTER TO THE SECOND TBUF SEF FOR A READ OPERATION; 2 READ CHANNELPROGRAMS, EACH WITH ONE TBUF, ARE USED TO INSURE AGAINST DATA OVERRUNS DURING FAST BLOCK MODE READS.

LINE PRINTER DIT (SERIES II/III)

There is one DIT per physical device. If a physical device represents more than one logical device, the logical device number is obtained from the IOQ element. The following diagram shows the DIT used for IOLPRT0.



DFLAG.AC - Active. A monitor is currently servicing this device. *
DFLAG.RQ - Request. A service request is pending while the monitor is active. *
DFLAG.IO - An I/O channel program is in progress. Decrement SIOCOUNT and check for multiple channels when complete. *
DFLAG.AK - Interrupt Acknowledge. An interrupt has occurred. *
DDF .PS - Prespace. The last request was a prespace (space then fill buffer) operation.
DDF .NE - Not Empty. The print buffer is not empty. Causes a print when changing from pre- to postspace or before ejecting a page for a File Open, File Close or Device Close.
DDF .TF - Top of Form. The last request ended with a skip to channel 1 (page eject).

* Not examined or modified by IOLPRT0.

DFLAG.STATE - State of the device monitor. Specifies the next action to be taken by SIODM in servicing the request. Not used within IOLPRT0.

DSTAT.(0:1) - SIO OK. Set when no SIO channel program is in progress, that is, it is OK to start one.
.(1:1) - WIO OK. Set when it is OK to execute a WIO instruction or a doubleword WRITE channel order. If clear, indicates that a one word transfer is in progress.
.(2:1) - Interrupt Pending. If set, indicates one or more bits of the Interrupt Status Byte (DSTAT.(8:8) are set.
.(3:2) - U.I. Transfer State. Used mostly for hardware maintenance. See U.I. card manual (30051-90001) for details.
.(5:1) - Device Flag. Indicates a print-and-advance-paper sequence in progress. Since the 2608 buffers such commands, this signal may be shorter than with other printers.
.(6:1) - Always 0. DSTAT.(8:8) always contains the Interrupt Status Byte.
.(7:1) - Not used. Always 0.
.(8:3) - Varies among HP-supported line printers according to the table below:

SUBTYPE	MODEL(S)	BIT 8	BIT 9	BIT 10
0	2610, 2614	LINE PRINTED	READY	NOT READY
1	2607	Not used	READY	NOT READY
2	2613, 2617, 2618, 2619	Not used	READY	NOT READY
3	2617J (KATAKANA)	Not used	READY	NOT READY
4	2608	ON LINE	NOT READY	VFC CHAN 9

.(11:1) - Data Transfer Interrupt bit. Always 0.
.(12:1) - Not used. Always 0.
.(13:1) - Programmed Interrupt bit. True if interrupt request was generated by:
a) SIN machine instruction,
b) INTERRUPT channel order, or
c) END-WITH-INTERRUPT channel order.
.(14:1) - Transfer Error Interrupt bit. True if interrupt was generated by:
a) an illegal memory address,
b) a memory parity error, or
c) a multiplexer parity error during data xfr to U.I.
.(15:1) - Time-out Interrupt bit. Set if 5-second timer on U.I. card is enabled, then times out without being cleared.

DLAST.(8:8) - Request dependent. If a print request has an odd number of bytes, this word holds the final byte. For VFC downloads, contains the associated data byte (6 or 8 lines per inch and number of lines in VFC). For left margin downloads, also contains the associated data byte (the number of columns to offset).

DVFC1.(0:1) - VFC Modified. 2608 only. Indicates that an external VFC has been downloaded into the 2608.

DVFC1.(1:1) - Power Fail/Reset. 2608 only. The 2608 has suffered a Power Failure or someone has pressed the front panel Reset button. In either case, the printer's operating environment has been destroyed, and must be reloaded by the operator.

DVFC1.(2:1) - Between Jobs. Set when a Device Close is executed, cleared when an FOPEN is performed. 2608 Power Fail/ Master Reset's will be cleared but not reported while this bit is set (thus avoiding an extraneous console message when the printer is powered up).

DVFC1.(3:1) - TALLY'NOT'READY. Set when an off-line condition is detected on a 2607. Causes a three-second delay when the 2607 comes back on-line.

DVFC1.(4:4) - Left margin offset (2608 only). Stored during each :DOWNLOAD which specifies a left margin and restored to printer following a 2608 power fail or reset. Set to 0 when system is initialized.

DVFC1.(8:8) - Request dependent. Contains the carriage control byte sent to the printer during a print request.

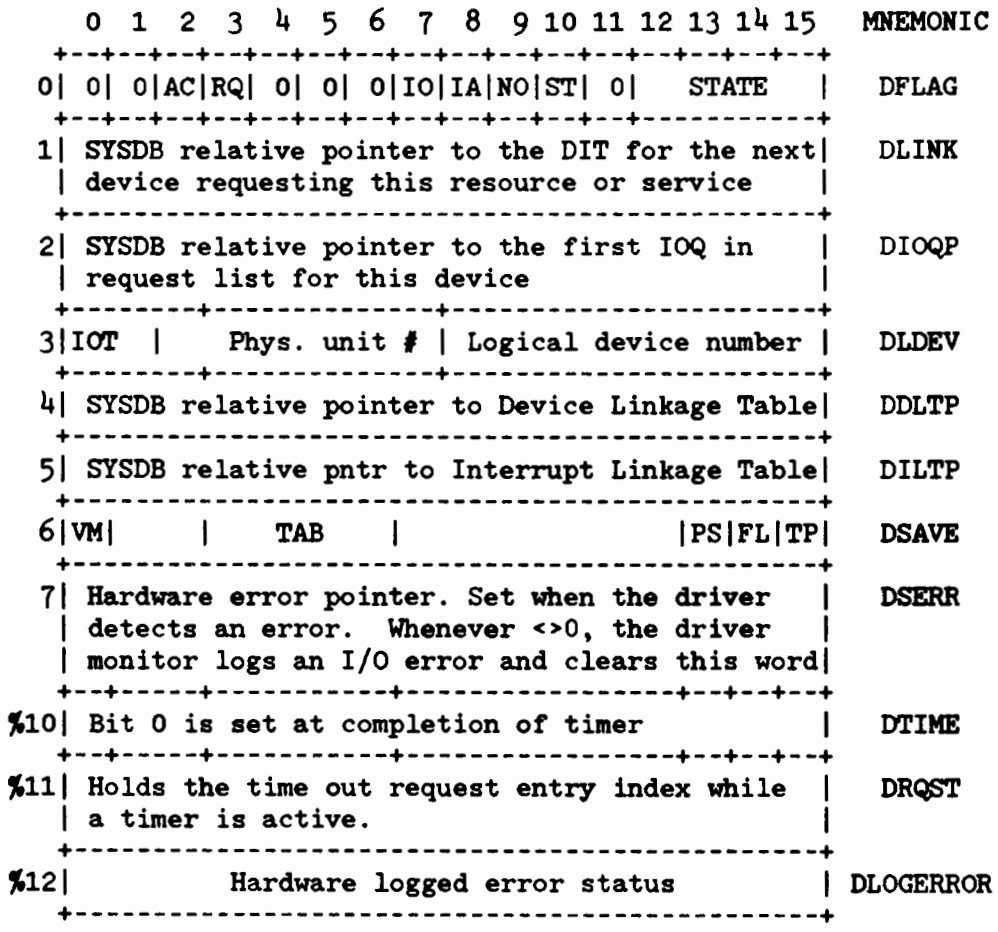
DVFC2.(0:8) - LINES'LEFT'OVER. Has two functions:

1) The 2607/13/17/18/19 can only slew (skip) a maximum of 15 lines per print command (not counting VFC skips, which can be of any length). Slew requests > 15 lines must be broken up. This byte holds the number of lines (greater than 15) which remain to be slewed at any point of a request to such a printer, or 0 if the number of lines to skip is <= 15. This mechanism is not needed (and this field is therefore 0) for CDC and 2608 line printers, which can slew up to 63 lines at a time.
2) The carriage control characters "0" in "-" specify double and triple spacing, respectively. But if you use the equivalent channel skip, you get skips to the next odd and third lines, respectively, which is not the same as double and triple spacing. If you slew (advance paper) 2 or 3 lines, you can easily print over the paper perforations unless your program watches out for such things. We avoid this by examining the NO'AUTO'PAGE eject bit (IOQ(QPAR2).(14:1)). If it is set, then the request is treated like a normal slew and LINES'LEFT'OVER is not used. If it is clear (auto eject desired), then we simulate the multiple line skip by doing two ("0") or three ("-") skips to channel 3 (single spaces with auto page eject for the standard VFC). In this case, LINES'LEFT'OVER holds the number of such single spaces remaining in the request.

DVFC2.(8:8) - %202 for 2608, %102 otherwise. Causes skip to channel 3 (single space with auto page eject). Used when last request left data in print buffer (prespace) and current operation is postspace. Buffer is dumped first, using this byte as carriage control.

2608 LINE PRINTER DIT (HPIB SYSTEMS)

There is one DIT per physical device. If a physical device represents more than one logical device, the logical device number is obtained from the IOQ element (however, there is only one device per 2608 controller.) The following diagram shows the DIT used for the 2608 line printer driver.



DFLAG - Flags and request state

AC	ACTIVE	- A monitor is currently servicing this device.
RQ	REQUEST	- A service request is pending while the monitor is active.
IO	IOPROG	- An I/O Channel Program is running for this device.
IA	IAK	- An interrupt or response has occurred for this device.
NO	NOTRDY	- Go to state %10 after Idle Channel Program is started.
ST	STWAIT	- The device monitor is starting an Idle Channel Program for this device. There is no IOQ associated with this type of request.

```
STATE       - State of the device monitor.  Specifies the next action
              to be taken in SIODM in servicing the request:
                0 - start new request
                1 - not used
                2 - call driver initiator procedure
                3 - call driver completor procedure
                4 - not used
                5 - process request completed
                6 - initiate device recognition sequence
                7 - start operator intervention wait
              %10 - wait for interrupt (operator intervention)
                    restart at state 0
              %11 - wait for data segment freeze, then state 2
              %12 - wait for driver initiator to be frozen, then
                    allocate controller (state 2)
              %13 - wait for I/O completion interrupt, then state 3
              %14 - wait for controller, then call driver initiator
              %15 - not used
              %16 - wait for initiator make present, then state 2
              %17 - wait for completor make present, then state 3

DLDEV - I/O system type, unit and logical device number
  IOT I/O TYPE- Type of I/O system
                0 - HP3000 Series II/III
                1 - HP3000 Series 33 (HP-IB)
                2 - unused
                3 - unsused

DSAVE - Device processing flags
  VM   VFCMOD     - VFC has been modified.
  TAB  TABDFAULT  - System tab default.
  PS   PRESPACE   - Last request used prespacing.
  FL   FULL       - Line printer buffer is full.
  TP   TOP        - Printer is at top of form
```

2608 Line Printer Status

BYTE 1 & BYTE 2:

BITS	USE
0	ON LINE
1	NOT READY
2	VFC CHANNEL 9 (BOTTOM OF FORM)
3	VFC CHANNEL 12 (TOP OF FORM)
4	VFC INITIALIZED
5	6/8 LINES PER INCH
6	(NOT USED)
7	POWER RESTORED/UNIT RESET
8	ON LINE
9	PRINT MECH ERROR
10	SELF TEST FAILURE
11	PAPER ERROR
12	SELF TEST MODE
13	6/8 LPI
14	PLATEN/RIBBON ERROR
15	(NOT USED)

BYTE 3: PRINT MODE
BITS 0-7 MODE NUMBER

BYTE 4: PRIMARY/SECONDARY
BITS 0-3 SECONDARY CHARACTER SET CODE
BITS 4-7 PRIMARY CHARACTER SET CODE

BYTE 5: SELF TEST
BITS 0 PASS FAIL
BITS 1-7 SUBTEST NUMBER

BYTE 6: 6 LPI DOT ROW COUNT

BYTE 7: 6 LPI FORM LINE NUMBER

BYTE 8: 6 LPI FORM LENGTH IN LINES

BYTE 9: 8 LPI DOT ROW COUNT

BYTE 10: 8 LPI FORM LINE NUMBER

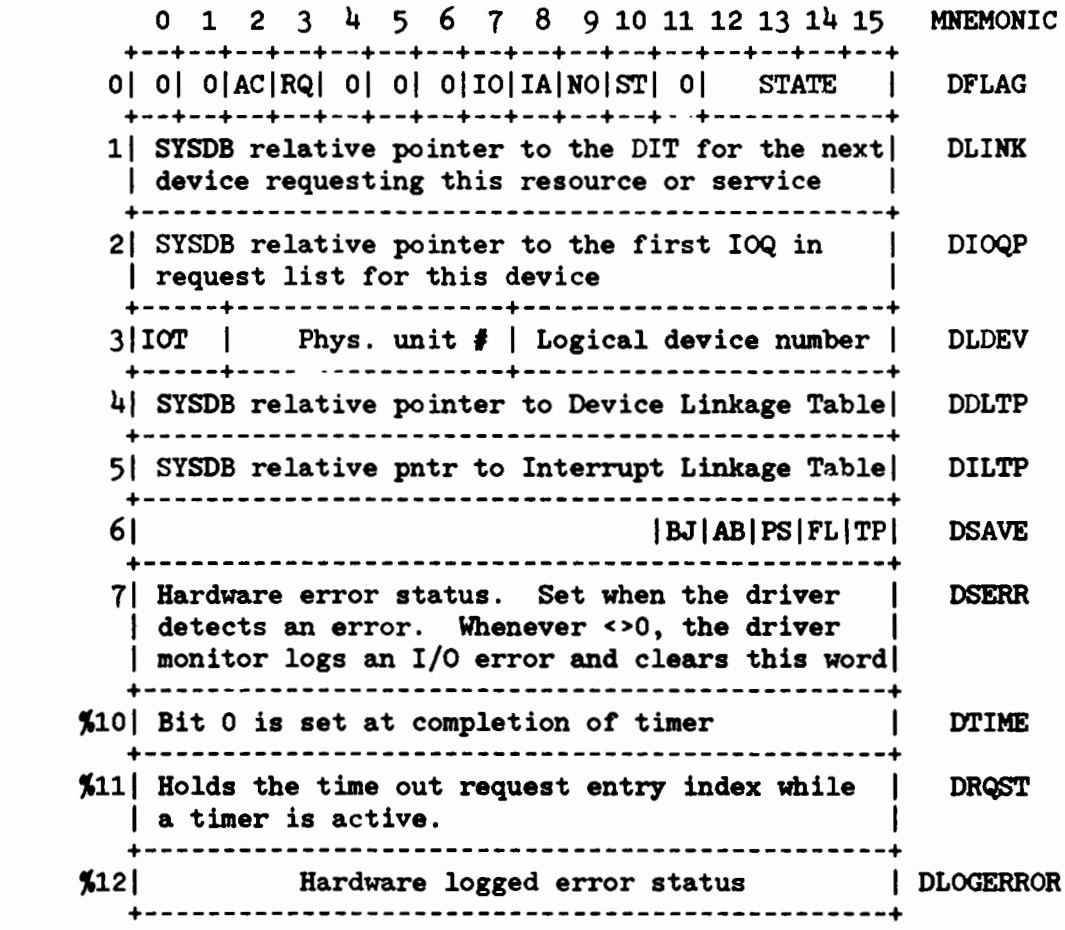
BYTE 11: 8 LPI FORM LENGTH IN LINES

BYTE 12: FIRMWARE IDENTIFICATION CODE

BYTE 20: POWER-UP LANGUAGE
BITS 0-3 SECONDARY CHARACTER SET CODE
BITS 4-7 PRIMARY CHARACTER SET CODE

2619A OR 2631 LINE PRINTER DIT (FOR HPIB SYSTEMS)

There is one DIT per physical device. If a physical device represents more than one logical device, the logical device number is obtained from the IOQ element (however, there is only one device per 2631 controller.) The following diagram shows the DIT used for the 2631 line printer driver.

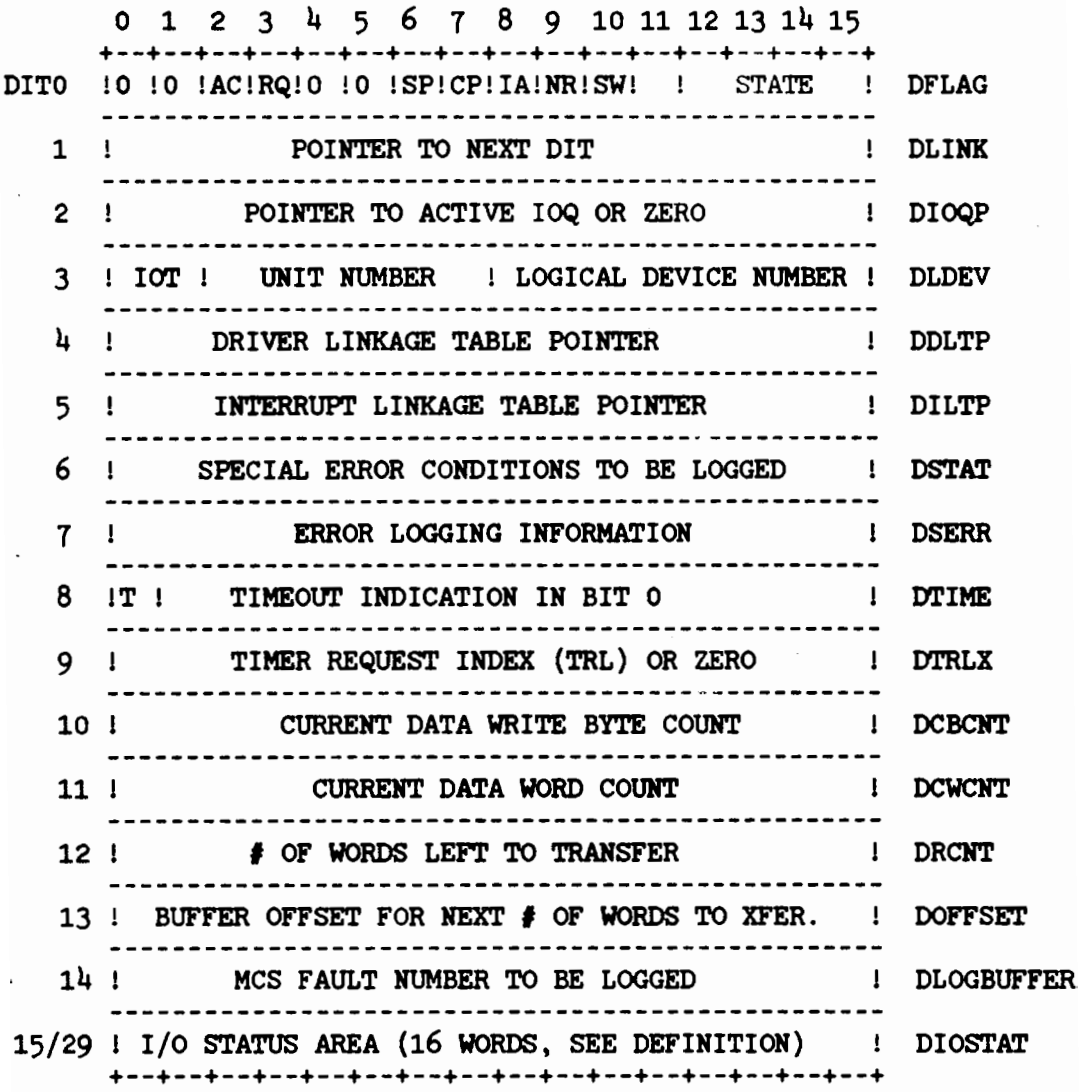


DFLAG - Flags and request state

AC	ACTIVE	- A monitor is currently servicing this device.
RQ	REQUEST	- A service request is pending while the monitor is active.
IO	IOPROG	- An I/O Channel Program is running for this device.
IA	IAK	- An interrupt or response has occurred for this device.
NO	NOTRDY	- Go to state %10 after Idle Channel Program is started.
ST	STWAIT	- The device monitor is starting an Idle Channel Program for this device. There is no IOQ associated with this type of request.

```
  STATE       - State of the device monitor.  Specifies the next action
                to be taken in SIODM in servicing the request:
                  0 - start new request
                  1 - not used
                  2 - call driver initiator procedure
                  3 - call driver completor procedure
                  4 - not used
                  5 - process request completed
                  6 - initiate device recognition sequence
                  7 - start operator intervention wait
                %10 - wait for interrupt (operator intervention)
                      restart at state 0
                %11 - wait for data segment freeze, then state 2
                %12 - wait for driver initiator to be frozen, then
                      allocate controller (state 2)
                %13 - wait for I/O completion interrupt, then state 3
                %14 - wait for controller, then call driver initiator
                %15 - not used
                %16 - wait for initiator make present, then state 2
                %17 - wait for completor make present, then state 3

DLDEV - I/O system type, unit and logical device number
  IOT I/O TYPE - Type of I/O system
              0 - HP3000 Series 2/3
              1 - HP3000 Series 33 (HPIB)
              2 - Unused
              3 - Unused

DSAVE - Device processing flags
  BJ   BETJOB     - Between jobs flag. If set, suppress
                    Powerfail message.
  AB   ABORT      - Abort (caused by Powerfail or Operator)
                    has occurred.
  PS   PRESPACE   - Last request used prespacing.
  FL   FULL       - Line printer buffer is full.
  TP   TOP        - Printer is at top of form
```

2680A DIT

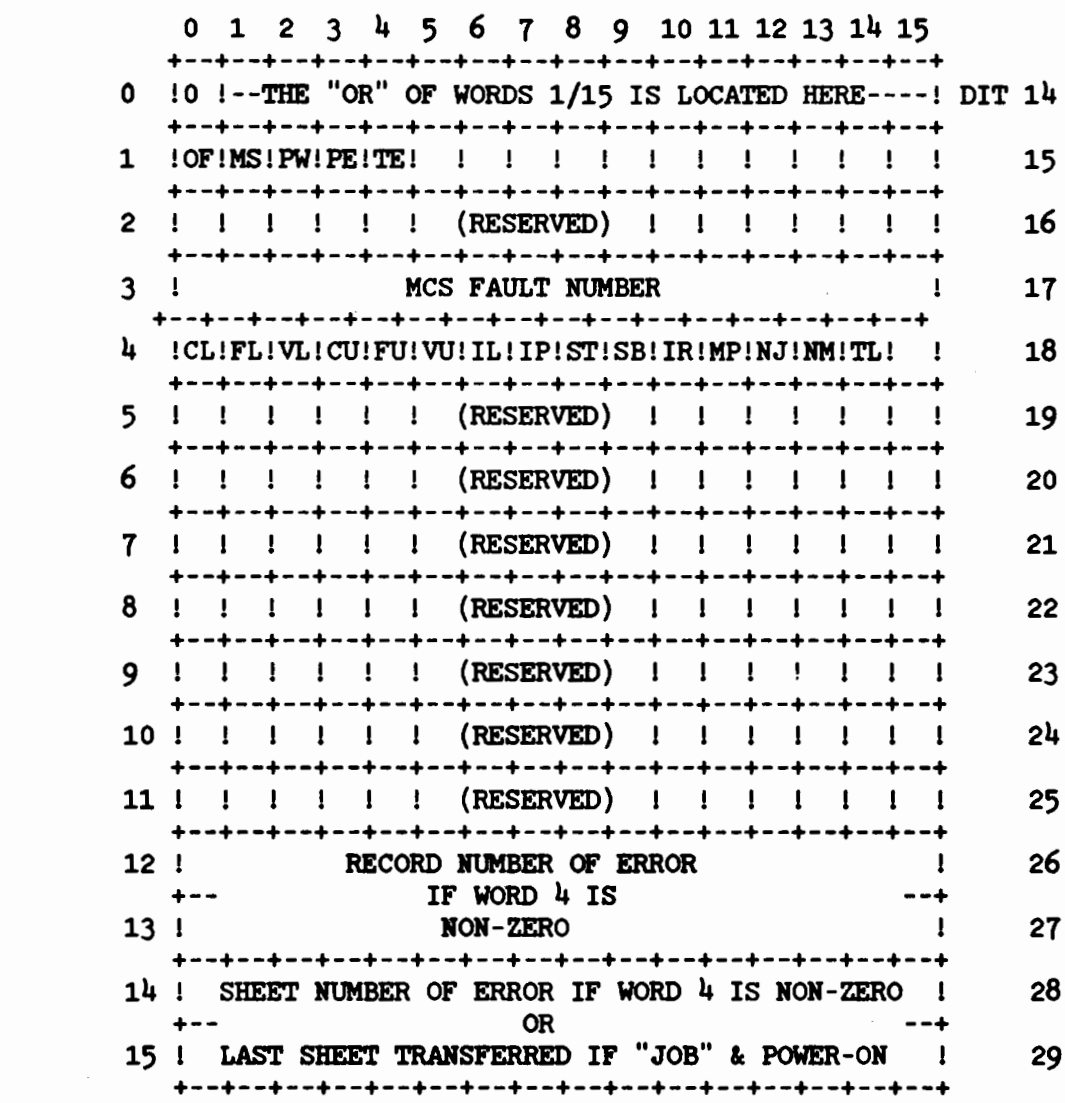


DFLAG - DEVICE RELATIVE FLAGS.

AC	ACTIVE BIT. 1 IMPLIES A MONITOR CURRENTLY SERVICING THIS DEVICE.
RQ	REQUEST BIT. 1 IMPLIES SERVICE REQUESTED WHILE MONITOR IS ACTIVE.
SP	SIO PREEMPTION. IF SET THEN A PREEMPTIVE REQUEST HAS BEEN QUEUED FOR THIS DEVICE. PREEMPT CODE IS SET IN IOQ ELEMENT.
CP	CHANNEL PROGRAM IN PROGRESS. IF SET, THEN A CHANNEL PROGRAM IS CURRENTLY EXECUTING.
IA	IF SET, AN INTERRUPT OR RESPONSE HAS OCCURED.
NR	IF SET, DEVICE IS IN A NOT READY OR OPERATOR WAIT.
SW	IF SET, AN IDLE CHANNEL PROGRAM SHOULD BE STARTED FOR THIS DEVICE.

```
      MSTATE      CURRENT DRIVER STATE AS DEFINED BY THE MONITOR.
                  ALLOWABLE STATES ARE:
                   0  - START REQUEST
                   1  - NOT USED(BUT RESERVED)
                   2  - CALL DRIVER INITIATOR
                   3  - CALL DRIVER COMPLETOR
                   4  - UNUSED(BUT RESERVED)
                   5  - COMPLETE REQUEST..PERHAPS RETURN TO USER.
                   6  - UNEXPECTED INTERRUPT OCCURRED.
                   7  - START OPERATOR INTERVENTION WAIT.
                  %10 - WAITING (ON OPERATOR). RESTART AT 0.
                  11  - WAITING (DATA MAKEPRESENT/FREEZING)
                  12  - WAITING (INITIATOR CODE MAKEPRESENT/FREEZE)
                  13  - WAITING (FOR COMPLETION INTERRUPT)
                  14  - WAITING (FOR DEVICE CONTROLLER AVAILABILITY)
                  15  - UNUSED(BUT RESERVED)
                  16  - WAITING (INITIATOR CODE MAKEPRESENT)
                  17  - WAITING (COMPLETOR CODE MAKEPRESENT)

DLDEV - I/O SYSTEM TYPE, UNIT AND LOGICAL DEVICE NUMBER.
      IOT         I/O SYSTEM TYPE.
                  0 - HP3000 SERIES II/III (SIO/DIO)
                  1 - HP-IB
                  2 - RESERVED
                  3 - RESERVED

DCBCNT - CURRENT BYTE COUNT TO BE TRANSFERRED.

DCWCNT - CURRENT WORD COUNT TO BE TRANSFERRED.

DRCNT  - REMAINING WORD COUNT TO TRANSFER.

DOFFSET - OFFSET IN BUFFER OF NEXT # WORDS TO TRANSFER.

DIOSTAT - I/O STATUS AREA 16 WORDS, SEE I/O STATUS BLOCK DEFINITION.
```

I/O STATUS BLOCK



WORD 0 - EACH BIT IS THE 'OR' OF ONE WORD IN THE TABLE (EXCEPT BIT 0 WHICH IS NOT USED). THEREFORE, BIT .(1:1) IS SET IF WORD 1 IN THE TABLE IS NON-ZERO.

WORD 1 - BIT= 0 - (OF) ONLINE/OFFLINE BIT.
1 - (MS) MESSAGE BEING DISPLAYED ON THE 2680A CONSOLE.
2 - (PW) POWER UP COMPLETED SINCE LAST I/O STATUS READ.
3 - (PE) PARITY ERROR DETECTED ON PHI COMMAND.
4 - (TE) TRANSMISSION ERROR DETECTED IN THE PRINTER.
5/15 - RESERVED. UNUSED.

WORD 2 - NOT USED. RESERVED.

WORD 3 - MCS FAULT NUMBER. CONTAINS AN INTEGER DESCRIBING THE LAST FAULT TO OCCUR SINCE THE LAST TIME THE I/O STATUS WAS READ OR THE HP2680A WAS POWERED DOWN. IF THE WORD IS ZERO THERE IS NO MCS FAULT. SEE DCS ERS FOR A DESCRIPTION OF THE MCS FAULT NUMBERS.

WORD 4 - BIT= 0 - (CL) NO ROOM FOR ATTEMPTED CHARACTER SET LOAD.
1 - (FL) NO ROOM FOR ATTEMPTED FORM LOAD.
2 - (VL) NO ROOM FOR ATTEMPTED VFC LOAD.
3 - (CU) ATTEMPT TO PRINT DATA AND THERE IS NO CURRENTLY SELECTED CHARACTER SET.
4 - (FU) ATTEMPT TO SELECT AN UNDEFINED FORM SET.
5 - (VU) ATTEMPT TO PRINT DATA AND THERE IS NO CURRENTLY SELECTED VFC SET.
6 - (IL) ATTEMPT TO PRINT DATA AND THERE IS NO CURRENTLY SELECTED LOGICAL PAGE TABLE (LPT) ENTRY.
7 - (IP) ATTEMPT TO MOVE PEN OFF THE LOGICAL PAGE.
8 - (ST) THE 2680A COULD NOT PROCESS ALL OF THE DATA BEFORE IT WAS SUPPOSED TO BE TRANSFERRED TO THE DRUM/PAPER. DATA WAS LOST!
9 - (SB) SPOOLER BLOCK CONTAINS FORMAT ERROR.
10 - (IR) INVALID RECOVERY BLOCK RECEIVED FROM SPOOLER.
11 - (MP) MAXIMUM NUMBER OF COPIES PER PHYSICAL PAGE HAS BEEN EXCEEDED. THIS IS A RESULT OF THE SPOOLER PROCESS SETTING THE MAXIMUM COPIES PER PAGE WITH FUNCTION CODE 132.
12 - (NJ) A COMMAND OR FUNCTION CODE WAS RECEIVED WHEN NO "JOB" WAS IN PROGRESS. THE COMMAND OR FUNCTION WAS IGNORED BY THE DCS.
13 - (NM) NO MEMORY. 2680A DYNAMIC MEMORY ALLOCATION HAS DETECED THAT MAIN MEMORY IS COMPLETELY OCCUPIED WITH CHARACTER SETS, VFC'S, FORMS AND DATA SUCH THAT THE 2680A CANNOT PROCESS THE CURRENT INPUT DATA. DATA WILL BE LOST!
14 - (TL) ATTEMPT TO PRINT DATA AND THERE ARE MORE THAN THE MAXIMUM ALLOWABLE LOGICAL PAGE TABLE (LPT) ENTRIES SELECTED.
15 - NOT USED BUT RESERVED FOR FUTURE USE.

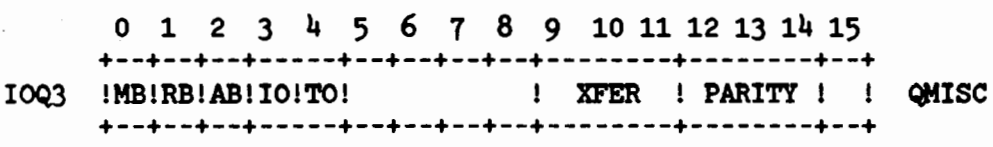
WORDS 5/11 NOT USED BUT RESERVED FOR FUTURE USE.

WORDS 12/13 - THE RECORD NUMBER WHICH CONTAINS THE OFFENDING ERROR AS DEFINED BY WORD FOUR. IF A POWER FAIL OCCURS DURING A "JOB", THE POWER FAIL BIT IS SET AND A SHEET NUMBER IS MADE AVAILABLE IN WORDS FOURTEEN AND FIFTEEN. HOWEVER, THE RECORD NUMBER IS LOST AND CANNOT BE REPORTED. THESE WORDS OCCUR IN A "JOB" ONLY.

WORDS 14/15 - THE SHEET NUMBER ON WHICH THE ERROR OCCURED AS DEFINED BY WORD FOUR. IF AN ERROR OCCURS IN THE ENVIRONMENT FILE AT THE START OF A "JOB", THEN THIS NUMBER WILL BE ZERO. IN ADDITION, WHEN A POWER FAIL OCCURS DURING A "JOB", THE POWER ON BIT IS SET IN WORD ONE AND THE SHEET NUMBER OF THE LAST SUCCESSFULLY TRANSFERRED PAGE IS PLACED HERE. THIS INFORMATION IS FOR USE BY THE SPOOLER SHOULD A RECOVERY OF A "JOB" BE DETERMINED. THESE WORDS OCCUR IN "JOB" ONLY.

ALL WORDS OF THE I/O STATUS ARE CLEARED WHENEVER THE STATUS BLOCK IS RETURNED TO THE HOST. IT IS UP TO THE HOST CPU TO RETAIN ANY ON-GOING STATUS BITS REQUIRED.

QMISC -



WHERE:

.(0:1) - MB — USER REQUESTED TRANSFER IN EXCESS OF 4096 WORDS. THE DRIVER CAN WRITE UP TO 4096 WORDS TO THE 2680A. IN ORDER TO HANDLE UP TO 32K WORDS, MULTIPLE WRITES ARE USED WITHOUT A RETURN TO THE USER WHO CALLED THE DRIVER. THIS BIT INDICATES THAT MULTIPLE WRITES ARE BEING DONE TO THE 2680A.

.(1:1) - RB — THE CURRENT WRITE BLOCK MUST BE RETRIED.

.(2:1) - AB — USER REQUESTED ABORT IN PROGRESS FLAG.

.(3:1) - IO — I/O STATUS HAS BEEN READ AND IS AVAILABLE.

.(4:1) - TO — GENERAL I/O CONTROLLER TIMED OUT.

.(5:4) - RESERVED — NOT CURRENTLY USED.

.(9:3) - XFER — 2680A TRANSFER ERROR COUNTER.

.(12:3)- PARITY — CHANNEL PROGRAM COMMAND PARITY ERROR COUNTER.

.(15:1)- RESERVED — NOT CURRENTLY USED.

NOTE IN THE ABOVE, SINGLE BIT FIELDS ARE AS DEFINED WHEN THE BIT IS A LOGIC "1".

30119 CARD READER/PUNCH DIT

Everything is the same as the SIO DIT and standard IOQ except as noted below:

1. DIT (9)

	0	1	2	3	4	5	6	7	8	9	10	11	12,13	14	15	
%11	CBF	SC	SS	HS	IIF	EOF	IB	PR	PN	SPD	EC	m	MOD E	CON	TR	DACCP

DIT(9).(0:1) CBF — Clear Buffer Full - 0= the next card leaving the hopper will be read by the device. 1= the read buffer will be cleared when next card leaves the hopper.

DIT(9).(1:1) SC — Stacker Control - 0=all cards are stacked in right hopper until device goes not ready. 1= cards are stacked per bit 2.

DIT(9).(2:1) SS — Stacker Select - 0=Right stacker (stacker 1) 1= Left Stacker (stacker 2).

DIT(9).(3:1) HS — Hopper Select - 0= Pick from rear hopper (primary hopper). 1= Pick from front hopper (secondary hopper).

DIT(9).(4:1) IIF — Inhibit Input Feed - Inhibit picking a card when card currently in wait station is eject to a hopper.

DIT(9).(5:1) EOF — End Of File has been detected on a read oper

DIT(9).(6:1) IB — Internal Buffer -An internal buffer is being used. The buffer is the SIO area in the ILT.

DIT(9).(7:1) PR — Print - Print on the next card to pass the print station.

DIT(9).(8:1) PN — Punch - Punch 80 columns of data on the next card to pass the punch station.

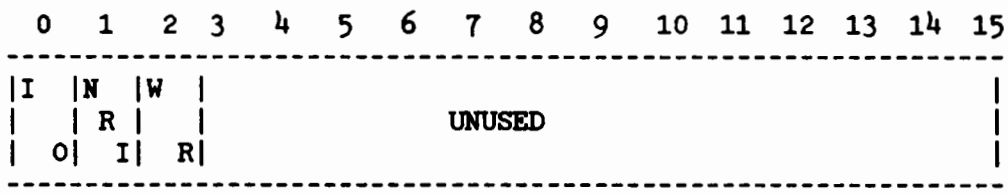
DIT(9).(9:1) SPD — Separate Print Data - Print data other than that being punched on the next card to pass the punch and print station.

DIT(9).(10:1) EC — Eject Card - Eject on a write after a read. Used when reading one card then punching one card (last card was read).

DIT(9).(11:1)	Sm	Stacker Mode -Saved staker mode on last read
DIT(9).(12:2)	MODE	Access Mode - 0= File opened for Read only 1= File opened for Write only 2= File opened for Read/Write
DIT(9).(14:1)	CON	Control - 0= no FCONTRL has occured for this file (use default settings). 1= FCONTROL has been done on this file (use settings in this DIT word for controlling this device).
DIT(9).(15:1)	TR	Timer Request - A timer request is pending. Timer request index is in word %12.

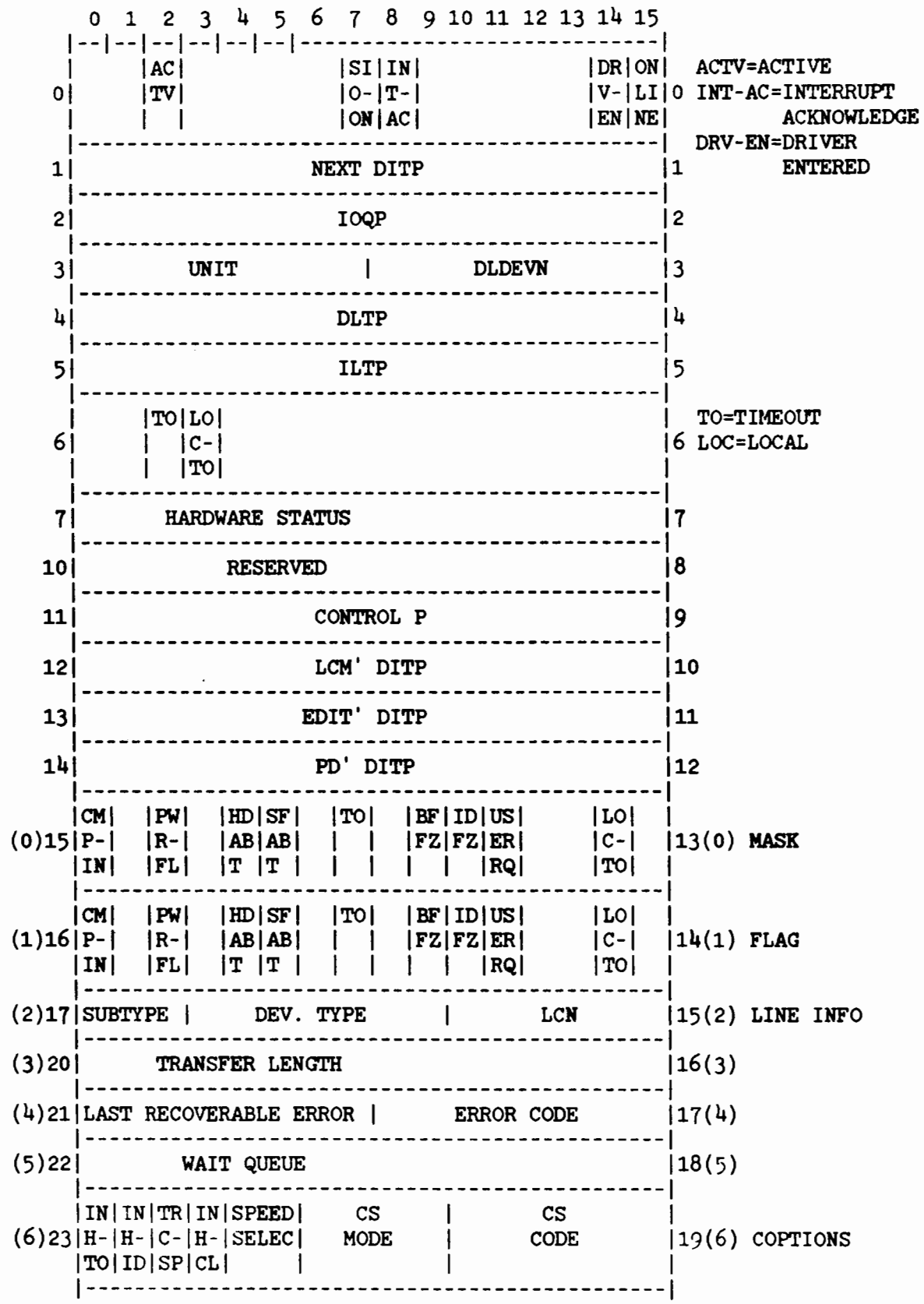
2. DIT(10) Timer request index (see DIT(9).(15:1)).

3. QMISC(IOQ(4))

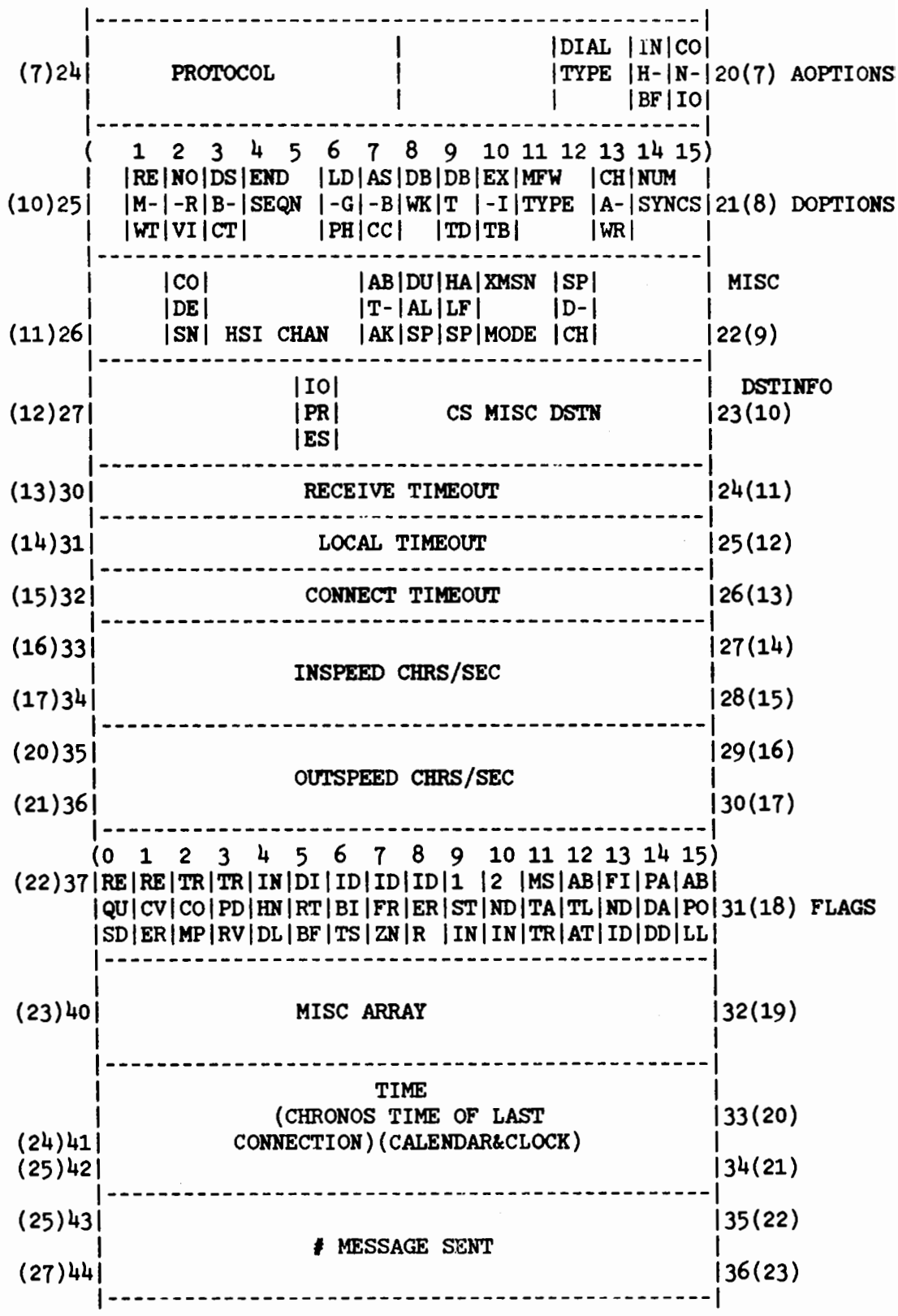


IOQ(4).(0:1)	IO	I/O initiated - waiting for completion interrupt.
IOQ(4).(1:1)	NRI	Waiting for a "Not Ready Interrupt" to bring the device back online.
IOQ(4).(2:1)	WR	Write - current operation is a write operation.
IOQ(4).(3:13)		Not Used

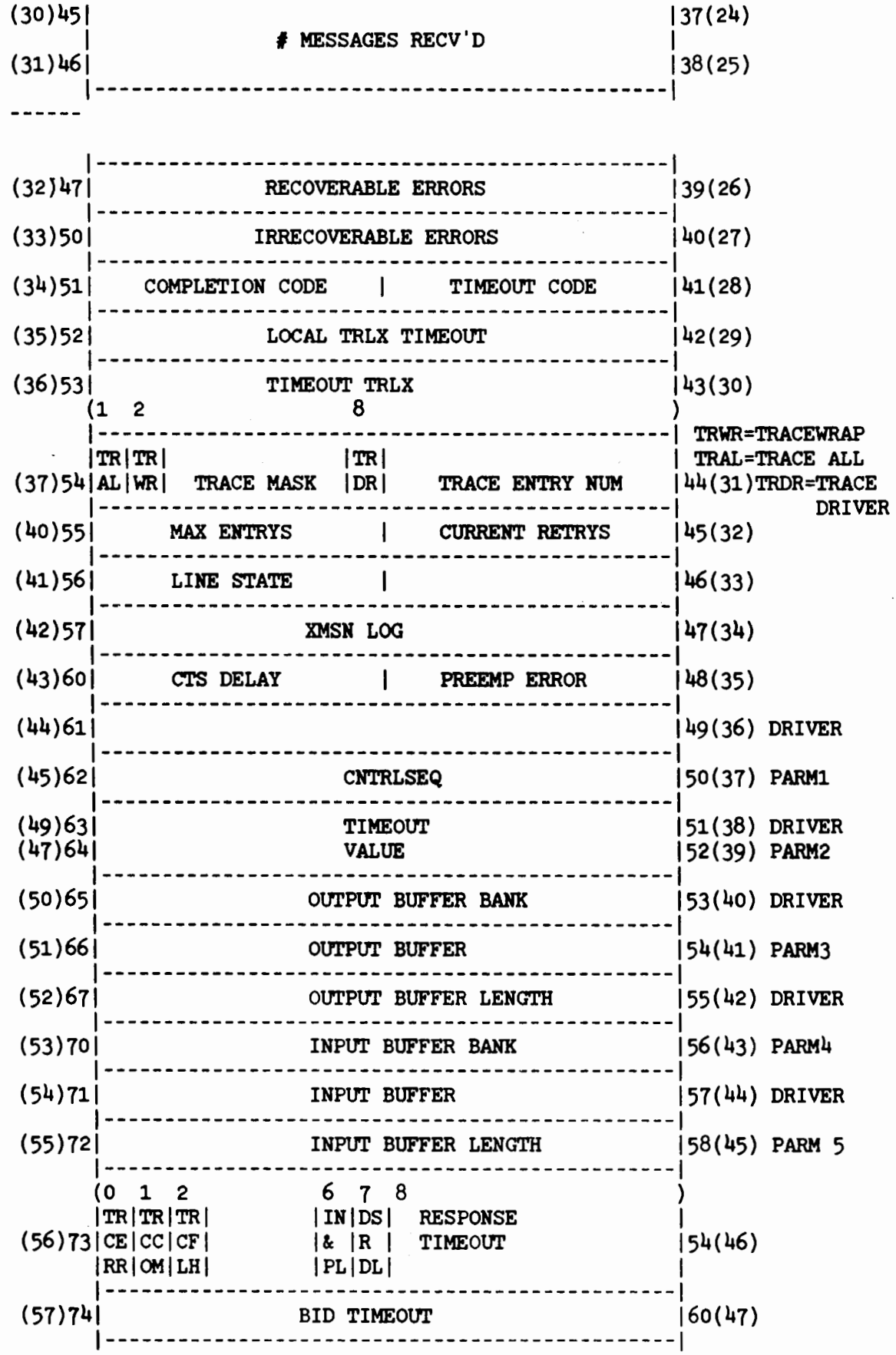
BINARY SYNCHRONOUS COMMUNICATION FOR CS DIT



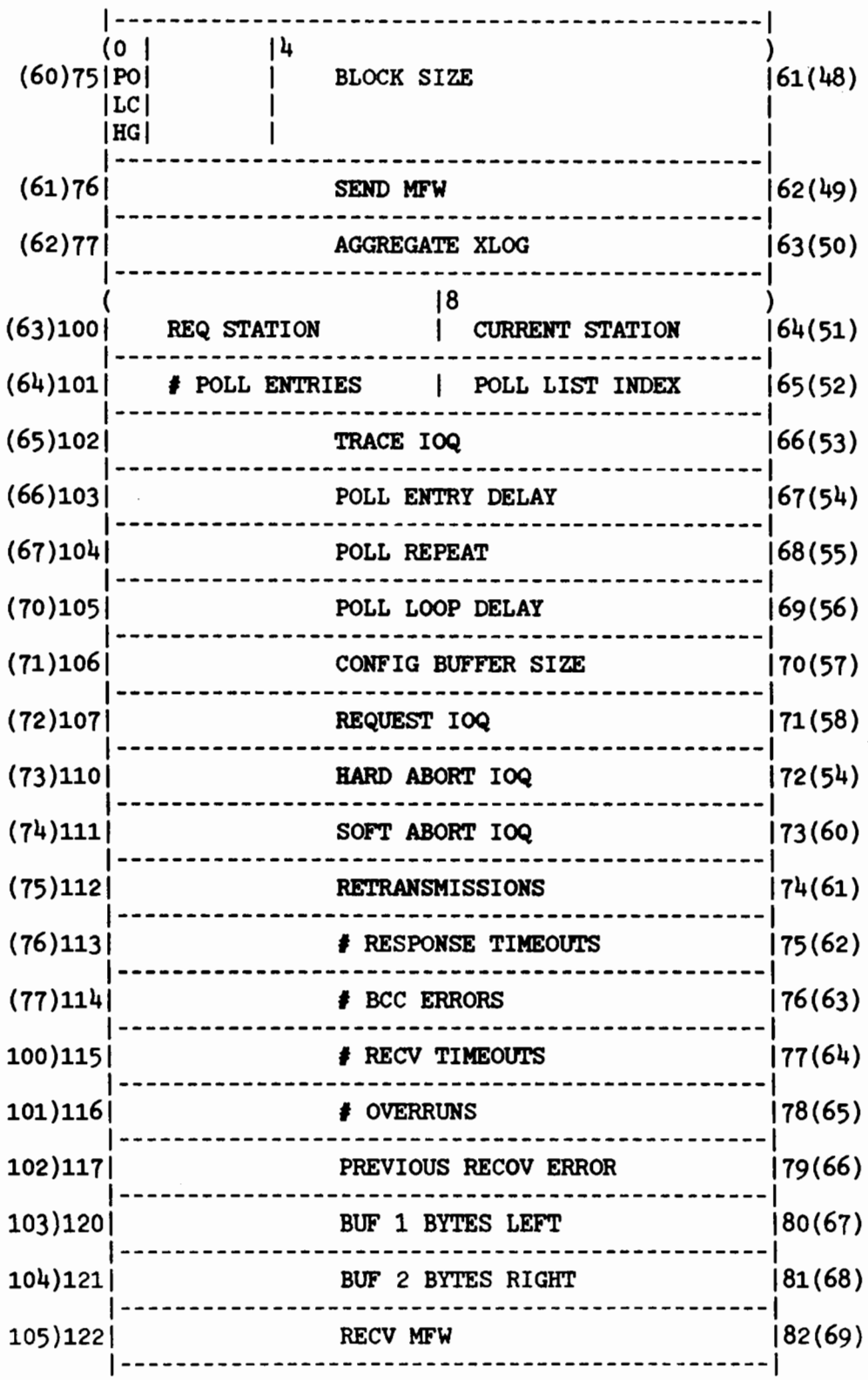
CS DIT (CONT.)

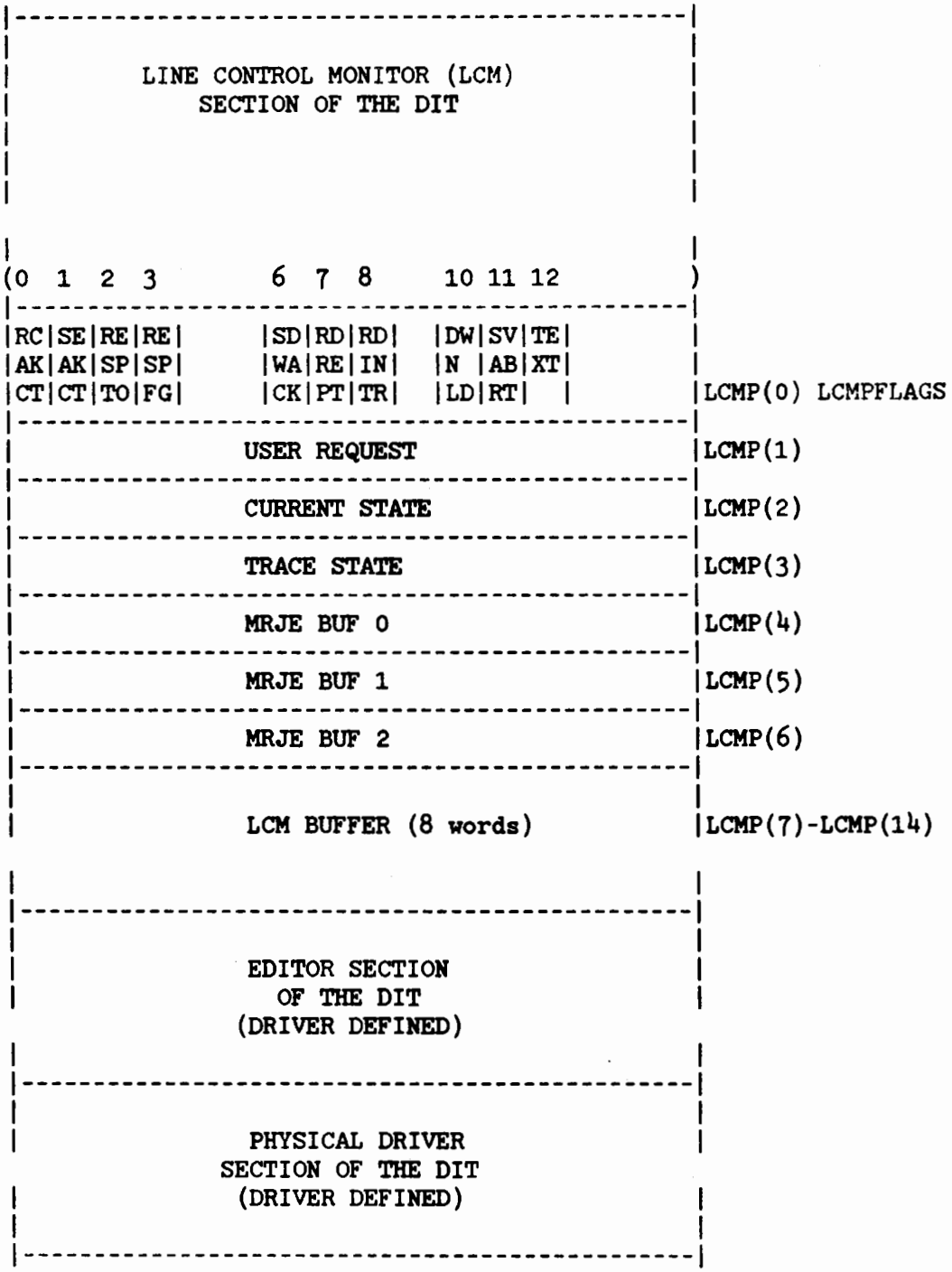

PROTOCOL
DIAL TYPE
IN H-BF
CO N-IO
(7)24
20(7) AOPTIONS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
RE M-WT
NO -R VI
DS B- CT
END SEQN
LD -G PH
AS -B CC
DB WK
DB T TD
EX -I TB
MFW TYPE
CH A- WR
NUM SYNCS
(10)25
21(8) DOPTIONS
CO DE SN
HSI CHAN
AB T- AK
DU AL SP
HA LF SP
XMSN MODE
SP D- CH
MISC
(11)26
22(9)
IO PR ES
CS MISC DSTN
DSTINFO
(12)27
23(10)
RECEIVE TIMEOUT
(13)30
24(11)
LOCAL TIMEOUT
(14)31
25(12)
CONNECT TIMEOUT
(15)32
26(13)
INSPEED CHRS/SEC
(16)33
27(14)
(17)34
28(15)
OUTSPEED CHRS/SEC
(20)35
29(16)
(21)36
30(17)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
RE QU SD
RE CV ER
TR CO MP
TR PD RV
IN HN DL
DI RT BF
ID BI TS
ID FR ZN
ID ER R
1 ST IN
2 ND IN
MS TA TR
AB TL AT
FI ND ID
PA DA DD
AB PO LL
(22)37
31(18) FLAGS
MISC ARRAY
(23)40
32(19)
TIME
(CHRONOS TIME OF LAST CONNECTION)(CALENDAR&CLOCK)
(24)41
(25)42
33(20)
34(21)
# MESSAGE SENT
(25)43
(27)44
35(22)
36(23)

CS DIT (CONT.)


(30)45
37(24)
# MESSAGES RECV'D
(31)46
38(25)
(32)47
RECOVERABLE ERRORS
39(26)
(33)50
IRRECOVERABLE ERRORS
40(27)
(34)51
COMPLETION CODE
TIMEOUT CODE
41(28)
(35)52
LOCAL TRLX TIMEOUT
42(29)
(36)53
TIMEOUT TRLX
43(30)
(1 2 8)
TRWR=TRACEWRAP
TRAL=TRACE ALL
TRDR=TRACE DRIVER
TR AL
TR WR
TRACE MASK
TR DR
TRACE ENTRY NUM
(37)54
44(31)
(40)55
MAX ENTRYS
CURRENT RETRYS
45(32)
(41)56
LINE STATE
46(33)
(42)57
XMSN LOG
47(34)
(43)60
CTS DELAY
PREEMP ERROR
48(35)
(44)61
49(36) DRIVER
(45)62
CNTRLSEQ
50(37) PARM1
(49)63
(47)64
TIMEOUT VALUE
51(38) DRIVER
52(39) PARM2
(50)65
OUTPUT BUFFER BANK
53(40) DRIVER
(51)66
OUTPUT BUFFER
54(41) PARM3
(52)67
OUTPUT BUFFER LENGTH
55(42) DRIVER
(53)70
INPUT BUFFER BANK
56(43) PARM4
(54)71
INPUT BUFFER
57(44) DRIVER
(55)72
INPUT BUFFER LENGTH
58(45) PARM 5
(0 1 2 6 7 8)
TR CE RR
TR CC OM
TR CF LH
IN & PL
DS R DL
RESPONSE TIMEOUT
(56)73
54(46)
(57)74
BID TIMEOUT
60(47)

CS DIT (CONT.)


(0 |4
(60)75|PO| BLOCK SIZE |61(48)
|LC|
|HG|
(61)76| SEND MFW |62(49)
(62)77| AGGREGATE XLOG |63(50)
(|8
(63)100| REQ STATION | CURRENT STATION |64(51)
(64)101| # POLL ENTRIES | POLL LIST INDEX |65(52)
(65)102| TRACE IOQ |66(53)
(66)103| POLL ENTRY DELAY |67(54)
(67)104| POLL REPEAT |68(55)
(70)105| POLL LOOP DELAY |69(56)
(71)106| CONFIG BUFFER SIZE |70(57)
(72)107| REQUEST IOQ |71(58)
(73)110| HARD ABORT IOQ |72(54)
(74)111| SOFT ABORT IOQ |73(60)
(75)112| RETRANSMISSIONS |74(61)
(76)113| # RESPONSE TIMEOUTS |75(62)
(77)114| # BCC ERRORS |76(63)
100)115| # RECV TIMEOUTS |77(64)
101)116| # OVERRUNS |78(65)
102)117| PREVIOUS RECOV ERROR |79(66)
103)120| BUF 1 BYTES LEFT |80(67)
104)121| BUF 2 BYTES RIGHT |81(68)
105)122| RECV MFW |82(69)


LINE CONTROL MONITOR (LCM)
SECTION OF THE DIT
(0 1 2 3 6 7 8 10 11 12
RC|SE|RE|RE| |SD|RD|RD| |DW|SV|TE|
AK|AK|SP|SP| |WA|RE|IN| |N |AB|XT|
CT|CT|TO|FG| |CK|PT|TR| |LD|RT| |
LCMP(0) LCMPFLAGS
USER REQUEST
LCMP(1)
CURRENT STATE
LCMP(2)
TRACE STATE
LCMP(3)
MRJE BUF 0
LCMP(4)
MRJE BUF 1
LCMP(5)
MRJE BUF 2
LCMP(6)
LCM BUFFER (8 words)
LCMP(7)-LCMP(14)
EDITOR SECTION
OF THE DIT
(DRIVER DEFINED)
PHYSICAL DRIVER
SECTION OF THE DIT
(DRIVER DEFINED)

CS DIT FIELDS AND DEFINITIONS

MASK and FLAG Words 13 and 14		
	CMP-IN	Completion Interrupt
	PWR-FL	Power Fail
	HD-ABT	Hard Abort
	SF-ABT	Soft Abort
	TO	Timeout
	BF FZ	Buffer Frozen
	ID FZ	ID Frozen
	USER RQ	User Request
	LOC-TO	Local Timeout
COPTIONS Word 19		
	INH-TO	Inhibit Timeout
	INH-ID	Inhibit ID
	TRC-SP	CS Trace
	INH-CL	Inhibit :CLINE
AOPTIONS Word 20		
	INH-BF	Inhibit Buffering Override
	CON-IO	Concurrent IO
DOPTIONS Word 21		
	REM-WT	Delay Sequence Wait
	NO-RVI	Poll Termination Sequence
	DSB-CT	Disable Control Read
	END-SEQN	Ending Sequence
	LD-GPH	Leading Graphics
	AS-BCC	Value of US ASCII BCC
	DB WK	Disable WACK
	DB-TTD	Disable TTD
	EX ITB	Expect ITB
	MWF TYPE	Message Format Word
	CHA-WR	Chain Writes
	NUM-SYNCS	Number of Leading SYNCS
MISC Word 22		
	CODE SN	Code Sensing
	ABT-AK	Abort ACK
	DUAL SP	Dual Speed
	HALF SP	Half Speed
	XMSN MODE	Transmission Mode
	SPD-CH	Speed Changeable

CS DIT (CONT.)

DST INFO
Word 23

ID PRES	ID Present

FLAGS
Word 31

REQ USD	Request Used
RECV ER	Recoverable Error
TR COMP	Trace Out Completion
TR PDRV	Trace Out Physical Driver
IN HNDL	Interrupt Handler
DIRT BF	Dirty Buffer
ID BITS	ID Frozen Bits
ID FRZN	ID Frozen
ID ERR	ID MAM Error
1ST IN	First Interrupt
2ND IN	Second Interupt
MSTA TR	MMSTAT Trace
ABT LAT	Abort Later
FIND ID	Find Station ID
PAD ADD	Pad Added
AB POLL	Abort Poll

STANDARD (46)
Word 54

TRC ERR	Trace Error Toggle
TRC COM	Trace Complete
TRC FLH	Trace Flush
IN & PL	Increment and Poll
DSR DL	Date Set Ready Delay

LCMFLAGS
LCMP(0)

RC AKCT	Received ACK Counter
SE AK CT	Send ACK Counter
RESP TO	Response Timeout
RESP FG	Response Flag
SD WACK	Send WACK
RD REPT	Read Repeat
RD INTR	Read Interrupt
DWN LD	Download
SV ABRT	Save Abort
TEXT	Text

MULTIPOINT TERMINAL DEVICE INFORMATION TABLE

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
0	0	AC	RQ	0	0	PM	0	IA	0	0	0	STATE				0	DFLAG
NEXT DITP																1	DLINK
IOQP																2	DIOQP
UNIT								LDEVNT								3	DLDEVT
DLTP																4	DDLTP
ILTP																5	DILTP
RESERVED																6	
RESERVED																7	
RT	LG	0														8	DTIME
GS	RE	CR	FC	MR	WP	RP	DR	UP	PS	RTR	TIM	BR	SSR	FLU	LP	9	DMISCT
LG TY	WA	RJ	DW	DR	UR	0	LDEVNL									10	DLDEVL
DSTN of terminal buffer																11	DDSBUF
Write limit Counter																12	DWLIM
FORMATF							Reserved									13	DFRMAT
Dit Pointer For Next Unit																14	DNEXT
Pointer to next Dit with postponed write																15	DNWRT
LF	DR	BM	AT	SM	WQ	DJST	STATIONINDIT									16	DSTA
FIRST WORD FOR ASCII WRITES (if par 1=1)																17	DFIRST
ACTUAL BYTE COUNT FOR READS																18	DBCNT
READTINDEXF							LOGONTINDEXF									19	DTIND
READTIME - 1ST WORD OF DOUBLE READTIMER READING																20	DRTMD
2nd WORD OF DOUBLE READTIMER READING (start)																21	
MAXIMUM READ TIME IN SECONDS																22	DRTMAX

MULTIPOINT TERMINAL DEVICE INFORMATION TABLE (cont)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
TERMINALTYPE | 0 | SPEED	23	DTYPE
LOGICAL/PHYSICAL WRITE COUNTER	24	DWCNT
HOLDS UNEDITED MODE CHARS, WHILE IN BREAK MODE	25	DBUNM
DSTN OF DATA SEGMENT HOLDING "HELLO" MESSAGE	26	DDSHEL
BYTE COUNT FOR "HELLO MESSAGE"	27	DHBCNT
POINTER TO NEXT DIT IN WACK Q	28	DWACK
POINTER TO NEXT DIT IN REJECT Q	29	DREJT
CURRENT VERSION NO. OF IOMPTRM0 (MODULE 1)	30	DMOD
ATTENCHAR | ENDCHAR	31	DUNMD
DSTN OF SECONDARY TERMINAL BUFFER	32	DDSB2
BYTE COUNT (READS), BUFFER LENGTH (WACK or reject	33	DBCNT
RESERVED | GROUPINDIT	34	DGRP

DFLAG - Flags and SIODM state.

.ACTIVE - SIODM is currently active servicing this device.

.REQUEST - Service for this device was requested while SIODM was active.

.PREMPT - Peemptive request flag.

.IAK - Response has occured (interrupt acknowledge flag).

.STATE - SIODM state.

DLINK - SYSDB relative pointer to the DIT for the next device requesting service or this resource.

DIOQP - SYSDB relative pointer to the DIT for the next device requesting service or this resource.

DLDEVT - Logical device number and unit number.

.LDEVNT - Logical device number of the multipoint terminal.

.UNIT - Unit number representing terminal address (group and device ID).

DDLTP - SYSDB relative pointer to Driver Linkage Table (DLT).

DILTP - SYSDB relative pointer to dummy Interrupt Linkage Table (ILT) to satisfy SIODM requirements (no reaal ILT is associated with multipoint terminals).

DTIME - Timer flags.

.READTOF - Read timeout has occurred.

.LOGONTOF - Log on timeout has occurred.

DMISCT - Miscellaneous flags.

.GSIN - Last character received from the terminal was the GS character.

.READEROR - Read error has occurred.

.CRITICAL - If set, IOMPTRM0 will not attempt to release extra data segments previously acquired by MPMON

.FILTERCRLFOK - Proper editing of input data with respect to CR and LF characters has already been made.

.MARKED - This DITT has already been processed during construction of SUPLIST.

.WPOSTP - Current write request has been postponed.

.READPEND - Read request is pending against this terminal.

.DATAREADY - Input data has been received and is ready in the terminal read buffer.

.UP - Device has been initialized through the log on procedure or has been allocated.

.PRESPACEF - Last write operation was with a prespace request. If the next write operation is with a post space request, output CR and LF before data.

.READTIMERF - Read timing requested and not yet in progress.

.TIMING - Current read request is being timed.

.BRKOK - System break is enabled.

.SSBRKOK - Subsystem break is enabled.

.FLUSH - This flag i set whenever break has been detected and accepted. While it is set, writes are returned completed without any I/O being done. Reads are returned with an unusual condition status %173. It also holds off any further break service requests. It is reset with a function code 25 operation.

.LASTPREMEPT - Last request was a preemptive request.

DLDEVL

. LOGONTYPE - 0: JOB
1: SESSION
2: DATA

. WACK - If set then WACK or EOT condition has been detected and the terminal was placed in the WACK queue.

. REJECT - If set then a terminal error has been detected and the terminal was placed in the REJECT queue.

. DOWN - If set then this terminal was declared down through the console operator command or the configuration file.

. DOWNREQ - If set then a request is pending to declare the terminal down.

. UPREQ - If set then a request is pending to declare the terminal up.

.LDEVNL - Logical device number of the controller servicing the multipoint line.

DDSBUF - Data segment number of the terminal read buffer.

DWLIM - Write limit counter.

DFORMAT

.FORMATF - This field holds information about vertical format specification for writes obtained from P1 parameter of the IOQ element or from the first data byte.

DNEXT - SYSDB relative pointer to the DITT for the next terminal on the same line.

DNWRITE - SYSDB relative pointer to the DITT for the next terminal with postponed write.

DSTATION - Flags and station number.

.LFLUSH - This flag is set to indicate that data for this terminal already scheduled to be written from the output buffer should not be physically sent to the terminal (break or subsystem break environment).

.DISCONREQ - Request to disconnect the terminal.

.BREAKMODE - Terminal is in break mode.

.ATTENTERM - Terminal is in attention mode.

.SSBMODE - Terminal is in subsystem break mode.

.WLQUEUE - A write request was forced to be queued by MPE I/O system.

.DJSTATE - State of terminal straps D and J.
0 - Initial state.
1 - Straps D and J are open or will be open before the next write.
2 - Undefined D and J setting.

.STATIONINDIT - Station number assigned to this terminal by CS.

DFIRST - Storage for first word for ASCII writes if vertical format is specified by first data byte.

DBCNT - Actual byte count for reads.

DTIND - Timer indexes.

.READTINDEXF - Read timer index.

.LOGONTINDEXF - Log on timer index.

DRTIME (DRTIMED) - During a timed read, this is the reading of the timer at the initiation of the read. After a timed read is completed, the time in 1/100 of a second is saved in DRTIME as a single word. If it is -1 then the time was greater than 32K.

DRTMAX - When a read operation timeout is requested, this quantity represents the maximum time in seconds allowed for the read to be completed.

DTYPE - Terminal type and speed.

.TERMINALTYPE - Configured terminal type. Multipoint terminal is type 14.

.SPEED - Reserved field for configured terminal speed (not used for multipoint terminals).

DWCNT - Logical/physical write counter.

DBUNMODE - Holds unedited mode characters while in break mode.

DDSHEL - DST number of data segment holding "HELLO" message (or backspaced data).

DHBCNT - Byte count for "HELLO" message (or backspaced data).

DWACK - Pointer to next DIT in WACK queue.

DREJECT - Pointer to next DIT in REJECT queue.

DMOD1VER - Current version number of the multipoint terminal driver (IOMPTRMO).

DUNMODE - Unedited mode characters.

.ATTENCHAR - Attention character.

.ENDCHAR - End-of-character. (Effective as a control character is set to %137, otherwise not used).

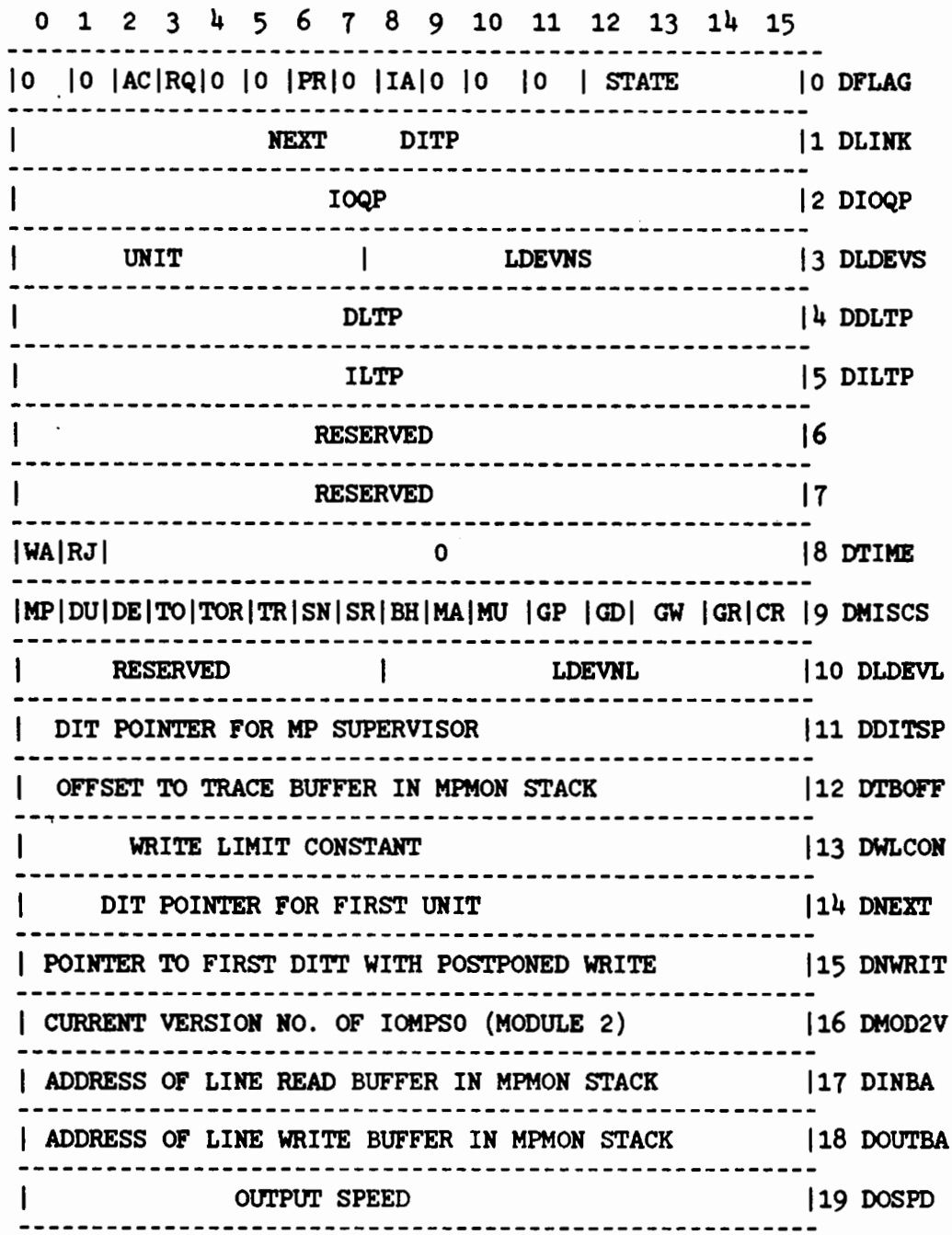
DDSBUF2 - Data segment number of secondary read buffer.

DBCNT2 - Byte count for read if secondary read buffer is used

DGROUP

GROUPINDIT - Logical group number assigned to this terminal by CS.

MULTIPOINT SUPERVISOR DEVICE INFORMATION TABLE (DITS)



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	
INDEX OF HEAD ENTRY IN LINE WRITE BUFFER	20 DHEADI
INDEX OF TAIL ENTRY IN LINE WRITE BUFFER	21 DTAILI
INDEX OF LAST AVAILABLE WORD IN LINE WRITE BUFFER	22 DENDI
TERMINAL TYPE |SP|DO|ID| SPEED	23 DTYPE
CURRENT VERSION NO. OF MPMONCMD (Module 3)	24 DMOD3V
DSTN OF MPMON STACK	25 DMDSTN
LINE SPEED - 1st WORD DLSPEED	26
LINE SPEED - 2nd WORD	27
POINTER TO FIRST DIT IN WACK Q	28 DWACK
POINTER TO FIRST DIT IN REJECT Q	29 DREJ
WACKTINDEX | REJECTTINDEX	30 DWRTI
CFCHAR0 | CFCHAR1	31 DCF01
CFCHAR2 | CFCHAR3	32 DCF23
CFCHAR 4 | CFCHAR5	33 DCF45
CFCHAR6 | CFCHAR7	34 DCF67
|RO|UDR|FB|CD|FS| 0 |MM| UD|MO|	35

DFLAG -
DLINK - Same as for DITT
DIOQP -

DLDEVS - Logical device number and unit number.

.LDEVNS - Logical device number of the Multipoint Supervisor.

.UNIT - Unit number (always 0).

DDLTP - Same as for DITT
DILTP

DTIME -
.WACKTO If set, then WACK timeout has expired
.REJECTIO If set, then REJECT timeout expired.

DMISCS - Miscellaneous flags.

.MPOK - If set, then IOMPSO is allowed to process I/O requests against the Multipoint Supervisor.

.DEBUGON - If set, then DEBUG will be called from MPMON. This flag is set through the MPLINE command.

.TRACEON - Trace facility is enabled.

.TRACEOFFREQ - Trace facility is to be disabled.

.TRACEONREQ - Trace facility is to be enabled.

.SHUTNOW - Request to shut the line immediately.

.SHUTREQ - Request to shut line after all terminals are released
New sessions are not allowed to be initiated.

.BUSYHEAD - The line write buffer contains data to be written to a terminal on the line.

.MPONACT - MPMON process is active.

.MPMONUP - MPMON process has been created and activated.

.GENWPOSTP - A write request for one or more terminals on the line has been postponed.

.GENDISCON - Request to disconnect the line.

.GENWACK - If set then there is a terminal in the WACK queue.

.GENREJECT - If set then there is a terminal in the REJECT queue.

.COMPLREQ - Request to complete dummy read pending against the Multipoint Supervisor.

DLDEVL

.LDEVNL - Logical device number of the controller servicing the multipoint line.

DDITSP - SYSDB relative pointer to the DIT for the Multipoint Supervisor (DITS).

DTBUFOFFS - Offset to the trace buffer in MPMON stack.

DWLCON - Write limit constant.

DNEXT - SYSDB relative pointer to the DITT for the first terminal on the line (the terminal with the lowest logical device number).

DNWRITE - SYSDB relative pointer to the DITT for the first terminal with postpond write.

DMOD2VER - Current version number of the Multipoint Supervisor driver (IOMPSO).

DINBUFA - Address of the line read buffer in MPMON stack.

DOUTBUFA - Address of the line write buffer in MPMON stack.

DOSPEED - Output speed.

DHEADI - Index of head entry in the line write buffer.

DTAILI - Index of tail entry in the line write buffer.

DENDI - Index of last available word in the line write buffer.

DTYPE

.TERMINALTYPE - Configured terminal type. Multipoint Supervisor is type 14 (same type as multipoint terminals).

.SUPER - This device is a Multipoint Supervisor.

.DITSOK - DIT's for the multipoint terminals and the Multipoint Supervisor on this line have been rearranged and their format corresponds to standard DIT format for SIO devices.

.SPEED - Reserved field for configured terminal speed (not used for Multipoint Supervisor).

.INITDONE - If set then all multipoint terminals belonging to the same multipoint supervisor have been linked.

DMOD3VER - Current version number of the MPLINE command processor (MPMONCMD).

DMONDSTN - Data segment number of MPMON stack.

DLSPEED (DLSPEEDD) - If not equal to 0, then the line is opened with speed specified in this double word.

DWACK - Pointer to the first terminal DIT in the WACK queue.

DREJECT - Pointer to the first terminal DIT in the REJECT queue.

DWRT1
.WACKTINDEX - WACK timer index.
.REJECTTINDEX - REJECT timer index.

DCF01 through DCF67 - String of characters representing:
a) the name of the configuration file, or
b) the logical device number of the terminal, or
c) terminal group and device ID.

DCONFL
.REOPEN - If set then a request for line reopening has been made.

.UPDOWNREQ - If set then a request to set the terminal UP or DOWN has been made.

.FORCE'SHUT - If set then a request has been made to shut the line immediately.

MULTIPOINT SUPERVISOR DIT (CONT.)

.UP'DOWN - If true then the terminal is to be set UP else the terminal is to be set DOWN. This flag is used in conjunction with .UPDOWNREQ flag.

.MSGOFF - If set then certain MTS messages are not displayed on the operator console.

INP DIT

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
DIT0	0		AC	RQ	TI	0	PR	IO	IN	SM	MAMSTATE		IOSTATE				DFLAG
1	POINTER TO NEXT DIT																DLINK
2	INPUT REQUEST QUEUE																DIOQP
3								LOGICAL DEVICE NUMBER									DLDEV
4	DRIVER LINKAGE TABLE POINTER																DDLTP
5	INTERRUPT LINKAGE TABLE POINTER																DILTP
6	INTERRUPT STATUS																DSTATUS
7	SOFTWARE TIMER REQUEST INDEX																DTRLX
8	TO																DTIME
9	READY QUEUE HEAD POINTER																READYQ
10	READY QUEUE TAIL POINTER																READYQTL
11	ACTIVE QUEUE HEAD POINTER																ACTIVEQ
12	ACTIVE QUEUE TAIL POINTER																ACTIVEQTL
13	WAITED QUEUE HEAD POINTER																WAITEDQ
14	WAITED QUEUE TAIL POINTER																
15	EO	WP	TR		PFSTATE		UF	PR	NR	SD	OS					AB	DSTATE
16	RESERVED							MESSAGE TO INP TYPE									DOUTMSG
17	REQUEST IDENTIFIER (@IOQP)																DOUTID
18	PARAMETER 1 (QMISC)																DOUTP1
19	OUT COUNT																DOUTCNT
20	PARAMETER 2 (QPAR2)																DOUTP2
21	SEND DIALOGUE COUNTER																DSEND
22	RECEIVE DIALOGUE COUNTER																DRECV
23	"MESSAGE SENT" EOT BUFFER																DEOT

INP DIT (cont)

24	RESERVED | MESSAGE FROM INP TYPE	DINMSG
25	REQUEST IDENTIFIER (@IOQP)	DINID
26	ERROR CODE |LS| CSTATUS	DRSTATUS
27	IN COUNT	DINCNT
28	TRANSMISSION LOG	DXLOG
29	PARAMETER	DINPARM
30	TRACE READY REQUESTS COUNT	DTRCNT
31	EXTERNAL TRACE EXTRA DATA SEGMENT NUMBER	DDSTN
32	RESERVED | OUT MSG TYPE AT ERROR	DERROR
33	REQUEST IDENTIFIER (@IOQP)	
34	PARAMETER 1 (QMISC)	
35	OUT COUNT	
36	PARAMETER 2 (QPAR2)	
37	LAST CS ERROR CODE	DCSERR
38	IOQP POINTER AT TIME OF ERROR	DSAVE
39	TP PHY DRVR VERSN # | LOGICAL DRIVER VERSION #	DVERSION
40	RESERVED | IN MSG TYPE AT ERROR	DERRORI
41	REQUEST IDENTIFIER (@IOQP)	
42	ERROR CODE |LS| STATUS	
43	IN COUNT	
44	TRANSMISSION LOG	
45	PARAMETER	
46	DRIVER ERROR CODE	DDRVRERR
47	MONITOR ERROR CODE	DMNTRERR

48	HARDWARE ERROR STATUS ! SIO PROGRAM INDEX	DSERR
49	TOOTH PICK HARDWARE ERROR STATUS	DTP'ERROR
50	ADDITIONAL TOOTHPICK HARDWARE ERROR STATUS	
51	DRIVER TRACE READ IOQ POINTER	DTR'IOQP

DFLAG - Flags, IOSTATE and MAMSTATE

ACTIVE - If set, the Driver is active servicing this device

REQUEST - If set, service for this device was requested while the Driver was active. The Driver is run again to insure servicing of the condition which caused REQUEST to be set.

DO'TIMING - If set, the hardware and software timers are started in the normal manner when performing an operation. If clear, no timing is done.

SIOPREEMPT- Preemptive request queued by ATTACHIO. Not used by this Driver.

IOPROG - If set, an I/O program is in progress. Set by STARTIO and cleared by GIP. Not used by the Driver.

IAK - Interrupt Acknowledge If set, an interrupt has occurred or a software timeout has completed.

SIMULATOR - If set, all I/O is to be simulated. The Driver will set flags in the DRT instead of calling STARTIO.

MAMSTATE - Memory Manager State
- 0 - Null, no Memory Management requests or condition
- 1 - Not used
- 2 - Data segment associated with the first request in the Active Queue is being made present and frozen.
- 3 - Data segment associated with the first request in the Active Queue is frozen in memory.
- 4 - Data segment associated with the second request in the Active Queue is being made present and frozen. Implies the data segment associated with the first request is frozen.
- 5 - Data segments associated with the first and second requests on the Active Queue are frozen in memory.
- 6 - Not used
- 7 - Not used

IOSTATE - Current I/O program operation being performed
- 0 - Inactive No I/O in progress
- 1 - Idle Read The Idle Read I/O program has been started.
- 2 - Sending message An I/O program which sends a message without data and then goes to the Idle Read section of the I/O program has been started.
- 3 - Sending data An I/O program which sends a message and data and then goes to the Idle Read section has been started.
- 4 - Send message and interrupt An I/O program which sends a message without data then interrupts and halts when the message is sent has been started.
- 5 - Send data and interrupt An I/O program which sends a message with data then interrupts and halts has been started.
- 6 - Receive data An I/O program which sends a message and receives data then interrupts and halts has been started.
- 7 - Do not start I/O Used to hold off requesting any I/O activity during a power on reset or when an error occurs.

DLINK - Link word for the linked list of devices waiting to be serviced by the I/O process associated with this device

DIOQP - System DB relative pointer to the first element in the requests to be processed list for this device The requests are queued to this list by ATTACHIO but in processing, the are moved to other queues depending of the state of the request The Driver always attempts to keep this list empty.

DLDEV - Logical Device Number of this device

DDLTP - System DB relative pointer to the Driver Linkage Table. (DLT)

DILTP - System DB relative pointer to the Interrupt Linkage Table. (ILT)

DSTATUS - Controller hardware status Set by GIP on interrupt and the Physical Driver during certain service operations See INP ERS for description. For the Toothpick version, this word contains the software timeout flags as described for the word DTIME below.

DTRLX - Timer request index for software timeouts as returned by the MPE procedure TIMEREQ

DTIME - Timed out flags and type 3 driver process PCB Number

TIMED - If set, a software timeout has completed

READYQ - System DB relative pointer to the IOQ for the first request in the Ready Queue. If zero, the Ready Queue is empty.

READYQTL - System DB relative pointer to the last IOQ in the Ready Queue. When the queue is empty, this word points to the word preceding the queue head pointer in the DIT.

ACTIVEQ - System DB relative pointer to the IOQ for the first request in the Active Queue. If zero, the Active Queue is empty.

ACTIVEQTL - System DB relative pointer to the last IOQ in the Active Queue. When the queue is empty, this word points to the word preceding then queue head pointer in the DIT.

WAITEDQ - System DB relative pointer to the IOQ for the first request in the Waited Queue. If zero, the Waited Queue is empty.

WAITEDQTL - System DB relative pointer to the last IOQ in the Waited Queue. When the queue is empty, this word points to the word preceding then queue head pointer in the DIT.

DSTATE - Driver state and control flags

ERRORONLY - If set, the Driver trace record is to be returned to the Trace Process only when an error occurs.

WRAP - If set, the Driver will overlay the oldest trace entry when a trace record overflow occurs. If clear, entries are lost when an overflow occurs.

TRACEON - If set the Driver trace facility is enabled and the Driver generates trace entries for most of its local subroutine calls.

PFSTATE - Power failure recovery state
- 0 - No power failure recovery in progress
- 1 - Powerfailure detected on the mainframe before INP indication. Check for completion of any pending I/O and then wait in PFSTATE 2 for INP to pfail.
- 2 - Power failure detected on the Mainframe before INP has indicated a power failure. Wait for INP to indicate a power failure.
- 3 - Power failure indicated by INP before being informed by the Mainframe power failure routines. Wait for the Mainframe power failed request.
- 4 - Power failure indicated both on the Mainframe and by INP. Power failure recovery may be started.
- 5 - Send Redo The Mainframe receive count was less than INP's send count so the dialogue must be restarted. The Driver is sending the Redo message.
- 6 - Send Ignore The Mainframe send count was greater than INP's receive count so any part of a dialogue so far received is to be ignored and the entire dialogue will retransmitted. The Driver is sending Ignore message.
- 7 - Recovered. The Mainframe and INP dialogue counters agree or mainframe not sending, so no recovery is necessary. The Driver is sending the recovered message informing INP to go back to its normal mode.

UNFRZ - If set, the source data segment is to be unfrozen when the data has been transmitted to the INP. If clear, the source data segment remains frozen until a reuquest complete indication is returned by the INP.

PASSREADS - If set, then read requests are to be passed around other requests which have been impeded because no buffers are available on the INP.

NOTRDYWAIT- If set, then a request has been impeded because no buffers were available on the INP.

SENDING - If set, an I/O program which send sends a message, with or without associated data has been started but not completed.

OPENSTATE - Operational state of the Driver and INP
- 0 - Not opened or closed
- 1 - In ROM The device has been opened but the RAM Operating System has not been entered
- 2 - Crashed Some catastrophic error has occured
- 3 - In RAM. The device has been opened, down loaded and is in the RAM Operating System.

ABORT - If set one or more requests have been aborted but the abort was not done because the aborted request was in the process of doing a Memory Management function or I/O when when request to abort was processed. The actual abort will take place when the Memory Management function completes.

The following five words hold the message block which is sent to INP when the Physical Driver is called to send a message with or without associated data. The Logical Driver sets the message contents into this area and calls the Physical Driver to send the message.

DOUTMSG - Message type code for messages sent to INP

DOUTID - Request identifier associated with the message being sent.

DOUTP1 - Parameter one of the message being sent to INP

DOUTCNT - Count parameter of the message being sent to INP

DOUTP2 - Parameter two of the message being sent to INP

DSEND - Messages sent counter. This word contains the number of messages sent since the RAM Operating System was entered. It is used for power failure recovery.

DRECV - Messages received counter. This word contains the number of messages received from INP since the RAM Operating System was entered. It is used for power failure recovery.

DEOT - End of dialogue flag. When a message has been sent and the EOT indicating INP has received the message is transmitted, it is received into this word. This flag is used to indicate to the Logical Driver that a transmission has been completed and that the Physical Driver should be called to check the completion status and update the IOSTATE.

The following six words are the data area into which messages from INP are received. The Physical Driver constructs I/O programs which reference this area.

Computer Museum

DINMSG - Message type code of message from INP

DINID - Request Identifier associated with message from INP

DRSTATUS - Request Completion status

DINCNT - Number of bytes of data to be received associated with the completion of a request which results in data being sent from INP.

DXLOG - Transmission log to be returned when the request identified by DINID is completed.

DINPARM - Parameter associated with the completion of this request. This word is return in the X register by IOSTATUSX.

DTRCNT - Trace ready pending count. This word contains the number of Trace Ready messages recieved but not satisfied by Trace Read requests.

DDSTN - If not zero then internal Driver extra data segment tracing is enabled and this is the data segment number into which the trace entries are to be set.

DERROR - Driver Error block. The following sixteen words are used to store information describing the current operations being performed when a catastrophic Driver error occurred. A catastrophic error occurres on illogical Driver control data, MPE errors or when INP does not respond in an expected manner. The first five word block is used to hold the current or last message transmitted to INP when a catastrophic error condition was detected. It contains the data in the same format as message to INP block.

DCSERR - CS Error Code associated with a catastrophic Driver error

DSAVE - Request Identifier of the request being processed when a catastrophic Driver error was detected

DVERSION - Version numbers of the Physical and Logical Drivers

TP - If set, the Physical Driver is for the Toothpick System

PVERSION - Physical Driver version number

LVERSION - Logical Driver version number

DERROR1 - The six word block beginning here is used to hold the last message received from INP before a catastrophic Driver error was detected. It contains the data in the same format as the message from INP block.

DDRVRERR - Holds the code specifying the catastrophic error detected by the Physical Driver. See ERRORS under the PHYSICAL DRIVER INTERNAL SPECIFICATIONS for the definition.

DMNTRERR - Holds the code specifying the catastrophic error detected by the Logical Driver. See ERRORS under the LOGICAL DRIVER INTERNAL SPECIFICATIONS for the definition.

DSERR - Hardware Controller status when a catastrophic Driver error was detected.

HSTATUS - Left byte of the DSTATUS word at time of error

SIOPX - SIO program area relative index to the last order executed or current order being executed at time of error.

DTP'ERROR - Toothpick hardware error status. To be defined.

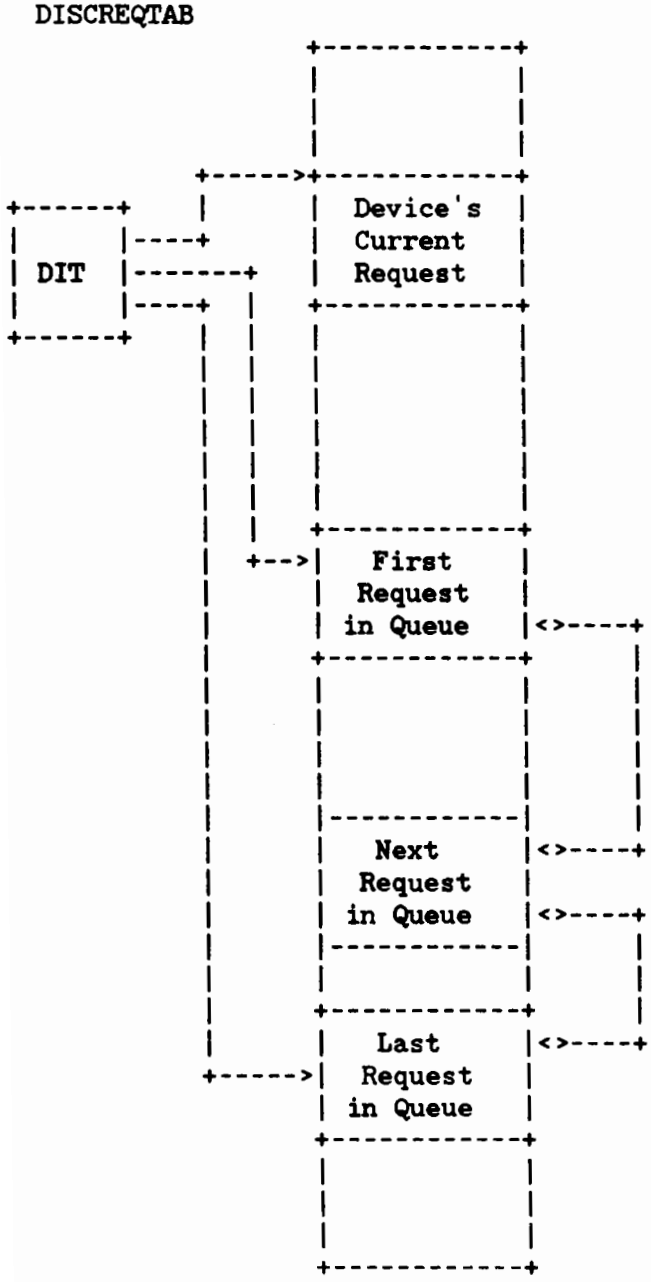
DTR'IOQP - If not zero then an IOQP pointer to the Trace Read request which is supplying the locked and frozen buffer into which the Driver places trace entries to generate a trace record.

DLOGX - Driver local trace buffer index. This is the index relative to the Driver local trace buffer to place the next trace entry.

DLOGBUF - Driver local trace buffer. This buffer extends from here to the end of the DIT.

DISC REQUEST TABLE AND DISC REQUESTS

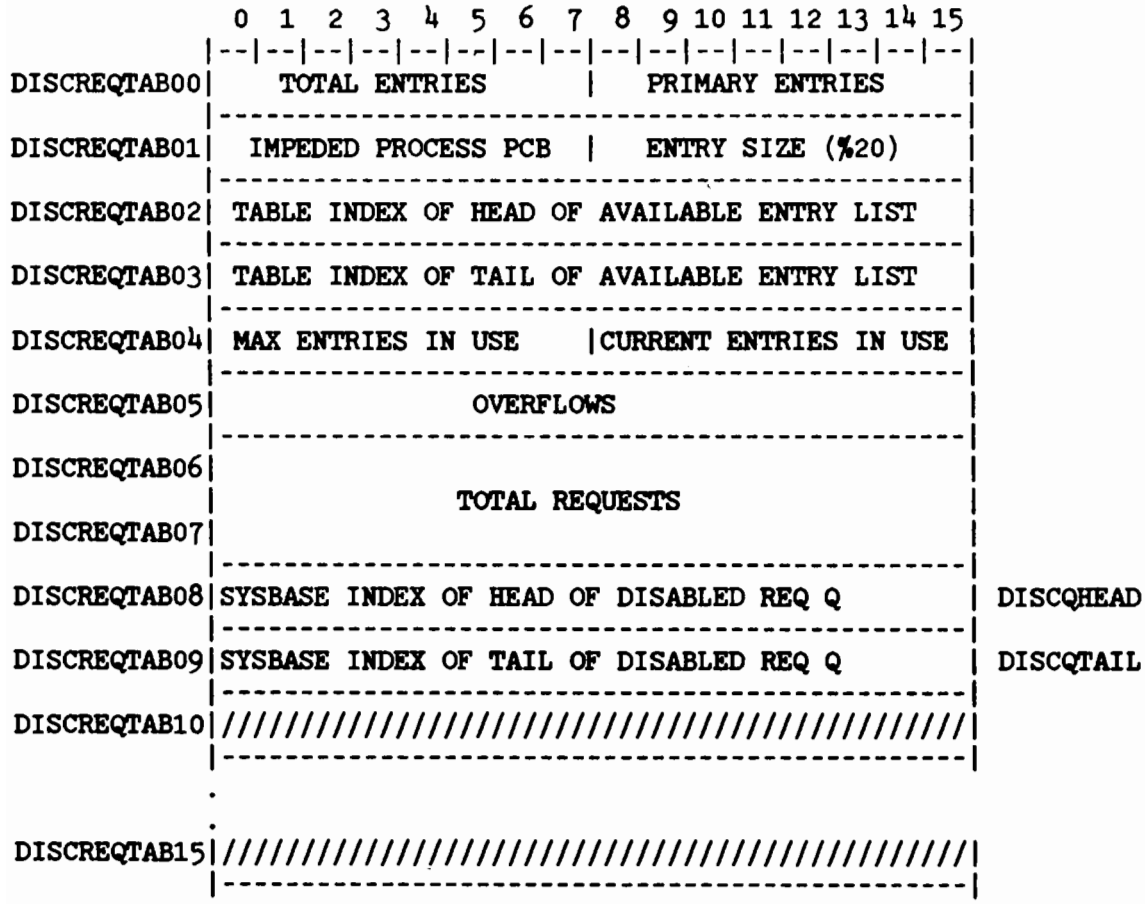
Requests for disc transfers are effected by acquiring an entry from the Dis Request Table (DISCREQTAB), filling the proper information, and calling the DISCQMANAGER to link the request into the device's doubly linked request qu The head and tail of a device's request queue are contained in the devices's DIT.



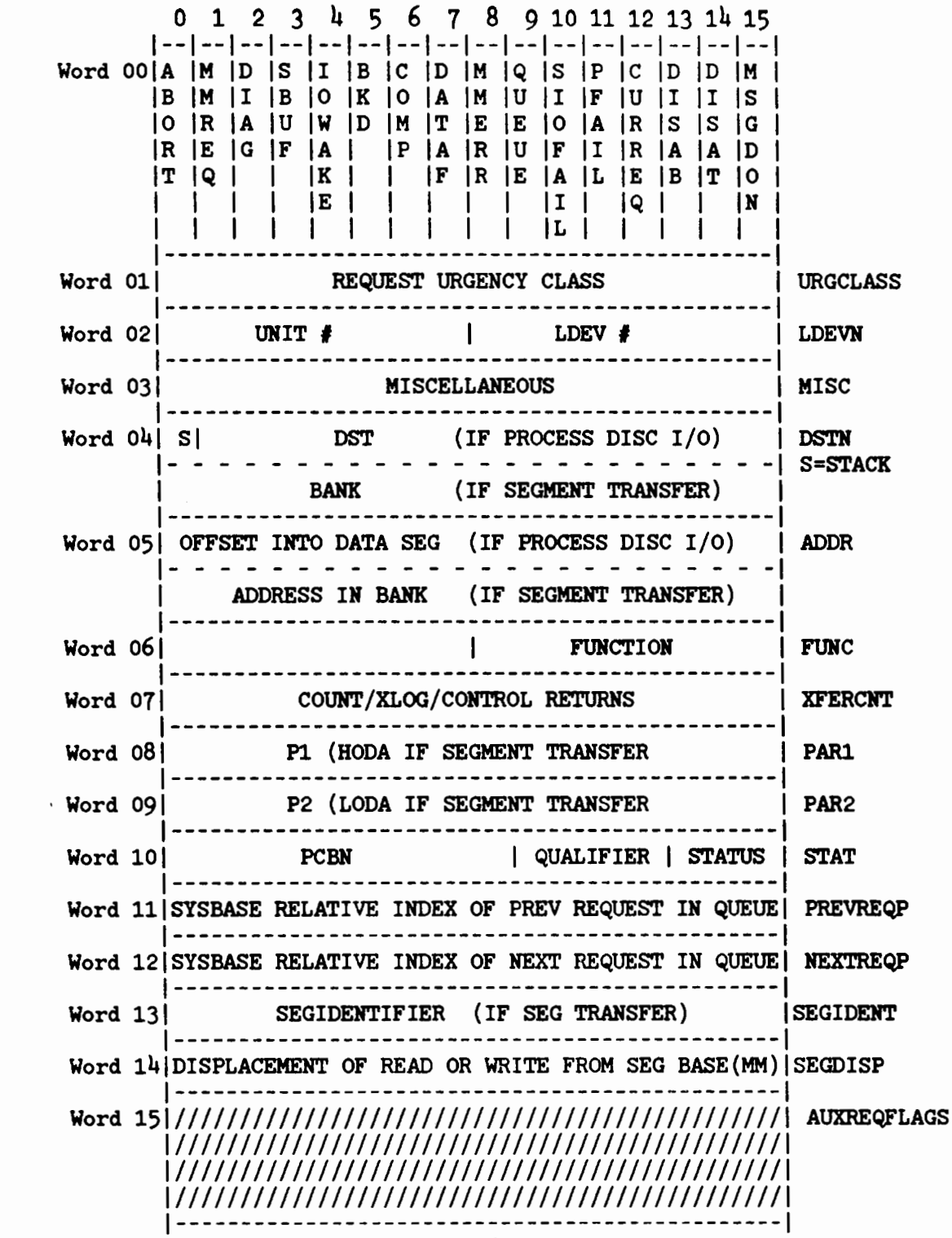
DISC REQUEST TABLE

DISCREQTAB DST ENTRY# = 56 (%70)
DISCREQTAB PRT = %1031

DISC REQUEST TABLE ENTRY 0 FORMAT



DISC REQUEST ELEMENT FORMAT



Note: Upon return to free list, word (#1) becomes index of next EE free entry.

Word 0 - QFLAG - Request dependent flags

Bit 0	.ABORT	Request has been aborted externally.
Bit 1	.MMREQ	Request is for a segment transfer.
Bit 2	.DIAG	Diagnostic request (not used).
Bit 3	.SBUF	System Buffer. Target is a system buffer whose index is relative to the start of the SBUF table.
Bit 4	.IOWAKE	Wake caller on completion of request.
Bit 5	.BLOCKED	Blocked I/O. Caller is waited in ATTACHIO until request is completed.
Bit 6	.COMPLETED	Request has been completed and caller woken if he had specified.
Bit 7	.DATAFRZN	Data segment has been made present and is frozen.
Bit 8	.MAMERRORD	MAM error on data segment make present.
Bit 9	.PREQQUEUED	Request is queued into disc's req queue
Bit 10	.SFAIL	Start SIO failure in GIP.
Bit 11	.PFAIL	The I/O has been aborted because of a powerfail.
Bit 12	.CURREQ	Request is device's current request.
Bit 13	.DISABLED	Request is disabled.
Bit 14	.DISATMPT	Attempted to disable this request.
Bit 15	.MSGDONE	A message request reply has completed.

Word 2 - QLDEV.QLDEVN - Logical Device Number
Word 3 - QMISC - Device dependent.

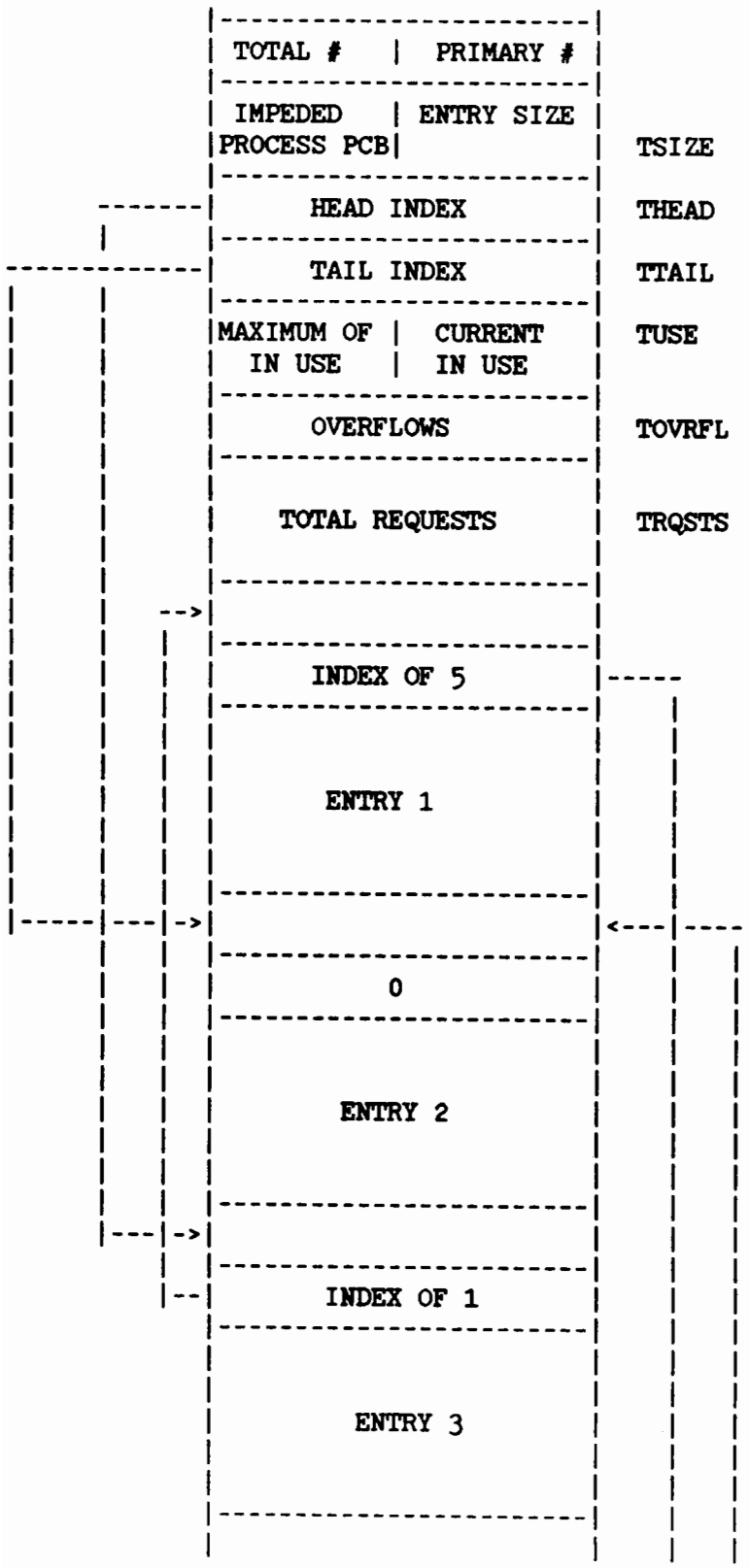
Word 4
QDSTN - If SYSBUFRs is clear then this is the DST number of the target data segment.If bit 0 is set then buffer address is a DB offset value instead of segment relative offset (implemented for NOWAIT IO and NOBUFF).
Word 5
QADDR - Offset in data segment or sys buff table to target data buffer.
Word 6
QFUNC.FUNC - Function code and qualifiers as specified by driver.

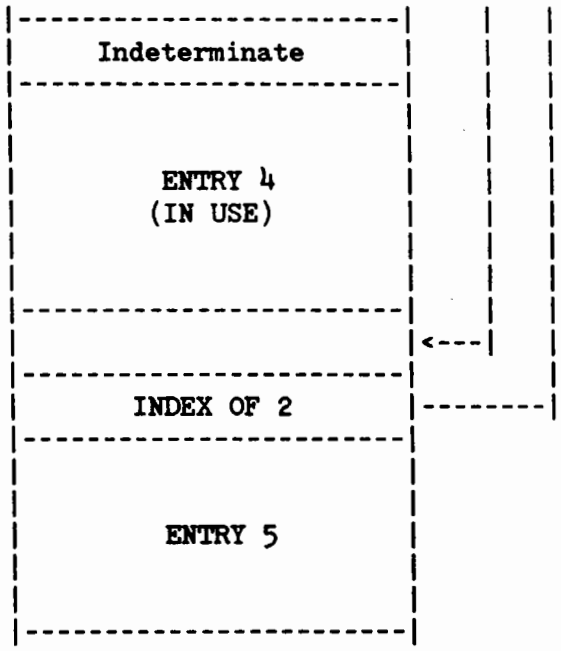
Word 7
QXFERCNT-On initiation specifies the word count if positive or byte count if negative. At completion of the request this location contains the actual transmission count in the same units as the call. Certain control requests return data through this location.
Word 8
QPAR1 - Parameter one, defined by driver
Word 9
QPAR2 - Parameter two, defined by driver
QMISC - Miscellaneous request dependent storage available to driver.
Word 10
QSTAT.PCBN - PCB Number of process which made this request. Zero if not associated with any process and IOQ is to be returned by the system.
.QUALIFIER - A code which further defies or qualifies the general status. Defined by driver.
.STATUS - General Status. Indicates current and result state of the request according to the following codes.
0 - not started or awaiting completion.
1 - successful completion.
2 - end of file detected.
3 - unusual condition.
4 - irrecoverable error.

NOTE: See I/O System Status Returns.

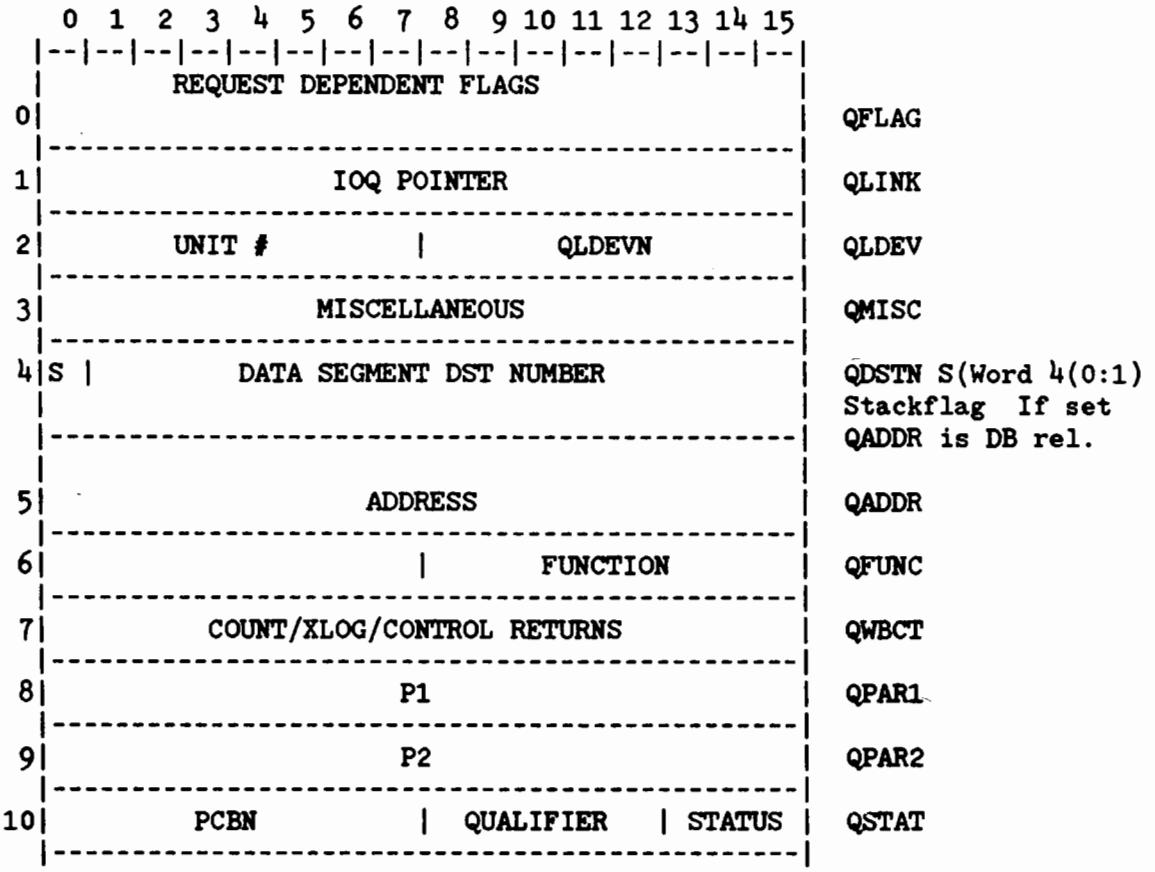
IOQ TABLE LAYOUT

DST %13




Indeterminate
ENTRY 4
(IN USE)
INDEX OF 2
ENTRY 5

I/O QUEUE ELEMENT (IOQ)



QFLAG - Request dependent flags

Bit 0	.ABORT	Request has been aborted externally.
Bit 1	.SPECIAL	Special handling is to be applied to this request. For disc, indicates a memory management request.
Bit 2	.DIAG	Diagnostic request (not used).
Bit 3	.SBUF	System Buffer. Target is a system buffer whose index is relative to the start of the SBUF table.
Bit 4	.IOWAKE	Wake caller on completion of request.
Bit 5	.BLOCKED	Blocked I/O. Caller is waited in ATTACHIO until request is completed.
Bit 6	.COMPLETED	Request has been completed and caller woken if he had specified.

Bit 7	.DATAFRZN	Data segment has been made present and is frozen.
Bit 8	.MAMERRORD	MAM error on data segment make present.
Bit 9	.PREQ	This request has been started but was preempted by a MAM request.
Bit 10	.SFAIL	Start SIO failure in GIP.
Bit 11	.PFAIL	The I/O has been aborted because of a powerfail.
Bits12-13	.PREMPT	Premptive type code: 1-soft, 2-hard.
Bit 15	.MSGDONE	A message request reply has completed.

QLINK - SYSDB relative pointer to next IOQ element. Points to first word of element.
QLDEV.QLDEVN - Logical Device Number
QMISC - Device dependent.

QDSTN - If SYSBUFRs is clear then this is the DST number of the target data segment.If bit 0 is set then buffer address is a DB offset value instead of segment relative offset (implemented for NOWAIT IO and NOBUFF).
QADDR - Offset in data segment or sys buff table to target data buffer.
QFUNC.FUNC - Function code and qualifiers as specified by driver.
QWBCT - On initiation specifies the word count if positive or byte count if negative. At completion of the request this location contains the actual transmission count in the same units as the call. Certain control requests return data through this location.
QPAR1 - Parameter one, defined by driver
QPAR2 - Parameter two, defined by driver
QMISC - Miscellaneous request dependent storage available to driver.
QSTAT.PCBN - PCB Number of process which made this request. Zero if not associated with any process and IOQ is to be returned by the system.
.QUALIFIER - A code which further defies or qualifies the general status. Defined by driver.
.STATUS - General Status. Indicates current and result state of the request according to the following codes.
0 - not started or awaiting completion.
1 - successful completion.
2 - end of file detected.
3 - unusual condition.
4 - irrecoverable error.

I/O SYSTEM STATUS RETURNS

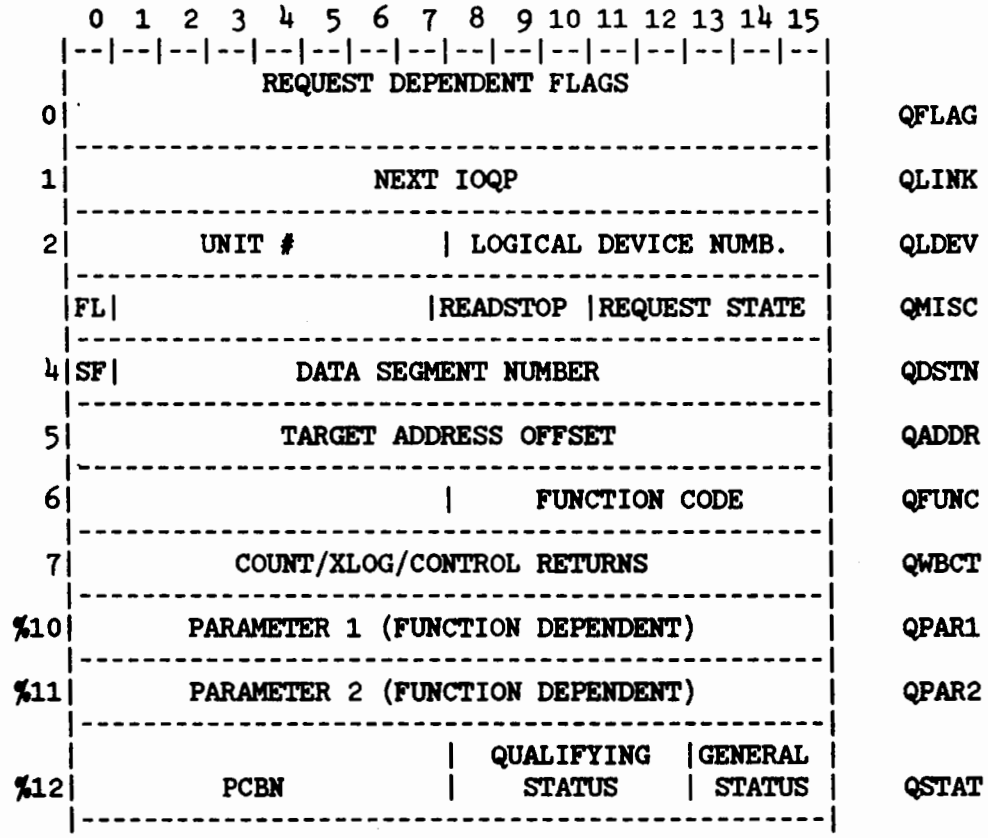
	STATUS %
0 - PENDING	
1 - WAITING FOR COMPLETION	10
2 - DOING ERROR RECOVERY	20
3 - NOT READY WAIT	30
4 - NO WRITE RING WAIT	40
5 - NEW PAPER TAPE WAIT	50
1 - SUCCESSFUL	
0 - NORMAL	1
1 - READ TERMINATED WITH SPECIAL CHARACTER	11
2 - TAPE RETRY FOR SUCCESS REQUIRED	21
3 - LOW TAPE OR END OF TAPE AFTER WRITE	31
2 - END OF FILE	
1 - PHYSICAL END OF FILE	12
2 - DATA	22
3 - END OF DATA	32
4 - HELLO	42
5 - BYE	52
6 - JOB	62
7 - END OF JOB	72
3 - UNUSUAL CONDITION	
1 - TERMINAL PARITY ERROR	13
2 - TERMINAL READ TIMED OUT	23
3 - I/O ABORTED EXTERNALLY	33
4 - DATA LOST	43
5 - DATA SET NOT READY OR DISCONNECT OR UNIT NOT ON LINE	53
6 - ABORTED BECAUSE OF POWER FAIL	63
7 - BOT AND BSR, BSF REQUEST	73
10 - TAPE RUNAWAY	103
11 - EOT AND WRITE REQUEST	113
12 - NO WRITE RING AFTER REQUEST TO OPERATOR	123
13 - END OF TAPE (PAPER TAPE LOW)	133
14 - PLOTTER LIMIT SWITCH REACHED	143
15 - ENABLE SUBSYSTEM BREAK AND NO CONTROL Y PIN	153
16 - READ TIME RETURNED OVERFLOW	163
17 - BREAK STOPPED READ	173
20 - WRITE AND NO CARD IN WAIT STATION	203

I/O SYSTEM STATUS RETURNS (CONT.)

4 - IRRECOVERABLE ERROR

0	- INVALID REQUEST	4
1	- TRANSMISSION	14
2	- I/O TIME OUT	24
3	- TIMING ERROR	34
4	- SIO FAILURE	44
5	- UNIT FAILURE	54
6	- INVALID DISC ADDRESS	64
7	- TAPE PARITY ERROR	74
11	- PAPER TAPE TAPE ERROR	114
12	- SYSTEM ERROR	124
13	- INVALID SBUF INDEX	134

TERMINAL IOQ ELEMENT



BIT0 ABORT
BIT1 SPECIAL
BIT2 DIAGNOSTIC
BIT3 SYS BUFFER
BIT4 IO WAKE
BIT5 BLOCKED
BIT6 COMPLETED
BIT7 DATA FREEZE
BIT8 MAM ERROR
BIT9
BIT10-12 READ ERRORS
BIT13-15 RPLEVEL

QFLAG - Flags and request state.

ABORT	Abort this request and return an error indication to the caller.
SPECIAL	Special handling is to be applied to this request. Has no meaning for terminal requests.
DIAGNOSTIC	This is a request from a diagnostic subsystem. Not used by terminal system.
SYSBUFRS	Target is an index relative to the SBUF table of the data buffer.
IOWAKE	Wake caller on completion of request.
BLOCKED	Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies wake.
COMPLETED	Request has been completed and caller woken if requested.
DATAFRZN	If set then the data segment has been frozen in memory. Set by MAM when a MAKEPRESENT request is successfully completed.
MAMERRD	An error has occurred in trying to make the target data segment present and freeze it in core.
READERRORS	This field contains a code specifying the resulting status on a read termination. 0 - no error 1 - read terminated on special read termination character 2 - read completed because break was enabled and detected and allowed. 3 - read data lost because of no TBUFS available, PTAPE swing buffer write not completed in time or term=11 and char following DC2 was not a CR. 4 - character lost because interrupt not service before next character was input 5 - read parity error occurred and parity checking enabled 6 - read timed out 7 - block mode read timed out

RPLEVEL Request preempt level. If the preempt type of the request was zero then this is the value of TMODE when the request was queued, otherwise it is the preempt type of the request.
- 0 - terminal in normal mode and non preemptive request
- 2 - normal request, terminal was in console mode when the request was queued
- 3 - soft preemptive, preempt reads with no data input
- 4 - hard preemptive, preempt all non preemptive requests

QLINK - SYSDB relative pointer to the next IOQ element. Points to the first word of the next element.

QLDEV - Logical device number.

QLDEVN Logical device number

QMISC - Request state and flags

FLUSH (FL) This flag is set when a control Y is detected and accepted while this request was waiting or being processed. Causes reads and writes to be successfully completed, although no I/O takes place.

READSTOP Stop read operation if not zero.
- 0 - null or no stop
- 1 - break has been detected and is allowed
- 2 - subsystem break has been detected and is allowed
- 3 - request has been prempted
- 4 - read operation has been timed out
- 5 - request has been aborted
- 6 - block mode read has timed out

NOTE: BIT 10 is NO STOP bit;suppresses aborts and prompts

RSTATE Request state. Any codes not described below are unused.
- 0 - Request not started or new.
- 1 - Request has been started. Reads or writes may be waiting for the current write to finish to be continued.
- 2 - A read operation is in progress.
- %43 - A read operation has been completed but the data has not been transferred to the callers buffer.
- %44 - A read operation has been stopped. The cause and corresponding action to be taken is identified by the STOPREAD field in QMISC.
- 5 - Read initiation conditions have been checked and the read can be started as soon as the current operation (usually a write) is completed.
- %30 - Waiting (because 270 bytes tanked or no TBUFs) to enter a CRLF because a post space write follows a previous prespace write.

%31 - Waiting (because 270 bytes tanked or no TBUFs) to enter prespace carriage control bytes.
%32 - Waiting (because 270 bytes tanked or no TBUFs9 to enter callers data into terminal buffers.
%33 - Waiting (because 270 bytes tanked or no TBUFs) to enter post space carriage control bytes.
%34 - %37 Correspond to states %30 - %33 but waiting to enter an ENQ for the 2640/44. When the ENQ has been entered into the TBUF, the state reverts to the current state -4.

STACKFLAG(SF) If the QADDR is the offset from DB to target address, otherwise QADDR is offset from DST base.

QDSTN - Contains the data segment number of the target data area.

QADDR - Offset to the target data area in the data segment or bank. For PTAPE reads, this word contains an SBUF index to the first of a pair of SBUFs used to read the data into.

QFUNC - Function code. See ATTACHIO description for details.

FUNC Function code field.

0 - read	%17 - enable tapemode
1 - write	%20 - disable timer
2 - file open	%21 - enable timer
3 - file close	%22 - read timer
4 - device close	%23 - disable parity
5 - set timeout	%24 - enable parity
6 - set inspeed	%25 - logged on
7 - set outspeed	%26 - set parity
%10 - echo on	%27 - set terminal type
%11 - echo off	%30 - allocate terminal
%12 - disable break	%31 - clear flush and write
%13 - enable break	%32 - enable control X !!! echo
%14 - disable escape	%33 - disable control X !!! ech
%15 - enable escape	%34 - not used
%16 - disable tapemode	%35 - PTAPE read
	%36 - set/reset break mode
	%37 - set/reset console mode

QWBCT - Word or byte count and control returns. On initiation specifies a word count if positive or a byte count if negative. At completion of the request this location contains the actual transmission count in the same units as the call specified. Certain control requests return information through this location.

QPAR1 - Parameter one. See first page of driver listing for details.

QPAR2 - Parameter two. See first page of driver listing for details.

NOTE: During PTAPE reads, QPAR1 and QPAR2 contain a double word disc base address of the virtual memory area where the spooled data is saved temporarily.

QSTAT - Request completion status and PCB number associated with this request.

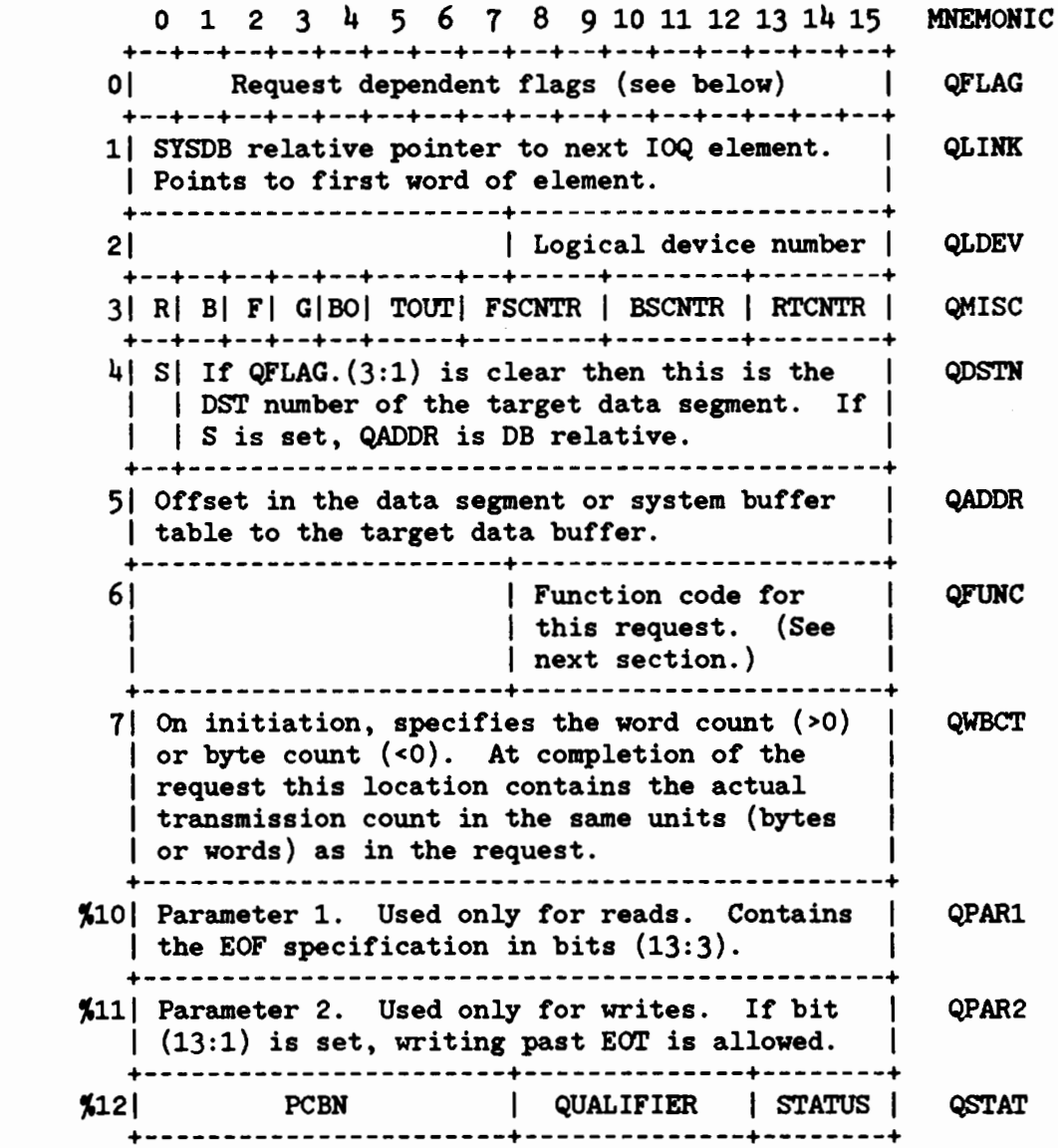
PCBN — PCB number associated with request. If zero this IOQ element is returned by the system when the request is completed.

QUALIFIER — A code which further defines or qualifies the general status. See ATTACHIO description for details.

STATUS — General status. Indicates the current or resultant status of the request accorddng to the following codes.

0 - not started or awaiting completion
1 - successfully completed
2 - end of file detected
3 - unusual condition
4 - irrecoverable error

I/O QUEUE ELEMENT FOR 7976A MAG TAPE



QFLAG - Request dependent flags

Bit 0	ABORT	- Abort this request and return an error indication to the caller.
Bit 1	SPECIAL	- Apply special handling to this request. (Not used)
Bit 2	DIAG	- This is a request from the diagnostic subsystem. (Not used)
Bit 3	SYSBUFF	- Target is an index relative to the SBUF Table of the data buffer.
Bit 4	IOWAKE	- Wake caller on completion of request.
Bit 5	BLOCKED	- Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies IOWAKE.
Bit 6	COMPLETED	- The request has been completed and the caller awakened if he had requested (with IOWAKE).

Bit 7 DATAFRZN - Set by the memory management routines (MAM) when a MAKEPRESENT request is successfully completed and indicates the data segment is frozen in memory.

Bit 8 MAMERRORD - An error has occurred while MAM was trying to make the target data segment present and freeze it in memory.

Bit 9 PREQ - (Not used)

Bit 10 SFAIL - Delayed failure of SIO instruction. If a call to START'HPIB resulted in the request being added to the channel queue, this bit indicates that the SIO instruction failed when the request was selected for execution.

Bit 11 PFAIL - The request was aborted because of a system power failure.

QMISC - Driver request dependent flags and counters. Used mostly for error retries.

RETRY - Indicates an error retry is in progress.

BACK - Backspace record processing for an error retry is in progress.

FORWARD - Forward space record processing for an error retry is in progress.

GAP - Gap processing for an error retry is in progress.

BODEOF - Backspace record due to a data EOF processing is in progress.

TOUTCNTR - GIC timed-out counter.

FSCNTR - Forward space record counter.

BSCNTR - Backspace record counter.

RTCNTR - Error retry counter.

Computer Museum

QSTAT - PCB number and request completion status.

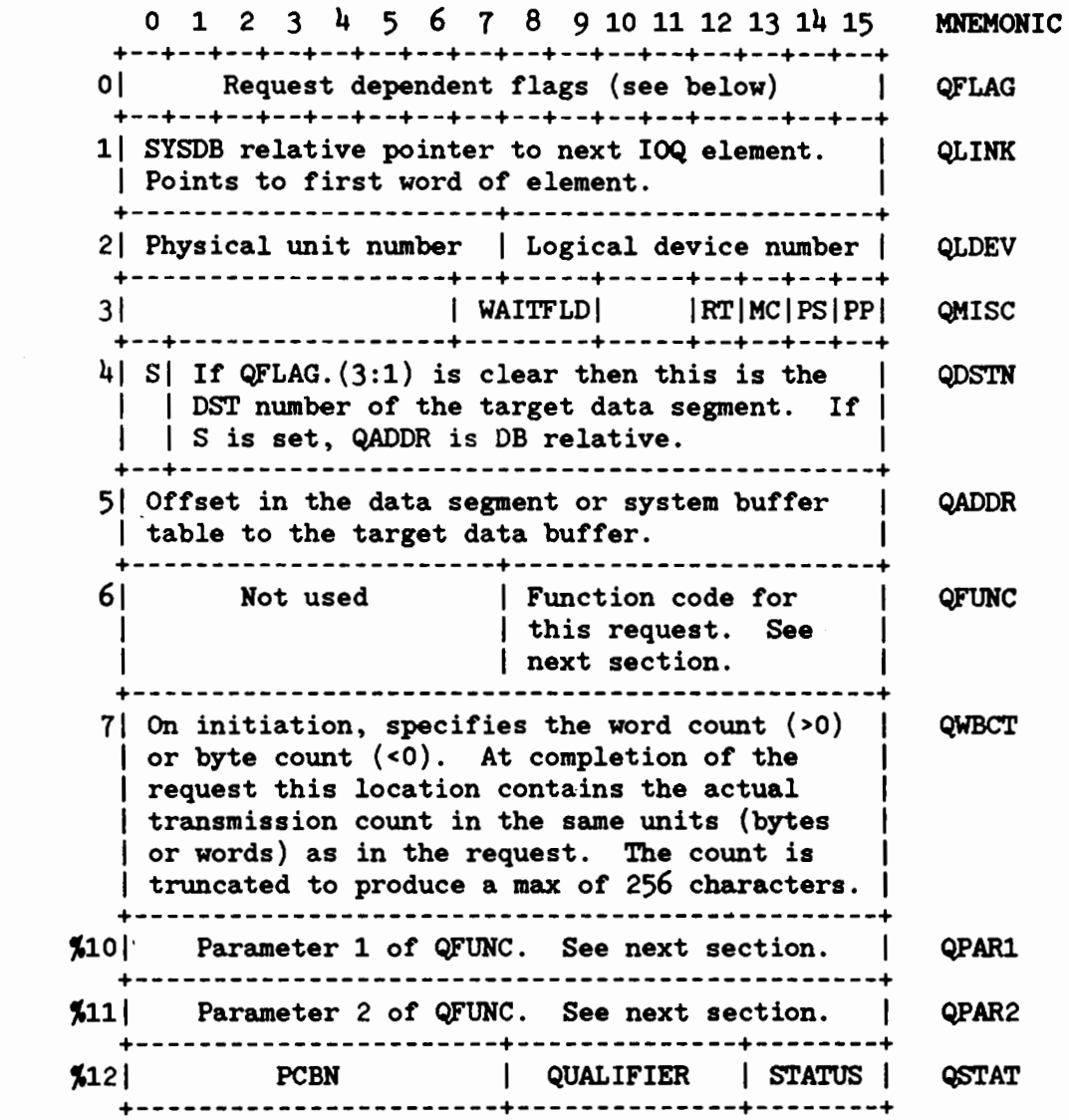
PCBN - The Process Control Block (PCB) number of the process which made this request. If zero, the request is not associated with any process and the IOQ element is to be returned by the system when the request has completed.

STATUS - General status indicating the final state of the request. The following codes are used:

0 - Not started or awaiting completion.
1 - Successful completion.
2 - End-of-file detected.
3 - Unusual, but recoverable, condition detected.
4 - Irrecoverable error has occurred.

QUALIFIER - A code which further defines or qualifies the general status. (See the section Driver Return Status Codes.)

SERIES II/III LINE PRINTER I/O QUEUE ELEMENT (IOQ)



QFLAG - Request dependent flags

Bit 0	.ABORT	- Request has been aborted externally, either by the operator or a system intrinsic.
Bit 1	.SPECIAL	- Not used.
Bit 2	.DIAG	- Not used.
Bit 3	.SYSBUFRS	- Target is a system-buffer-relative index to the data buffer. *
Bit 4	.IOWAKE	- Wake caller on completion of request. *
Bit 5	.BLOCKED	- Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies IOWAKE. *
Bit 6	.COMPLETED	- Request has been completed, and the caller awakened if s/he had requested (with IOWAKE). *

Bit 7 .DATAFRZN - If set, then the data segment has been made present and frozen in memory. Set by the memory management routines (MAM) when a MAKEPRESENT request is successfully completed. *

Bit 8 .MAMERRORD - An error has occurred while MAM was trying to make the target data segment present and freeze it in memory. *

Bit 9 .PREQ - Not used.

Bit 10 .SFAIL - Delayed failure of SIO instruction. If a call to STARTIO resulted in the request being added to the channel queue, this bit indicates that the SIO instruction failed when the request was selected for execution.

Bit 11 .PFAIL - The request was aborted because of a system power failure.

Bits12-13 .PREMPT - Not used.

Bit 14 . - Not used.

Bit 15 .MSGDONE - Not used.

QMISC.WAITFLD - This field contains a code describing the current idle state of the driver. The driver orients itself at each entry, based on the state of this field.

0 - The current entry is the start of a new request.

1 - The normal state while waiting for a completion interrupt of a print, fill or control operation.

2 - An SIO channel program was in progress when an asynchronous interrupt (usually an external abort) occurred, or a 2607 printer was placed on-line after going off-line while printing. The driver enters this state and waits for three seconds for the channel program or 2607 printer to complete, so as not to pose control conflicts to the U.I. card between the driver and the program.

3 - A Not Ready, Off Line or Paper Out (or Jammed) condition has been detected. The request will be continued or retried when the operator has corrected the condition and placed the printer on line.

4 - A 2607 (Tally) printer has come on-line after going off-line while printing. One line of data is buffered in the printer. This state causes the driver to shift to state 2 to allow the 2607 to print and space the buffered line before sending it the next line.

QMISC.(12:1) - RETRY (RT). Kludge to catch an LDEV configured as a 2608 when the physical device is a different subtype. Prevents Master Clear'ing and retrying a request more than once when the Power Fail/Reset device status bit is "set" by a non-2608.

QMISC.(13:1) - MASTER'CLEAR (MC). Set when a 2608 Master Reset, required because of a printer Power Fail/Reset, is configured and executed.

QMISC.(14:1) - PRESPACE (PS). The current operation is a prespace (space then print) request. This bit alerts the continuation section to fill the print buffer after spacing.

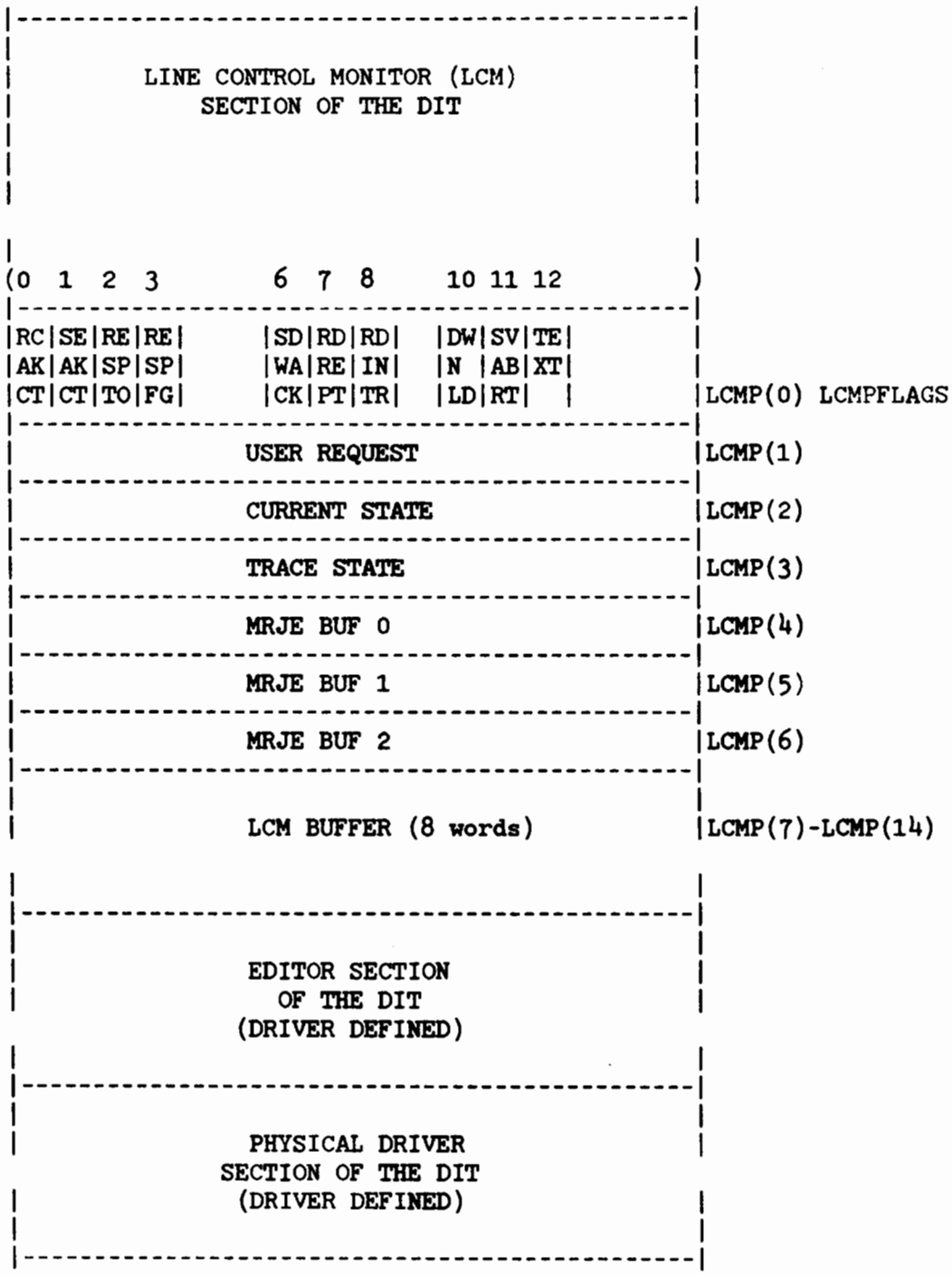
QMISC.(15:1) - PRE'TO'POST (PP). The previous request was a prespace operation while the current operation is a postspace.

QSTAT.PCBN - The Process Control Block (PCB) number of the process which made this request. If zero, the request is not associated with any process, and the IOQ element is to be returned by the system when the request has completed. *

QSTAT.STATUS - General status. Indicates the final state of the request. The following codes are used:

0 - Not started, or awaiting completion.
1 - Successful completion.
2 - Not used.
3 - Unusual, but recoverable, condition (such as Request Aborted Externally).
4 - Irrecoverable error (such as SIO failure, memory parity error, etc.).

QSTAT.QUALIFIER - A code which further defines or qualifies the general status.


LINE CONTROL MONITOR (LCM)
SECTION OF THE DIT
(0 1 2 3 6 7 8 10 11 12
RC AK CT | SE AK CT | RE SP TO | RE SP FG | SD WA CK | RD RE PT | RD IN TR | DW N LD | SV AB RT | TE XT
LCMP(0) LCMPFLAGS
USER REQUEST
LCMP(1)
CURRENT STATE
LCMP(2)
TRACE STATE
LCMP(3)
MRJE BUF 0
LCMP(4)
MRJE BUF 1
LCMP(5)
MRJE BUF 2
LCMP(6)
LCM BUFFER (8 words)
LCMP(7)-LCMP(14)
EDITOR SECTION
OF THE DIT
(DRIVER DEFINED)
PHYSICAL DRIVER
SECTION OF THE DIT
(DRIVER DEFINED)

CS DIT FIELDS AND DEFINITIONS

MASK and FLAG Words 13 and 14		
	CMP-IN	Completion Interrupt
	PWR-FL	Power Fail
	HD-ABT	Hard Abort
	SF-ABT	Soft Abort
	TO	Timeout
	BF FZ	Buffer Frozen
	ID FZ	ID Frozen
	USER RQ	User Request
	LOC-TO	Local Timeout
COPTIONS Word 19		
	INH-TO	Inhibit Timeout
	INH-ID	Inhibit ID
	TRC-SP	CS Trace
	INH-CL	Inhibit :CLINE
AOPTIONS Word 20		
	INH-BF	Inhibit Buffering Override
	CON-IO	Concurrent IO
DOPTIONS Word 21		
	REM-WT	Delay Sequence Wait
	NO-RVI	Poll Termination Sequence
	DSB-CT	Disable Control Read
	END-SEQN	Ending Sequence
	LD-GPH	Leading Graphics
	AS-BCC	Value of US ASCII BCC
	DB WK	Disable WACK
	DB-TTD	Disable TTD
	EX ITB	Expect ITB
	MWF TYPE	Message Format Word
	CHA-WR	Chain Writes
	NUM-SYNCS	Number of Leading SYNCS
MISC Word 22		
	CODE SN	Code Sensing
	ABT-AK	Abort ACK
	DUAL SP	Dual Speed
	HALF SP	Half Speed
	XMSN MODE	Transmission Mode
	SPD-CH	Speed Changeable

CS DIT (CONT.)

DST INFO
Word 23

ID PRES	ID Present

FLAGS
Word 31

REQ USD	Request Used
RECV ER	Recoverable Error
TR COMP	Trace Out Completion
TR PDRV	Trace Out Physical Driver
IN HNDL	Interrupt Handler
DIRT BF	Dirty Buffer
ID BITS	ID Frozen Bits
ID FRZN	ID Frozen
ID ERR	ID MAM Error
1ST IN	First Interrupt
2ND IN	Second Interupt
MSTA TR	MMSTAT Trace
ABT LAT	Abort Later
FIND ID	Find Station ID
PAD ADD	Pad Added
AB POLL	Abort Poll

STANDARD (46)
Word 54

TRC ERR	Trace Error Toggle
TRC COM	Trace Complete
TRC FLH	Trace Flush
IN & PL	Increment and Poll
DSR DL	Date Set Ready Delay

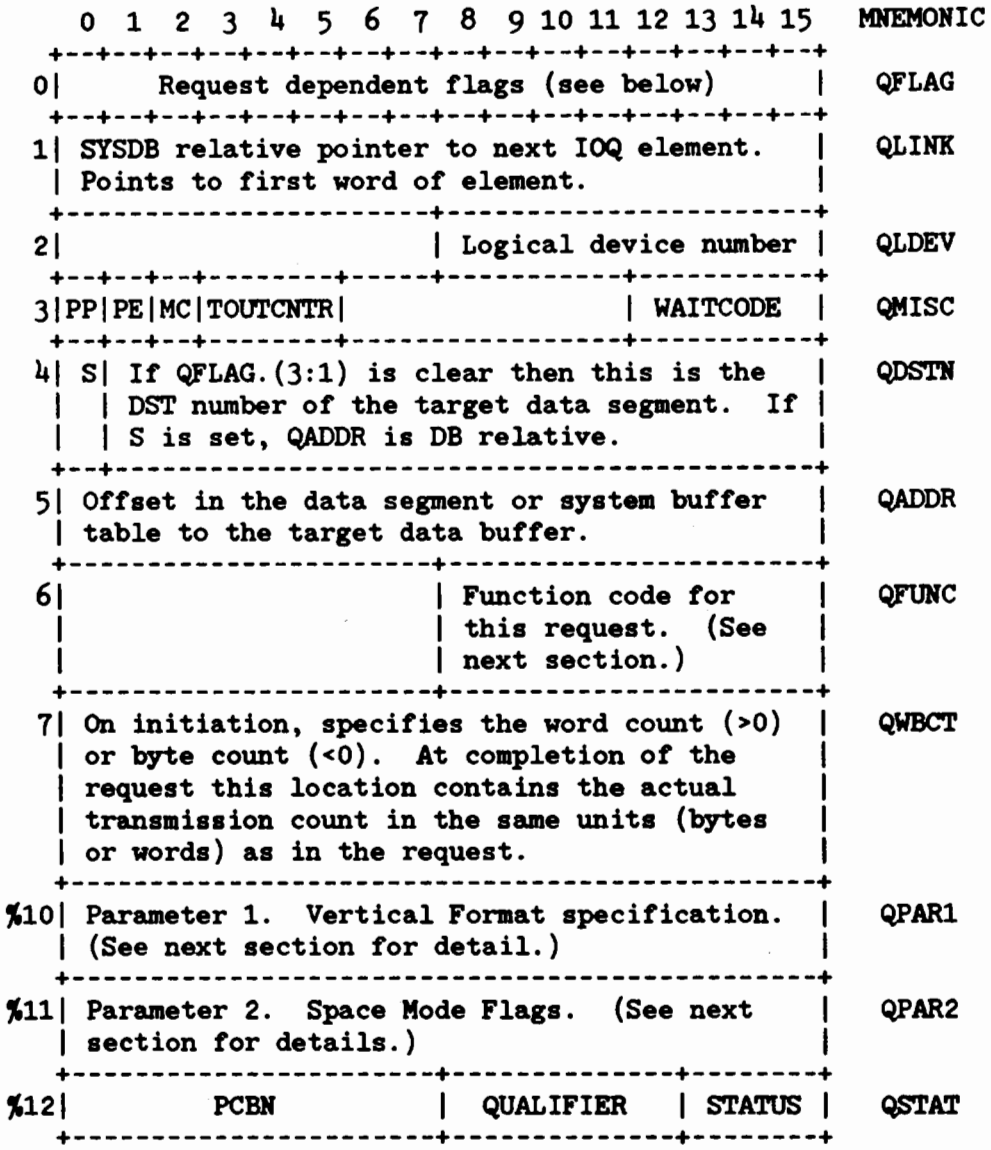
LCMFLAGS
LCMP(0)

RC AKCT	Received ACK Counter
SE AK CT	Send ACK Counter
RESP TO	Response Timeout
RESP FG	Response Flag
SD WACK	Send WACK
RD REPT	Read Repeat
RD INTR	Read Interrupt
DWN LD	Download
SV ABRT	Save Abort
TEXT	Text

MULTIPOINT TERMINAL DEVICE INFORMATION TABLE

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
0	0	AC	RQ	0	0	PM	0	IA	0	0	0	STATE				0	DFLAG
NEXT DITP																1	DLINK
IOQP																2	DIOQP
UNIT								LDEVNT								3	DLDEVT
DLTP																4	DDLTP
ILTP																5	DILTP
RESERVED																6	
RESERVED																7	
RT	LG							0								8	DTIME
GS	RE	CR	FC	MR	WP	RP	DR	UP	PS	RTR	TIM	BR	SSR	FLU	LP	9	DMISCT
LG TY	WA	RJ	DW	DR	UR	0		LDEVNL								10	DLDEVL
DSTN of terminal buffer																11	DDSBUF
Write limit Counter																12	DWLIM
FORMATF								Reserved								13	DFRMAT
Dit Pointer For Next Unit																14	DNEXT
Pointer to next Dit with postponed write																15	DNWRT
LF	DR	BM	AT	SM	WQ	DJST		STATIONINDIT								16	DSTA
FIRST WORD FOR ASCII WRITES (if par 1=1)																17	DFIRST
ACTUAL BYTE COUNT FOR READS																18	DBCNT
READTINDEXF								LOGONTINDEXF								19	DTIND
READTIME - 1ST WORD OF DOUBLE READTIMER READING																20	DRTMD
2nd WORD OF DOUBLE READTIMER READING (start)																21	
MAXIMUM READ TIME IN SECONDS																22	DRTMAX

2608 LINE PRINTER I/O QUEUE ELEMENT (IOQ) -- HPIB SYSTEMS



QFLAG - Request dependent flags

Bit 0	ABORT	- Abort this request and return an error indication to the caller.
Bit 1	SPECIAL	- Apply special handling to this request. (Not used)
Bit 2	DIAG	- This is a request from the diagnostic subsystem. (Not used)
Bit 3	SYSBUFF	- Target is an index relative to the SBUF Table of the data buffer.
Bit 4	IOWAKE	- Wake caller on completion of request.
Bit 5	BLOCKED	- Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies IOWAKE.
Bit 6	COMPLETED	- The request has been completed and the caller awakened if he had requested (with IOWAKE).

Bit 7 DATAFRZN - Set by the memory management routines (MAM) when a MAKEPRESENT request is successfully completed and indicates the data segment is frozen in memory.

Bit 8 MAMERRORD - An error has occurred while MAM was trying to make the target data segment present and freeze it in memory.

Bit 9 PREQ - (Not used)

Bit 10 SFAIL - Delayed failure of SIO instruction. If a call to STARTIO resulted in the request being added to the channel queue, this bit indicates that the SIO instruction failed when the request was selected for execution.

Bit 11 PFAIL - The request was aborted because of a system power failure.

QMISC - Driver request dependent flags and counters.

PRE'TO'POST - Pre to post spacing change flag.

PEJECT - Last operation was a page eject.

MASTERCLR - Master clear done to clear powerfail bit in status. Master clear needs to be done from not ready conditon.

TOUTCNTR - Channel time-out retry counter.

WAITCODE - Indicates type of wait:

0 - new request
1 - completion wait
2 - not ready wait

QSTAT - PCB number and request completion status.

PCBN - The Process Control Block (PCB) number of the process which made this request. If zero, the request is not associated with any process and the IOQ element is to be returned by the system when the request has completed.

STATUS - General status indicating the final state of the request. The following codes are used:

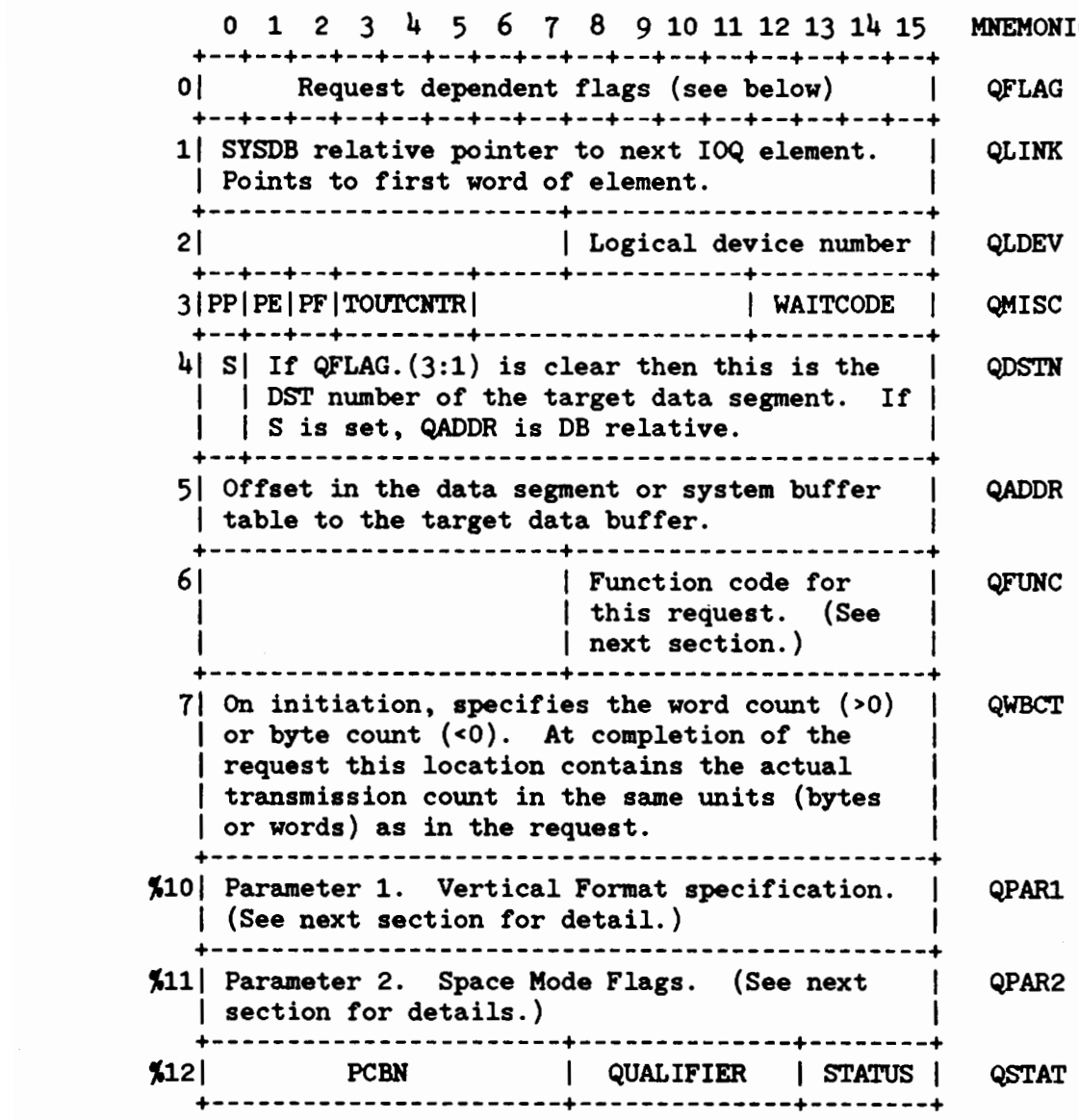
0 - Not started or awaiting completion.
1 - Successful completion.
2 - End-of-file detected.
3 - Unusual, but recoverable, condition detected.
4 - Irrecoverable error has occurred.

QUALIFIER - A code which further defines or qualifies the general status. (See the section Driver Return Status Codes.)

2608 Line Printer Request Codes

Operation	Function	Parameters
WRITE	1	P1 - Vertical Format Specification 1 - use 1st data char as format spec %53 - "+", print and suppress spacing %55 - "-", print and triple space %60 - "0", print and double space %61 - "1", print and top of form %200-%277, print and space N-%200 lines %300-%377, print with channel N-%277 All others, print and single space. P2 - Space Mode Flags (15:1) - Prespace flag if set, print then fill buffer if clear, fill buffer then print (14:1) - No page stepover flag if set, single and double space without stepover (66 lines/page) if clear, single and double space with stepover (60 lines/page)
FILE OPEN	2	Page eject if not at top of form
FILE CLOSE	3	Page eject if not at top of form
DEVICE CLOSE	4	Page eject if not at top of form
READ STATUS	%17	Read I/O status Count - buffer must be at least 2 bytes
VFC SET	%100	Load VFC RAM Count - form length in words (0 loads RAM form internal ROM) P1 - 6 for 6 LPI or 8 for 8 LPI any other value defaults to 6 LPI
TAB SET	%101	Sets logical column definition P1 - 0 to 15, any other value defaults to 15

2619A AND 2631 LINE PRINTER I/O QUEUE ELEMENT (IOQ) -- HPIB SYSTEMS



QFLAG - Request dependent flags

Bit 0	ABORT	- Abort this request and return an error indication to the caller.
Bit 1	SPECIAL	- Apply special handling to this request. (Not used)
Bit 2	DIAG	- This is a request from the diagnostic subsystem. (Not used)
Bit 3	SYSBUFF	- Target is an index relative to the SBUF Table of the data buffer.
Bit 4	IOWAKE	- Wake caller on completion of request.
Bit 5	BLOCKED	- Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies IOWAKE.
Bit 6	COMPLETED	- The request has been completed and the caller awakened if he had requested (with IOWAKE).

Bit 7 DATAFRZN - Set by the memory management routines (MAM) when a MAKEPRESENT request is successfully completed and indicates the data segment is frozen in memory.

Bit 8 MAMERRORD - An error has occurred while MAM was trying to make the target data segment present and freeze it in memory.

Bit 9 PREQ - (Not used)

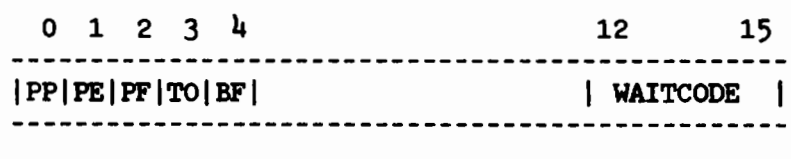
Bit 10 SFAIL - Delayed failure of SIO instruction. If a call to STARTIO resulted in the request being added to the channel queue, this bit indicates that the SIO instruction failed when the request was selected for execution.

Bit 11 PFAIL - The request was aborted because of a system power failure.

QMISC - Driver request dependent flags and counters for 2631.

PRE'TO'POST - Pre to post spacing change flag.
PEJECT - Last operation was a page eject.
TOUTCNTR - Channel time-out retry counter.
POWERFAIL - Power fail flag indicates power fail occurred.
WAITCODE - Indicates type of wait:
0 - new request
1 - completion wait
2 - not ready wait

Format for 2619A



TOUT - Channel timed out flag
BUF'FILL - Buffer fill operation in progress

QSTAT - PCB number and request completion status.

PCBN - The Process Control Block (PCB) number of the process which made this request. If zero, the request is not associated with any process and the IOQ element is to be returned by the system when the request has completed.

STATUS - General status indicating the final state of the request. The following codes are used:
0 - Not started or awaiting completion.
1 - Successful completion.
2 - End-of-file detected.
3 - Unusual, but recoverable, condition detected.
4 - Irrecoverable error has occurred.

QUALIFIER - A code which further defines or qualifies the general status. (See the section Driver Return Status Codes.)

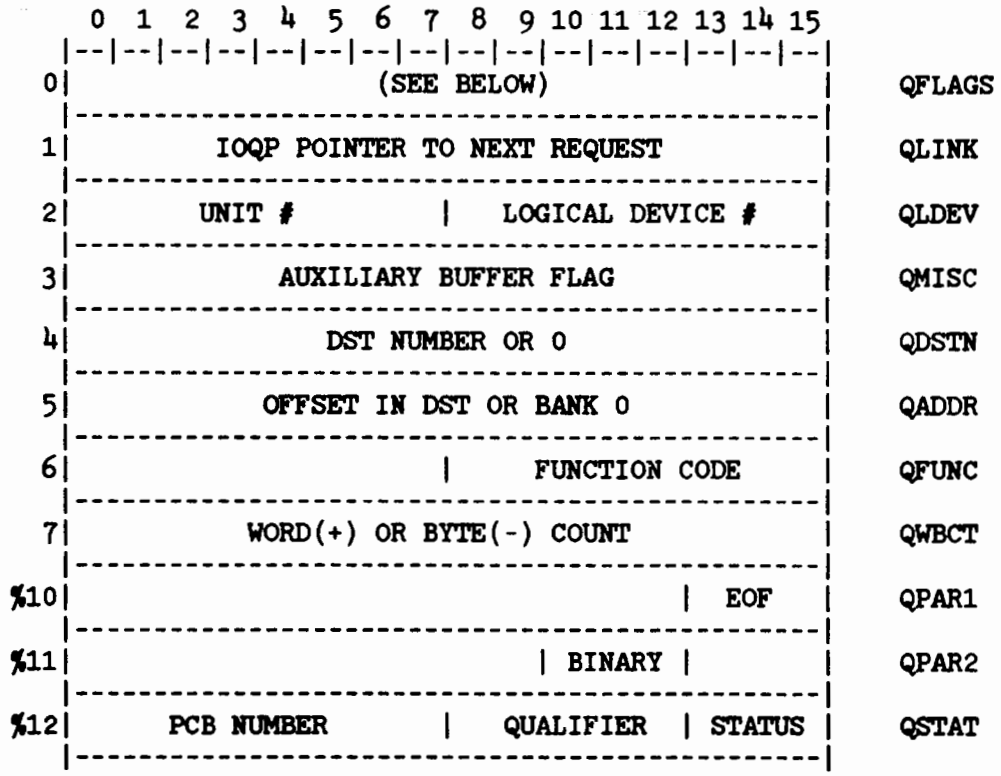
2619 Line Printer Request Codes

Operation	Function	Parameters
WRITE	1	P1 - Vertical Format Specification 1 - Use 1st data char as format specification. %53 - "+", print and suppress spacing %55 - "-", print and triple space %60 - "0", print and double space %61 - "1", print and top of form %200-%277, print and space N-%200 lines %300-%312, print with channel N-%277 %320 - Fill Line Printer Buffer Only All others, print and single space. P2 - Space Mode Flags (15:1) - Prespace flag if set, print then fill buffer if clear, fill buffer then print (14:1) - No page stepover flag if set, single and double space without stepover (66 lines/page) if clear, single and double space with stepover (60 lines/page)
FILE OPEN	2	Page eject if not at top of form
FILE CLOSE	3	Page eject if not at top of form
DEVICE CLOSE	4	Page eject if not at top of form
READ STATUS	%17	Read I/O status Count - buffer size
*IDENTIFY	%110	Return ID value in Bank & Buffaddr
*SELF TEST:		
INITIATE	%111	Subtest number to execute in Bank and Buffaddr (subtest number ranges from 0 to 7)
STATUS	%112	Subtest result returned in Bank & Buffaddr
*LOOPBACK TEST:		
WRT DATA	%113	Data to LP in Bank & Buffaddr [PING]
READ DATA	%114	Data from LP read into Bank & Buffaddr [PONG] Count - Buffer Size (256 bytes max)

2631 Line Printer Request Codes - HPIB

Operation	Function	Parameters
WRITE	1	P1 - Vertical Format Specification 1 - Use 1st data char as format specification. %53 - "+", print and suppress spacing %55 - "-", print and triple space %60 - "0", print and double space %61 - "1", print and top of form %200-%277, print and space N-%200 lines %300-%307, print with channel N-%277 %320 - Fill Line Printer Buffer Only All others, print and single space. P2 - Space Mode Flags (15:1) - Prespace flag if set, print then fill buffer if clear, fill buffer then print (14:1) - No page stepover flag if set, single and double space without stepover (66 lines/page) if clear, single and double space with stepover (60 lines/page)
FILE OPEN	2	Page eject if not at top of form
FILE CLOSE	3	Page eject if not at top of form
DEVICE CLOSE	4	Page eject if not at top of form
READ STATUS	%17	Read I/O status Count - 1 byte minumum required
VFC SET	%100	LOADS VFC RAM P1 - 1 - 1 LPI (lines per inch) 2 - 2 LPI 3 - 3 LPI 4 - 4 LPI 5 - 5 LPI 6 - 6 LPI 8 - 8 LPI 12 - 12 LPI Any other value defaults to 6 LPI.

CARD READER IOQ



BIT0 ABORT
BIT1 SPECIAL
BIT2 DIAGNOSTIC
BIT3 SYS BUFFER
BIT4 IO WAKE
BIT5 BLOCKED
BIT6 COMPLETED
BIT7 DATA FREEZE
BIT8 MAM ERROR
BIT9 0
BIT10 SFAIL
BIT11 PFAIL

QFLAG - Flags and request state.

ABORT	Abort this request and return an error indication to the caller.
SPECIAL	Special handling is to be applied to this request. Has no meaning for card reader requests.
DIAGNOSTIC	This is a request from a diagnostic subsystem. Not used by card reader driver.
SYSBUFRS	Target is an index relative to the SBUF table of the data buffer.
IOWAKE	Wake caller on completion of request.
BLOCKED	Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies wake.
COMPLETED	Request has been completed and caller woken if requested.
DATAFRZN	If set then the data segment has been frozen in memory. Set by MAM when a MAKEPRESENT request is successfully completed.
MAMERRD	An error has occurred in trying to make the target data segment present and freeze it in core.
SFAIL	SIO program failed to start because a) device didn't respond, or b) request has queued because device was busy.
PFAIL	This request has been aborted because of a power failure.

QLINK - SYSDB relative pointer to the next IOQ element. Points to the first word of the next element.

QLDEV - Logical device number.

QLDEVN	Logical device number.

QMISC - Auxiliary buffer flag. When odd. Data is being read into an auxiliary buffer because the requested count is less than 40 words.

QDSTN - Contains the data segment number of the target data area.

QADDR - Offset to the target data area in the data segment or bank.

QFUNC - Function code. See ATTACHIO description for details.

FUNC Function code field.

0 - read		
2 - file open		(no operation)
3 - file close		(no operation)
4 - device close		(clear EOF field in LPDT)

QWBCT - Word or byte count and control returns. On initiation specifies a word count if positive or a byte count if negative. At completion of the request this location contains the actual transmission count in the same units as the call specified. Odd counts are rounded up to produce reads of an even number of bytes. All counts are truncated to produce maximum reads of 40 words for ASCII or 80 words for column binary.

QPAR1 - End of file specification. See EOFCHECK write up for details.

QPAR2 - Binary/ASCII specification.

BINARY If 0 then ASCII code conversion; 40 words maximum read. If not 0 then column binary read; 80 words maximum read.

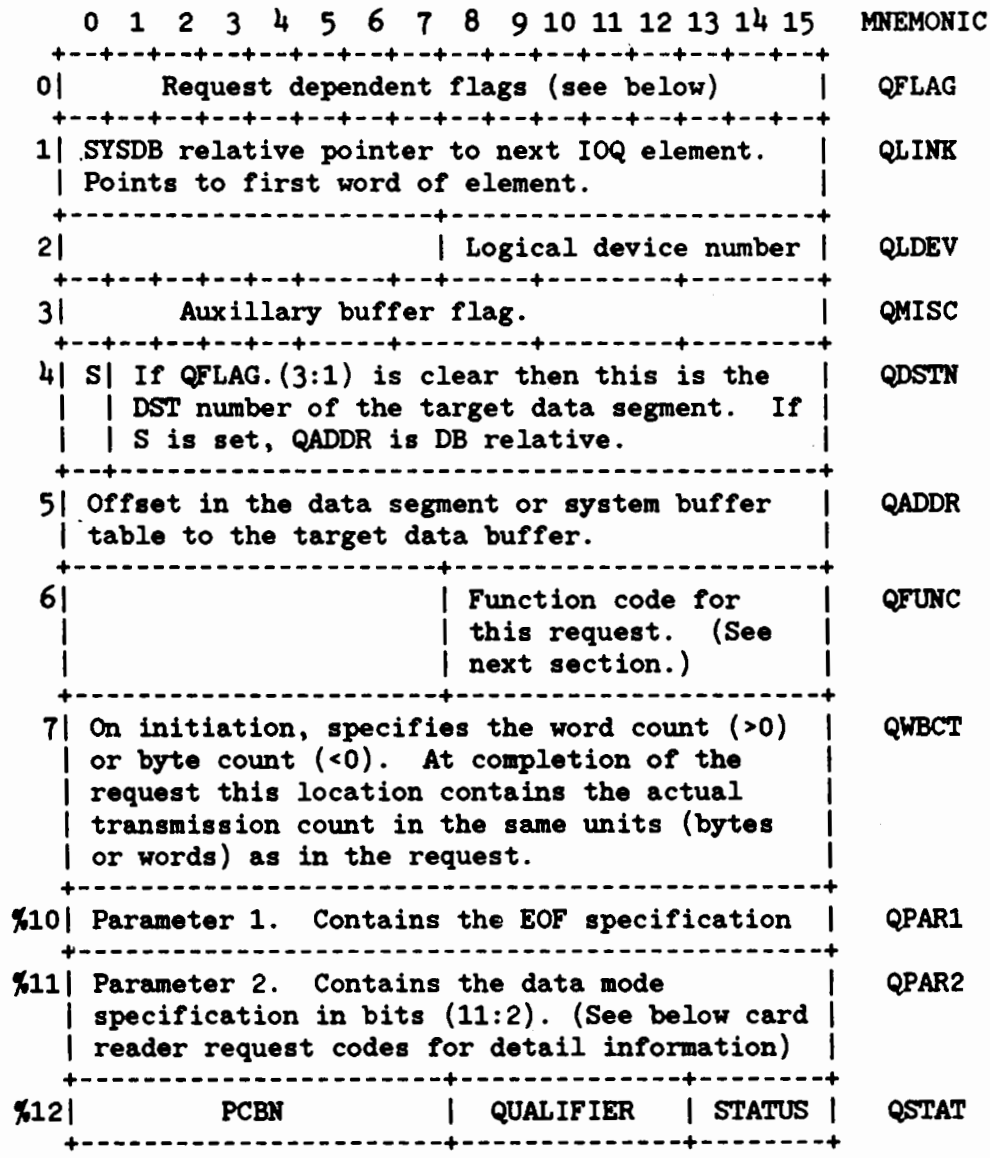
QSTAT - Request completion status and PCB number associated with this request.

PCBN PCB number associated with request. If zero this IOQ element is returned by the system when the request is completed.

STATUS General Status. See general IOQ entry for specifications.

QUALIFIER Driver specific status. See general IOQ entry.

I/O QUEUE ELEMENT FOR HPIB CARD READER



QFLAG - Request dependent flags

Bit 0	ABORT	- Abort this request and return an error indication to the caller.
Bit 1	SPECIAL	- Apply special handling to this request. (Not used)
Bit 2	DIAG	- This is a request from the diagnostic subsystem.
Bit 3	SYSBUFF	- Target is an index relative to the SBUF Table of the data buffer.
Bit 4	IOWAKE	- Wake caller on completion of request.
Bit 5	BLOCKED	- Blocked I/O. The caller is waited in ATTACHIO until the request is completed. Implies IOWAKE.
Bit 6	COMPLETED	- The request has been completed and the caller awakened if he had requested (with IOWAKE).
Bit 7	DATAFRZN	- Set by the memory management routines (MAM) when a MAKEPRESENT request is successfully completed and indicates the data segment is frozen in memory.

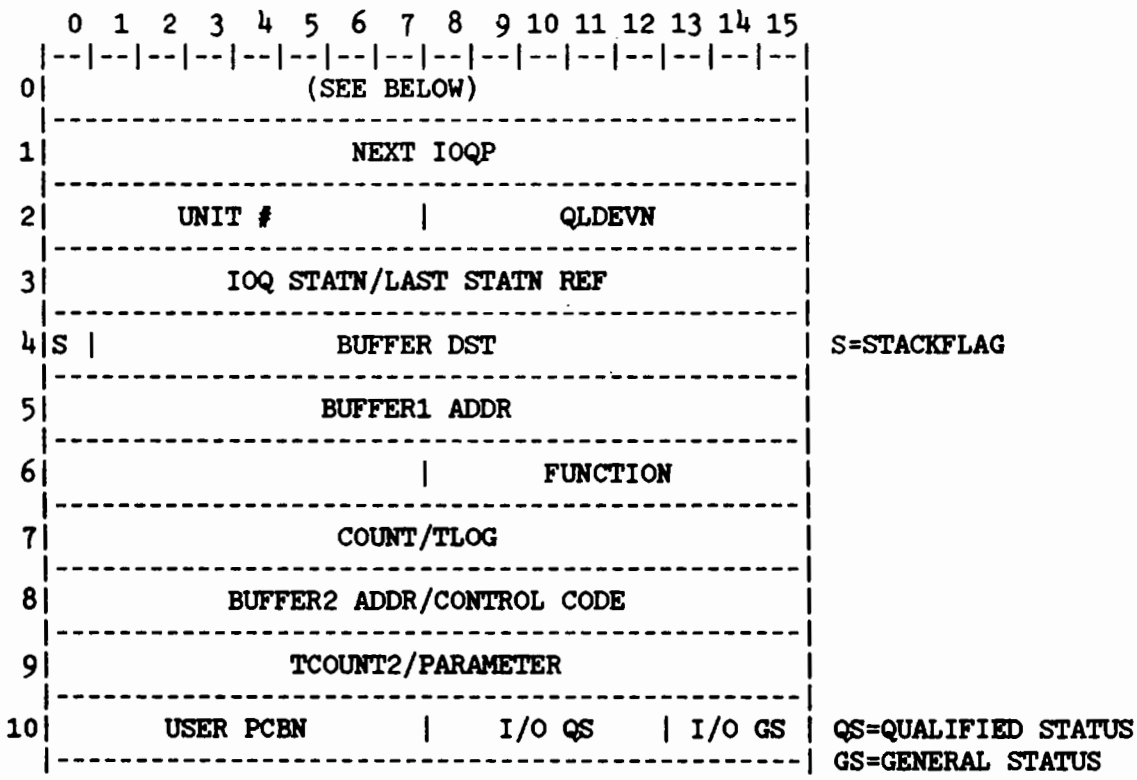
Bit 8 MAMERRORD - An error has occurred while MAM was trying to make the target data segment present and freeze it in memory.
Bit 9 PREQ - (Not used)
Bit 10 SFAIL - Delayed failure of SIO instruction. If a call to STARTIO resulted in the request being added to the channel queue, this bit indicates that the SIO instruction failed when the request was selected for execution.
Bit 11 PFAIL - The request was aborted because of a system power failure.

QMISC - Auxillary buffer flag used to indicated a read into the driver's buffer and not the user's buffer.

QSTAT - PCB number and request completion status.

PCBN - The Process Control Block (PCB) number of the process which made this request. If zero, the request is not associated with any process and the IOQ element is to be returned by the system when the request has completed.
STATUS - General status indicating the final state of the request. The following codes are used:
0 - Not started or awaiting completion.
1 - Successful completion.
2 - End-of-file detected.
3 - Unusual, but recoverable, condition detected.
4 - Irrecoverable error has occurred.
QUALIFIER - A code which further defines or qualifies the general status. (See the section Driver Return Status Codes.)

DATA COMMUNICATIONS IOQ ENTRY

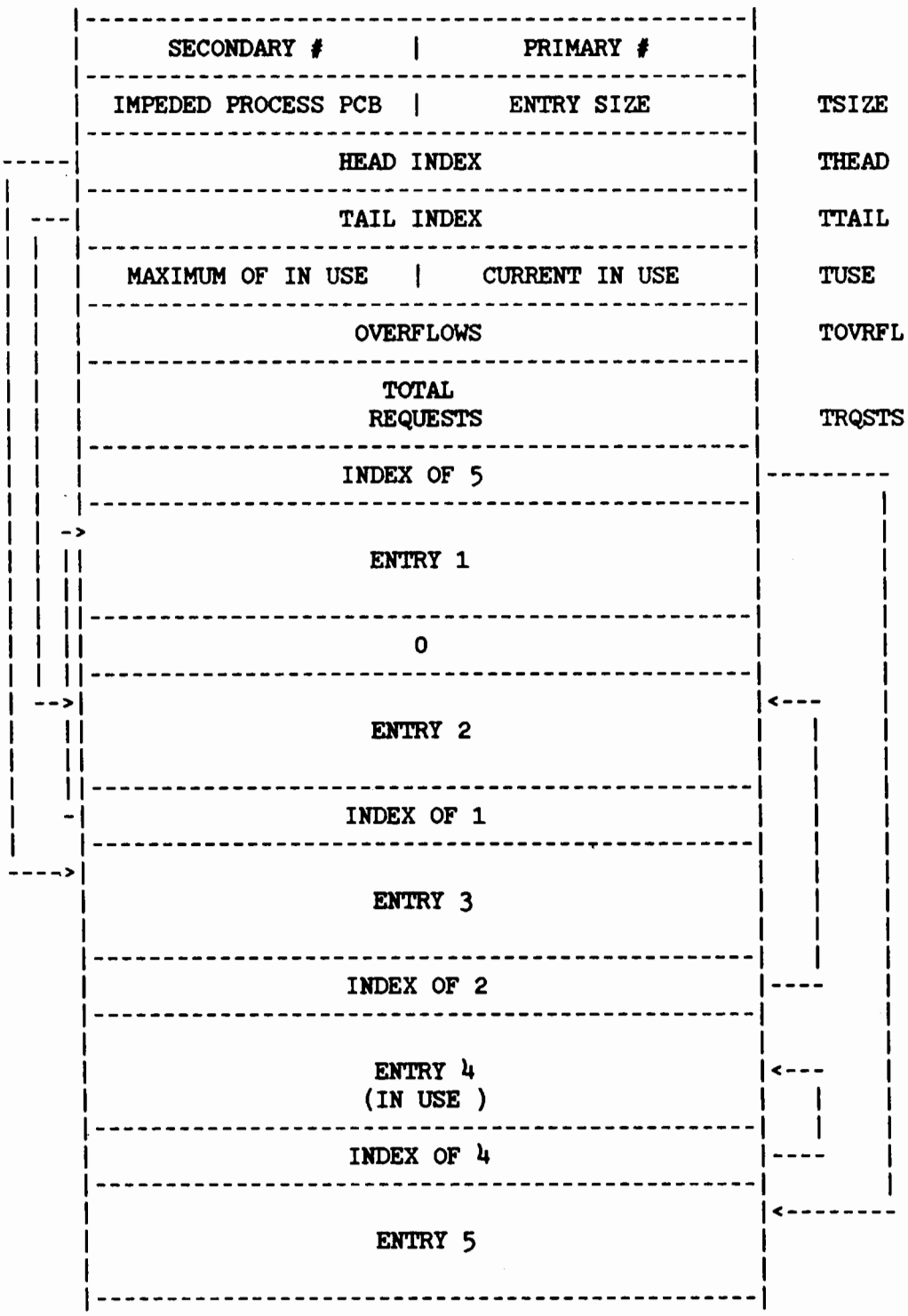


BIT0 ABORT
BIT3 SYS BUFFER
BIT4 IO WAKE
BIT5 BLOCKED
BIT6 COMPLETED
BIT7 DATA FROZEN
BIT8 MAM ERROR
BIT 10 SFAIL
BIT11 PFAIL
BIT14 TIMER
BIT15 MSG ERROR

GS 0=PENDING
GS 1=SUCCESSFUL
GS 2=END OF TRANSMISSION RECEIVED
GS 3=UNUSUAL CONDITION

Word 0	.ABORT	- Abort this I/O request
	.SYSBUF	- Data is in system buffers
	.IOWAKE	- Wake caller upon completion
	.BLOCKED	- Blocked I/O, do blocked AWAKE when I/O is complete
	.COMPLETE	- Request has been completed
	.DATAFRZN	- The DST has been frozen
	.MAMERRORD	- MAM failed to freeze the DST
	.SFAIL	- The I/O program failed to start due to no SIO OK
	.PFAIL	- The Abort bit was set because of a power failure
	.TIMED	- An I/O timeout request has completed
	.MSGDONE	- A message reply has been completed

SBUF AND TBUF TABLE LAYOUT



3 - 1 - 5 - 4 - 2

TABLE ELEMENT ALLOCATION (TBUF AND SBUF)

The allocation of the elements in the IOQ terminal buffer (TBUF) and system buffer (SBUF) tables is of concern to the I/O system.

FREE LIST OF TABLE ELEMENTS

These tables are in the form of a free-linked list of the free elements. For the SBUF's the -1 word of entry is the link to the next element. For the TBUF's, word zero is the link and word 1 is the link for the IOQ elements.

Each word has an 8-word header beginning at the base of the table. The first four words of the header are for managing the table and the second four are for monitoring table activity.

The entries follow the header at word eight.

Computer Museum

ELEMENT ALLOCATION

Elements are obtained from the beginning of the free list, pointed to by the head and returned to the end of the free list pointed by the tail.

When the free list is empty, the head index is zero and the tail index is set to point at the head index.

The tables are divided into two areas: a primary and a secondary area. Most requests are obtained from the primary area. The secondary area is used only for critical requirements when the primary area is exhausted. These areas are logical areas determined by parameters in the header.

The utility of the core resident tables is seriously reduced if their use is not restricted to dynamic situations.

One of three responses must be specified to the routines which allocate elements from the I/O system tables.

1. Impede caller if primary is empty.

2. Get from primary area only.

3. Get from secondary area if primary area is empty.

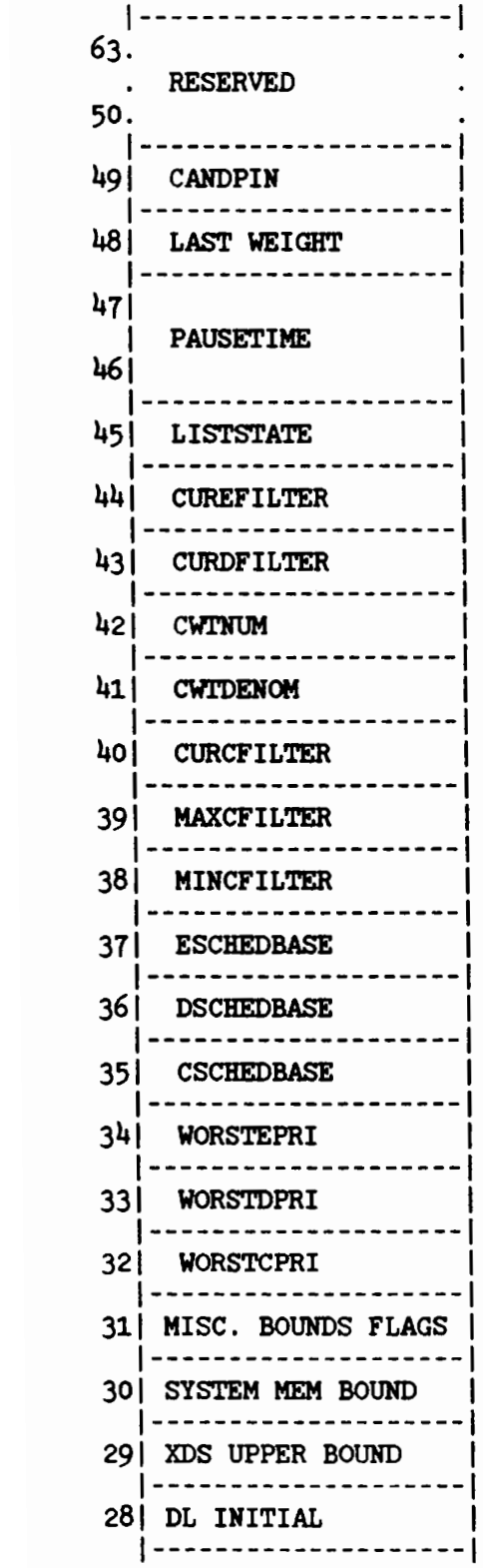
Request types 2 and 3 return an indication to the caller if the request could not be satisfied. The following table specifies the types of calls for element allocation and the action if an element is not activated.

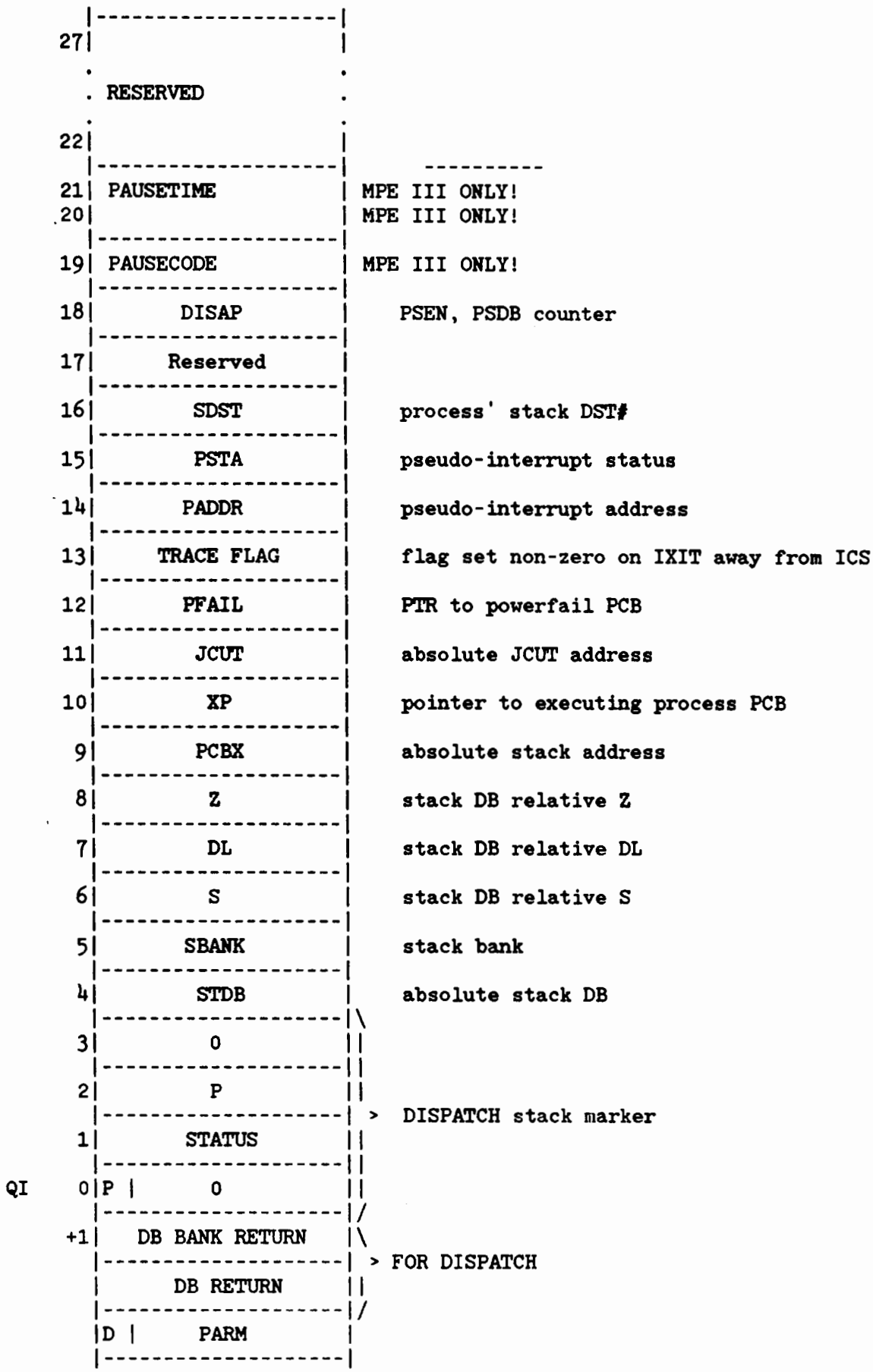
BUFFER USER	CALL TYPE	FINAL ACTION
SBUF's		
File system	Impede	---
Ptape	Impede	---
Bad track	Primary	Forget request
TBUF's		
Terminal write (impedable)	Impede	---
Terminal write (not impedable)	Primary	I/O error
Terminal read on ICS	Secondary	I/O error
Log error	Primary	Forget request
IOQ's		
ATTACHIO (not impedable)	Primary	Return IOQX-0
ATTACHIO (impedable)	Impede	---
SIODM (memory management)	Secondary	Sudden death
IOMESSAGE	Secondary	I/O error

HEADER DEFINITION

Primary #	- Number of elements in the primary area.
Total #	- Total number of elements in the table.
Size	- Size in words of each element.
Impeded PCB	- If not zero then contains the PCB number of the first process waiting for an element in this table.
Head index	- Index of first free element.
Tail index	- Index of last free element.
In use	- Current number not in free list.
Overflows	- Number of requests made for an element.
Total requests	- Total number of elements requested.

QI -


63.
RESERVED
50.
49 CANDPIN
48 LAST WEIGHT
47
PAUSETIME
46
45 LISTSTATE
44 CUREFILTER
43 CURDFILTER
42 CWTNUM
41 CWTDENOM
40 CURCFILTER
39 MAXCFILTER
38 MINCFILTER
37 ESCHEDBASE
36 DSCHEDBASE
35 CSCHEDBASE
34 WORSTEPRI
33 WORSTDPRI
32 WORSTCPRI
31 MISC. BOUNDS FLAGS
30 SYSTEM MEM BOUND
29 XDS UPPER BOUND
28 DL INITIAL


RESERVED
PAUSETIME
MPE III ONLY!
MPE III ONLY!
PAUSECODE
MPE III ONLY!
DISAP
PSEN, PSDB counter
Reserved
SDST
process' stack DST#
PSTA
pseudo-interrupt status
PADDR
pseudo-interrupt address
TRACE FLAG
flag set non-zero on IXIT away from ICS
PFAIL
PTR to powerfail PCB
JCUT
absolute JCUT address
XP
pointer to executing process PCB
PCBX
absolute stack address
Z
stack DB relative Z
DL
stack DB relative DL
S
stack DB relative S
SBANK
stack bank
STDB
absolute stack DB
0
P
DISPATCH stack marker
STATUS
QI
0
0
DB BANK RETURN
FOR DISPATCH
DB RETURN
PARM

P=PSEUDO-DISABLED AND DISP INSTRUCTION EXECUTED.
D=DISPATCHER INTERRUPTED.

-19 PAUSECODE(MPE III ONLY): 0 = system not paused 1 = paused for disc
2 = paused for swap 3 = system idle

ICS GLOBAL CELLS, with initial values

STDB - absolute address of the currently running process's stack.
SBANK - bank address for process' stack.
S - stack DB relativeS
DL - stack DB relative DL
Z - stack DB relative Z
PCBX - absolute stack address
XP - PCB table relative pointer to word 0 of the running process' PCB.

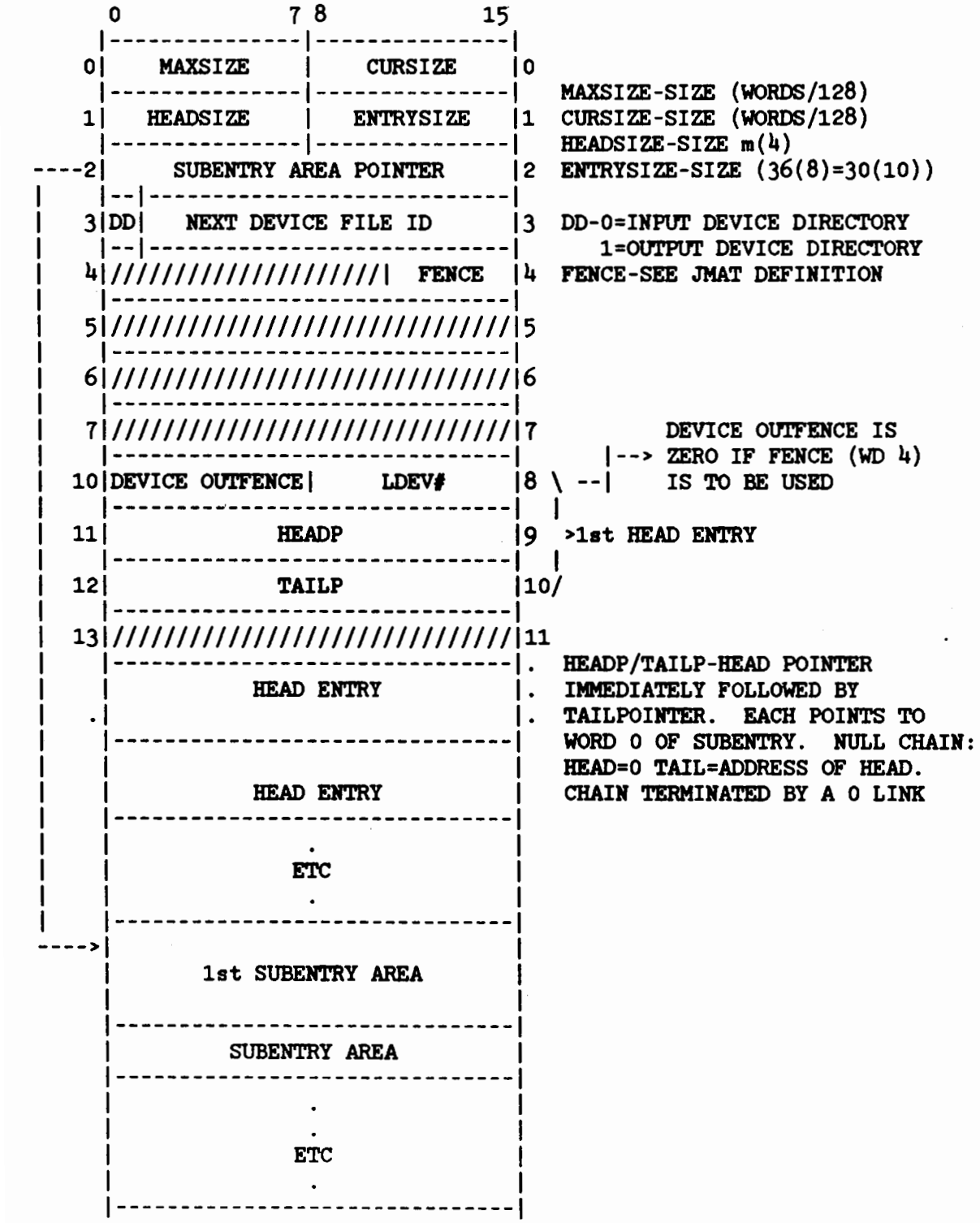
The above cells are to be initialized for the PROGENITOR.

CPCB - absolute 4, is an absolute version of XP. If CPCB is zero, then the above cells are invalid. This will never be the case in a process. CPCB should also be set by INITIAL.
SDST - DST# for running process' stack.
JCUT - the bank zero absolute address of the JCUT table.
PADDR - PB relative address for the procedure PSEUDOINT.
PSTA - status value for PSEUDOINT, %140000+CST#.
DISAP - PSDB counter, initially 0.

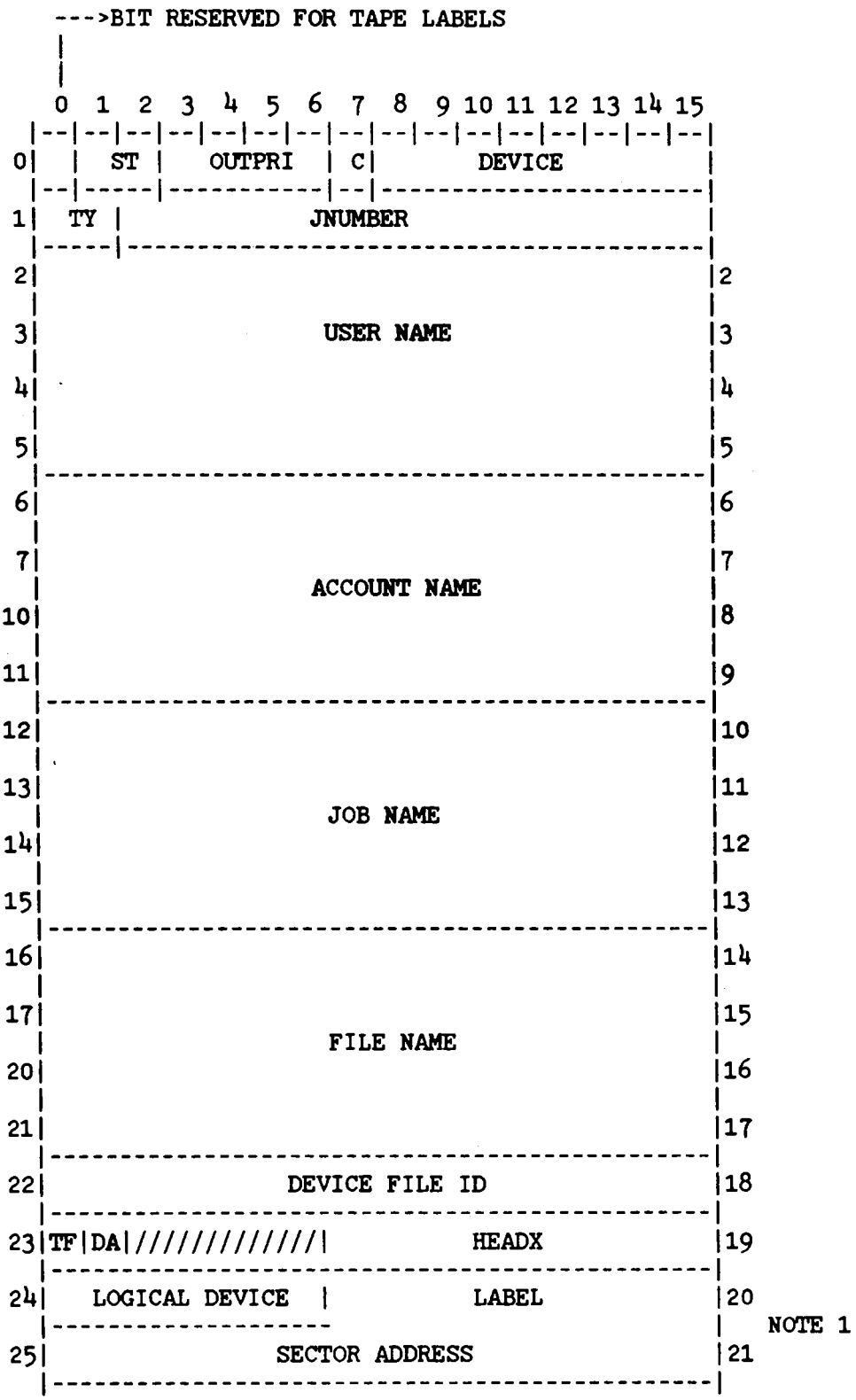
INITIAL sets the above as described.

INPUT DEVICE DIRECTORY/OUTPUT DEVICE DIRECTORY

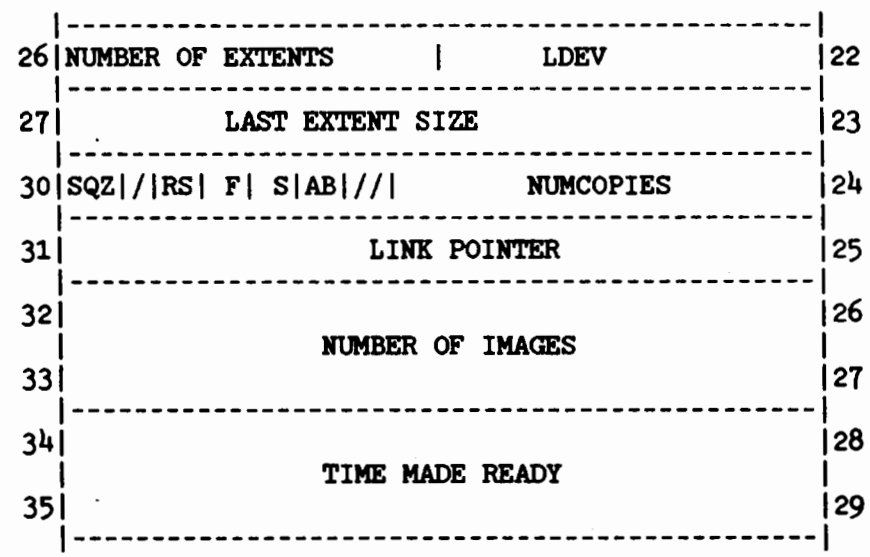
IDD/ODD



XDD (IDD/ODD) SUBENTRY FORMAT



XDD SUBENTRY FORMAT (CONT.)



SQZ- EXTENT PURGING AFTER EXTENT PRINTED
ST-STATE OF ENTRY
0=ACTIVE
1=READY
2=OPENED
3=IGNORE (LOCKED)

C-DEVICE IS A CLASS INDEX TO DEVICE CLASS TABLE

TY-JOB TYPE
0=SESSION' (SPOOK)
1=SESSION
2=JOB
3=JOB' (SPOOK)
TF-1=THERE EXISTS FORMS
DA-1=:DATA CREATED INPUT FILE

HEADX-INDEX OF HEAD ENTRY FOR THIS CHAIN OF SUBENTRIES
RS-1=RESTART IS REQUESTED IF WARM-START WAS NECESSARY

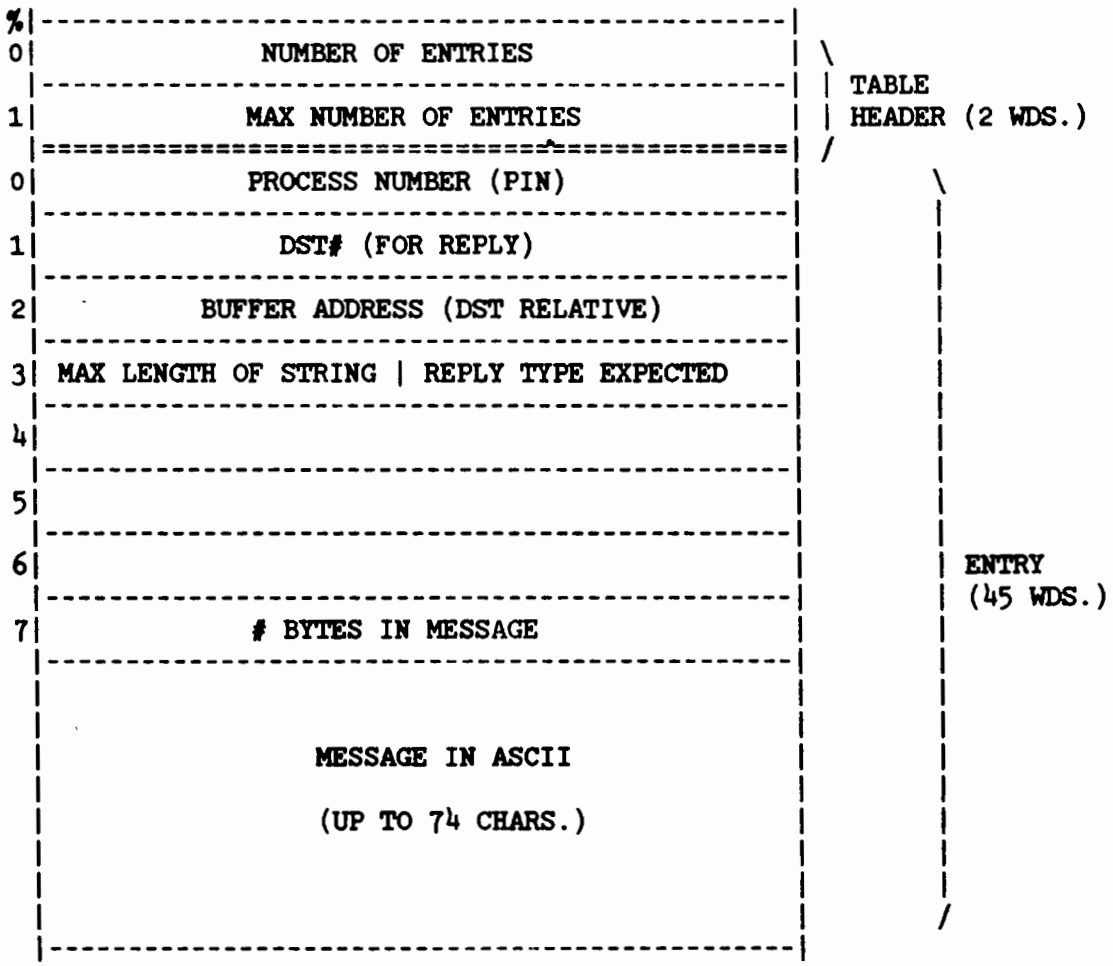
F - 1=NON-STANDARD FORM CONTROL ON DEVICE

S - 1=FAILURE DURING ALLOCATION OF NEW EXTENT
AB - ABORTED JOB $STDLIST ENTRY

NOTE 1 - SPOOLFILE EXTENSION OR LABEL EXTENSION

REPLY INFORMATION TABLE (RIT)

DST %34; SIR %25



NOTE: Process Number = 0 means entry is empty

Reply Type = 0 for number (num)
= 1 for yes or no (y/n)
= 2 for string (sxx)
= 3 for yes, no, or STRING
TABLE SIZE = 1024 words

MAX # OF ENTRIES = 22
= 4 for string

MESSAGE SYSTEM GENERAL DESCRIPTION

The message system consists of the following parts:

- Callable intrinsic GENMESSAGE.
- Uncallable procedure GENMSG which is used by MPE.
- System message catalog (CATALOG.PUB.SYS) and any number of user catalogs.
- Program MAKECAT which builds message catalogs.
- MESSAGE SIR %24
- MESSAGE SYSGLOB CELLS %371-373
- MESSAGE DATA SEGMENT

The message system is used by calling GENMESSAGE (or GENMSG) with a message number. The message system fetches the message from a message catalog, inserts parameters, then routes the message to a file or returns the message in a buffer to the caller.

A message catalog is a numbered editor-type file containing sets of messages. The sets serve to break a catalog into managable portions. A message system user may call GENMESSAGE using either his own message catalog or using MPE's catalog (CATALOG.PUB.SYS).

After creating a message file, run the program MAKECAT in order to build a catalog that is readable by the message system. This file is still readable by the editor (it can be "texted") but it contains a directory (written as a userlabel).

In order to use the message catalog, the program must first open the message catalog, then call GENMESSAGE with the file number, set number and message number. (MPE users don't need to open the catalog, GENMSG automatically uses CATALOG.PUB.SYS.) The file must be opened with the aoptions "NOBUF" and "MULTI" -record access.

MESSAGE CATALOG

Messages in the catalog can be of any length and can contain up to five parameters. Continuation of a message is indicated by "%" or "&" at the end of a line. The "%" symbol indicates that the message is continued and that a carriage return, line feed be issued the terminal. The "&" symbol indicates that the message is continued on the same line with no carriage return, line feed.

Parameters may be inserted into the message fetched from the catalog. The parameters are passed in the GENMESSAGE (or GENMSG) call and inserted wherever a "!" is found. Message sets are indicated by "$SET n" starting in column 1 (the rest of the line is treated as a comment). Maximum value for n is 63. Comments can be inserted in the catalog by placing "$" in column 1. Message numbers are positive integers, need not be contiguous, but must be in ascending order. After processing by the program MAKECAT, the catalog file contains records of 80 bytes, blocked 16, in 32 extents. (The system message catalog is only one extent, however). The format of the message catalog is as follows:

MESSAGE SYSTEM (CONT.)

```
   $SET 1    SYSTEM MESSAGES
   1 LDEV #! IN USE BY FILE SYSTEM
   2 LDEV #! IN USE BY DIAGNOSTICS
   3 LDEV IN USE, DOWN PENDING
   5 IS "!" ON LDEV#! (Y/N)?
      .
      .
      .
   $ MESSAGE 35 IS TWO LINES LONG, A PARAMETER STARTS THE
   $ FIRST LINE AND THE SECOND LINE IS "HP32002"
   35 !%
   HP32002B.00.!
      .
      .
      .
   276 LDEV # FOR "!" ON ! (NUM)!
   $
   $SET 2 CIERROR MESSAGES
   82 STREAM FACILITY NOT ENABLED:  SEE OPERATOR.  (CIERR 82)
   200 MORE THAN 30 PARAMETERS TO BUILD COMMAND.  (CIERR 200)
      .
      .
      .
   204 FILE COMMAND REQUIRES AT LEAST TWO PARAMETERS, INCLUDING THE
    FORMAL NAME OF THE FILE  (CIERR 204)
      .
      .
```

MAKECAT PROGRAM

The program MAKECAT.PUB.SYS is used to build message catalogs (and also HELP catalogs). The program's input file has the formaldesignator INPUT, which must be used for all entry points. The program has the following entry points:

(no entry point)	- Reads from input file and builds a temporary file (formaldesignator CATALOG). Also renames any old temporary CATALOG, CATnn, using an archival numbering scheme (i.e., CAT1, CAT2, etc.).
BUILD	- (Must log on under MANAGER.SYS.) Reads from input file, build the system message catalog (formaldesignator CATALOG), and installs the message system. Existing catalog is renamed CATnnnn according to the same scheme as for no entry point (above). Installation of the message system means moving the directory contained in the userlabel of the catalog into a data segment. The DST number and the disc address of CATALOG are placed in system global area. The message system may be installed while the system is running.

MESSAGE SYSTEM (CONT.)

DIR - (Must have PM or OP capability.) Installs the system message catalog (does not build a new one). Opens input file, moves the directory in the CATALOG into a data segment, and places the DST number and disc address of CATALOG in system global area. This may be done when the message system seems to be "broken", but the catalog is intact. (MPE is issuing "MISSING MSG. SET=mm. MSG=nn" at terminals and at the console.) This may be done while the system is running.

HELP - Used to build the HELP catalog. Reads input file and builds a HELP catalog (formaldesignator HELPCAT).

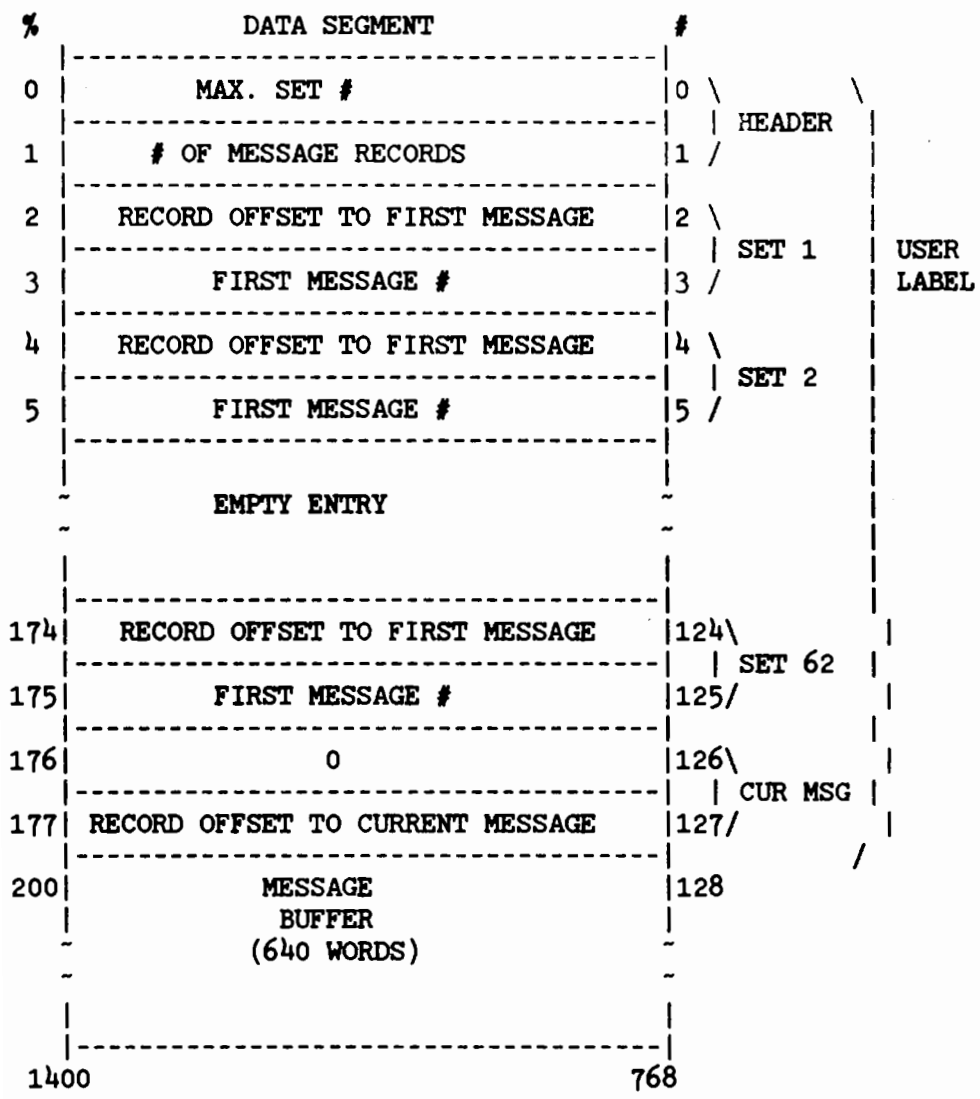
```
MESSAGE SYSTEM              CATALOG.PUB.SYS
--------------              ---------------

$SET 1 - SYSTEM MESSAGES (FORMER MESSAGE CATALOG)

$SET 2 - CIERROR MESSAGES

$SET 3 - MISCELLANEOUS ABORT MESSAGES

$SET 4 - PROGRAM ERROR ABORT MESSAGES

$SET 5 - INTRINSIC ABORT MESSAGES

$SET 6 - RUN-TIME ABORT MESSAGES

$SET 7 - CI GENERAL MESSAGES

$SET 8 - FILE SYSTEM ERROR MESSAGES

$SET 9 - LOADER ERROR MESSAGES

$SET 10- CREATE ERROR MESSAGES

$SET 11- ACTIVATE ERROR MESSAGES

$SET 12- SUSPEND ERROR MESSAGES

$SET 13- MYCOMMAND ERROR MESSAGES

$SET 14- LOCKGLORIN ERROR MESSAGES

$SET 15- PRIVATE VOLUMES ERROR MESSAGES

$SET 16- DS/3000 ERROR MESSAGES

$SET 17- "HELP" ERROR MESSAGES

$SET 18- GRAPHIC DEVICES ERRORS/WARNINGS/ADVISORY MSGS.

$SET 19- SERIAL DISC ERROR MESSAGES

$SET 20- USER LOGGING MESSAGE

$SET 21- ASSOCIATE UTILITY

$SET 22- PAGE PRINTER MESSAGES
```

MESSAGE SET DIRECTORY

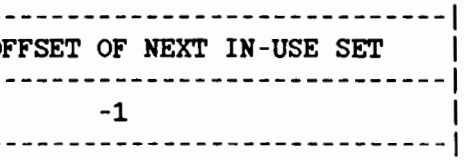
DST # IN SYSGLOB %373

CAT DISC ADDR IN SYSGLOB %371-372

CREATED BY RUNNING MAKECAT.PUB.SYS.
KEPT IN A DATA SEGMENT AND IN A USER LABEL.



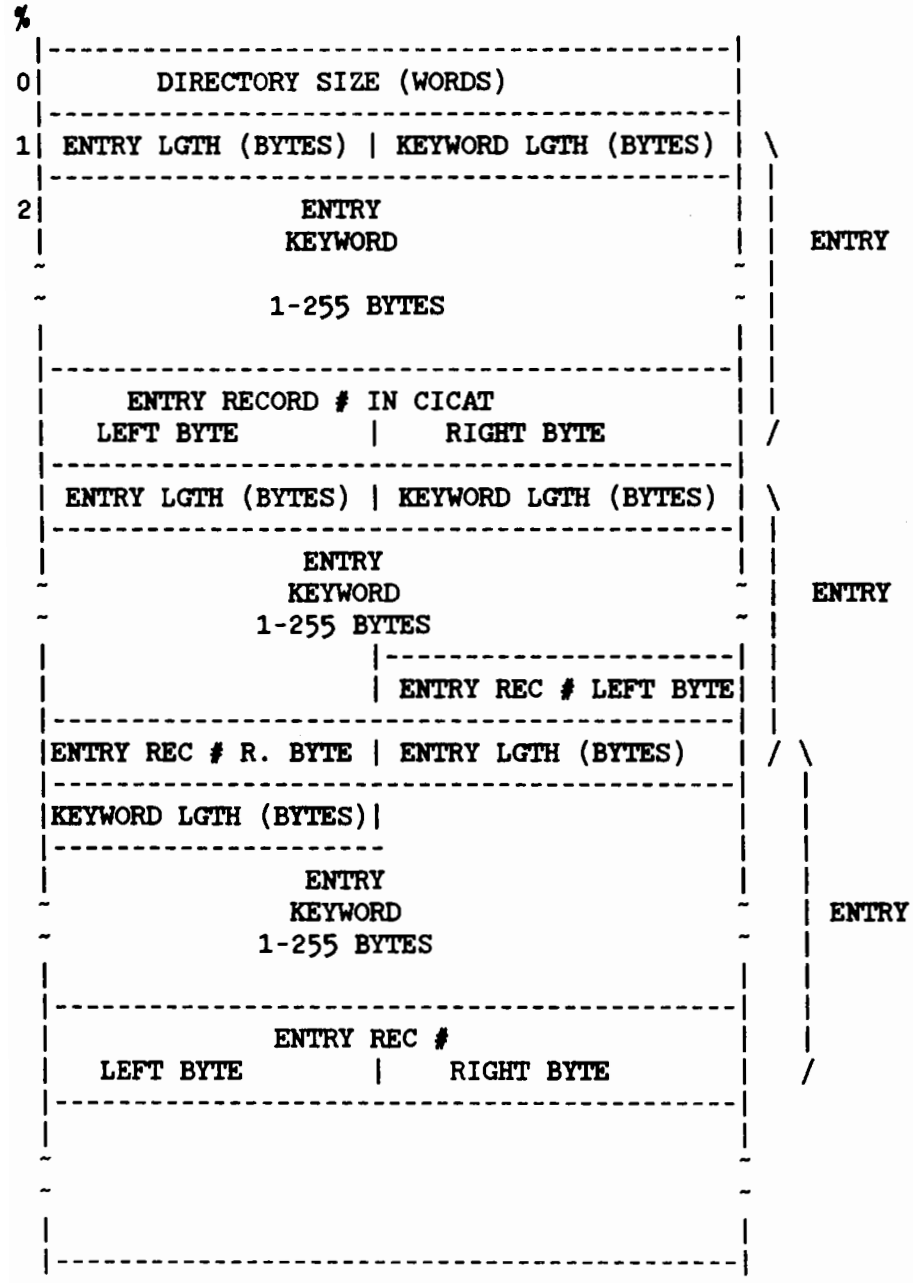
EMPTY ENTRY:



HELP SUBSYSTEM

HELP DIRECTORY

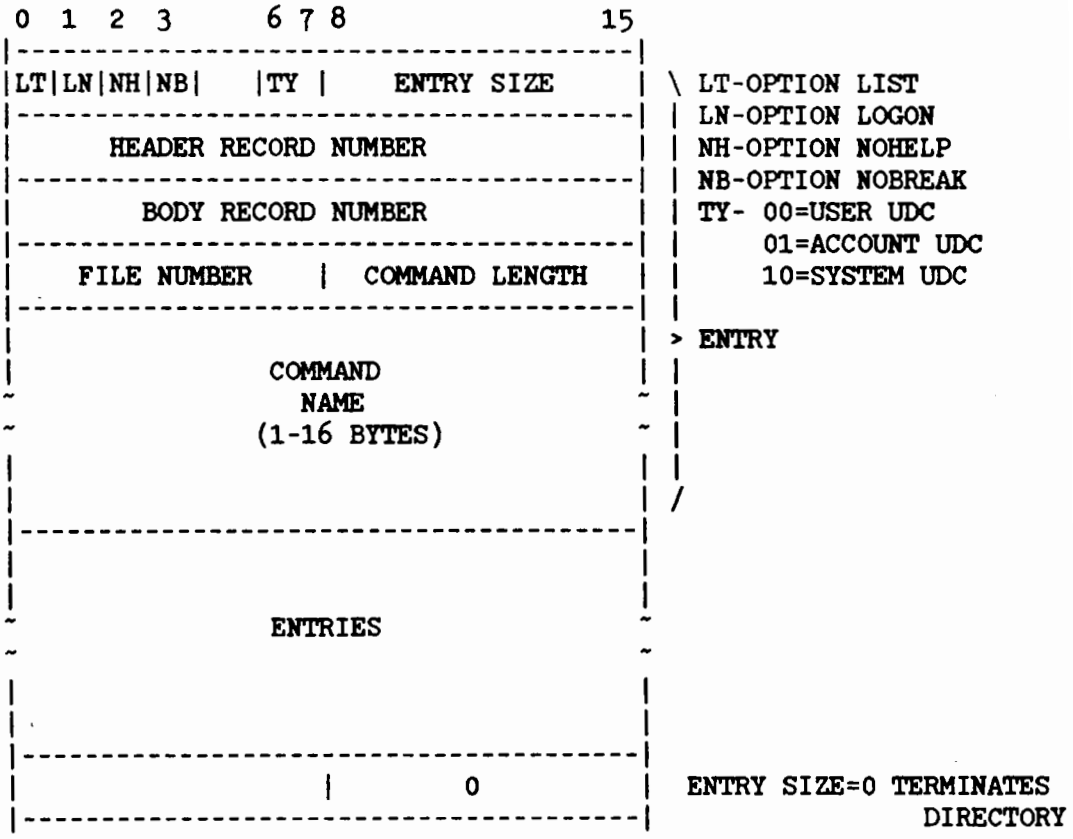
KEPT AS USER LABEL
READ ONTO USER'S STACK
USES SEARCH INTRINSIC FORMAT
VARIABLE ENTRY SIZE



UDC DIRECTORY

*EXTRA DATA SEGMENT - DST # IN DB+%250 OF UMAIN STACK

*BUILT BY INITUDC



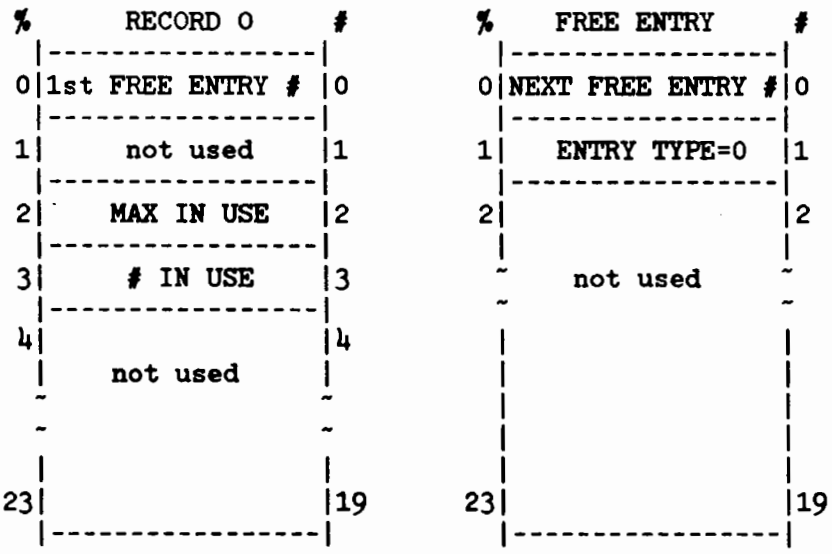
UDC'S COMMAND.PUB.SYS

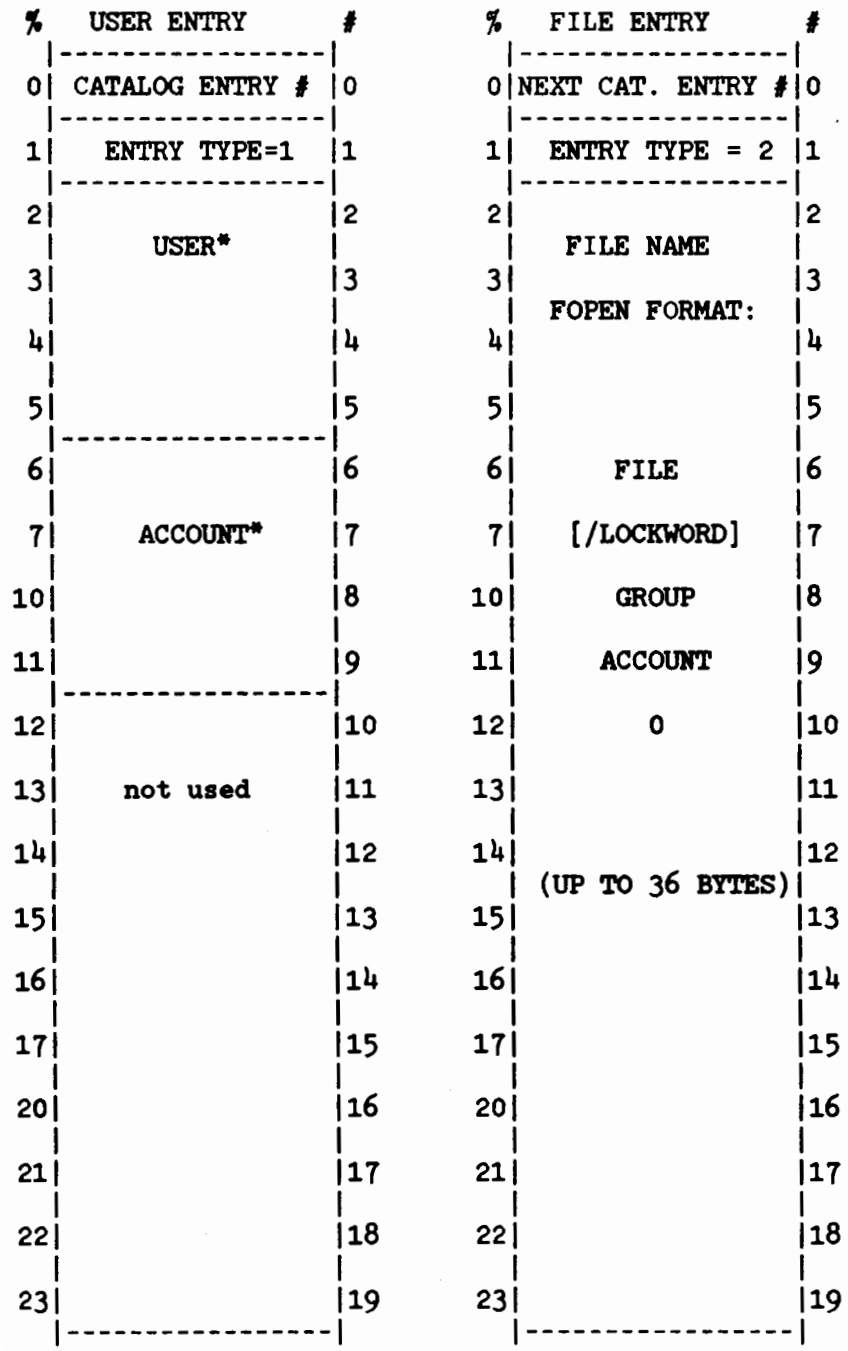
*RECORD SIZE = 20(10) WORDS, 6 RECORDS/BLOCK

*KEEPS TRACK OF WHO IS USING WHAT UDC CATALOG

*CAN BE PURGED TO DISABLE UDC'S

*CAN BE REBUILT TO REENABLE UDC'S





* IF THE USER FIELD AND THE ACCOUNT FIELD CONTAIN "@_____", THIS INDICATES SYSTEM LEVEL UDC'S.

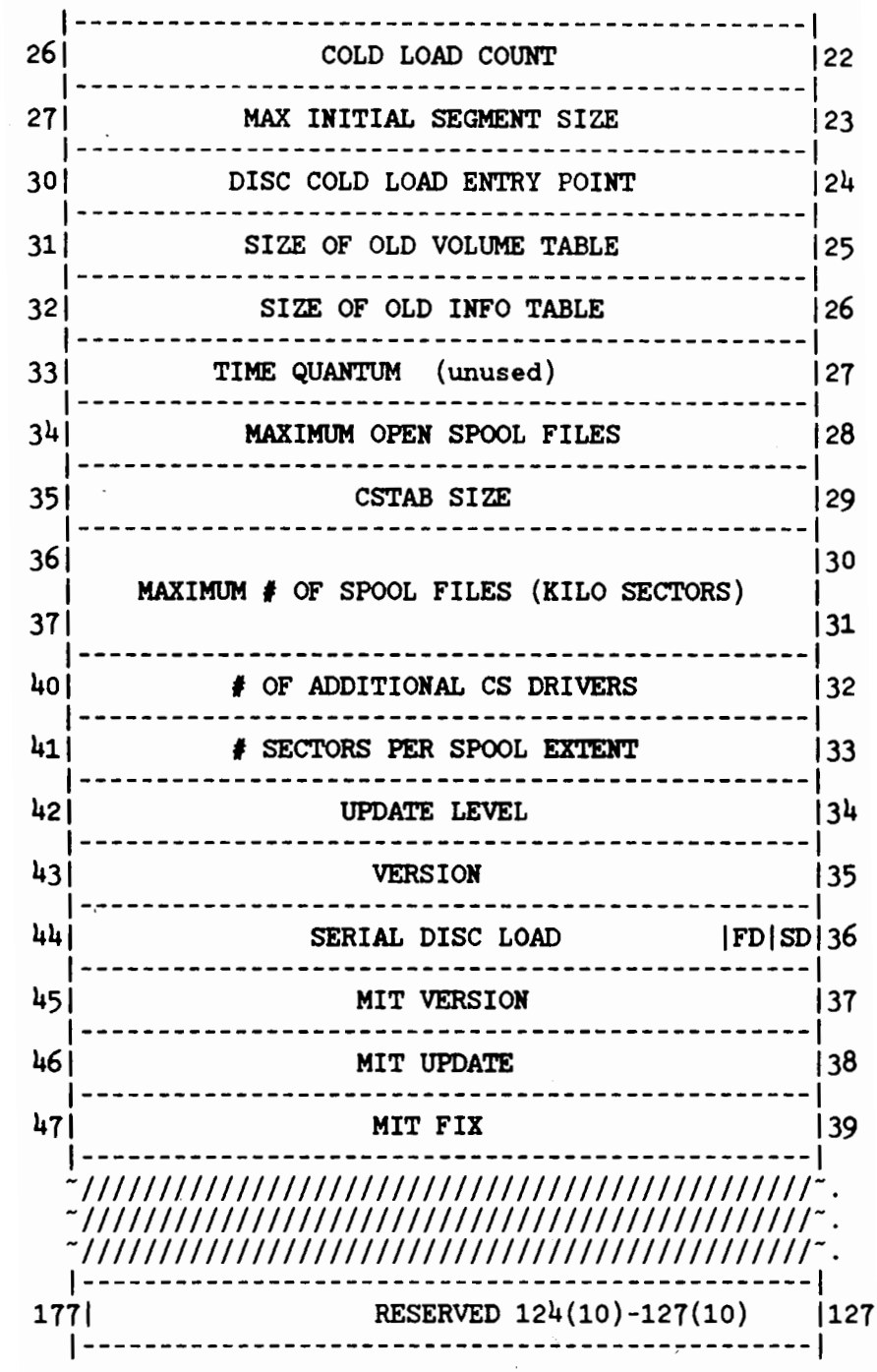
IF ONLY THE USER FIELD CONTAINS @ AND 7 SPACES, THIS INDICATES ACCOUNT LEVEL UDC'S.

CTAB0 (Memory Size Independent Configuration Values)

RECORD 0 OF CONFDATA FILE

0	MEMORY SIZE IN K WORDS	0
1	CORE SIZE INDEX	1
2	STANDARD STACK SIZE	2
3	HIGHEST DRT #	3
4	TERMINAL BOUND PRIORITY	4
5	NORMAL PRIORITY	5
6	CPU BOUND PRIORITY	6
7	# OF SECONDS TO LOG-ON	7
10	LOG FILE RECORD SIZE (SECTORS)	8
11	LOG FILE SIZE (RECORDS)	9
12	LOG FILE #	10
13	LOG BITS (ONLY 11 USED)	11
14		12
15	<<DEFINES WHAT IS BEING LOGGED>>	13
16		14
17		15
20	DEFAULT JOB/SESSION CPU TIME LIMIT	16
21	FILES DUMPED	17
22	HIGHEST LOGICAL DEVICE #	18
23	HIGHEST VOLUME # | # OF VOLUMES	19
24	DEVICE CLASS TABLE SIZE	20
25	FIX LEVEL	21

RECORD 0 (CONT.)



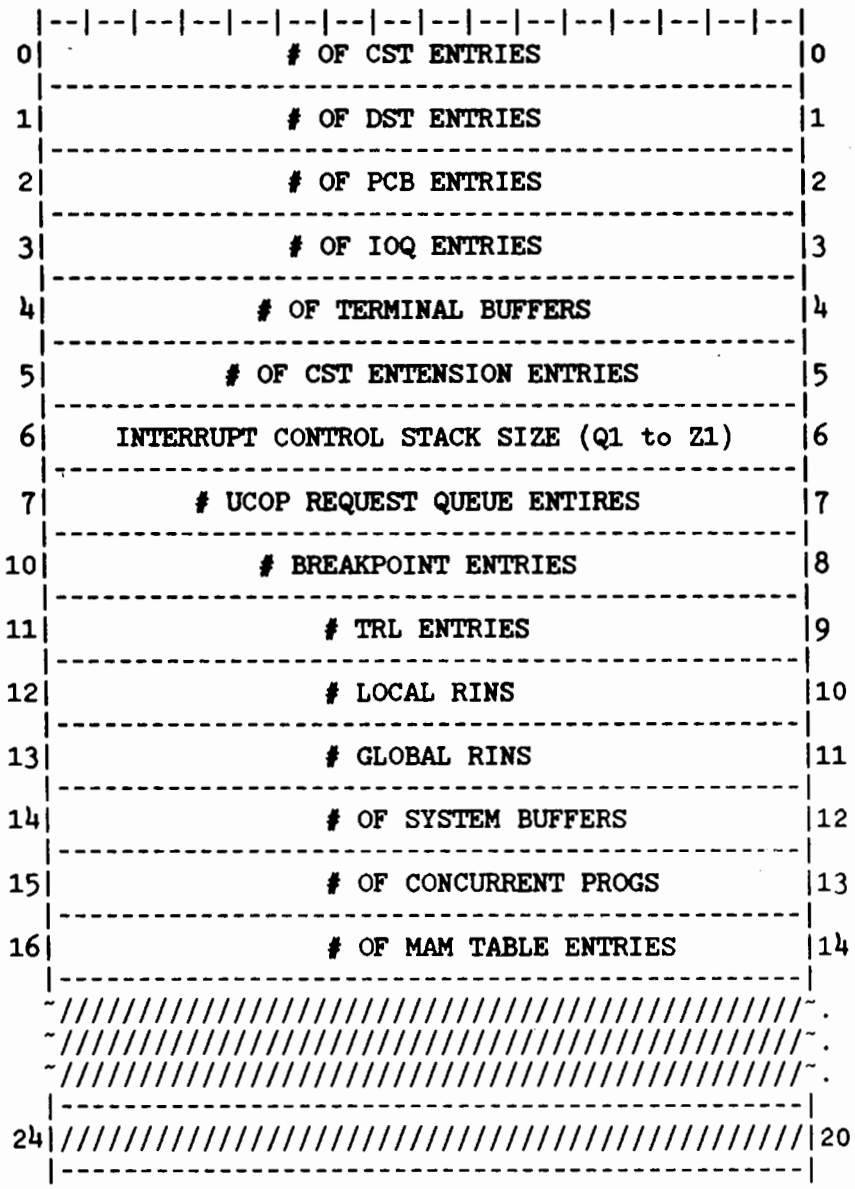
SERIAL DISC LOAD (Word %44)
- FD - Date given for sysdump was future date
- SD - Sysdump was to serial disc

CTAB (Memory Size Dependent Configuration Values)

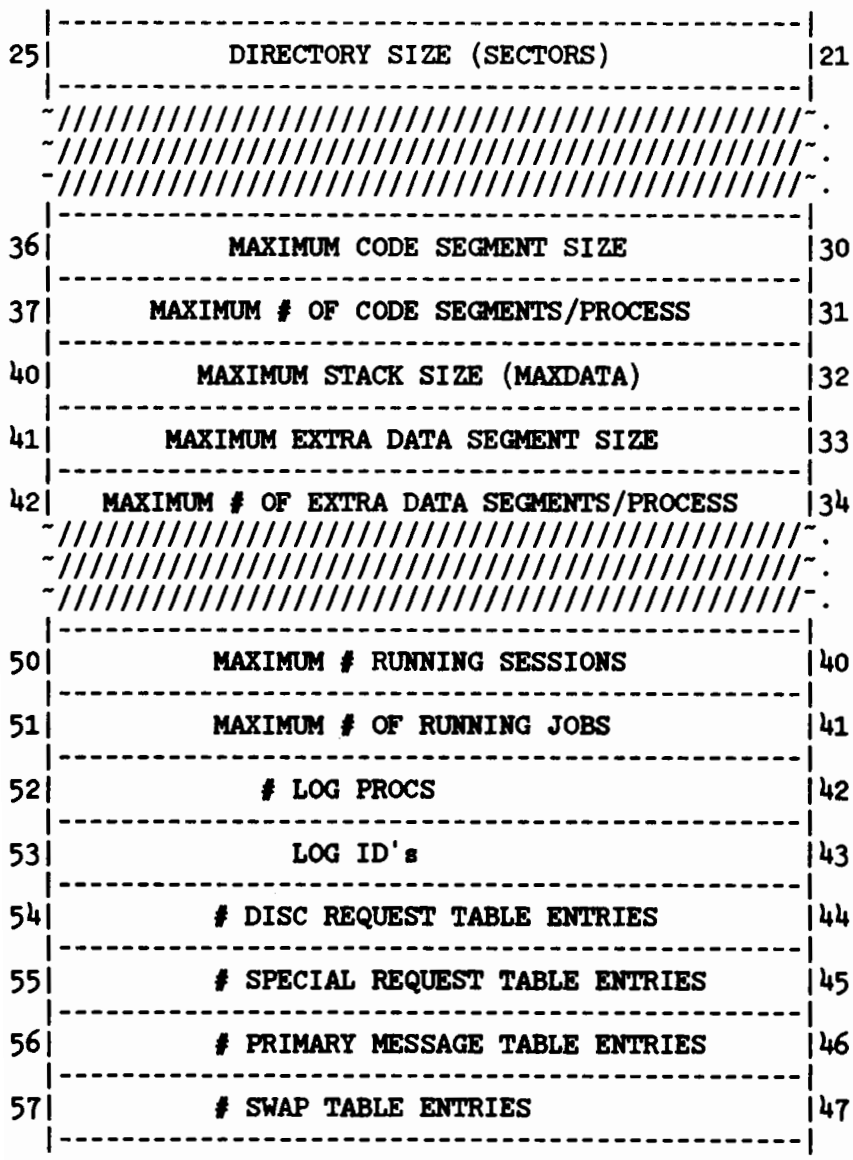
RECORDS 1-8 OF CONFDATA

record	memory size k words
1	64
2	80
3	96
4	128
5	160
6	192
7	224
8	256 and larger

This table describes the CTAB format in detail and is typical of any record (1-8)

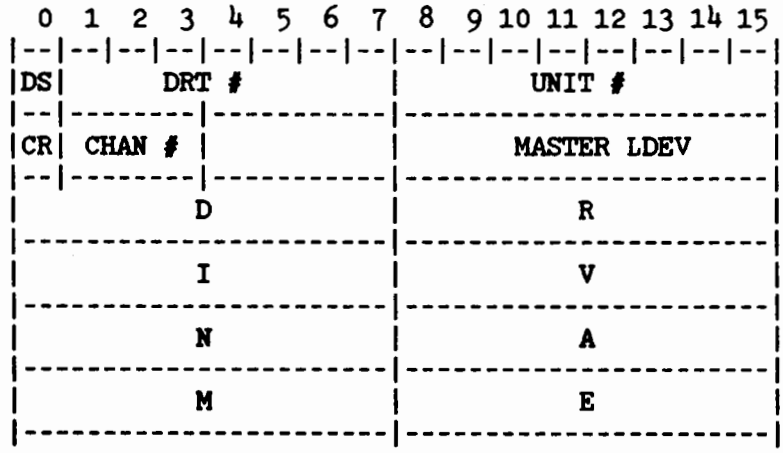


RECORDS 1-8 (CONT.)



DRIVER TABLE

The Driver Table consists of 6 word entries, in correspondence to the LDEV entries, up to the highest LDEV used, entry zero is a dummy entry.

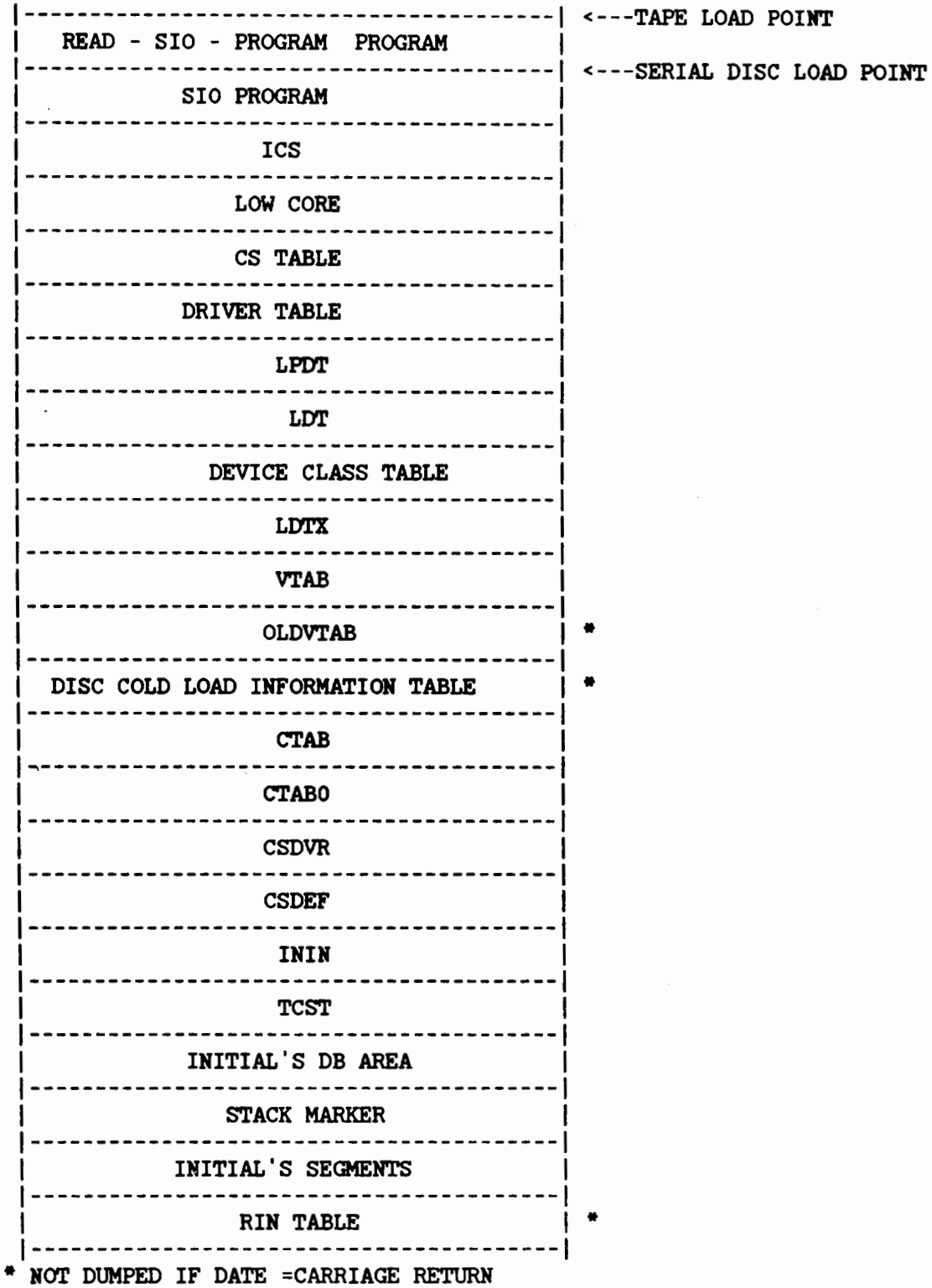


TYPICAL ENTRY FORMAT

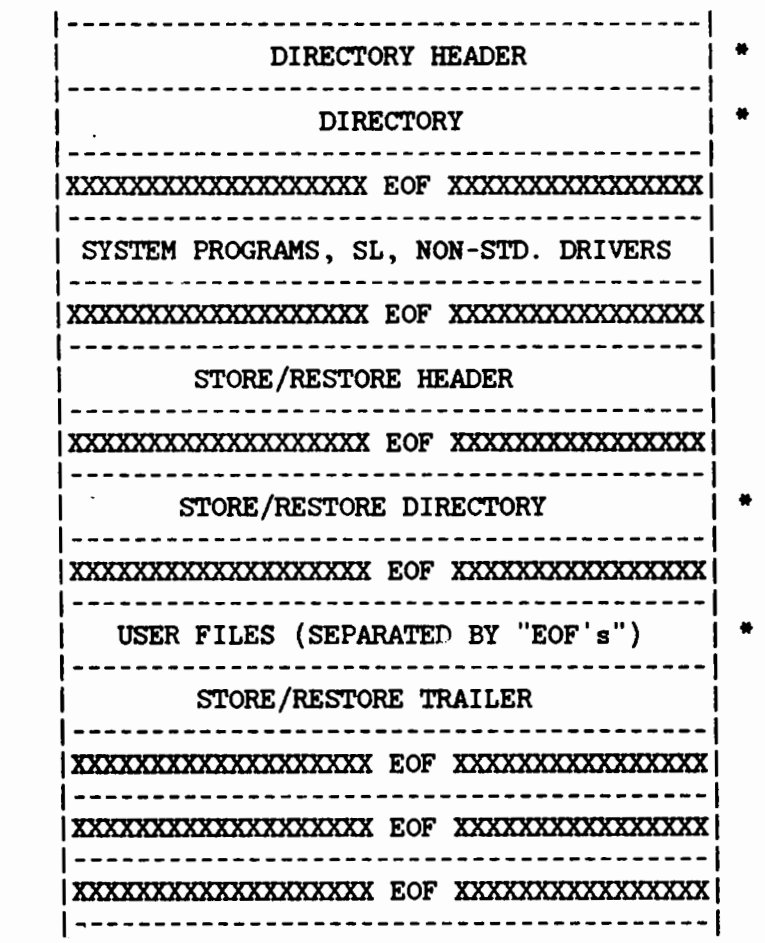
DS	DS DEVICE (if set DRT is zero)
CR	CORE RESIDENT
CHAN #	CHANNEL #
MASTER LDEV	LDEV of device which this DS device is linked to.

Words 2-6 contain the driver name.

SYSDUMP FORMAT



SYSDUMP FORMAT (CONT.)

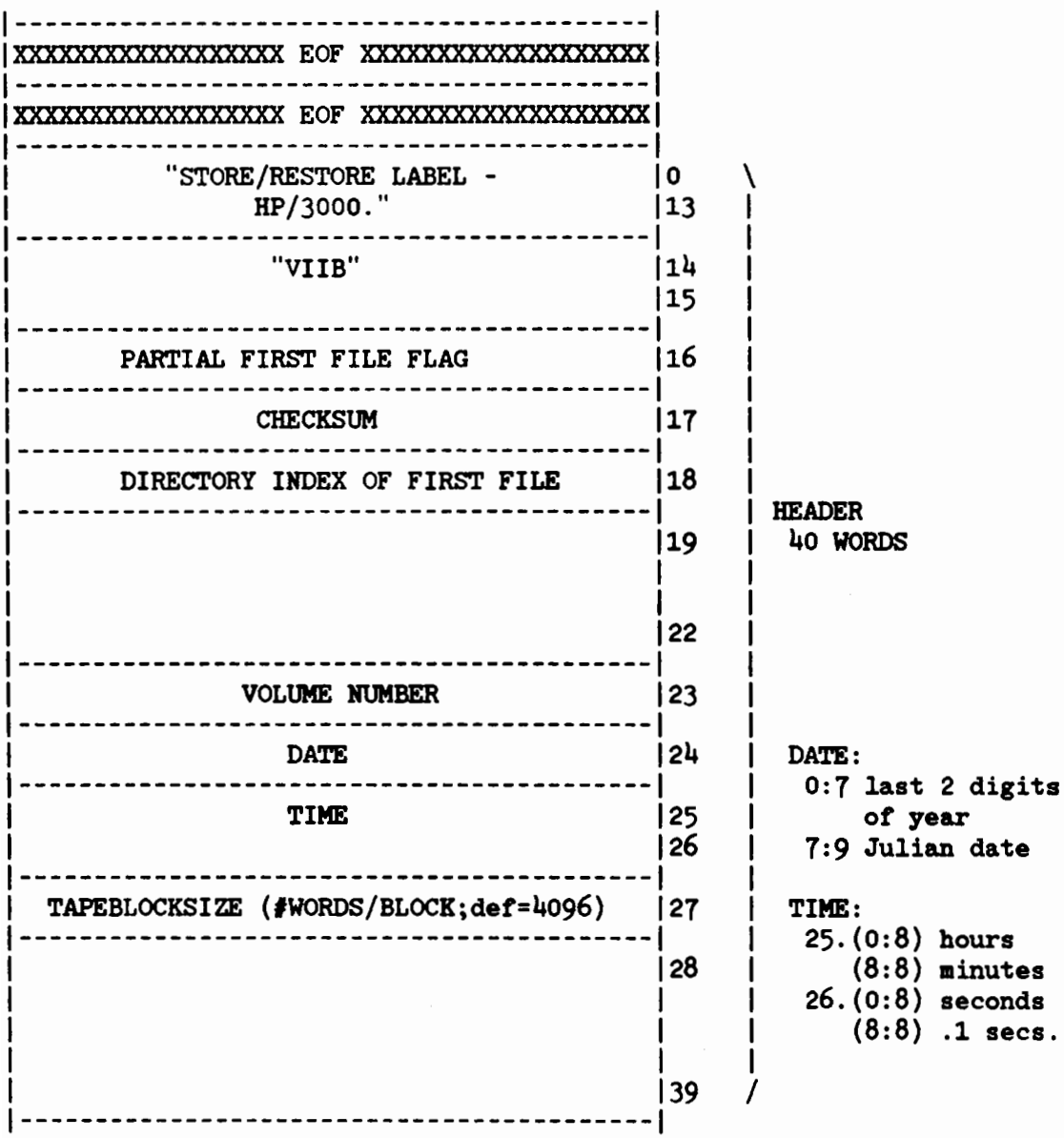


* NOT DUMPED IF DATE = CARRIAGE RETURN

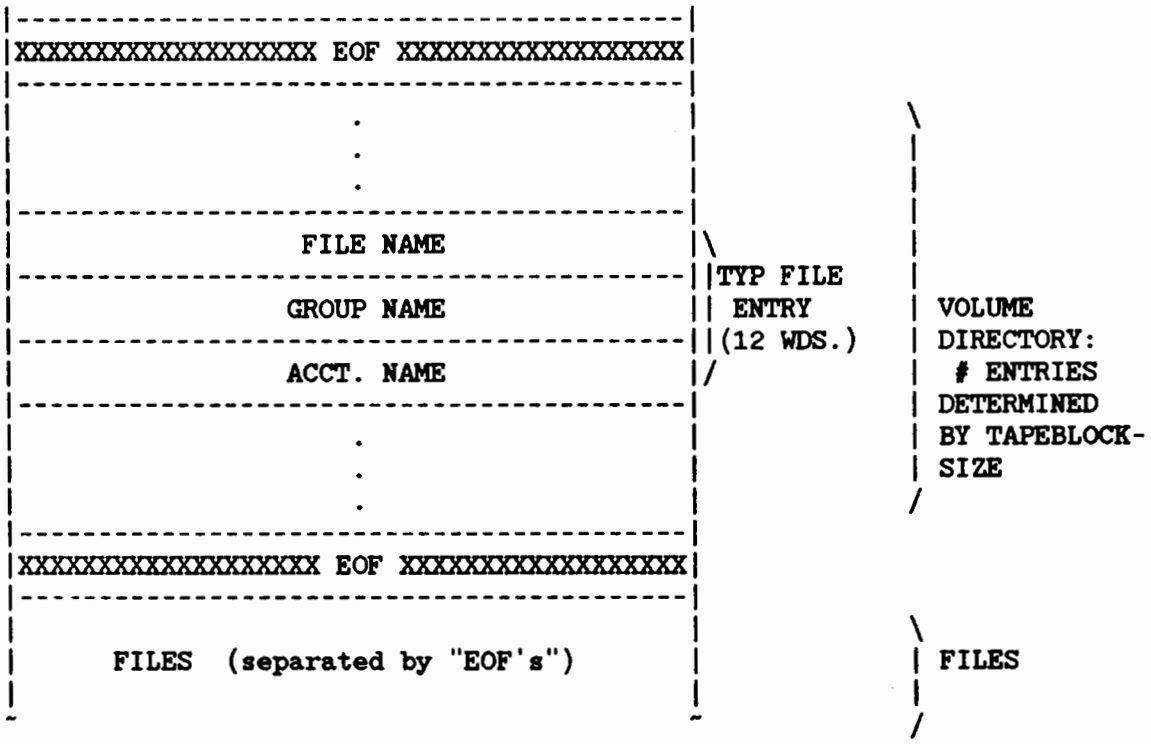
NOTE: ON DISC, READ-SIO-PROGRAM KEPT IN DISC LABEL.

STORE TAPE FORMAT

FIRST VOLUME

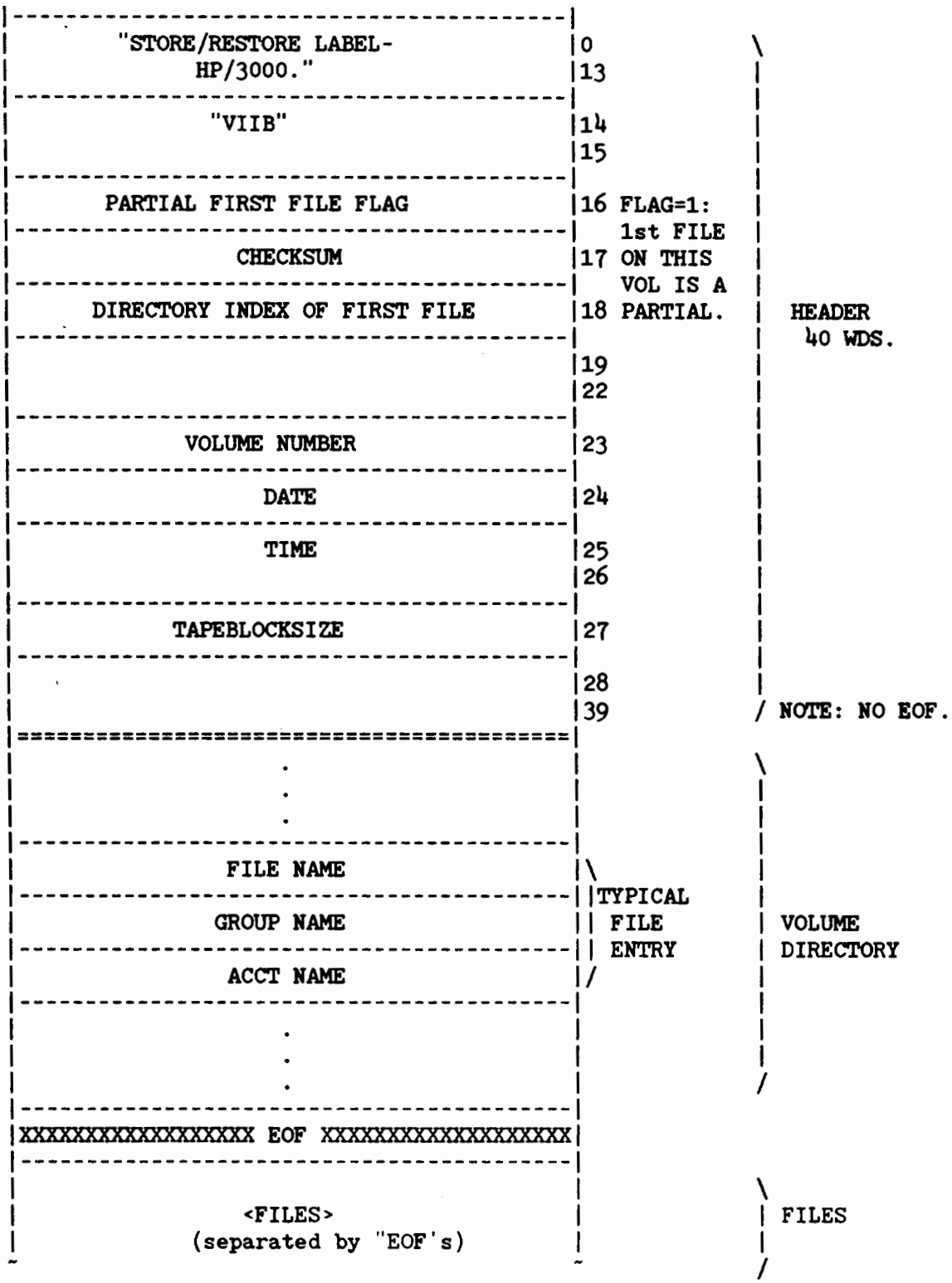


FIRST VOLUME (CONT.)



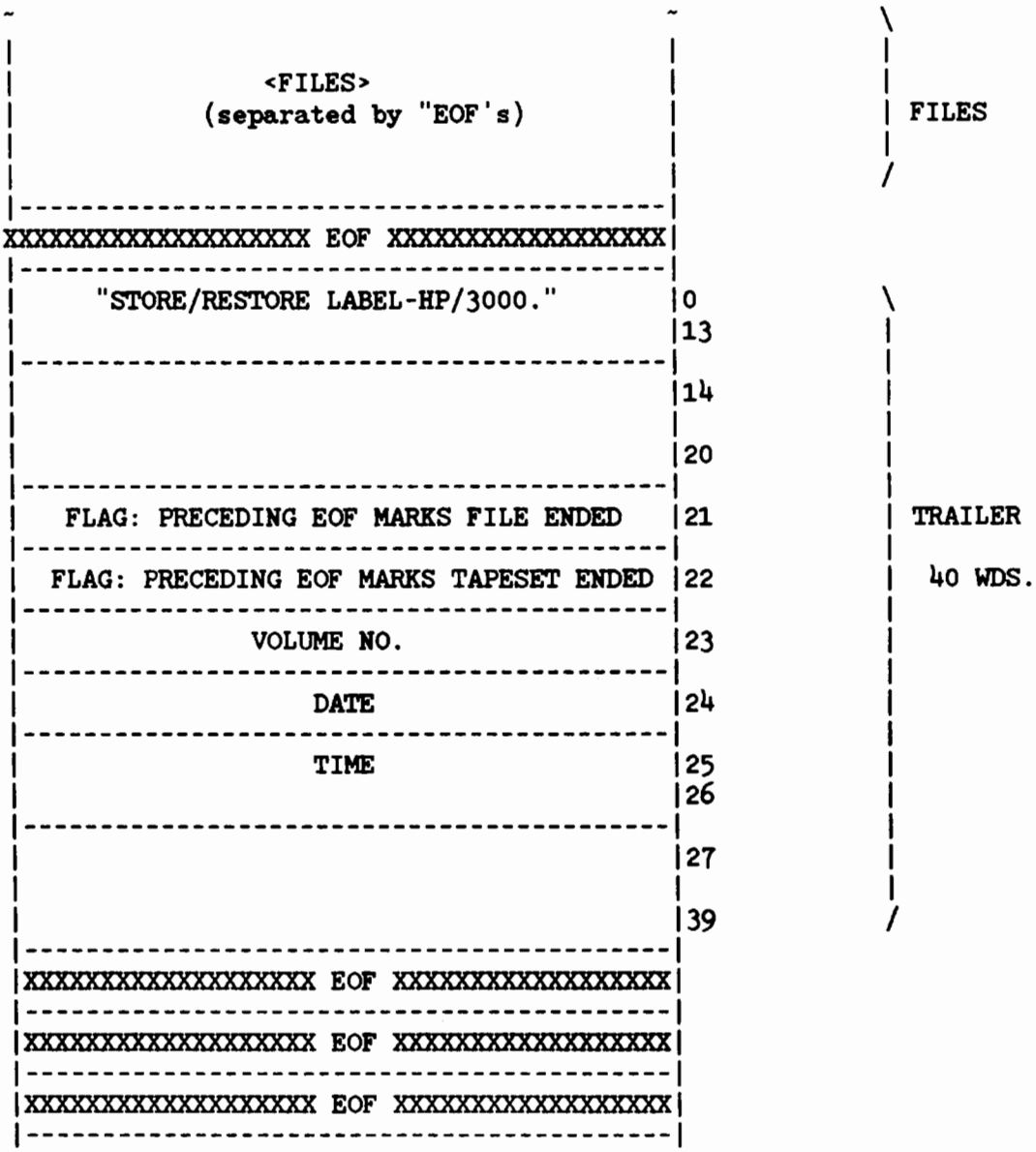
STORE FORMAT

SUBSEQUENT VOLUMES

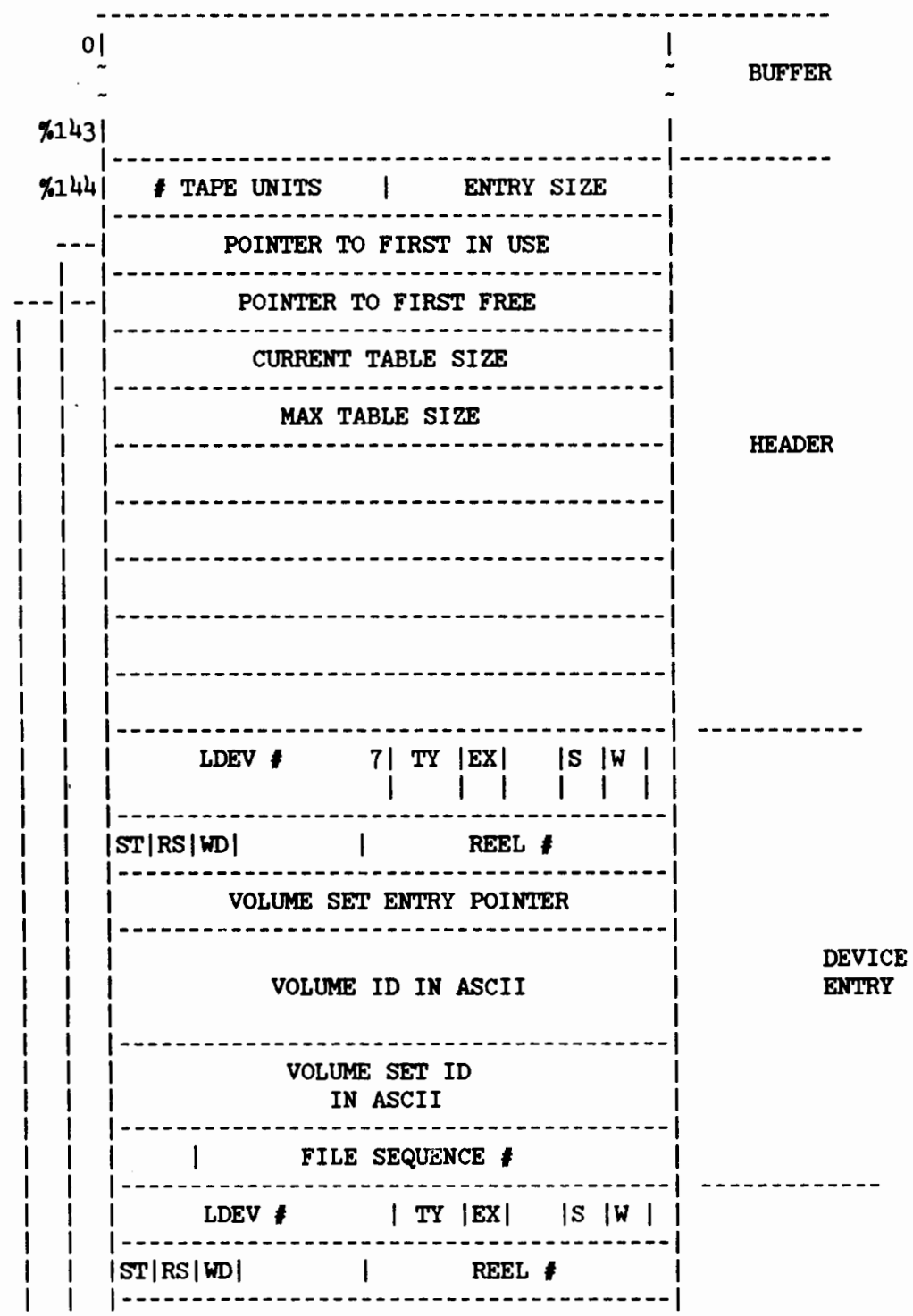


STORE FORMAT

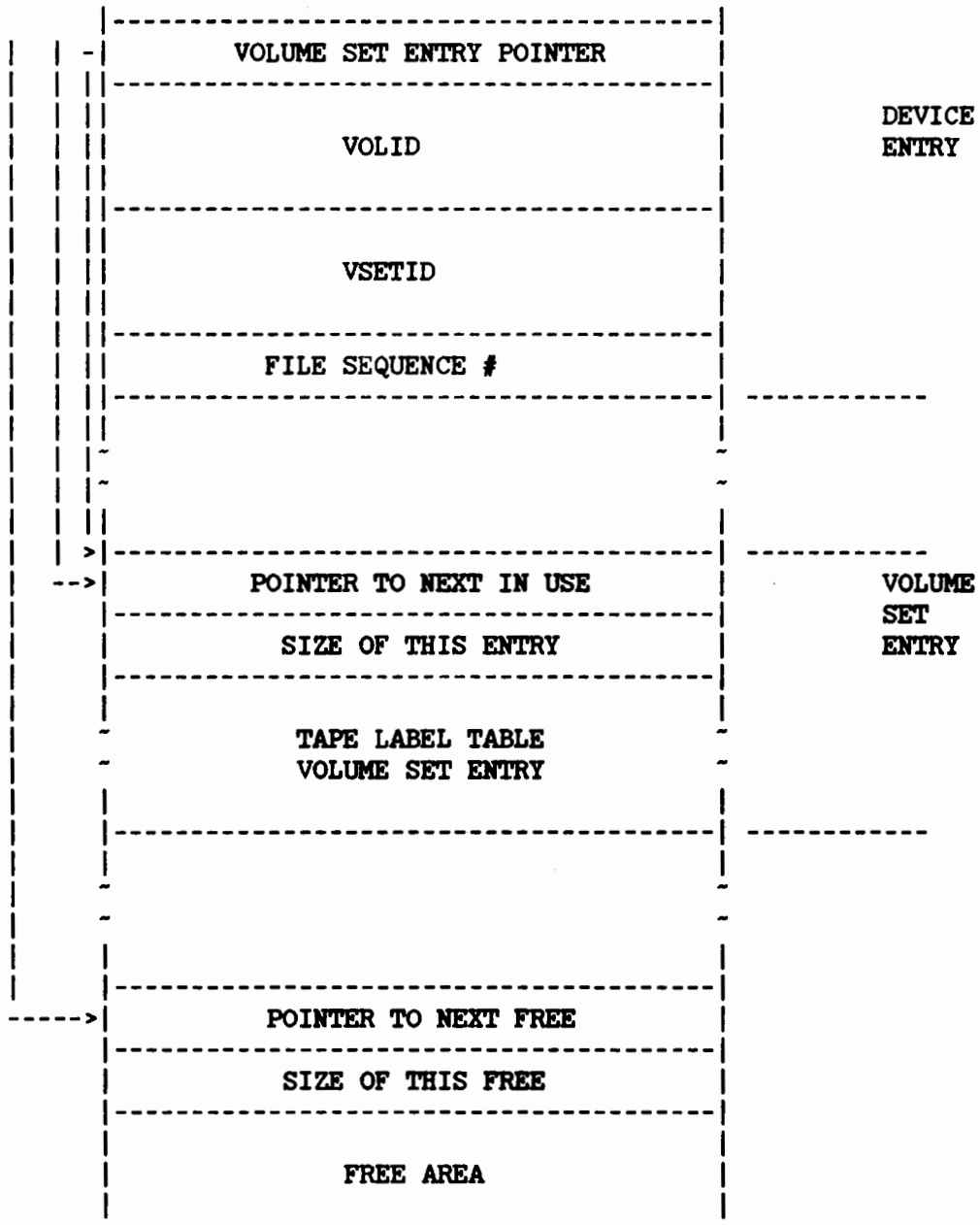
END OF VOLUME



TAPE LABEL TABLE DST 26(10)

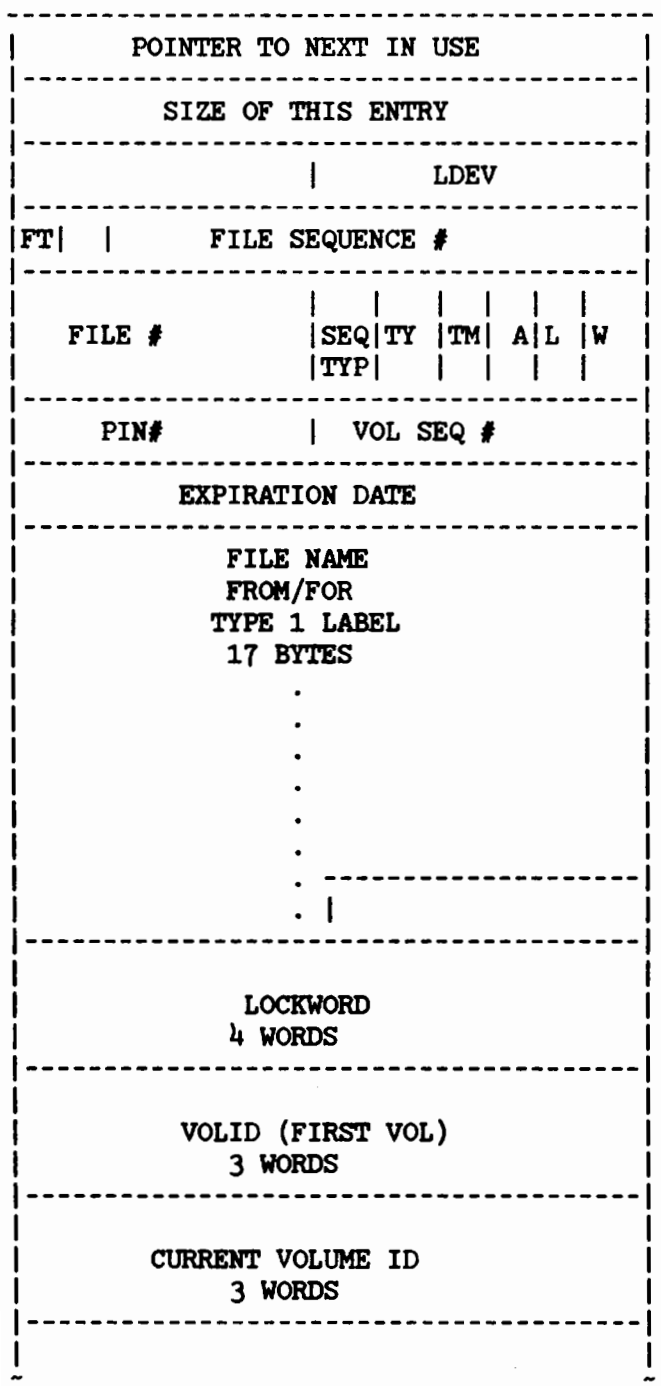


TAPE LABEL TABLE (CONT.)

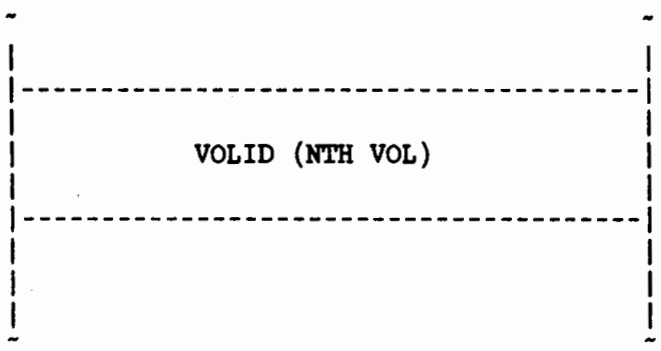


RS	- Waiting for reel switch
W	- Waiting for link to volume set entry
ST	=1, STORE TAPE
WD	=1, NEXT FILE IS DIRECTORY
EX	=1, expired tape
S	=1, file has lockword
TY	=0 no tape mounted
	=1 unlabelled tape
	=2 ANSI tape
	=3 IBM tape

TAPE LABEL TABLE VOLUME SET ENTRY



VOLUME SET ENTRY (CONT.)



FT = 1 AT LEAST 1 READ/WRITE COMPLETED
TY = 0 NO TAPE MOUNTED
= 1 UNLABELLED
= 2 ANSI
= 3 IBM

SQ TY = 0 SEARCH FOR MATCH ON FILE NAME
= 1 NEXT OR DEFAULT
= 2 ADDF
= 3 SPECIFIED FILE SEQ #

W = 1 WAITING FOR MOUNT
L = 1 WAITING TO LINK DEVICE ENTRY TO VOLUME SET ENTRY
A = 1 USER HEADER LABEL
TM = 1 USER TRAILER LABEL

BREAK POINT TABLE

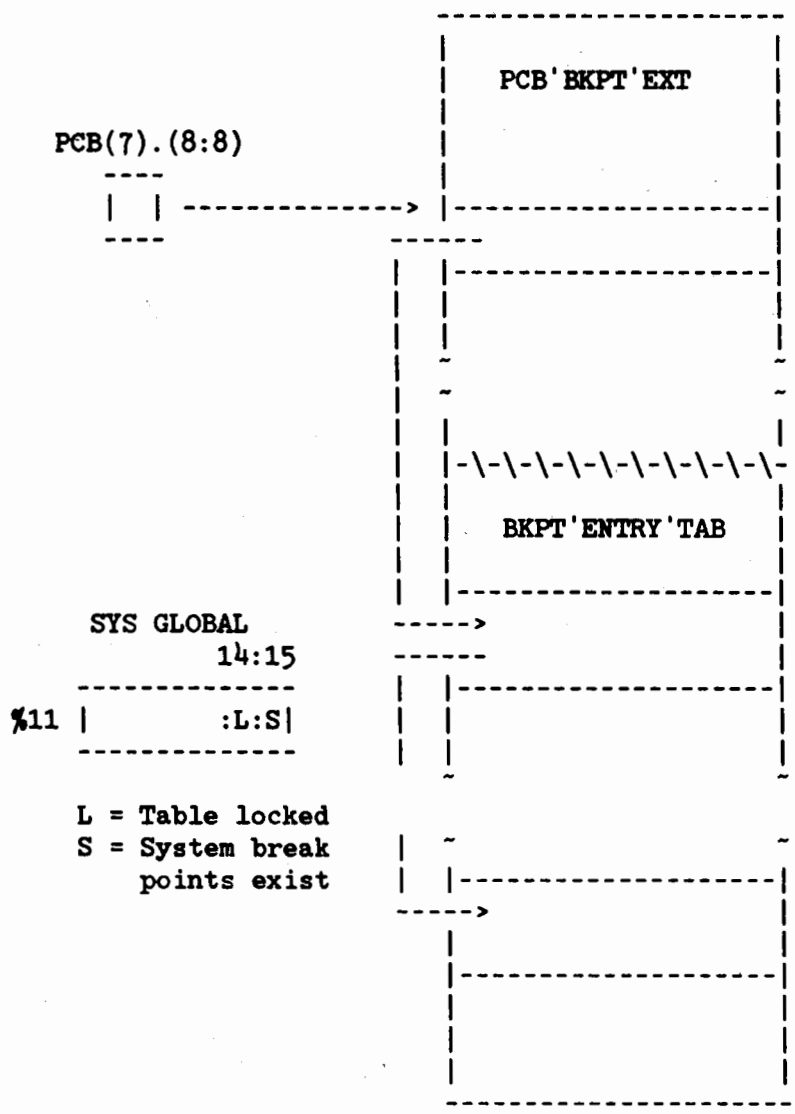
DST = 30(10) = %36

The break point table is divided into 2 sections:

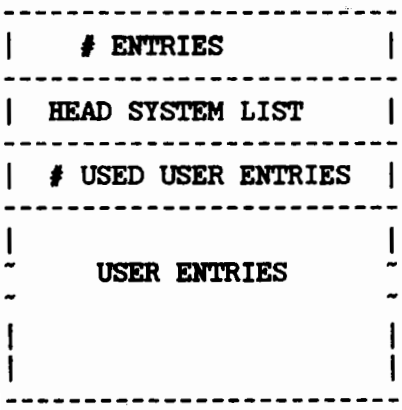
1) PCB BREAKPOINT EXTENSION TABLE (PCB'BKPT'EXT)
   This table contains the heads of the breakpoint chains

2) BREAKPOINT ENTRY TABLE (BKPT'ENTRY'TAB)
   This table contains the actual entries

General Layout



PCB BREAKPOINT EXTENSION TABLE

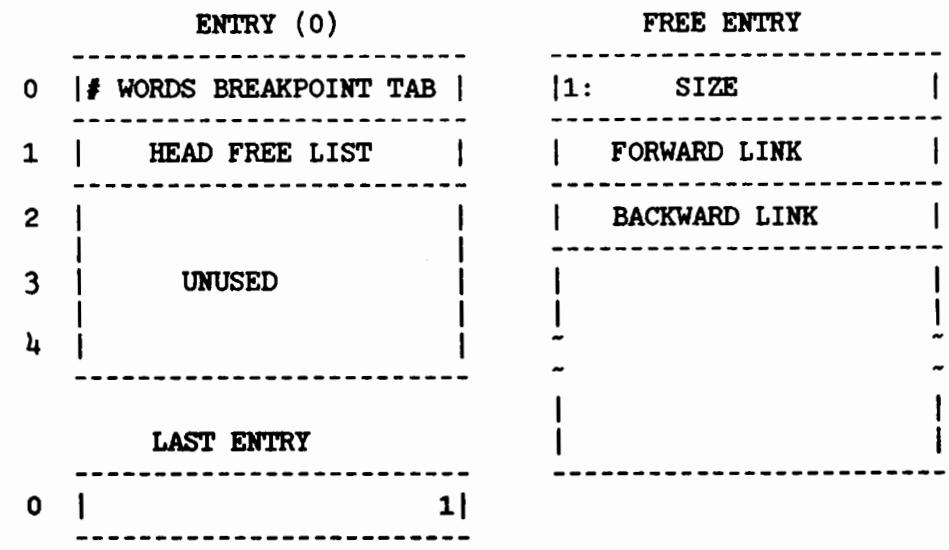


ENTRY SIZE = 1

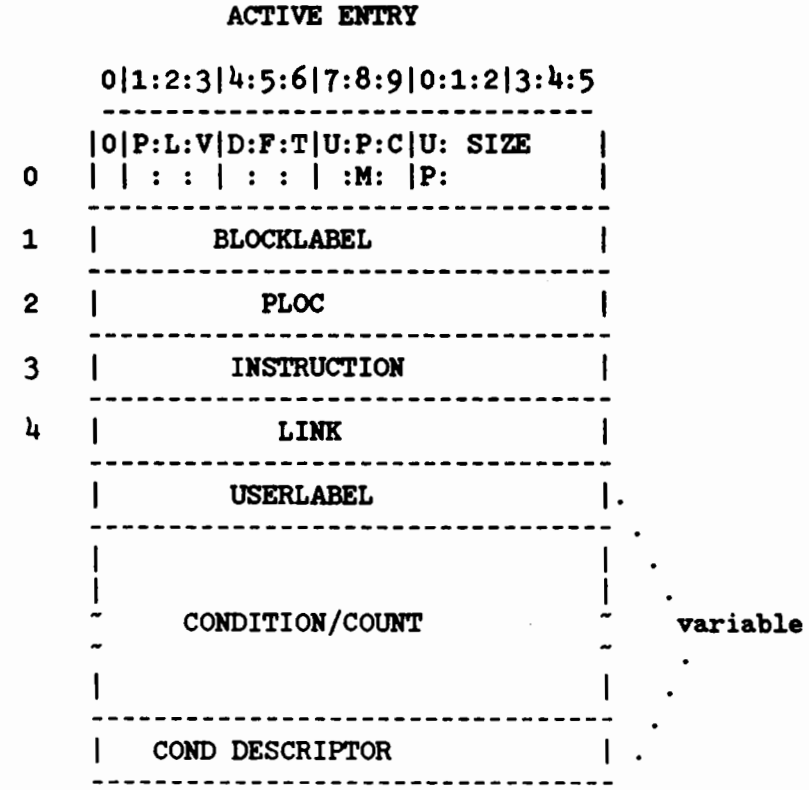
FREE ENTRY = 0

ACTIVE ENTRY = Index 1st Entry in breakpoint chain

BREAKPOINT ENTRY TABLE



The breakpoint entry table consists of variable length entries The minimum entry size is 5.



BREAKPOINT ENTRY TABLE (CONT.)

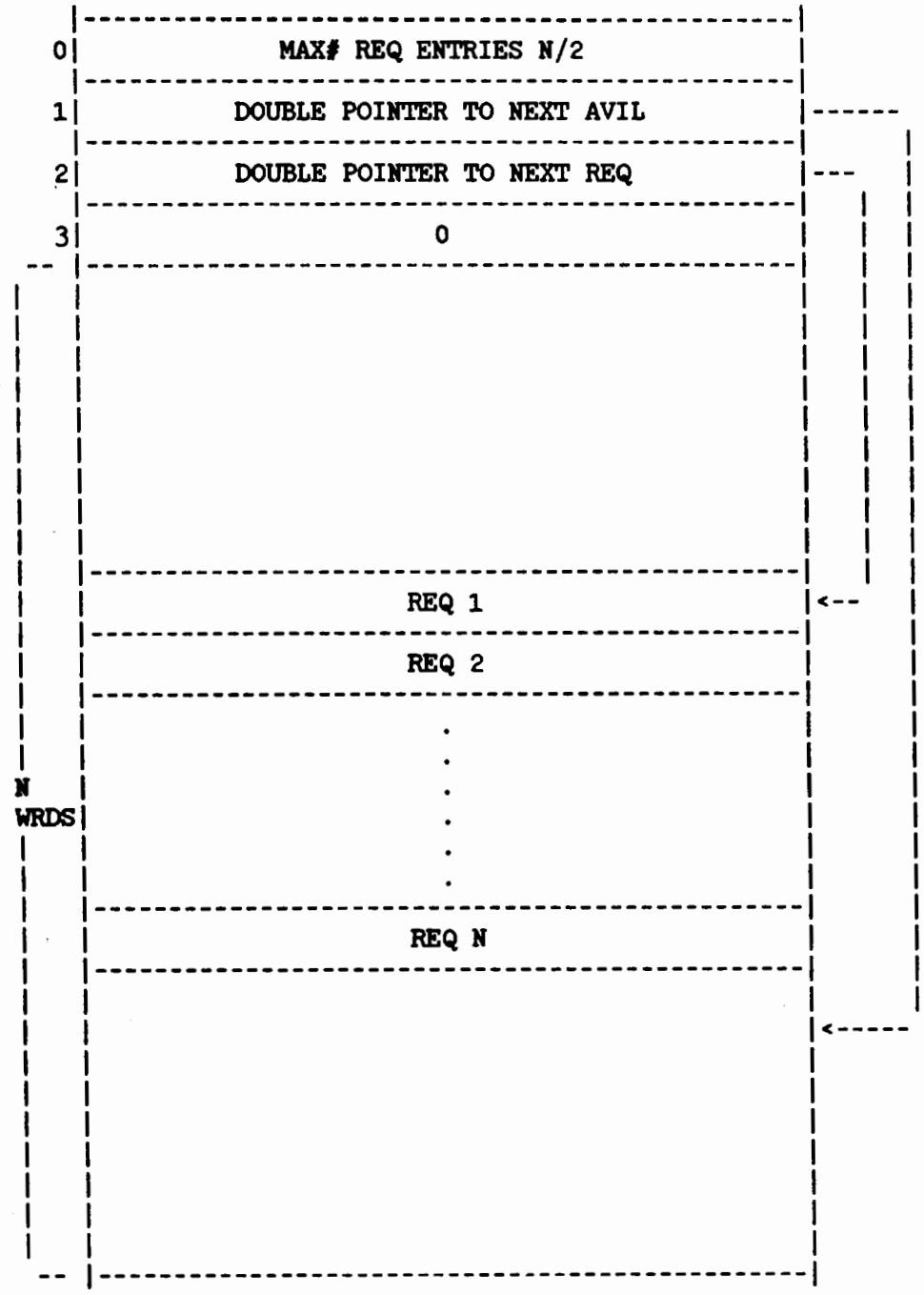
```
ENTRY(0).(0:1) = FR:     FREE ENTRY
                           1 = FREE
                           0 = USED
ENTRY(0).(1:1) = P:      PRIVILEGED MODE BREAKPOINT
                           1 = PRIV.
                           0 = NON-PRIV
ENTRY(0).(2:1) = L:      PROCESS-LOCAL BREAKPOINT
                           1 = PROCESS-LOCAL
                           0 = SYSTEM
ENTRY(0).(3:1) = V:      VALIDATION BIT
                           1 = INSTRUCTION IN ENTRY(3)
                           0 = INSTRUCTION NOT IN TAB.
ENTRY(0).(4:1) = D:      DOUBLE TRAP
                           1 = BREAKPOINT OSCILLATES BETWEEN
                               P/P+1
                           0 = NOT DOUBLE TRAP
ENTRY(0).(5:1) = F:      FAKE 'DUMMY' TRAP
                           1 = BREAKPOINT AT P+1
                           0 = BREAKPOINT AT P (ORIG. LOC)
ENTRY(0).(6:1) = T:      TWO WORD INSTRUCTION
                           1 = TWO WORD INSTRUCTION
                           0 = NOT TWO WORD INSTRUCTION
ENTRY(0).(7:1) = U:      USER LABEL PRESENT
                           1 = TRAP TO USER SUPPLIED LABEL
                           0 = TRAP TO DEBUG
ENTRY(0).(8:1) = PM:     PERMANENT BREAKPOINT
                           1 = PERM
                           0 = TEMPORARY
ENTRY(0).(9:1) = C:      CONDITION/COUNT
                           1 = CONDITION/COUNT SPECIFIED
                           0 = NO COND/COUNT
ENTRY(0).(10:1) = UP:    UPDATING
                           1 = ENTRY IN PROCESS OF BEING
                               UPDATED/REMOVED
                           0 = NOT BEING UPDATED/REMOVED
ENTRY(4) = LINK:         LINK
                           0 = END OF CHAIN
                           >0= INDEX NEXT ENTRY
```

BREAKPOINT ENTRY TABLE (CONT.)

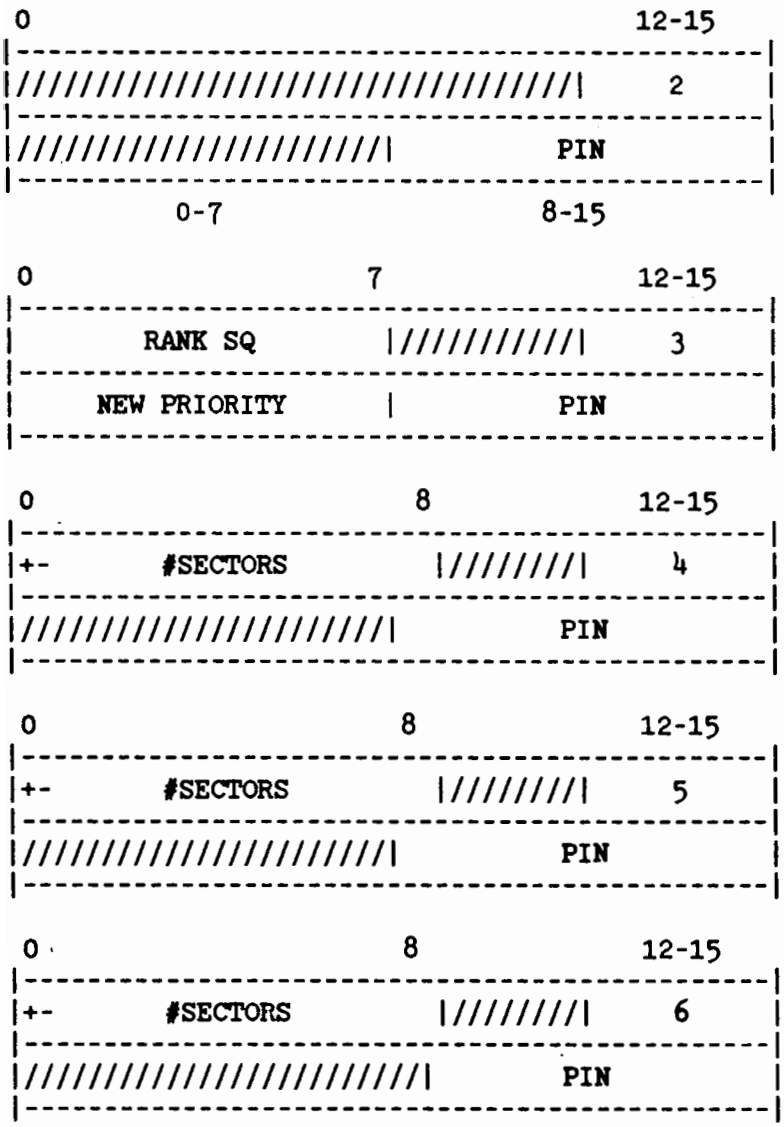
```
        COUNT                        CONDITION
    --------------------         --------------------
1)  |  ORIGINAL CNT.    |     2)  |  OPERAND1         |
    --------------------         --------------------
    |  # OF HITS        |         |  OPERAND2         |
    --------------------         --------------------
    |                1  |         |OPT1|OPt2| RELOP   |
    --------------------         --------------------
```

```
RELOP -> (8:8) RELOP NUMBER:
               3  = LT     9  = LTE
               4  = GT     10 = GTE
               5  = EQ     11 = NEQ
OPT1  -> (0:2) OPERAND1'S TYPE
OPT2  -> (2:2) OPERAND2'S TYPE

OPERAND TYPES:
   0 ->  CONSTANT (SINGLE WORD)
   1 ->  ADDRESS (DOUBLE WORD)
   3 ->  INDIRECT ADDRESS (TRIPLE WORD)

OPERAND FORMS:
   CONSTANT ->  -------------
                | CONST     |
                -------------

   ADDRESS  ->  -------------
                | REG | BASE|
                -------------
                |  OFFSET   |
                -------------
                |IND. OFFSET|   (TYPE 3 ONLY)
                -------------

   REG      ->  (0:6) CORRESPONDING INDEX INTO 'REGY':
                      3  = A     10 = DL
                      4  = SY    11 = Q
                      7  = DA    12 = S
                      8  = DX    17 = EA
                      9  = DB
   BASE     ->  (6:10) SEG #/BANK #
```

UCOP REQUEST QUEUE (DST#9)



UCOP ENTRY FORMAT

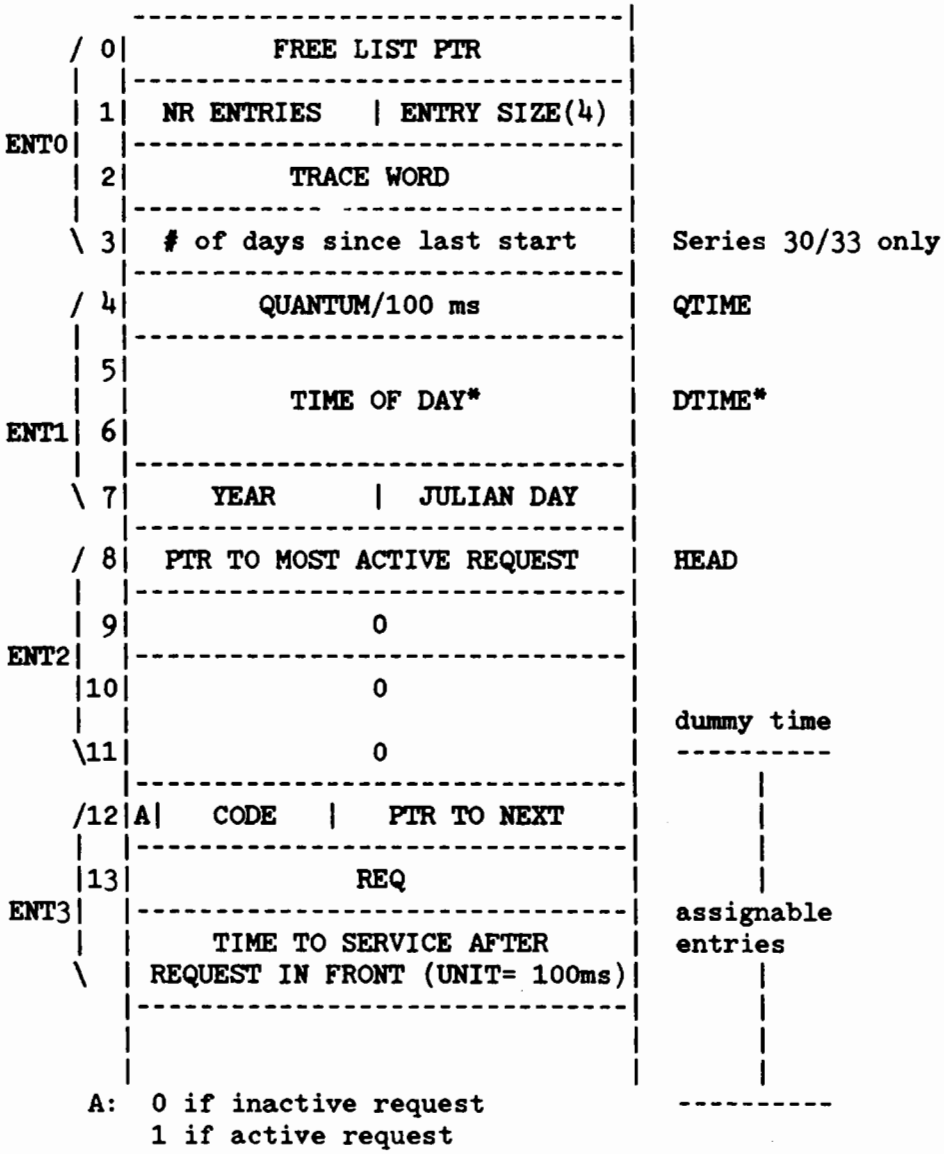


Request Codes

0 null
1 null
2 process deletion
3 priority change
4 DL change
5 Z change
6 PCBX size change

TIMER REQUEST LIST (TRL)

The system clock interrupts every 100 ms, with the CR being automatically cleared. An exception is the Shared Clock Interface measurement service which allows rates as fast as 5 ms. The interrupt handler is the procedure TICK. On entry, DB is pointing to the base of timer request list. Besides timeout requests, the clock also controls time slicing.



CODE & REQ indicate the type of request.

CODE:	REQ:	TYPE:
0	DITP	Hangup
1	DITP	Carrier failure
2	DITP	202 turnaround
3	DITP	Read
4	DITP	Logon
5	PCBB index to process	Delay
6	DITP	LP not ready
7	DITP	2640

The list of pending requests is kept ordered by time with later entries at the tail.

%20-%37	DITP	SIO device timeout: DIT8. (code_1 on expiration, cleared on Timereq.
%5/%6	*DTIME	For Series 30/33, DTIME is # of TICS (0.091457 ms) since last midnight.

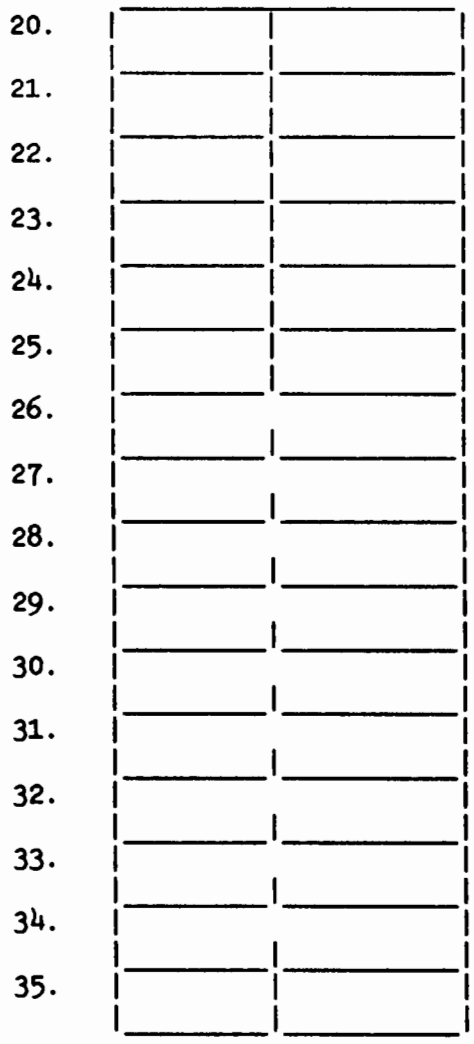
USER LOGGING TABLE

ENTRY SIZE = 36
DST %33

FIRST ENTRY

0.	NUMBER OF ENTRIES	
1.	FREE ENTRY HEAD PT.	
2.	INUSE ENTRY HEAD PT.	
3.	NEXT BUFFER NUMBER	
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		

USER LOGGING TABLE (CONT)



NUMENTRIES	=	LOGTAB
FREE	=	LOGTAB(1)
INUSE	=	LOGTAB(2)
BUFNUM	=	LOGTAB(3)

NUMENTRIES
The number of entries in the logging table.

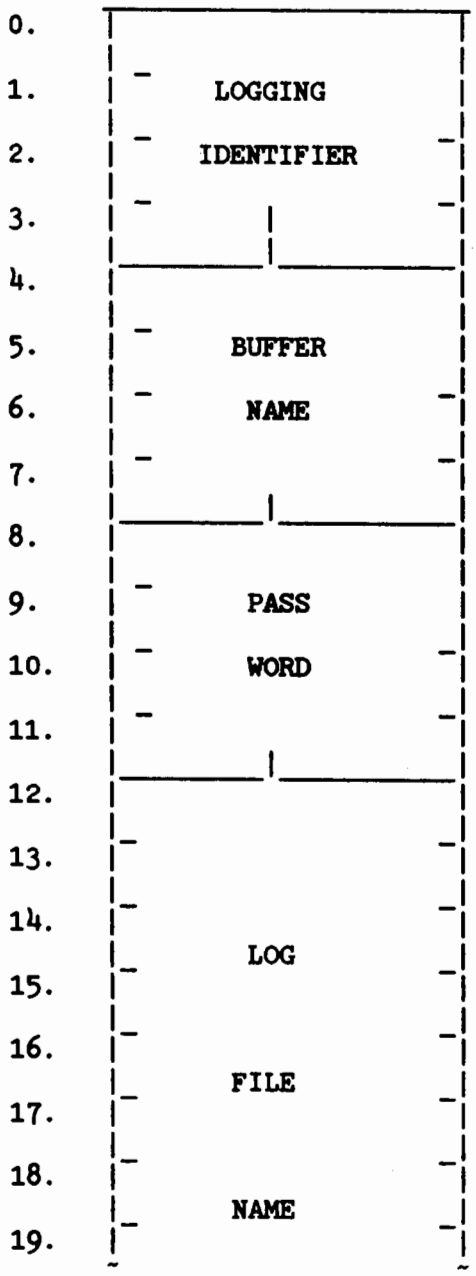
FREE
A table relative pointer to the first free entry in the logging table.

INUSE
A table relative pointer to the first entry in the logging table that is being used.

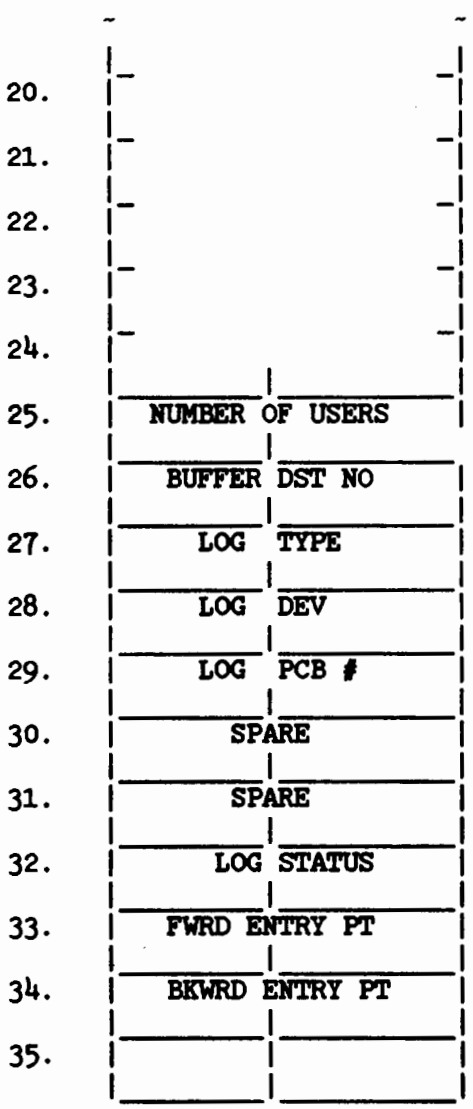
BUFNUM
The number of the buffer associated with this logging process.

USER LOGGING TABLE (CONT)

TYPICAL ENTRY



USER LOGGING TABLE (CONT)



```
TABINDEX
TABINDEX            =       WORD INDEX TO CURRENT ENTRY
BTABINDEX           =       BYTE INDEX TO CURRENT ENTRY
DTABINDEX           =       DOUBLE INDEX TO CURRENT ENTRY

LGNAME              =       BTABINDEX
BNAME               =       BTABINDEX+8
PWORD               =       BTABINDEX+16
LFGROUP             =       BTABINDEX+32
LFACCT              =       TABINDEX+40
NUMUSERS            =       TABINDEX+24
DST                 =       TABINDEX+25
LGTYPE              =       TABINDEX+27
0  =  TAPE
1  =  DISC
LGDEV               =       TABINDEX+28
PIN                 =       TABINDEX+29
STATUS              =       TABINDEX+26
ACT  =   1
INACT =  0
RECOVERING =   2
NEXT                =       TABINDEX+36
PREV                =       TABINDEX+37
```

LGNAME
The name of the logging process (logging identifier).

BNAME
The name of the disc buffer used if the logging process destination file is a tape file. This is a file that resides in PUB.SYS. The format of the name is ULOGxxxx where xxxx is the buffer number padded on the left with zeroes.

PWORD
The password of the logging identifier.

LFGROUP
The group that the destination logging file resides in if the file is a disc file.

LFACCT
The account that the destination logging file resides in if the file is a disc file.

NUMUSERS
The number of users currently accessing the logging file.

DST
The dst number of the logging data segment.

LGTYPE
The type of destination file of the logging process. Either disc or tape.

LGDEV
The logical device number of the destination file.

PIN
The process identification number for the logging process.

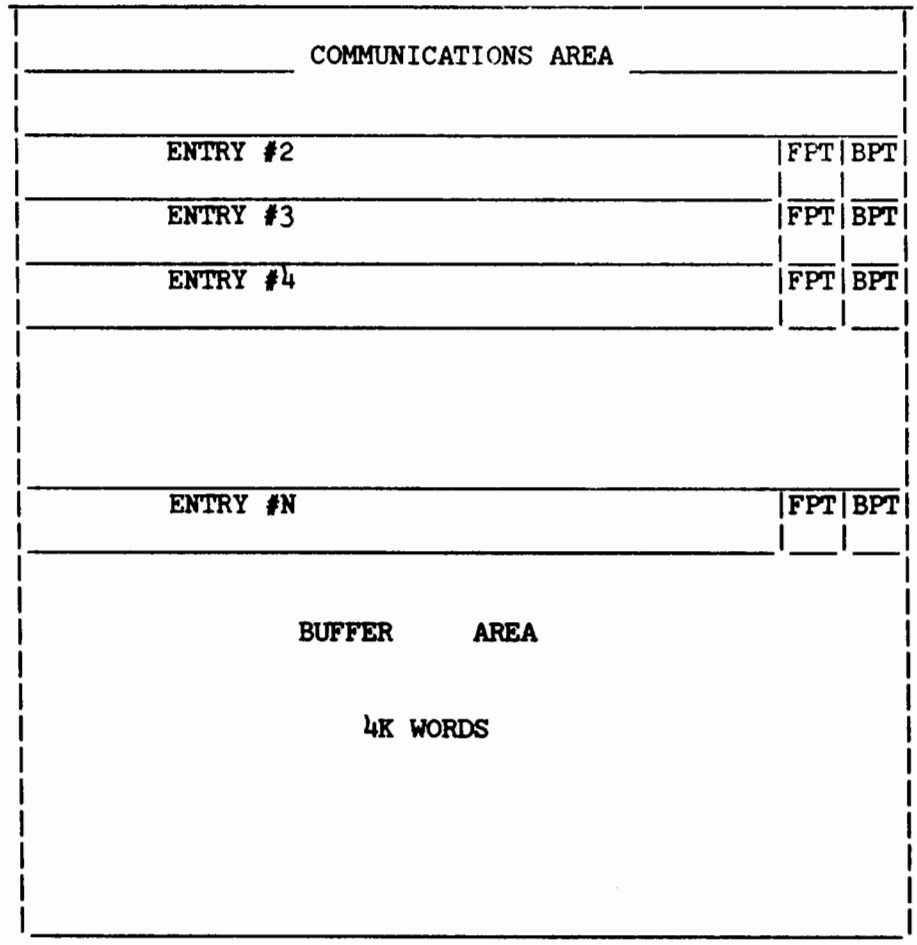
STATUS
The status of the logging process

NEXT
A table relative pointer to the next entry in the logging table.

PREV
A table relative pointer to the previous entry in the logging table.

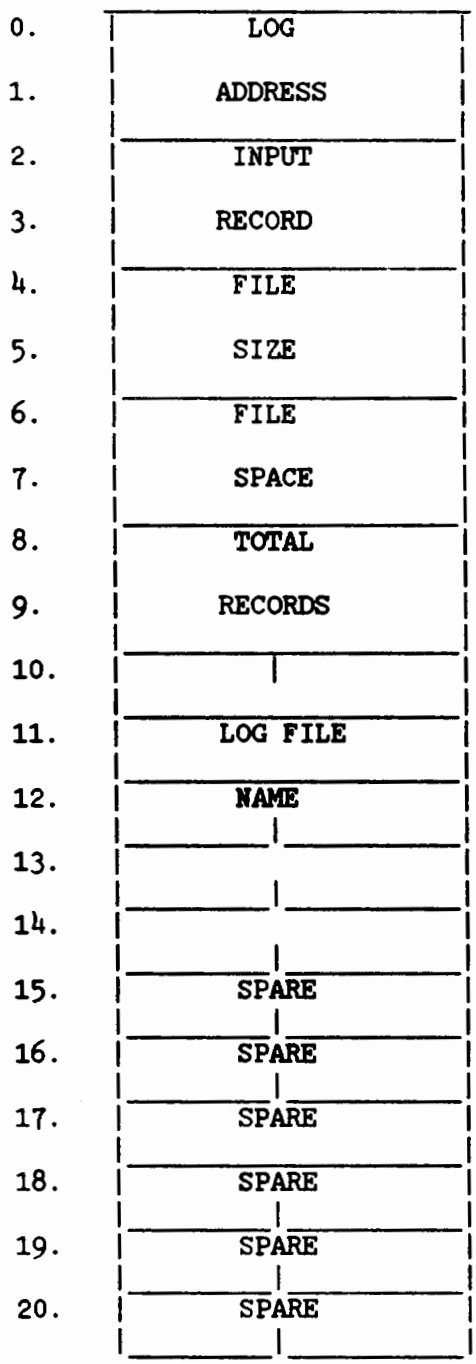
USER LOGGING BUFFER

ENTRY SIZE = 25

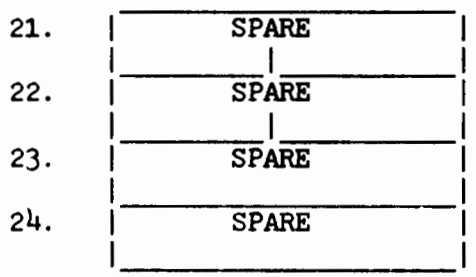


USER LOGGING BUFFER (CONT)

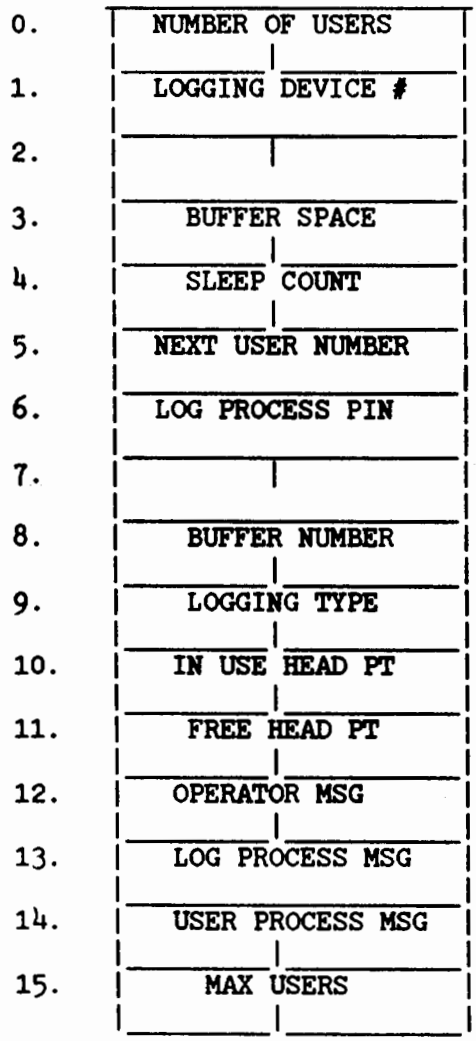
ENTRY #0



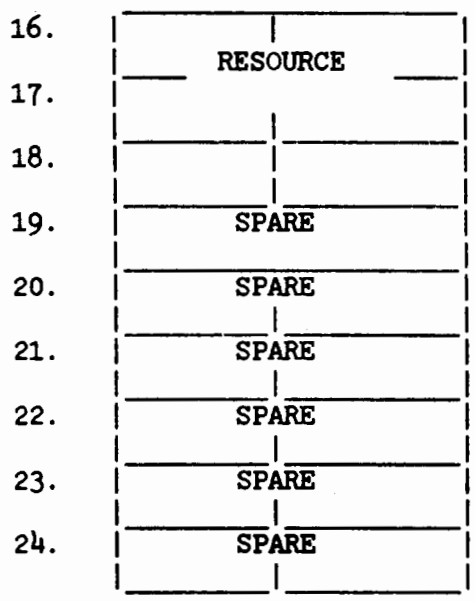
USER LOGGING BUFFER (CONT)



ENTRY #1



USER LOGGING BUFFER (CONT)



WORD ENTRIES

LOGADDR	=	LOGBUFF(0)
LOGTYPE	=	LOGBUFF(23)
DISC = 0		
TAPE = 1		
STATE	=	LOGBUFF(23)
NUMUSERS	=	LOGBUFF(25)
LOGDEV	=	LOGBUFF(26)
BSPACE	=	LOGBUFF(28)
BNUM	=	LOGBUFF(33)
SLPCT	=	LOGBUFF(29)
USERNO	=	LOGBUFF(30)
LOGPIN	=	LOGBUFF(31)
TYPE	=	LOGBUFF(34)
UHEAD	=	LOGBUFF(35)
FHEAD	=	LOGBUFF(36)
MSG	=	LOGBUFF(37)
INMSG	=	LOGBUFF(39)
OUTMSG	=	LOGBUFF(38)
MAXUSERS	=	LOGBUFF(40)

DOUBLE ENTRIES

INBUFREC	=	DLOGBUFF(1)
FSIZE	=	DLOGBUFF(2)
FSPACE	=	DLOGBUFF(3)
TRECS	=	DLOGBUFF(4)
RESOURCE	=	DLOGBUFF(21)

BYTE ENTRIES

LOGFILENAME	=	BLOGBUFF(20)

LOGADDR
The disc address of the logging destination file if the file is on disc. If the file is on tape, this is the disc address of the disc buffer for the file.

INBUFREC
The record number of the next block to be written to the logging destination file or the disc logging buffer for tape file.

LOGTYPE
The type of destination file for the logging process. This can be disc or tape.

STATE
The state of the user process accessing the logging file. This can be either active or inactive.

NUMUSERS
The number of users currently accessing the logging file.

LOGDEV
The logical device number of the destination logging file.

FSIZE
The current extent size of the logging destination file or disc logging buffer file for tape destination files.

BSPACE
The amount of space in records that remains in the memory logging buffer.

BNUM
The buffer number of the disc buffer for tape destination logging files.

FSPACE
The space in records that remains in the current extent of the disc logging destination file or disc buffer for tape destination files.

SLPCT
The number of users accessing the logging file that are waiting to be activated by the logging process.

USERNO
The next sequential number to be assigned users accessing the system.

LOGPIN
The process identification number for the logging process that services request for this logging file.

LOGFILENAME

TRECS
The total number of records written to the logging destination file.

UHEAD
A table relative pointer to the first entry into the logging data segment

FHEAD
A table relative pointer to the first free entry in the logging data segment.

MSG
A message word for messages coming from the operator.

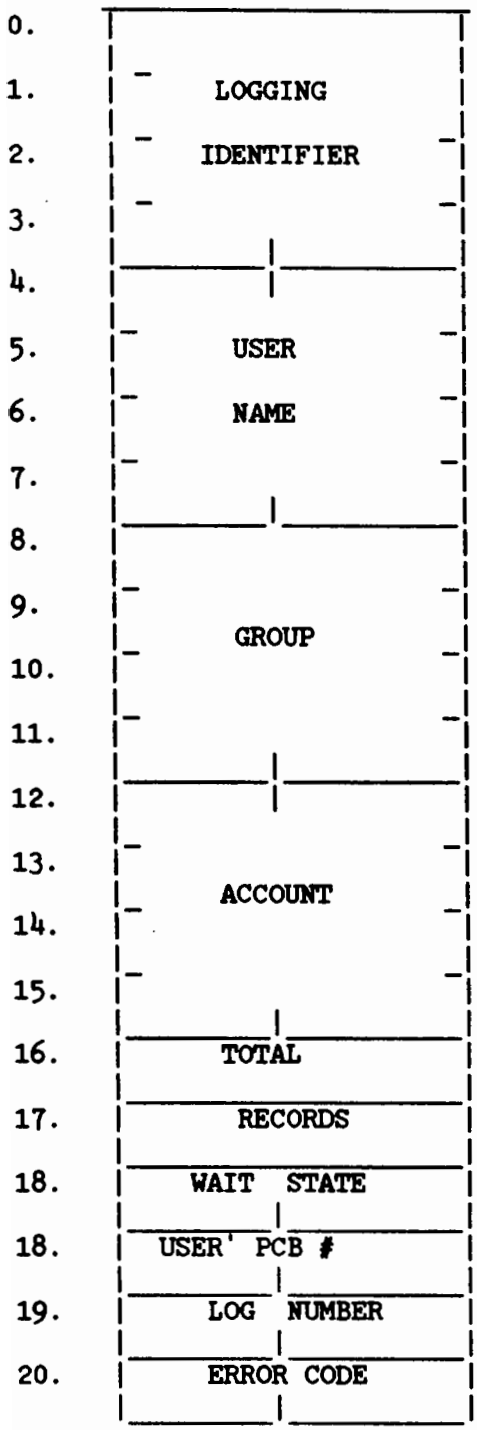
INMSG
A message word for messages coming from the user process.

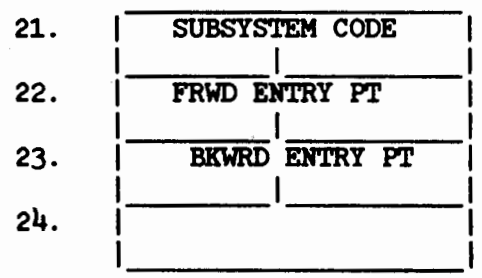
OUTMSG
A message word for sending messages to the user process.

RESOURCE
A double word used for resource management through the procedures obtain and release.

MAXUSERS
The maximum number of users allowed to access the logging file.

TYPICAL LOGBUFF ENTRY





BINDEX	=	BYTE INDEX TO CURRENT ENTRY
INDEX	=	WORD INDEX TO CURRENT ENTRY
DINDEX	=	DOUBLE INDEX TO CURRENT ENTRY
LOGID	=	BINDEX
USER	=	BINDEX+8
GROUP	=	BINDEX+16
ACCT	=	BINDEX+24
RECS	=	DINDEX+8
WSTATE	=	INDEX+18
0 = INACT		
1 = ACT		
UPIN	=	INDEX+19
LGNUM	=	INDEX+20
ERROR	=	INDEX+21
SCODE	=	INDEX+22
NENTRY	=	INDEX+23
PENTRY	=	INDEXT+24

LOGID
The name of the logging identifier for the logging process.

USER
The name of the user who opened the logging file through this entry.

GROUP
The group of the user who open the logging file.

TYPICAL LOGBUFF ENTRY (CONT)

ACCT
The account of the user who open the logging file.

RECS
The number of records written by this user.

WSTATE
The wait status of the users process. This is either waiting or not waiting

UPIN
The process identification number for the user's process.

LGNUM
The logging number assigned to the user.

ERROR
Used to hold error information for this user.

SCODE
The subsystem code for the caller. This applies only to privleged callers.

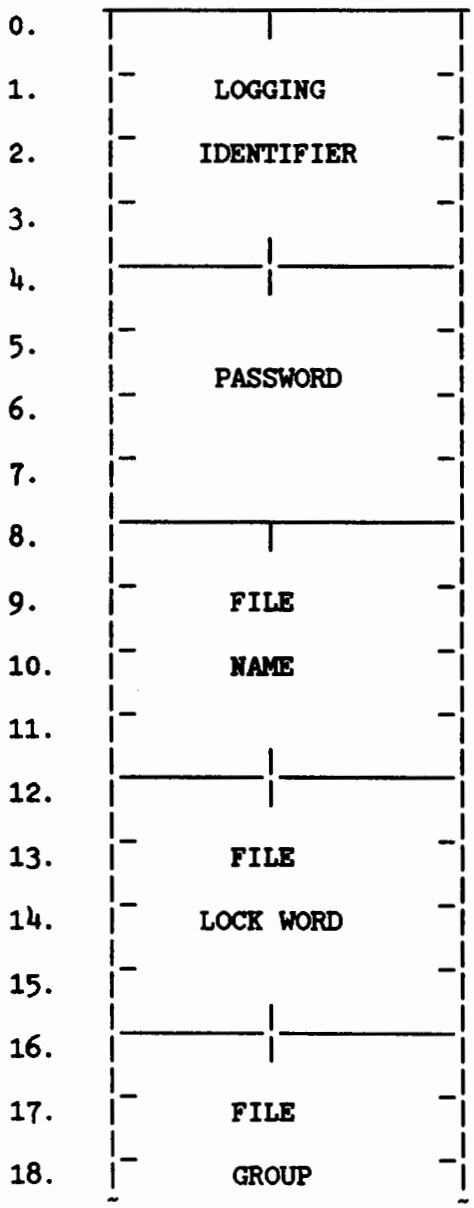
NENTRY
A table relative pointer to the next entry in the logging data segment .

PENTRY
A table relative pointer to the previous entry in the logging data segment.

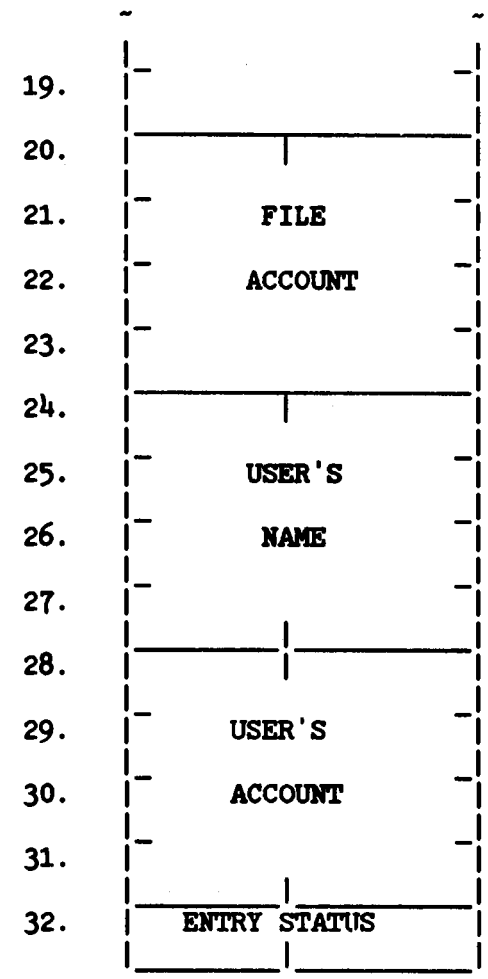
LOGGING IDENTIFIER TABLE

ENTRY SIZE = 33
DST %41

ENTRY #0



LOGID TABLE (CONT)



WORD ENTRIES

NENTRIES	=	LIDTAB(0)
MENTRIES	=	LIDTAB(1)
FENTRIES	=	LIDTAB(2)

BYTE ENTRIES

LID	=	BLIDTAB
PW	=	BLIDTAB(8)
FNAME	=	BLIDTAB(16)
LW	=	BLIDTAB(24)
FGROUP	=	BLIDTAB(32)
FACCT	=	BLIDTAB(40)
UNAME	=	BLIDTAB(48)
UACCT	=	BLIDTAB(56)

NENTRIES
The number of entries in the table.

MENTRIES
The maximun number of entries in the table.

FENTRIES
The number of free entries in the table.

LID
The logging identifier name. This is a maximum of eight characters long.

PW
The pass word for the logging identifier. This is a maximun of eight characters long.

FNAME
The name of the destination file.

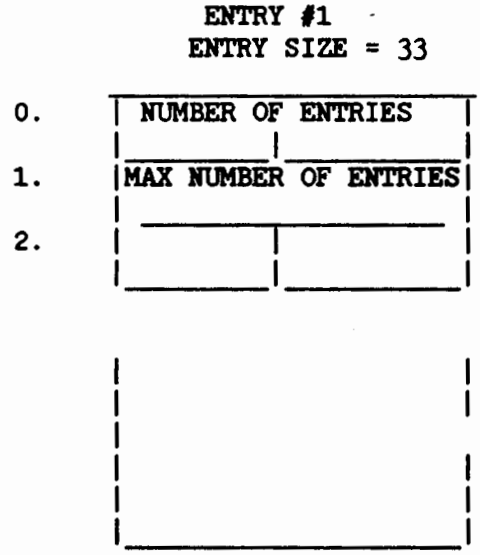
LW
The lock word on the destination file if the file is on disc.

FGROUP
The group that the file resides in.

FACCT
The account that the destination file resides in.

UNAME
The name of the user who created the logging identifier.

UACCT
The account of the user who created the logging identifier.



DOUBLE ENTRIES

NENTRIES	=	DLIDTAB(0)
MENTRIES	=	DLIDTAB(1)

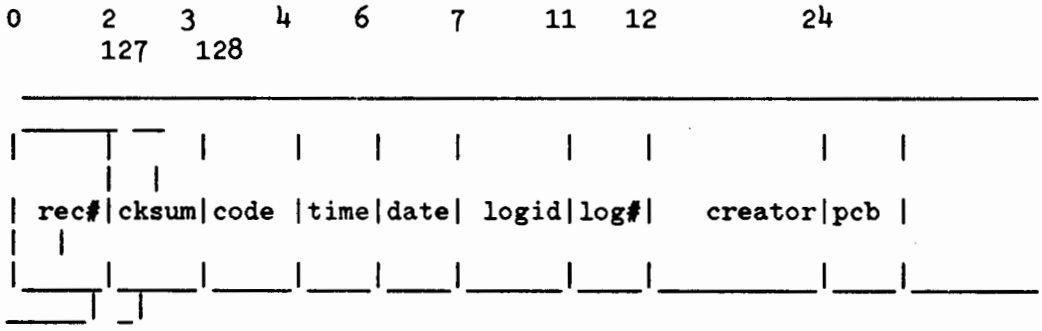
NENTRIES
The number of entries in the table.

MENTRIES
The maximum number of entries in the table.

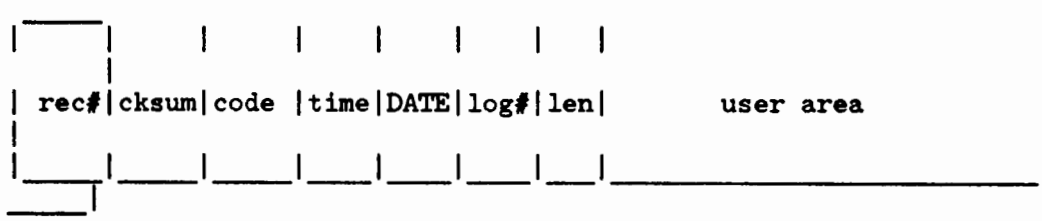
LOGGING RECORD FORMAT

RECORD SIZE = 128 WORDS
USER AREA = 117 WORDS

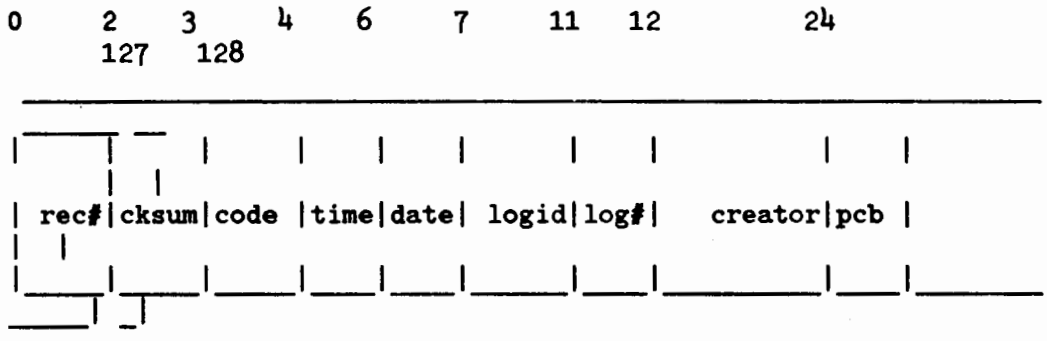
LOG RECORD AT OPENLOG



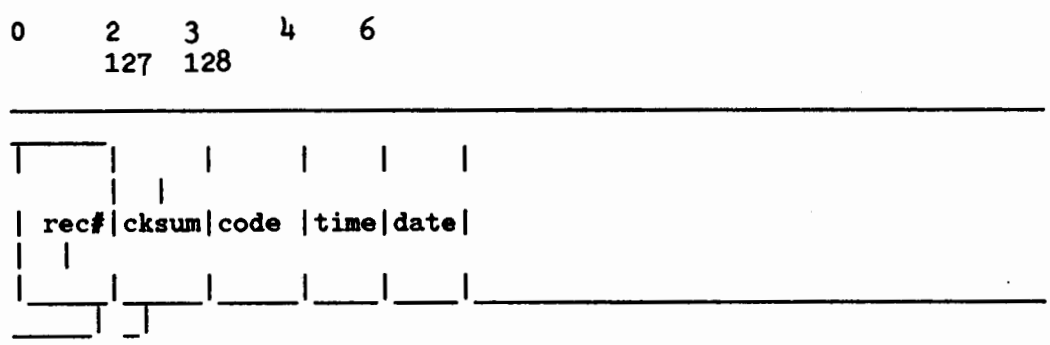
USER OR SUBSYSTEM/CONTINUATION LOG RECORD



LOG RECORD AT CLOSELOG

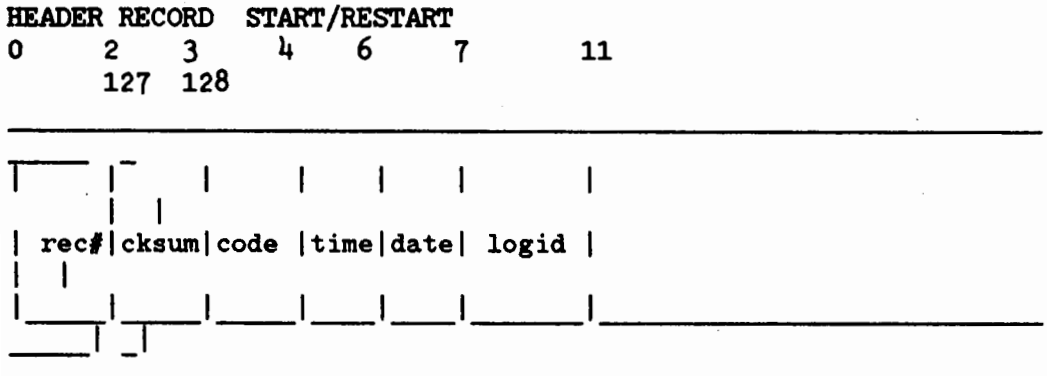


CRASH MARK

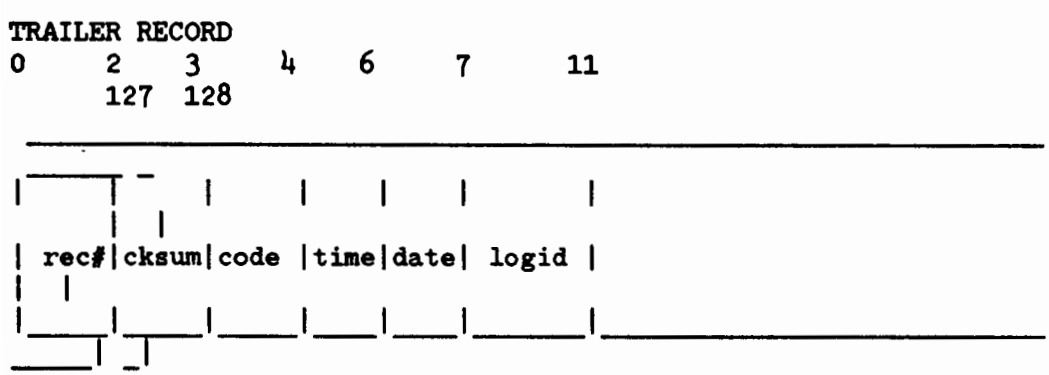


LOG RECORD FORMAT (CONT)

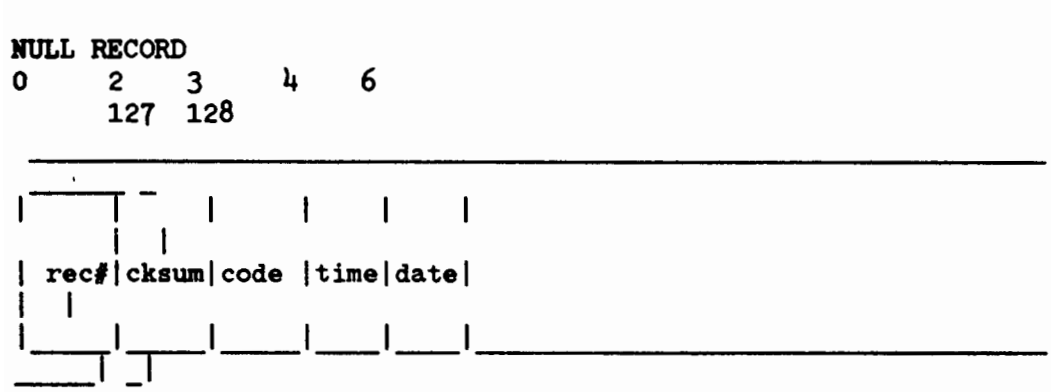
HEADER RECORD START/RESTART



TRAILER RECORD



NULL RECORD



CODE DEFINITION

CODE=1	OPEN LOG
2	USER/SUBSYSTEM RECORD
3	CLOSE LOG
4	HEADER
5	TRAILER
6	RESTART
7	CONTINUATION OF USER OR SUBSYSTEM RECORD
9	CRASH MARKER
SPACE	NULL RECORD

NOTE:

1. The checksum algorithm uses the exclusive or function against a base of negative one.

2. Null record is used for filler.

3. The code word of the logging record can contain a subsystem code defined by the user in the first half of the word (0:8). User logging allows privileged users to pass this code in the index parameter of the Open Log intrinsic.

MEASINFOTAB DST = 59 (% 73)

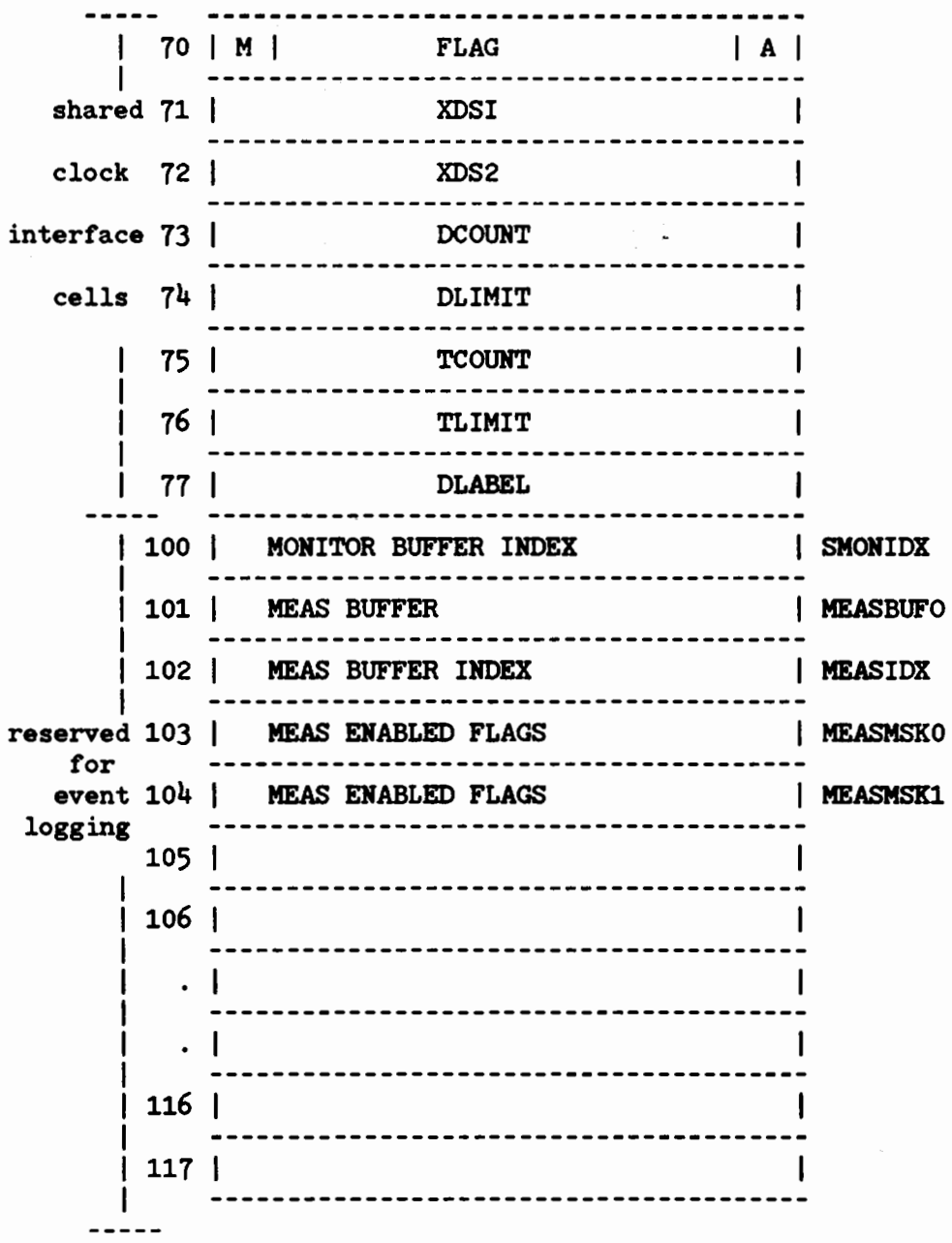
	0	LDEV # OF MEASIO	MEASLDEV
	1	MEASIO PLABEL	MEASPLAB
	2	MEASIO DST #	MEASDSTN
Reserved for MEASIO control	3		
	4		
	5		
	6		
	7		
performance tunning parameters	10	STOP'FLAG	
	11	ABSOLUTE MEMORY ADDRESS	
	12	INCREMENT VALUE	
	13	INCREMENT COUNT	
	14		
	15		
	16		
	17		
	20	GLOBAL STATISTICS XDS NUMBER	MEASSTATX-DSNUM
	21	PROCESS STATISTICS XDS BANK	MEASPROC-XDSBANK
	22	PROCESS STATISTICS XDS BASE	MEASPROC-XDSBASE
	23	PROCESS STATISTICS XDS NUMBER	MEASPROC-XDSNUM
	24	CLASS 14 STATISTICS XDS BANK	
	25	CLASS 14 STATISTICS XDS BASE	

26	CLASS 14 STATISTICS XDS NUM.
27	CLASS 13 STATISTICS XDS BANK
30	CLASS 13 STATISTICS XDS BASE
31	CLASS 13 STATISTICS XDS NUM.
32	CLASS 12 STATISTICS XDS BANK
33	CLASS 12 STATISTICS XDS BASE
34	CLASS 12 STATISTICS XDS NUM.
35	CLASS 11 STATISTICS XDS BANK
36	CLASS 11 STATISTICS XDS BASE
37	CLASS 11 STATISTICS XDS NUM.
40	CLASS 10 STATISTICS XDS BANK
41	CLASS 10 STATISTICS XDS BASE
42	CLASS 10 STATISTICS XDS NUM.
43	CLASS 09 STATISTICS XDS BANK
44	CLASS 09 STATISTICS XDS BASE
45	CLASS 09 STATISTICS XDS NUM.

MEASINFOTAB (cont)

reserved for measurement interface	50	CLASS 0 ENABLED COUNT	CLASS 1 ENABLED COUNT
	51	CLASS 2 EN.CNT.	CLASS 3 EN.CNT.
	52	CLASS 4 EN.CNT.	CLASS 5 EN.CNT.
	53	CLASS 6 EN.CNT.	CLASS 7 EN.CNT.
	54	CLASS 8 EN.CNT.	CLASS 9 EN.CNT.
	55	CLASS 10 EN.CNT.	CLASS 11 EN.CNT.
	56	CLASS 12 EN.CNT.	CLASS 13 EN.CNT.
	57	CLASS 14 EN.CNT.	CLASS 15 EN.CNT.
	60		
	61		
reserved for shared clock interface user	62		
	63		
	64		
	65		
	66		
	67		

MEASINFOTAB (CONT)



M: Interrupt has missed due to last interrupt handling.

A: Current interrupt handling active.

Message File Mechanics

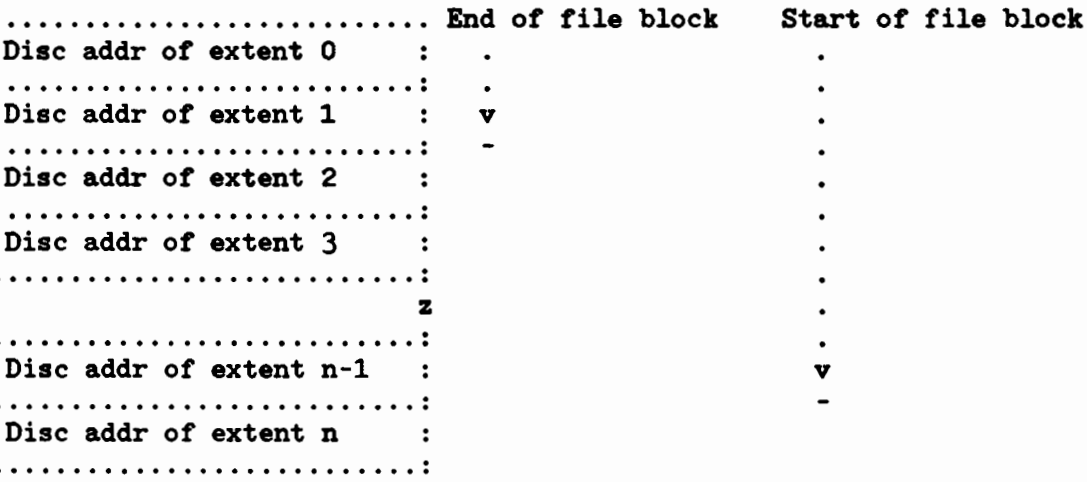
Message File Data Structures

This chapter contains the data structures necessary to support message files. The first section details the message file's version of the familiar file system data structure; ie, the file label, file control block, access control block, etc..

The second section show the tables used by the basic ipc mechanism which is a set of internal, MPE procedures designed to support the "boundary conditions" of ipc files. For example, signalling a no wait reader that its record has arrived. See the section's introduction for a detailed description.

File Structure

File label/FCB extent map



The EOF and SOF are examples only, meant to show that 1) the start of file moves into the extent map as records are read and 2) that the file can wrap around and, hence, cause the SOF to be greater than the EOF.

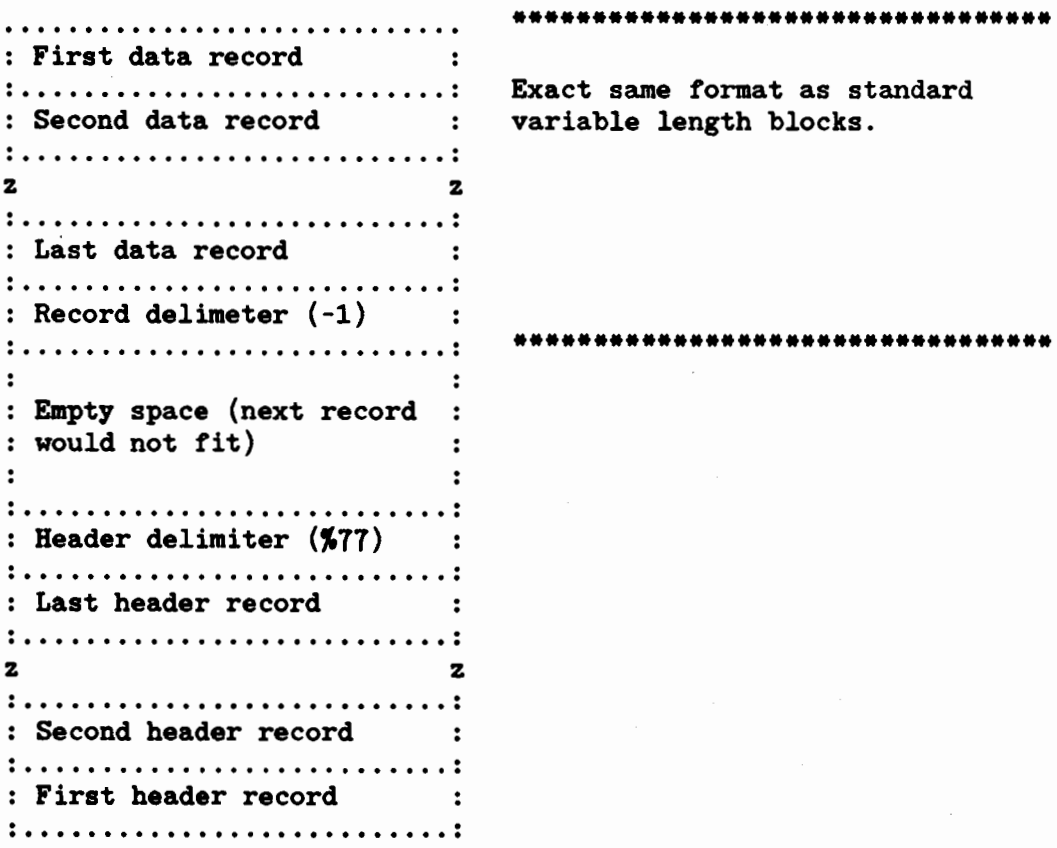
When a file becomes empty the SOF and EOF are reset to the first block of extent zero.

Each extent is composed of a number of blocks. Extents all have the same number of blocks. Extent zero also contains space for the file label and user labels in the exact same format as standard files.

Starting with block zero, sufficient blocks are allocated to the file label/user labels to satisfy their space requirements.

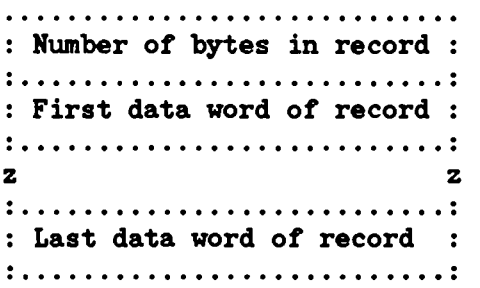
Extents outside of the SOF/EOF range may not exist. They are deleted at close time when there are no more writers accessing the file.

Block Structure



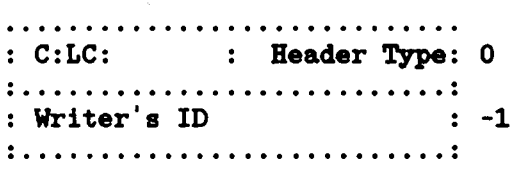
Separating the data portion of the records from their header enables the standard file system access procedures to read the records with no knowledge that they are msg file records.

Record Format



Length word's value does not include itself.

Header Format



C (0:1) - Set on if this was the last record written before the system crashed. This bit is set on by the first open on the file after the crash.

LC (1:1)- Valid only for close headers. Set to one if this is the last writer to close the file.

Type(8:8)- 0 data
1 open
2 close

Message Access Control Block

Notes:

1. Words/fields that do not pertain to message files are left blank.

2. This diagram shows the "combined" ACB as it appears to the message access procedures (the procedures in IPC). Thus it is a combination of the LACB and the PACB.

0	Size of the ACB including buffers (words)	0	
1	File number	1	*
2	File name	2	*
z		z	*
6	Foptions	6	*
7	Aoptions	7	*
8	Record size (bytes)	10	*
9	Block size (words)	11	*
z		z	*
11	Carriage control code (writers)	13	*
z		z	*
14	Error code	16	*
15	Transmission log (units same as last read/write)	17	*
16	Total number of unread records (includes opens	20	
17	and closes)	21	
18	Block number of the file's tail (relative to the	22	
19	start of file block)	23	
20	Logical record transfer count	24	
21		25	

```
   ..................................................
22 : Physical block transfer count                  : 26
   .................  ...............................
23 :                                                 : 27
   ..................................................
24 : Address of the head record's header            : 30
   ..................................................
25 : Address of the next write header               : 31
   ..................................................
26 : FCB control block vector                       : 32
   ..................................................
   z                                                 z
   ..................................................
28 : Number readers       : Number readers & writers : 34
   ..................................................
29 z                                                 z
   ..................................................
30 :                      : Records per block        : 36
   ..................................................
31          :Wrt buf indx:              : # buf - 1  : 37
   ..................................................
32 : Address of the head record's data              : 40
   ..................................................
33 : Size of the buffer (words)                     : 41
   ..................................................
   z                                                 z
   ..................................................
38 :                      : Logical device number    : 46
   ..................................................
39 :0:# rd buf  : # wt buf   :er :qw :m :c :d  :s :f : 47
   ..................................................
40 : Number of max sized free records               : 50
   ..................................................
41 :                                                 : 51
   ..................................................
42 : Number of free words in the current free record : 52
   ..................................................
43 : Address of the next write record               : 53
   ..................................................
44 : Number of nondata records in the file          : 54
   ..................................................
45 :                                                 : 55
   ..................................................
46 : # of read requests that have a claim on file   : 56
   ..................................................
47 : Last read error     : Last write error         : 57
   ..................................................
48 : DST number of the physical ACB                 : 60
   ..................................................
49 : Address of the physical ACB                    : 61
   ..................................................
```

50	DST number of the logical ACB	62
51	Address of the logical ACB	63
52	DST rel address of the stack access control blk	64
53	DST rel address of the DB area	65
54	PACB vector table entry address	66
55	PACB control block vector table address	67
56	Target area's DST number	70
57	Reserved for calling parameters	71
58		72
59		73
60	Reserved for the stack marker from file system	74
61	intrinsics	75
z		z
64	Number of seconds to wait on boundary condition	100*
65	0:Ex:Nd:Vr:Bt:Cls :C : Carriage control	101*
66	Reply Port (basic IPC port)	102*
67	Writer ID	103*
68	Control block index for nowait writer record buf	104*
69	DST relative addr of nowait writer record buffer	105*
70	No wait I/O resultant error code	106*
71	No wait I/O resultant transmission log	107*
72	Write wait queue (basic IPC port)	110
73	Read wait queue (basic IPC port)	111
74	Head record's length (bytes)	112
75	Head record's record type (same values as header)	113

```
   ..................................................
76 : Head record's writer ID                        : 114
   ..................................................
77 : Head record's header word value                : 115
   ..................................................
78 : Max size record plus its overhead (words)      : 116
   ..................................................
79 : ACB wait queue message - contains same info  as : 117
   ..................  ..................
80 : the wait queue message in the Message Queue     : 120
   ..................  ..................
81 : Entry                                          : 121
   ..................  ..................
82 :                                                : 122
   ..................................................
84 : Waiter's reply port, 0 if using ACB compltn area : 124
   ..................................................
85 : ACB completion message area - see Message Queue : 125
   ..................  ..................
86 : Entry for completion message format            : 126
   ..................................................
87 : Waiting process's PCB address (rel to PCB base) : 127
   ..................................................
88 : DST rel address of buffer one                   : 130
   ..................................................
89 : DST rel address of buffer two                   : 131
   ..................................................
90 : Etc.                                           : 132
   ..................................................
```

* Value is private to a particular accessor.

Word	Field	Description
65		Accessor's local flags.
	(0:1)	0 1 - have not yet issued an FREAD/FWRITE against the file.
	(1:1)	ex 1 - extended wait mode.
	(2:1)	nd 1 - do not destroy the next record read.
	(3:1)	vr 1 - writer has not yet written his first record (ie., he is a virgin).
	(4:1)	bt 0 - transmission log should be expressed in words. 1 - " " " " " " bytes.
	(5:1)	cls Not currently used (reserved for group IPC standard).
	(6:1)	C No wait completion message is in LACB area.
	(8:8)	car ctl carriage control character to be used for the writer's record (a value of one indicates no carriage control character).

Word	Field	Description
39		File's global flags.
	(9:1)	er 1 - extended read
	(10:1)	qw 1 - one or more writers has been queued on the wait queue.
	(11:1)	m 1 - wait msg is located in the ACB
	(12:1)	c 1 - completion msg is located in the ACB
	(13:1)	d 1 - the current write buffer has dirty bit set
	(14:1)	s 1 - the start of file is block zero
	(15:1)	f 0 - the ACB buffers have not been filled

MMSTAT Definitions

Octal Value	Event Type	Parameter 1	Parameter 2
72/0	Read init	# free rec	
72/1	Read compl	(0:8) error, (8:8) ID	Number of records
72/2	Write init	(0:8) # rec, (8:8) ID	Number of free records
72/3	Write compl	(0:8) error, (8:8) ID	Number of free records
72/4	Control	(0:8) error, (8:8) ID	(0:4) func, (4:12) parm
72/5	EOF	(0:8) error, (8:8) ID	Number of records
72/6	Open	(0:8) error, (8:8) ID	Number of records
72/7	Close	(8:8) #free, (8:8) ID	Number of records
72/10	Initiation	0	(0:8) fix, (8:8) update
73/0	Put record	(0:8) error, (8:8) ID	(0:3) rec type, (3:13) number of records
73/1	Delete rec	(0:8) error, (8:8) ID	(0:3) rec type (3:13) number of records
73/2	Delete blk	Start of file block #	End of file block #

Notes:

1. The aa/bb notation in the "octal value" column denotes type/subtype. Type is the actual MMSTAT event number. Subtype is (0:4) of parameter 0.

2. Several items can possibly exceed their fields, in that case the bits beyond the field are lost. These items are number of records, number of free records, start of file, and end of file.

3. Parameter word zero has a common format for all the MMSTAT events.

Field	Description
(0:4)	Event's subtype.
(4:2)	File's state 0 - empty 1 - partially full 2 - only a fraction of a free record is left 3 - completely full
(6:1)	Nonzero indicates that there is one or more waiting readers.
(7:1)	Nonzero indicates that there is one or more waiting writers.
(11:1)	Nonzero indicates that the write has a carriage control character.
(12:4)	Flags local to the accessor. (12:1) - the accessor has done no FREADs/FWRITEs (13:1) - extended wait (14:1) - nondestructive read (15:1) - writer has not written any records

File System Basic IPC Definitions

The objective of this set of uncallable procedures is to provide a simple ipc mechanism to support the ipc file access procedures. It enables one process to send short, control messages to another process.

General behavior

FCPORTOPEN procedure

The heart of this mechanism is the port. A process desiring to receive messages would first open (create) a port. This process is termed the "port manager." When the port is created, a port number is returned to the opener. Since the port number value cannot be known in advance, potential senders need some method of obtaining the port number from the port manager.

Both the ports and the messages are contained in a single disc resident data segment. There can be a total of over thiry-five hundred open ports and outstanding messages Thus neither ports nor message blocks are scarce resources.

FCPORTSEND procedure

This procedure sends a 0 to 5 word message to a port. Optionally a timeout value may be specified which will limit the duration the message will remain attached to the port. Expiration of the timeout causes the message to be deleted from the target port's queue and placed on the sender's reply port (specified by the sender in the FCPORTSEND procedure call).

FCPORTRECEIVE

Reads and deletes the head message from a port. The sender's return port number is also given to the receiver, enabling him to send a reply message.

FCPORTCLOSE

Demolishes the port.

IPC file's use of this mechanism

All open message files have two ports open for the file (read wait queue and write wait queue), plus one port per accessor (reply port). Their use is described in the following.

Reader and writer wait queues

When an empty message file is accessed by more than one reader (share), then there must be a way of having the readers' FREADs satisfied in the same order that they were issued. That is, there must be queue of waiting readers. The ipc access procedures accomplish this by dedicating a basic ipc port as a "read wait queue." Whenever a reader's request is stalled because the file is empty, a message is sent to the read wait queue. Subsequent FREADs by other processes will queue up behind the first reader in a FIFO manner. An FWRITE will take the first entry from the wait queue and send a "read may be done" message to the reader's reply port.

In a like manner multiple writers will queue on the write wait queue when the file is full.

Completion notification for nowait I/O

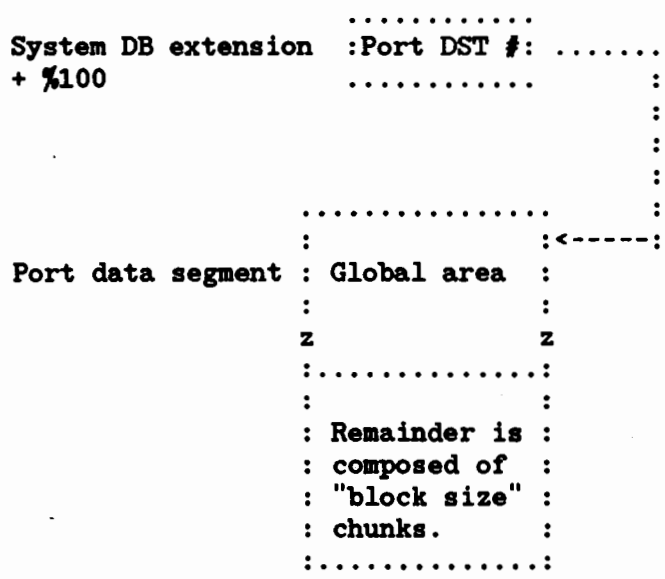
The IOWAIT intrinsic waits for a message to be sent to the reply port (s) of the specified user files.

Timeouts

When an accessor encounters a boundary condition (ex, a reader accesses an empty file), it may specify that the condition must be satisfied in x seconds (FCONTROL 4). To this end the ipc access procedures merely issue the FCPORTSEND to the wait queue with the user's timeout value specified. The timeout will tear the message from the wait queue and place it on the accessor's reply port.

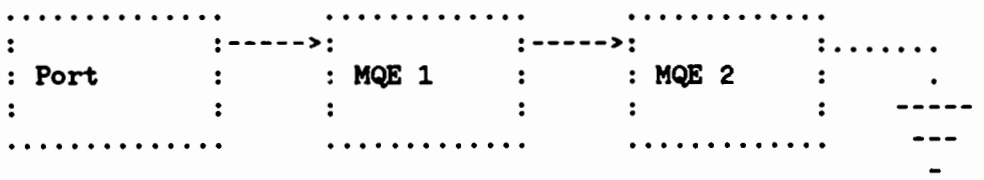
Port Data Structures

Port data segment



The chunks are a combination of free entries, ports, message queue entries, and timer list entries.

Port with two outstanding messages



Port number

```
 0  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16
...:..:..:..:..:..:..:..:..:..:..:..:..:..:..:..:...
:Port index :  Port data segment relative addr/8    :
.....................................................
```

Port index Index into the port DST number array

Port DST Number Array

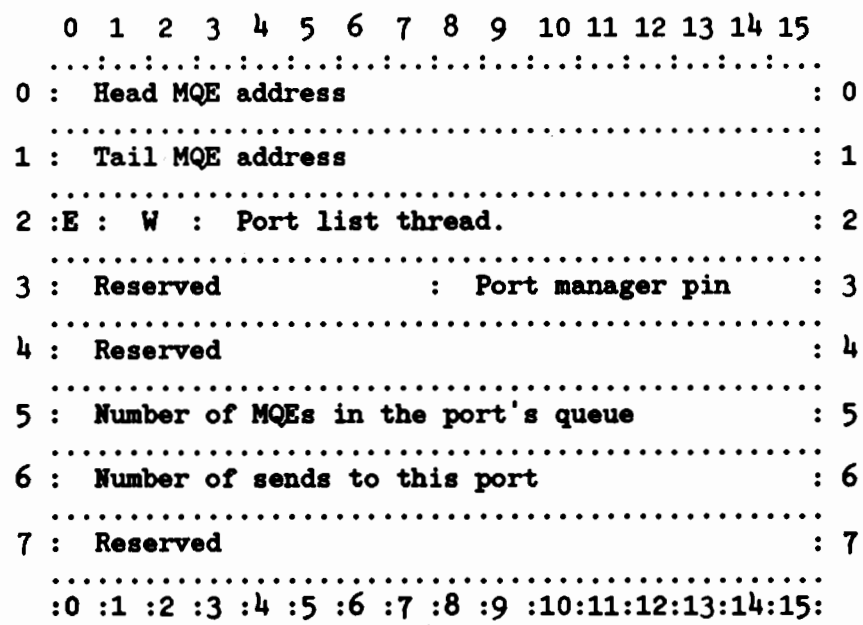
Located in System DB Extension Area.

```
   .....................................................
64 : Port data segment number                        : 64
   .....................................................
65 : Reserved for a second port segment               : 65
   .....................................................
```

Port Data Segment Global Area

0	Data segment number of this port data segment	0
1	Block size in words	1
2	Total number of blocks	2
3	Maximum number of blocks	3
4	Current number of free blocks	4
5	Number of open ports	5
6	Head of free list	6
7	Tail of free list	7
10	Head of impeded process list	8
11	Tail of impeded process list	9
12	Head of timeout thread (TQE address)	10
13	TRLX of timeout	11
14	Value returned by TIMER intrinsic when	12
15	Timeout was initiated.	13
16	Head of port address list.	14
17	Not used.	15

Port



E Enable wake up bit
0 - Do not awaken the process
1 - Awaken the process

W type Action to be taken on an enabled port when a message is received.

0 - Awaken the process on a message wait bit.

1/3 Reserved for future use.

Message Queue Entry (MQE)

```
    0  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16
   ...:..:..:..:..:..:..:..:..:..:..:..:..:..:..:...
 0 :  Next MQE entry; if last, (port addr) LOR 7   : 0
   .............................................
 1 :  Return port                                  : 1
   .............................................
 2 :Time List Entry (TLE),0=no timeout,-1=timed out: 2
   .............................................
 3 :  Parameter zero                               : 3
   .............................................
 4 :  Parameter one                                : 4
   .............................................
 5 :  Parameter two                                : 5
   .............................................
 6 :  Parameter three                              : 6
   .............................................
 7 :  Parameter four                               : 7
   .............................................
   :0 :1 :2 :3 :4 :5 :6 :7 :8 :9 :10:11:12:13:14:15:
```

Timer entry definitions - 0 - no timeout
1 - timeout expired
2 - TLE address for a pending timeout

File System Message Files

Wait Message

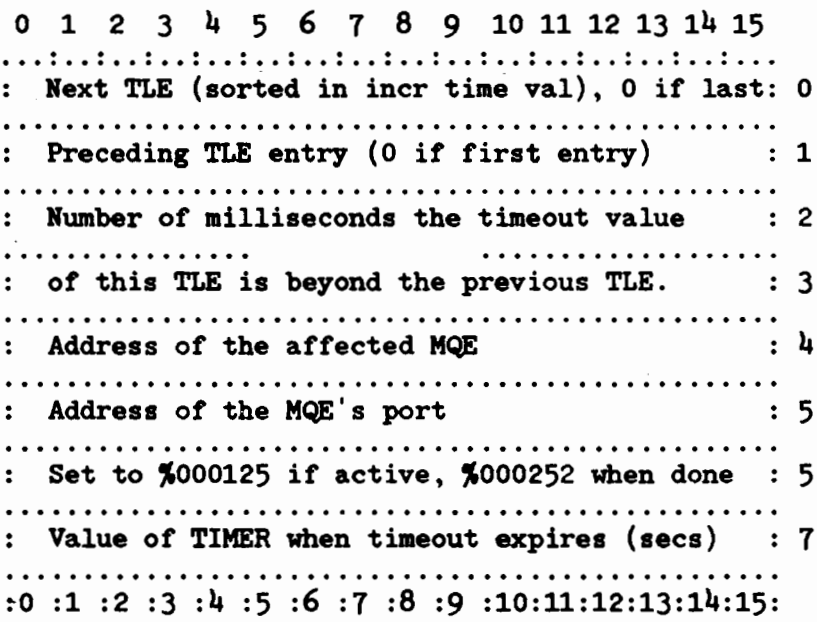
parm#

- 0 - WRITER ID
- 1 - LOCAL FLAGS (differ with each accessor)
  - (0:1) - accessor just opened file
  - (1:1) - will wait on boundary condition if no symbiotic process
  - (3:1) - writer has not written a record
  - (4:1) - transmission log in bytes
  - (8:1) - carriage control code
- 2 - DST# of data buffer
- 3 - Address of data buffer (DST relative)
- 4 - Length of data buffer in bytes

Completion Message

- 0 - Resultant error code
- 1 - Resultant transmission log in bytes

Timer List Entry (TLE)



MMSTAT Definitions

Octal Value	Event Type	Parameter 0	Parameter 1	Parameter 2
62	Open	Port number	Port DST num	Flags parameter
63	Receive completion	Port number	MQE address 15:1 Waitspc	Return port
64	Send	Port number	MQE address 15:1 Q type	Return port
65	Change status	Port number	0 = enable 1 = disable	Head MQE address
66	Abort	Port number	Parameter zero	Return port
67	Close	Port number	Port DST	# open ports left
70	Expand	Port DST num	# expand blks	Total # blocks
71	Timeout expired	Port num	MQE address	Return port

CHAPTER 19 MPE Memory Resident Message Facility

I. Overview of Facility

The memory resident message facility of MPE IV addresses the need for an efficient, simple, and uniform method for system code to send short status-type messages to processes.

Each process is created with a message harbor which supports a set of message ports which are private to that process. There is a maximum of four ports per harbor in the initial implementation. This limit can be easily extended when new ports are required.

Any system code, even code running on the ICS, can send a message to any port of any process. The destination process' PIN must be known, and a priori conventions on portnumber and message formats must be established. The caller of SENDMSG may optionally specify that the destination process be awakened from a message wait.

The caller of SENDMSG specifies whether the message is to be buffered in the primary message table or the secondary message table. When the secondary table is specified, if the pool of secondary message entries is exhausted, the calling process is queued for a message table entry and blocked until one becomes available. Use of the primary message table is reserved for code running on the ICS or during critical sections (Pdisabled or Disabled intervals) in which it is not possible to release control of the processor to queue for a free message table entry. If the primary table is specified and no free entries are available, the SENDMSG crashes the system.

Messages can be of any length up to the configured maximum. Message length is specified in the call to SENDMSG and RECEIVEMSG. In the initial implementation, messages are limited to 4 words in length. This maximum can be easily increased if the need arises.

By calling PORTSTATUS, a process may at any time determine whether a specified port is non-empty or obtain the portnumber of his most urgent non-empty port (lowest numerical port number =most urgent port).

By calling RECEIVEMSG, a process may receive the message at the head of his specified message port. This receive is optionally non-destructive.

A process can wait on a message wait, or on a combination of message wait and other wait types.

II. Message Intrinsics

A. Procedure SENDMSG(Destpin,Destport,Msglength,Flags);
Value Destpin,Destport,Msglength,Flags;
Integer Destpin,Destport,Msglength;
Option Privileged,Uncallable;
Logical Flags;

Destpin, Destport, and Msglength had better be within range and reasonable (process and port exist), since SENDMSG checks and will crash if the parameters are bad.

The caller of SENDMSG stacks the message contents before calling the procedure. SENDMSG expects the first msg word to be at Q-7-Msglength, and the last msg word at Q-8. The message contents at Q-8 to Q-7-Msglength are deleted from top of stack by the exit from SENDMSG to the caller.

```
Flags.(0:1)=1 ==> Wake-up destination process from a
                  message wait
     .(1:1)=1 ==> place message in secondary message
                  table
```

Return CC=CCG if process was already awake else CC=CCE.

B. Logical Procedure PORTSTATUS(Portnumber);
Value Portnumber;
Integer Portnumber;
Option Privileged,Uncallable;

When supplied a valid port number, PORTSTATUS returns a true value if the port is non-empty and a false value if the port is empty.

When passed a -1 as portnumber parameter, PORTSTATUS returns the portnumber of the process' most urgent non-empty port (the smaller the number, the more urgent the port).

If all ports are empty, PORTSTATUS returns CC=CCE. If at least one port is non-empty, PORTSTATUS returns CC=CCG.

C. **Procedure RECEIVEMSG(Portnum,Msglength,Flags);**
Value Portnum,Msglength,Flags;
Integer Portnum,Msglength;
Option Privileged,Uncallable;
Logical Flags;

Portnum and Msglength had better be within range or else its Suddendeath time.

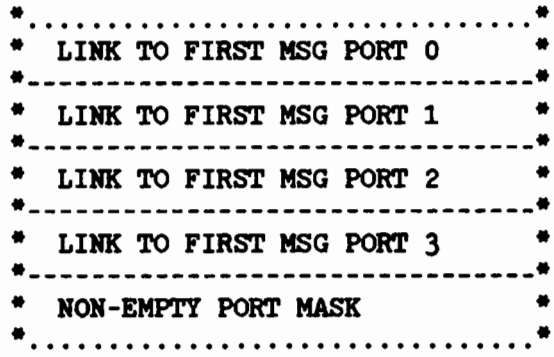
The caller of RECEIVEMSG does an ADD S Msglength to make space for the message contents. RECEIVEMSG stores the message contents into Q-8,Q-9,...,Q-7-Msglength. Q-7-Msglength contains the first word of the message.

Flags.(0:1)=1 ==> do not release message from head of port's message queue (non-destructive read)
Return CC=CCG if port was empty, else CC:=CCE.

III. Supporting Data Structures

A. Message Harbor Table [DST #57 (%71)]

The message facility is presently used only by the Dispatcher and should not be used by any process. The Message Harbor Table is created during system generation. It is a resident structure, though needn't reside in bank 0. Its base is located through the DST entry which describes it.



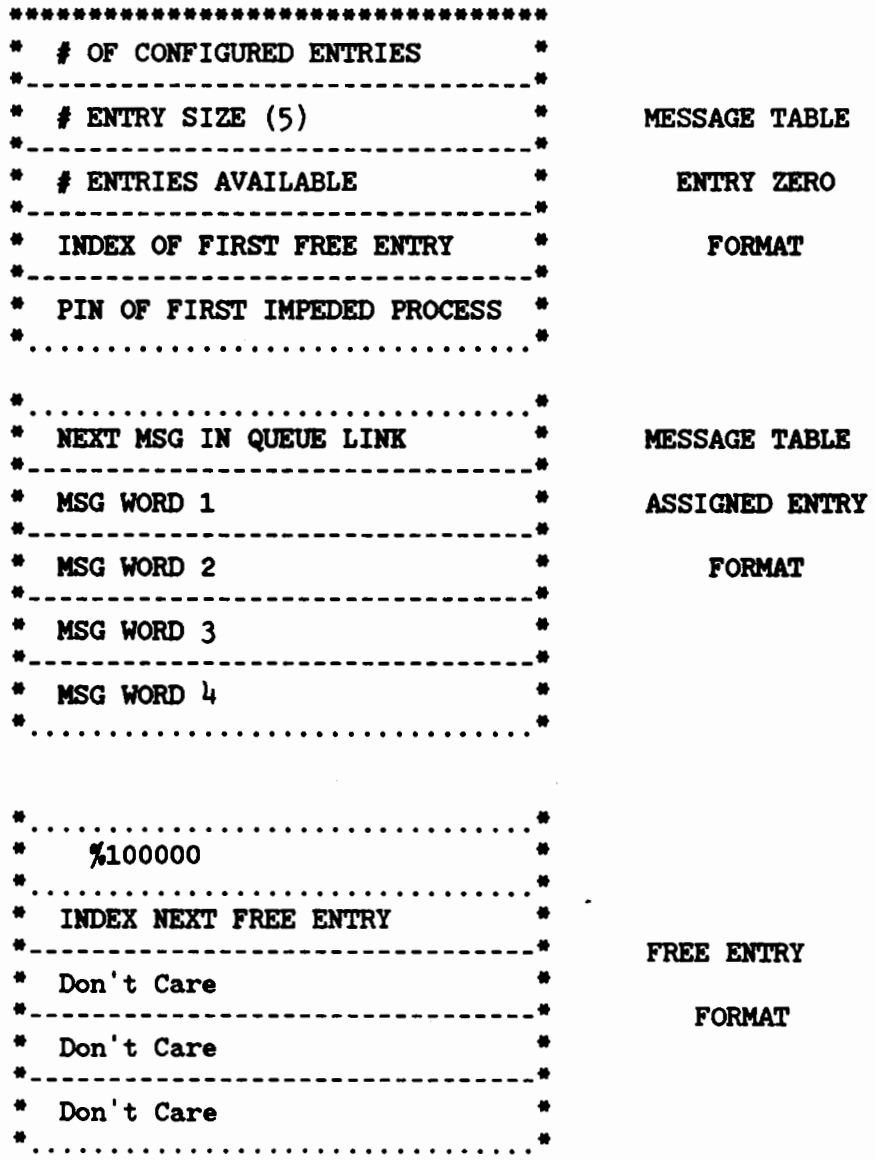
MESSAGE HARBOR TABLE ENTRY FORMAT

FIRST MSG QUEUE LINK .(0:1) =1 ==> NEXT MESSAGE IN SECONDARY MESSAGE TABLE
.(1:15) = INDEX OF NEXT ENTRY IN APPROPRIATE TABLE

MESSAGE TABLES

Prim Msg Tab DST = #58 (%72)
Sec Msg Tab DST = #60 (%74)

There are two flavors of tables which are used to buffer sent messages, the primary and secondary message tables. The tables are identical in format, but independently configurable with respect to size. Both tables are residen structures, though they needn't be located in bank 0. The bases of the message tables are located by looking up their addresses in the DST entry describing them.



```
NEXT MSG IN QUEUE LINK .(0:1) =1 ==> NEXT MESSAGE IN SECONDARY
                                     MESSAGE TABLE
                      .(1:15) = INDEX OF NEXT ENTRY IN
                                APPROPRIATE TABLE
```

Message Port Assignments

Message Port 0 : Junk Port (to be used when no message interference can occur.)
Message Port 1 : Reserved
Message Port 2 : Reserved
Message Port 3 : Currently Unassigned

HP3000
MMSTATS EVENT CATALOG

MMSTAT CATALOG INDEX

EVENT GROUP	DESCRIPTION OF GROUP	PAGE NO.
0	MEMORY MANAGER	20-1
1	MEMORY MANAGER	20-9
2	MEMORY MANAGER	20-10
4	SCHEDULING	20-13
6	FILESYS	20-16
7	FILESYS	20-25
8	FILESYS	20-30
9	DISC I/O TRANSFER	20-31
10	DISC ERRORS	20-32
11	SIO	20-33
12	DISC SPACE	20-34
14	CS/3000	20-36
15	CS/3000	20-40
16	CS/3000	20-43
19	DISC CONTROLLER INTRPT	20-44
20	PRIVATE VOLUMES	20-47
21	PROCESS CREATION AND TERMINATION	20-48
22	MONITOR CONFIG INFORMATION	20-49
23	TERMINAL I/O	20-53

MMSTATS CATALOG INDEX

EVENT NAME	EVENT NO. DEC.	%		EVENT NAME	EVENT NO. DEC.	%	
ALCSTBLK	20	024	(-) *	FREAD	62	076	(-)
ALLOCMEM	12	014	*	FREADDIR	64	100	(-)
BINREAD	233	351	(-) *	FREADLABEL	76	114	(-)
BREAK	237	355	(-) *	FREADSEEK	68	104	(-)
CABORTIO	142	216	*	FRENAME	80	120	(-)
CCLOSE	146	222	*	FSETMODE	72	110	(-)
CCLOSETRACEFILE	154	232	*	FSPACE	69	105	(-)
CCONTROL	152	230	*	FUNLOCK	79	117	(-)
CGARBAGE	7	007	*	FUPDATE	66	102	(-)
CONFIG-INFO	221	335	(-) *	FWRITE	63	077	(-)
CONFIG-INFO	222	336	(-) *	FWRITEDIR	65	101	(-)
CONFIG-INFO	223	337	(-) *	FWRITELABEL	77	115	(-)
COPEN	140	214	*	GIPINTERRUPT	192	300	
COPENTRACEFILE	153	231	*	IOBUFTRAP	125	175	
CPOLLIST	155	233	*	I/O COMPLETION	111	157	(-)
CREAD	147	223	*	IOWAIT	67	103	(-)
CREAD1	147	240	*	MAKEOC	1	001	
CSDRIVER	150	226	*	MONINIT	228	344	(-)
CSIOWAIT	144	220	*	MONOFF	229	345	(-)
CWRITE	149	225	*	PROCESS COMPLETE	211	323	(-)
DC1DC2ACK	231	347	(-) *	QONSEG	0	000	
DEALLOCM	13	015	*	QUIESCE	40	050	
DEALCSTBLK	21	025	(-) *	RELRESOURCES	23	027	(-)
DISKBUGCATCHER	200	310	*	SEGIOINIT	5	005	
DISKBUGCATCHER	201	311	*	SIODM	195	303	
DISKERROR	100	144	(-) *	SIODONE	6	006	
DISKERROR	101	145	(-) *	SPECCHAR	236	354	(-)
DISKINTRPT	191	277	*	SPECIALRQ	2	002	
DISKSPACE	120	170	(-) *	SPECREAD	238	356	(-)
DISKSPACE	121	171	(-) *	START I/O	110	156	(-)
DISK TRAFFIC	98	142	(-) *	SWAPIN	8	010	
FCHECK	74	112	(-) *	SYSPINS	224	340	(-)
FCLOSE	81	121	(-) *	SYSPINS	225	341	(-)
FCONTROL	71	107	(-) *	SYSPINS	226	342	(-)
FETCHSEG	4	004	*	SYSPINS	227	343	(-)
FGETINFO	75	113	(-) *	TERMLOGOFF	235	353	(-)
FLOCK	78	116	(-) *	TERMLOGON	234	352	(-)
FOPEN/(DA)	60	074	(-) *	TERMREAD	230	346	(-)
FOPEN/(DA)	61	075	(-) *	TERMWRITE	232	350	(-)
FPOINT	70	106	(-) *				

```
**********************************************************************
*                                                                    *
*                                                                    *
*                    MMSTAT EVENT GROUP 0                            *
*                                                                    *
*                  MEMORY MANAGEMENT EVENTS                          *
**********************************************************************
```

EVENT 0

EVENT NAME: OONSEG
DESCRIPTION: ABSENCE TRAP ON CODE/DATA SEGMENT

CALLING MODULE: KERNELC
CALLING PROCEDURE(S): QUEUEONSEGMENT

PARAMETER DESCRIPTION

P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
= 0 => SEG IS A DATA SEGMENT,
.(2:14) = DST ENTRY NUMBER
= 1 => SEG IS AN SL SEGMENT,
.(2:14) = SL ENTRY NUMBER
= 2,3 => SEG IS PART OF A PROGRAM,
.(1:7) = PROGRAM INDEX
INTO CSTBLK
.(8:8) = LOGICAL SEGMENT
NUMBER (0-255)

P2 = PCB01(CPCB) - SLL POINTER
P3 = STATUS (IN STACK MARKER) OF CALLING (TRAPPING) SEGMENT

EVENT 1

EVENT NAME: MAKEOC
DESCRIPTION: MAKE SEGMENT AN OVERLAY CANDIDATE - RELEASE SEGMENT
TO THE POOL OF AVAILABLE SPACE

CALLING MODULE: KERNELC
CALLING PROCEDURE: MAKEOC

PARAMETER DESCRIPTION

P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
= 0 => SEG IS A DATA SEGMENT
.(2:14) = DST ENTRY NUMBER
= 1 => SEG IS AN SL SEGMENT
.(2:14) = SL ENTRY NUMBER
= 2,3 => SEG IS PART OF A PROGRAM,
.(1:7) = PROGRAM INDEX
.(8:8) = LOGICAL SEGMENT NUMBER
(0-255)

P2 = 0 (UNUSED)
P3 = 0 (UNUSED)

EVENT 2

EVENT NAME: SPECIALRO
DESCRIPTION: REQUEST OF SEGMENT EXPANSION/CONTRACTION, UNLOCK, UNFREEZE, IOUNFREEZE, LOCK, IOFREEZE, FREEZE

CALLING MODULE: KERNELC, KERNELD, ININ
CALLING PROCEDURES: UNLOCKSEG', IOFREEZE', FETCHSEGMENT-(KERNELC)
DLSIZE, ZSIZE, GETPXSEG, ALTDSEGSIZE,
ALTPXFILESIZE -(KERNELD)
STACKOVERFLOW -(ININ)

PARAMETER DESCRIPTION

P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
= 0 => SEG IS A DATA SEGMENT,
.(2:14) = DST ENTRY NUMBER
=1 => SEG IS AN SL SEGMENT,
.(2:14) = SL ENTRY NUMBER
=2,3 => SEG IS PART OF A PROGRAM,
.(1:7) = PROGRAM INDEX
INTO CSTBLK
.(8:8) = LOGICAL SEGMENT
NUMBER (0-255)

P2 = .(0:1) =1 => REQUEST IS THROUGH FETCHSEGMENT (TYPES 0,1,2)
.(12:4) TYPE OF REQUEST
= 0=> IOFREEZE
= 1=> FREEZE
= 2=> LOCK
= 3=> IOUNFREEZE
= 4=> UNFREEZE
= 5=> UNLOCK
= 6=> DLSIZE EXPANSION
= 7=> DLSIZE CONTRACTION
= 8=> PXFIXED EXPANSION
= 9=> PXFILE EXPANSION
= 10=> PXFILE CONTRACTION
= 11=> XDS EXPANSION
= 12=> XDS CONTRACTION
= 13=> ZSIZE EXPANSION
= 14=> ZSIZE CONTRACTION
= 15=> STACKOVERFLOW

P3 = FOR TYPES (P2.(12:4))
= 0,2,3,5 => P3.(8:8) = LOCK OR IOFREEZE COUNT
= 1,4 => P3.(0:8) = FREEZE COUNT
= 6-15 => REQUESTED SIZE OF AREA IN WORDS

EVENT 4

EVENT NAME: FETCHSEG
DESCRIPTION: SEGMENT REQUEST (FOR I/O SYSTEM OR PROCESS)

CALLING MODULE: KERNELC
CALLING PROCEDURE: FETCHSEGMENT

PARAMETER DESCRIPTION

```
P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
                         = 0  => SEG IS A DATA SEGMENT,
                                 .(2:14) = DST ENTRY NUMBER
                         = 1  => SEG IS AN SL SEGMENT,
                                 .(2:14) = SL ENTRY NUMBER
                         = 2,3=> SEG IS PART OF A PROGRAM,
                                 .(1:7) = PROGRAM INDEX
                                          INTO CSTBLK
                                 .(8:8) = LOGICAL SEGMENT
                                          NUMBER (0-255)
P2 = REQUESTORID
     .(0:1) = 1   => I/O SYSTEM REQUEST
                     .(8:8) = LDEV #
      (0:1) = 0   => PROCESS REQUEST
                     .(8:8) = PIN # OF REQUESTING PROCESS
     .(1:1) = 1   => IOFREEZE REQUEST
     .(2:1) = 1   => BLOCKED LOCK REQUEST
     .(3:1) = 1   => LOCK REQUEST
     .(4:1) = 1   => FREEZE REQUEST
P3=  .(13:3)= 0   => SEGMENT ALREADY PRESENT
            = 1   => SEGMENT IS RECOVERABLE OVERLAY CANDIDATE
            = 2   => SEGMENT ALREADY ON ITS WAY IN FOR SOMEONE
            = 3   => SEGMENT NOT PRESENT -- MUST FETCH
```

EVENT 2

EVENT NAME: SPECIALRO
DESCRIPTION: REQUEST OF SEGMENT EXPANSION/CONTRACTION, UNLOCK, UNFREEZE, IOUNFREEZE, LOCK, IOFREEZE, FREEZE

CALLING MODULE: KERNELC, KERNELD, ININ
CALLING PROCEDURES: UNLOCKSEG', IOFREEZE', FETCHSEGMENT-(KERNELC)
DLSIZE, ZSIZE, GETPXSEG, ALTDSEGSIZE,
ALTPXFILESIZE -(KERNELD)
STACKOVERFLOW -(ININ)

PARAMETER DESCRIPTION

P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
= 0 => SEG IS A DATA SEGMENT,
.(2:14) = DST ENTRY NUMBER
=1 => SEG IS AN SL SEGMENT,
.(2:14) = SL ENTRY NUMBER
=2,3 => SEG IS PART OF A PROGRAM,
.(1:7) = PROGRAM INDEX INTO CSTBLK
.(8:8) = LOGICAL SEGMENT NUMBER (0-255)

P2 = .(0:1) =1 => REQUEST IS THROUGH FETCHSEGMENT (TYPES 0,1,2)
.(12:4) TYPE OF REQUEST
= 0=> IOFREEZE
= 1=> FREEZE
= 2=> LOCK
= 3=> IOUNFREEZE
= 4=> UNFREEZE
= 5=> UNLOCK
= 6=> DLSIZE EXPANSION
= 7=> DLSIZE CONTRACTION
= 8=> PXFIXED EXPANSION
= 9=> PXFILE EXPANSION
= 10=> PXFILE CONTRACTION
= 11=> XDS EXPANSION
= 12=> XDS CONTRACTION
= 13=> ZSIZE EXPANSION
= 14=> ZSIZE CONTRACTION
= 15=> STACKOVERFLOW

P3 = FOR TYPES (P2.(12:4))
= 0,2,3,5 => P3.(8:8) = LOCK OR IOFREEZE COUNT
= 1,4 => P3.(0:8) = FREEZE COUNT
= 6-15 => REQUESTED SIZE OF AREA IN WORDS

EVENT 4

EVENT NAME: FETCHSEG
DESCRIPTION: SEGMENT REQUEST (FOR I/O SYSTEM OR PROCESS)

CALLING MODULE: KERNELC
CALLING PROCEDURE: FETCHSEGMENT

PARAMETER DESCRIPTION

```
P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
                         = 0  => SEG IS A DATA SEGMENT,
                                 .(2:14) = DST ENTRY NUMBER
                         = 1  => SEG IS AN SL SEGMENT,
                                 .(2:14) = SL ENTRY NUMBER
                         = 2,3=> SEG IS PART OF A PROGRAM,
                                 .(1:7) = PROGRAM INDEX
                                          INTO CSTBLK
                                 .(8:8) = LOGICAL SEGMENT
                                          NUMBER (0-255)
P2 = REQUESTORID
     .(0:1) = 1   => I/O SYSTEM REQUEST
                     .(8:8) = LDEV #
      (0:1) = 0   => PROCESS REQUEST
                     .(8:8) = PIN # OF REQUESTING PROCESS
     .(1:1) = 1   => IOFREEZE REQUEST
     .(2:1) = 1   => BLOCKED LOCK REQUEST
     .(3:1) = 1   => LOCK REQUEST
     .(4:1) = 1   => FREEZE REQUEST
P3=  .(13:3)= 0   => SEGMENT ALREADY PRESENT
            = 1   => SEGMENT IS RECOVERABLE OVERLAY CANDIDATE
            = 2   => SEGMENT ALREADY ON ITS WAY IN FOR SOMEONE
            = 3   => SEGMENT NOT PRESENT -- MUST FETCH
```

EVENT 5

EVENT NAME: SEGIOINIT
DESCRIPTION: MEMORY MANAGEMENT READ/WRITE OF SEGMENT FROM/TO DISC QUEUED

CALLING MODULE: KERNELC
CALLING PROCEDURES: PROCESSINITMSG, STARTSEGWRITE

PARAMETER DESCRIPTION

```
P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
                         = 0   => SEG IS A DATA SEGMENT,
                                  .(2:14) = DST ENTRY NUMBER
                         = 1   => SEG IS AN SL SEGMENT,
                                  .(2:14) = SL ENTRY NUMBER
                         = 2,3 => SEG IS PART OF A PROGRAM,
                                  .(1:7)  = PROGRAM INDEX
                                            INTO CSTBLK
                                  .(8:8)  = LOGICAL SEGMENT
                                            NUMBER (0-255)
P2 = DISCREQUEST INDEX - INDEX INTO THE DISC REQUEST TABLE
                         (SYSDB RELATIVE)
P3 = .(0:1) = 1  => WRITE START
            = 0  => READ START
     .(2:15) = LDEV #
```

EVENT 6

EVENT NAME: SIODONE
DESCRIPTION: MEMORY MANAGEMENT SEGMENT READ/WRITE FROM/TO DISC COMPLETE

CALLING MODULE: KERNELC
CALLING PROCEDURES: SEGREADCOMPLETOR, SEGWRITECOMPLETOR

PARAMETER DESCRIPTION

```
P1 = SEGIDENTIFIER.(0:2) = SEG TYPE FIELD
                         = 0  => SEG IS A DATA SEGMENT,
                                 .(2:14) = DST ENTRY NUMBER
                         = 1  => SEG IS AN SL SEGMENT,
                                 .(2:14) = SL ENTRY NUMBER
                         = 2,3=> SEG IS PART OF A PROGRAM,
                                 .(1:7)  = PROGRAM INDEX
                                           INTO CSTBLK
                                 .(8:8) = LOGICAL SEGMENT
                                           NUMBER (0-255)
P2 = DISCREQUEST INDEX - INDEX INTO THE DISC REQUEST TABLE
                         (SYSDB RELATIVE)
P3 = .(0.1) = 1  => WRITE COMPLETE
            = 0  => READ COMPLETE
```

EVENT 7 (%7)

EVENT NAME: CGARBAGE
EVENT DESCRIPTION: GARBAGE COLLECTION HAS JUST TAKEN PLACE

CALLING MODULE: KERNELC
CALLING PROCEDURE: COLLECTGARBAGE

PARAMETER	DESCRIPTION
P1	= BANK OF SOURCE JUST MOVED FROM
P2	= ADDR OF SOURCE JUST MOVED FROM
P3	= MOVEPAGECNT, NUMBER OF PAGES JUST MOVED FROM

EVENT 8 (%10)

```
EVENT NAME:  SWAPIN
DESCRIPTION:  SWAP IN A PROCESS

CALLING MODULE:  KERNELC
CALLING PROCEDURE:  SWAPIN

     PARAMETER DESCRIPTION
     ---------------------

     P1 = PIN OF PROCESS BEING SWAPPED IN
     P2 = .(0:1) =  0 => BEING SWAP
                 =  1 => END SWAP
          .(1:1) =  0 => NORMAL (PARTIAL SWAP OK)
                 =  1 => SWAP REQUIRED
          .(12:4)=  0 => PROCESS SWAPIN COMPLETE
                    2 => NO ROOM, HARD REQ MAY SUCCEED
                    3 => NO ROOM, HARD REQ FAILED
                    4 => SWAPIN STOPPED - MORE URGENT ACTIVITY
                    8 => NO LOCK SPACE
     P3 = HARDREQUEST = TRUE => HARD REQUEST ON SWAPIN
                        FALSE=> NORMAL
```

****
*
*
* MMSTAT EVENT GROUP 1
* MEMORY MANAGER
*
****

EVENT 12 (%14)

EVENT NAME: ALLOCMEM
DESCRIPTION: FOUND A HOLE FOR A SEGMENT REPLACEMENT REQUEST

CALLING MODULE: KERNELC
CALLING PROCEDURE: RESERVEREGION

PARAMETER DESCRIPTION

P1 = REQUESTED SIZE IN PAGES
P2 = BANK OF SELECTED REGION
P3 = ADDRESS OF SELECTED REGION

EVENT 13 (%15)

EVENT NAME: DEALLOCM
DESCRIPTION: RELEASE REGION OF MEMORY TO AVAILABLE STATUS

CALLING MODULE: KERNELC
CALLING PROCEDURE: RELEASEREGION

PARAMETER DESCRIPTION

P1 = SIZE RELEASED IN PAGES
P2 = BANK OF RELEASED REGION BASE
P3 = ADDRESS OF RELEASED REGION BASE

****
*
*
* MMSTAT EVENT GROUP 2
*
*
****

EVENT -20 (-%24)

EVENT NAME: ALCSTBLK
DESCRIPTION: REQUEST TO RESERVE A BLOCK OF ENTRIES IN THE CSTX

CALLING MODULE: KERNELD
CALLING PROCEDURE: ALCSTBLOCK

PARAMETER	DESCRIPTION
P1=EIX	CST BLOCK INDEX ASSIGNED
P2=CSTX	DST RELATIVE INDEX OF WORD 0 OF THE FIRST RESERVED CSTX ENTRY
P3=N	NUMBER OF CSTX ENTRIES RESERVED

EVENT -21 (%25)

EVENT NAME: DEALCSTBLK
DESCRIPTION: INDICATES THAT A CST EXTENSION BLOCK HAS BEEN DEALLOCATED

CALLING MODULE: KERNELD
CALLING PROCEDURE: DEALCSTBLOCK

PARAMETERS	PARAMETER DESCRIPTION
P1=EIX	CST BLOCK INDEX ASSIGNED TO THE BLOCK OF CST ENTRIES
P2=CSTX	DST RELATIVE INDEX OF WORD 0 OF THE FIRST CST ENTRY TO BE RELEASED
P3=MCNT	=(#ALLOCATED CSTX ENTRIES-#ENTRIES BEING RELEASED)*4

EVENT -23 (-%27)

EVENT NAME:RELRESOURCES
DESCRIPTION: RESOURCES (VDS,MAIN MEMORY, ST ENTRY) RESERVED FOR THE
FOR THE SEGMENT HAVE BEEN RELEASED

CALLING MODULE: KERNELD

CALLING PROCEDURE: RELDATASEG

PARAMETERS PARAMETER DESCRIPTION

P1=NEW DB DST NUMBER
P2=DELTA P AT EXCHANGEDB CALL

P3=STATUS AT EXCHANGEDB CALL

****
*
*
*

```
**********************************************************************
*                                                                    *
*                                                                    *
*                    MMSTAT EVENT GROUP 4                            *
*                        SCHEDULING                                  *
*                                                                    *
**********************************************************************
```

EVENT 40 (%50)

EVENT NAME: QUIESCE
DESCRIPTION: PROCESS SWITCH - STATE OF PROCESS SAVED

CALLING MODULE: KERNELC
CALLING PROCEDURE: DSP

PARAMETER DESCRIPTION

P1 = PCB00(CPCB)

- .(0:1) = 1 => SAR - SCHEDULING ATTENTION REQUIRED
- .(2:1) = 1 => CRIT - PROCESS IS CRITICAL
- .(3:1) = 1 => HSIR - PROCESS HAS SIR
- .(4:1) = 1 => PIOVR - PENDING PI, PROCESS CRITICAL
- .(5:1) = 1 => HSPRI - HOLD SIR PRIORITY
- .(6:1) = 1 => IPEXP - INCORE PROTECT EXPIRED
- .(7:1) = 1 => PC - PREMPT CAPABILITY
- .(8:1) = 1 => MP - MUST PREMPT
- .(9:1) = 1 => LW - LONG WAIT
- .(10:1)= 1 => SW - SHORT WAIT
- .(11:1)= 1 => TRW - TERMINAL READ WAIT
- .(12:1) =1 => USEQD - USED A QUANTUM SINCE TRANSACTION BEGAN
- .(13:1)= 1 => HIPRI - HOLD IMPEDED PRIORITY
- .(14:1)= 1 => ALLOW SOFT INTERRUPTS EVEN THOUGH IN SYSTEM CODE
- .(15:1)= 1 => RITBK - PROCESS IN RIT BREAK

```
P2 = PCB04(CPCB)
          .(0:1) =  1  => M      - MOURNING WAIT
          .(1:1) =  1  => RG     - GLOBAL RIN WAIT
          .(2:1) =  1  => RL     - LOCAL RIN WAIT
          .(3:1) =  1  => MA     - MAIL WAIT
          .(4:1) =  1  => BIO    - BLOCKED IO WAIT
          .(5:1) =  1  => IO     - IO WAIT
          .(6:1) =  1  => UCP    - UCOP WAIT, RIT WAIT
          .(7:1) =  1  => JNK    - JUNK WAIT
          .(8:1) =  1  => TIM    - TIMER WAIT
          .(9:1) =  1  => INT    - INTERRUPT WAIT
          .(10:1)=  1  => SON    - SON WAIT
          .(11:1)=  1  => FA     - FATHER WAIT
          .(12:1)=  1  => IMP    - PROCESS WAITING TO UNIMPEDED
          .(13:1)=  1  => SIR    - PROCESS WAITING FOR SIR
          .(14:1)=  1  => TIM    - PROCESS WAITING FOR TIME OUT
          .(14:1)=  1  => MEM    - PROCESS WAITING FOR MEMORY

P3 = PCB13(CPCB)
          .(0:1) =  1  => DISPQ - PROCESS ON DISPATCHING QUEUE

          .(1:1) =  1  => L SCHEDULING CLASS
          .(2:1) =  1  => C SCHEDULING CLASS
          .(3:1) =  1  => D SCHEDULING CLASS
          .(4:1) =  1  => E SCHEDULING CLASS
          .(5:1) =  1  => INTER- PROCESS IS INTERACTIVE
          .(6:1) =  1  => CORER- PROCESS IS CORE-RESIDENT
          .(8:8) =  PROCESS' SCHEDULING PRIORITY
```

****

MMMSTAT EVENT GROUP 5

(SEE CHAPTER 18 FOR THESE EVENTS)

****

```
**********************************************************************
*                                                                    *
*                    MMSTAT EVENT GROUP 6                            *
*                           FILESYS                                  *
*          THESE EVENTS ARE FOR DEVELOPMENT USE ONLY                 *
**********************************************************************
```

EVENT -60(%74)

EVENT NAME: FOPEN
DESCRIPTION: OLD FILE OPEN

CALLING MODULE: FILEACC

CALLING PROCEDURE: FOPENDA

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:2)=2 -> NON-SPOOLER ACCESS (0:2).NE.2 ->
P2= AOPTIONS	SEE INTRINSICS MANUAL
P3= FILE LABEL FOPTIONS	SEE INTRINSICS MANUAL

EVENT -61(%75)

EVENT NAME: FOPEN'
DESCRIPTION: OLD DISC FILE OPEN (CONTINUATION OF EVENT -60)

CALLING MODULE: FILEACC

CALLING PROCEDURE: FOPENDA

PARAMETERS	PARAMETER DESCRIPTION
P1= RECORD SIZE	
P2= FILE LABEL BLOCK SIZE	
P3= # OF BUFFERS	

EVENT -61(%75)

EVENT NAME: FOPEN'
DESCRIPTION: OLD FILE OPEN (CONTINUATION OF EVENTS -60 & -61)

CALLING MODULE: FILEACC

CALLING PROCEDURE: FOPENDA

PARAMETERS	PARAMETER DESCRIPTION
P1=	FILE LABEL FILE LIMIT MSW
P2=	FILE LABEL FILE LIMIT LSW
P3=	FILE LABEL # OF EXTENTS

EVENT -60(%74)

EVENT NAME: FOPEN
DESCRIPTION: NEW DISC FILE OPEN

CALLING MODULE: FILEACC

CALLING PROCEDURE: FOPEN

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:2)=2 -> NON-SPOOLER ACCESS (0:2).NE.2 ->
P2= AOPTIONS	SEE INTRINSICS MANUAL
P3= FOPTIONS	SEE INTRINICS MANUAL

EVENT -61(%75)

EVENT NAME: FOPEN'
DESCRIPTION: NEW DISC FILE OPEN (CONTINUATION OF EVENT -60)

CALLING MODULE: FILEACC

CALLING PROCEDURE: FOPEN

PARAMETERS	PARAMETER DESCRIPTION
P1= RECORD SIZE	
P2= BLOCK SIZE	
P3= # OF BUFFERS	

EVENT NAME: FOPEN'
DESCRIPTION: NEW DISC FILE OPEN (CONTINUATION OF EVENT -60 & -61)

CALLING MODULE: FILEACC

CALLING PROCEDURE: FOPEN

PARAMETERS PARAMETER DESCRIPTION

P1= FCB FILE LIMIT

P2= FCB MAX # EXTENTS

P3= (0:8)= INITIAL ALLOCATION EXTENTS

EVENT -62(%76)

EVENT NAME: FREAD
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FREAD

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:1) BUFFER HIT FLAG
P2= ACBTLOG	TRANSFER COUNT
P3= NOT USED	

EVENT -63(%77)

EVENT NAME: FWRITE
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FWRITE

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:1) BUFFER HIT FLAG
P2= TCOUNT	SEE INTRINSIC MANUAL
P3= NOT USED	

EVENT -64(%100)

EVENT NAME: FREADDIR
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FREADDIR

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:1) BUFFER HIT FLAG
P2= ACBTLOG	TRANSFER COUNT
P3= NOT USED	

EVENT -64(%100)

EVENT NAME: FREADDIR'
DESCRIPTION: CONTINUATION OF EVENT -64 FREADDIR

CALLING MODULE: FILEIO

CALLING PROCEDURE: FREADDIR

PARAMETERS	PARAMETER DESCRIPTION
P1= REC #	MSW
P2= REC #	LSW
P3= NOT USED	

EVENT -65(%101)

EVENT NAME: FWRITEDIR
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING MODULE: FWRITEDIR

PARAMETERS	PARAMETER DESCRIPTION
P1= FILENUM	(0:1) BUFFER HIT FLAG
P2= TCOUNT	SEE INTRINSIC MANUAL
P3= NOT USED	

EVENT -65(%101)

EVENT NAME: FWRITEDIR'
DESCRIPTION: CONTINUATION OF EVENT -65 FWRITEDIR

CALLING MODULE: FILEIO

CALLING PROCEDURE: FWRITEDIR

PARAMETERS	PARAMETER DESCRIPTION
P1= REC #	MSW
P2= REC #	LSW
P3= NOT USED	

EVENT -66(%102)

EVENT NAME: FUPDATE
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FUPDATE

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:1) BUFFER HIT FLAG
P2= TCOUNT	SEE INTRINSIC MANUAL
P3= NOT USED	

EVENT -67(%103)

EVENT NAME: IOWAIT
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: IOWAIT

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:1) BUFFER HIT FLAG
P2= ACBTLOG	TRANSFER COUNT
P3= NOT USED	

EVENT -68(%104)

EVENT NAME: FREADSEEK
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FREADSEEK

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	(0:1) BUFFER HIT FLAG
P2= REC #	MSW
P3= REC #	LSW

EVENT -69(%105)

EVENT NAME: FSPACE
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FSPACE

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= DISPLACEMENT	SEE INTRINSIC MANUAL
P3= NOT USED	

```
**********************************************************************
*                                                                    *
*                    MMSTAT EVENT GROUP 7                            *
*                           FILESYS                                  *
*          THESE EVENTS ARE FOR DEVELOPMENT USE ONLY                 *
**********************************************************************
```

EVENT -70(%106)

EVENT NAME: FPOINT
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FPOINT

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= REC #	MSW
P3= LSW	LSW

EVENT -71(%107)

EVENT NAME: FCONTROL
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FCONTROL

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= CODE	SEE INTRINSIC MANUAL
P3= NOT USED	

EVENT -72(%110)

EVENT NAME: FSETMODE
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FSETMODE

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= MODEFLAGS	SEE INTRINSIC MANUAL
P3=	

EVENT -74(%112)

EVENT NAME: FCHECK
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FCHECK

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= ERRORCODE	SEE INTRINSIC MANUAL
P3= 0	

EVENT -75(%113)

EVENT NAME: FGETINFO
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FGETINFO

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= FOPTIONS	SEE INTRINSIC MANUAL
P3= AOPTIONS	SEE INTRINSIC MANUAL

EVENT -76(%114)

EVENT NAME: FREADLABEL
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE:

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= TCOUNT	SEE INTRINSIC MANUAL
P3= 0	

EVENT -77(%115)

EVENT NAME: FWRITELABEL
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FWRITELABEL

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= TCOUNT	SEE INTRINSIC MANUAL
P3= 0	

EVENT -78(%116)

EVENT NAME: FLOCK
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FLOCK

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= LOCKCOND	SEE INTRINSIC MANUAL
P3= COND CODE	SEE INTRINSSIC MANUAL

EVENT NAME: FUNLOCK
DESCRIPTION:

CALLING MODULE: FILEIO

CALLING PROCEDURE: FUNLOCK

PARAMETERS	PARAMETER DESCRIPTION
P1=	FILE #
P2=	0
P3=	0

```
**********************************************************************
*                                                                    *
*                    MMSTAT EVENT GROUP 8                            *
*                                                                    *
*          THESE EVENTS ARE FOR DEVELOPMENT USE ONLY                 *
*                                                                    *
**********************************************************************
```

EVENT -80(%120)

EVENT NAME: FRENAME
DESCRIPTION:

CALLING MODULE: FILEACC

CALLING PROCEDURE: FRENAME

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= 0	
P3= 0	

EVENT -81(%121)

EVENT NAME: FCLOSE
DESCRIPTION:

CALLING MODULE: FILEACC

CALLING PROCEDURE: FCLOSE

PARAMETERS	PARAMETER DESCRIPTION
P1= FILE #	
P2= DISP	SEE INTRINSIC MANUAL
P3= SECCODE	SEE INTRINSIC CODE

```
**********************************************************************
*                                                                    *
*                    MMSTAT EVENT GROUP 9                            *
*                                                                    *
*                    DISC I/O TRANSFER REQUESTS                      *
*          THESE EVENTS ARE FOR DEVELOPMENT USE ONLY                 *
**********************************************************************
```

EVENT -98(%142)

EVENT NAME: DISK TRAFFIC
DESCRIPTION: DISC I/O REQUEST HAS BEEN QUEUED

CALLING MODULE: HARDRES

CALLING PROCEDURE: ATTACHIO

PARAMETERS	PARAMETER DESCRIPTION
P1=CNT	DATA TRANSFER COUNT:WORDS IF >0; BYTES IF <0
P2=FLAGS.(0:4)	
P3=FNCT	=0 ==>READ
	=1 ==>WRITE
	=2 ==>OPEN FILE
	=3 ==>CLOSE FILE
	=4 ==>CLOSE DEVICE

```
**********************************************************************
*                                                                    *
*                                                                    *
*                    MMSTAT EVENT GROUP 10                           *
*                                                                    *
*                                                                    *
**********************************************************************
```

EVENT 100(%144)

EVENT NAME: DISK ERROR
DESCRIPTION: RECORD DISC ERROR

CALLING MODULE: IOFDISC1

CALLING PROCEDURE: FHDDVR

PARAMETERS	PARAMETER DESCRIPTION
P1=DIPT(DSTAT)	HARDWARE STATUS
P2=S0	QMISC
P3=IOQP(QLDEV).QLDEVN LOR STOCOUNT&LSL(8)) =LDEV/SIO PROGRAM COUNTER	

EVENT 101(%145)

EVENT NAME: DISK ERROR
DESCRIPTION: RECORD DISC ERROR

CALLING MODULE: IOMDISCO

CALLING PROCEDURE: MHDDVR

PARAMETERS	PARAMETER DESCRIPTION
P1=DIPT(DSTAT)	HARDWARE STATUS
P2=S0	QMISC
P3=IOQP(QLDEV).QLDEVN LOR STOCOUNT&LSL(8)) =LDEV/SIO PROGRAM COUNTER	

```
**********************************************************************
*                                                                    *
*                                                                    *
*                    MMSTAT EVENT GROUP 11                           *
*                                                                    *
*                                                                    *
**********************************************************************
```

EVENT -110(%156)

EVENT NAME: START I/O
DESCRIPTION:DRIVER INITIATOR FOR SIO DEVICE HAS BEEN CALLED

CALLING MODULE: HARDRES

CALLING PROCEDURE: SIODM

PARAMETERS PARAMETER DESCRIPTION

P1=IOQPL(QSTAT) LOR IOQPL(QLDEV).LDEVN
=(0:8) PCB ENTRY # OF PROCESS MAKING REQUEST
(8:8) LOGICAL DEVICE NUMBER OF DEVICE FOR I/O
P2=IOQP(QWBCT)=WORD COUNT IF>0;BYTE COUNT IF<0
P3=(0:2) = FUNCTION CODE SPECIFIED BY DRIVER

= 0 => READ
= 1 => WRITE
= 2 => CONTROL

=(6:10)= DSTN OF TARGET DATA SEG

EVENT -111(%157)

EVENT NAME: I/O COMPLETION
DESCRIPTION: SIO COMPLETION

CALLING MODULE: HARDRES

CALLING PROCEDURE: SIODM

PARAMETERS PARAMETER DESCRIPTION

P1=IOQP(QLDEV).LDEVN=LOGICAL DEVICE NUMBER OF
DISC INVOLVED IN TRANSFER
P2=IOQP(QPAR1) (DEFINED BY DRIVER)
P3=IOQP(QPAR2) (DEFINED BY DRIVER)

```
**********************************************************************
*                                                                    *
*                                                                    *
*                    MMSTAT EVENT GROUP 12                           *
*                                                                    *
*                                                                    *
**********************************************************************
```

EVENT -120(%170)

EVENT NAME: DISKSPACE
DESCRIPTION: BUG CATCHER

CALLING MODULE: ALLOCATE

CALLING PROCEDURE: DISKSPACE

PARAMETERS PARAMETER DESCRIPTION

P1=PDISKADR<0 ==> GET DISC SPACE AT THIS ADDRESS
=0 ==>GET N SECTORS ON ANY DISC
>0 ==>RETURN SPACE
P2=SECOND WORD OF PDISKADR
P3=LDEV=LOGICAL DEVICE NUMBER OF DISC

EVENT -121(%171)

EVENT NAME: DISKSPACE
DESCRIPTION: BUG CATCHER

CALLING MODULE: ALLOCATE

CALLING PROCEDURE: DISKSPACE

PARAMETERS PARAMETER DESCRIPTION

P1=NSECT NUMBER OF SECTORS REQUESTED
P2=WORD 2 OF NSECT
P3=RETURNVAL =0==> OK
=1 ==>I/O ERROR
=2 ==>INVALID NSECT
=3 ==>SPACE NOT AVAILABLE
=4 ==> INVALID DISC ADDRESS
=5 ==> FREE SPACE TABLE FULL

EVENT 125 (%175)

EVENT NAME: IOBUFTRP

EVENT DESCRIPTION: IOSYSTEM BUFFER TRAP

CALLING MODULE: HARDRES
CALLING PROCEDURE: SIODM

PARAMETER DESCRIPTION
P1 = IOQP
P2 = IOQP(QDSTN).DSTN = DST NUMBER OF BUFFER
P3 = 0

****
*
*
* MMSTAT EVENT GROUP 13
*
* (NOT USED)
****

****
*
*
* MMSTAT EVENT GROUP 14
*
* CS/3000
****

EVENT 140 (%214)

EVENT NAME: COPEN
DESCRIPTION:

CALLING MODULE: COMSYS2

CALLING PROCEDURE: COPEN

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	PMAP1
P3	PMAP2

EVENT 142 (%216)

EVENT NAME: CABORTIO
DESCRIPTION:

CALLING MODULE: COMSYS1

CALLING PROCEDURE: CABORTIO

PARAMETERS	PARAMETER DESCRIPTION
P1	LOGICAL DEVICE
P2	IOQINDEX
P3	0

EVENT 144 (%220)

EVENT NAME: CSIOWAIT
DESCRIPTION:

CALLING MODULE: COMSYS1

CALLING PROCEDURE: CSIOWAIT

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	TRANSMISSION LOG
P3	

EVENT 146 (%222)

EVENT NAME: CCLOSE
DESCRIPTION:

CALLING MODULE: COMSYS3

CALLING PROCEDURE: CCLOSE

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	LINE NUMBER
P3	0

EVENT 147 (%223)

EVENT NAME: CREAD
DESCRIPTION:

CALLING MODULE: COMSYS4

CALLING PROCEDURE: CREAD

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	INCOUNT
P3	STATION

EVENT 149 (%225)

EVENT NAME: CWRITE
DESCRIPTION:

CALLING MODULE: COMSYS4

CALLING PROCEDURE: CWRITE

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	OUTCOUNT
P3	INCOUNT

****
*
*
* MMSTAT EVENT GROUP 15
*
* CS/3000
*
****

EVENT 150 (%226)

EVENT NAME: CSDRIVER
DESCRIPTION:

CALLING MODULE: BSCLCM

CALLING PROCEDURE: CSDRIVER

PARAMETERS		PARAMETER DESCRIPTION
P1	TIMER LSW	
P2	CURRENTSTATE	WHERE THE DRIVER IS IN THE STATE TRANSITION TABLE
P3	CURRENTEVENT	(0:8) = CURRENT EVENT (8:8) = LOGICAL DEVICE WHAT CAUSED THE DRIVER TO BECOM ACTIVE

EVENT 152 (%230)

EVENT NAME: CCONTROL
DESCRIPTION

CALLING MODULE: COMSYS5

CALLING PROCEDURE: CCONTROL

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	CONTROL CODE
P3	PARAMETER

EVENT 153 (%231)

EVENT NAME: COPENTRACEFILE
DESCRIPTION:

CALLING MODULE:

CALLING PROCEDURE: COPENTRACEFILE

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	CTRACEINFO
P3	0

EVENT 154 (%232)

EVENT NAME: CCLOSETRACEFILE
DESCRIPTION:

CALLING MODULE:

CALLING PROCEDURE: CCLOSETRACEFILE

PARAMETERS	PARAMETER DESCRIPTION
P1	(0:8) = CS ERROR CODE (8:8) = LOGICAL DEVICE NUMBER
P2	0
P3	0

EVENT NAME: CPOLLIST
DESCRIPTION:

CALLING MODULE:

CALLING PROCEDURE: CPOLLIST

PARAMETERS	PARAMETER DESCRIPTION
P1	LOGICAL DEVICE
P2	CS ERROR CODE
P3	PMAP

****

MMSTAT EVENT GROUP 16

****

EVENT 160(%240)

EVENT NAME: CREAD
DESCRIPTION:

CALLING MODULE: DSMON

CALLING PROCEDURE:

PARAMETERS PARAMETER DESCRIPTION

P1= TIME STAMP

P2= (0:4) NOT USED
(4:1) BLOCK
(5:2) STATE
(7:3) NEXT
(10:1) :=0 INITIALIZATION EVENT
:=1 COMPLETION EVENT
(11:5) SUB EVENT NUMBER

P3= DEPENDS ON THE SUB EVENT NUMBER AND
IF ITS A INTIALIZATION OR COMPLETION EVENT.
MSG: (0:4) STRMTYPX
(4:6) MSG CLS
(10:16) STRMTYP

SUB EVENT NO.	SUB EVENT NAME	INIT PARM	COMP PARM
0	CREAD	0	LEN
1	CWRITE	X MSG	LEN
2	IOWAIT	0	LEN
3	CCHECK	0	ERRCOD
4	DSATTN	0	0
5	DSWC	X MSG	R MSG
6	CHNGEWAIT	PARM	0
7	MONREQ	REQ	0
10	CABORT	0	T/F
11	CRESET	0	0
12	CSDATA	R MSG	
13	CSREREAD		

****
*
*
* MMSTAT EVENT GROUP 19
*
*
****

EVENT 191(%277)

EVENT NAME: DISKINTRPT
DESCRIPTION: A 7905/7920 CONTROLLER IS PROCESSING AN ATTENTION INTERRUPT (ONLINE/OFFLINE)
CALLING MODULE: HARDRES

CALLING PROCEDURE: SIODM

PARAMETERS	PARAMETER DESCRIPTION
P1= @DITP	(US)--ie.WHO GOT THE INTERRUPT
P2= @DITP	(THEM)--ie. WHO RAN THE POLL PROGRAM
P3= DITP	"OUR" DIT FLAGS WORD

THERE SHOULD BE AT LEAST AN %300 AND AN %303 FOR EACH SIO PRGM. A SINGLE ISOLATED (IN TIME) REQUEST WILL GENERATE AT LEAST A %303, %300, %303. IF THE QUEUE OF IOQE'S ON A DIT NEVER EMPTIES THERE WOULD BE ONE %300 AND ONE %303 PER SIO PRGM.

EVENT NAME: GIPINTERUPT
DESCRIPTION: INTERRUPT JUST PROCESSED

CALLING MODULE: HARDRES

CALLING PROCEDURE: GIP

PARAMETERS	PARAMETER DESCRIPTION
P1= (0:7)	LDEV note a) its easy to read in oct b) ldevs > 127 will be recorded mod 128
(8:9)	ADDRESS CONTAINED IN DRT WORD 0 RELATIVE TO SIO PROGRAM AREA (ie where did it stop?) ABS(DRTN*4)-(ILTP(ISIOP)+SYSDB))
P2= DEVICE STATUS	(the TIO GIP just did)
P3= LSW of a call to TIMER	

EVENT NAME: SIODM
DESCRIPTION: LEAVING SIODM

CALLING MODULE: CRIO

CALLING PROCEDURE: SIODM

PARAMETERS PARAMETER DESCRIPTION

P1= (0:7) LDEV -- SAME AS 192(%300)

(8:9) a IOQ table relative index
to convert this into the number that
is formated by DPAN2, multiply this num
ber by %13 and add %10,that will be the
number in the left column of returned
IOQ'S-- add the table base to get the
DPAN number for "in-use" enries.

P2= DIT WORD 0 (DIT FLAGS) -- note that P2.(12:4)
contains the state we are "leaving"

P3= (0:4) THE CONTENTS OF DIT0.(12:4)
ie, the state we entered in

(4:12) LSW OF TIMER -- note the difference
between P3 of %300 and
P3 of %303, these 12 bit
will hold ~4.1 seconds w
is enough for 30229 con-
trollers purpose and DS
timeouts (some types).

****
*
*
* MMSTAT EVENT GROUP 20
*
* THESE EVENTS ARE FOR DEVELOPMENT USE ONLY
*
****

EVENT 200(%310)

EVENT NAME: DISKBUGCATCHER
DESCRIPTION:

CALLING MODULE: PVSYS

CALLING PROCEDURE: MVTABLE

PARAMETERS PARAMETER DESCRIPTION

P1= FUNCT

P2= MVTABX

P3= DELTAP

EVENT 201(%311)

EVENT NAME: DISKBUGCATCHER
DESCRIPTION:

CALLING MODULE: PVSYS

CALLING PROCEDURE: USERTABLE

PARAMETERS PARAMETER DESCRIPTION

P1= FUNCT

P2= MVTABX

P3= DELTAP

```
**********************************************************************
*                                                                    *
*                                                                    *
*                    MMSTAT EVENT GROUP 21                           *
*                PROCESS CREATIONS AND TERMINATIONS                  *
*                LOGICAL PROCESS TABLE                               *
*                                                                    *
**********************************************************************
```

EVENT -211(%323)

EVENT NAME: PROCESS COMPLETION
DESCRIPTION: PROCESS HAS TERMINATED

CALLING MODULE: MORGUE

CALLING PROCEDURE: TERMINATE

PARAMETERS	PARAMETER DESCRIPTION
P1=0	
P2=0	
P3=0	

****
*
*
* MMSTAT EVENT GROUP 22
*
* TIME STAMP OF EVENT TRACE ENABLE AND DISABLE
****

EVENT 221(%335)

EVENT NAME: CONFIGURATION INFORMATION
DESCRIPTION: EVENT GROUP MASK

CALLING MODULE: CRIO

CALLING PROCEDURE: CONSMON

PARAMETERS	PARAMETER DESCRIPTION
P1= MEASMSK0	
P2= MEASMSK1	
P3=	

EVENT 222(%336)

EVENT NAME: CONFIGURATION INFORMATION
DESCRIPTION: MPE VERSION FIX UPDATE

CALLING MODULE: OPCOMMAND

CALLING PROCEDURE: CXMON

PARAMETERS PARAMETER DESCRIPTION

P1= VERSION

P2= FIXL

P3= UPDATEL

EVENT -223 (-%337)

EVENT NAME: CONFIGURATION INFORMATION
DESCRIPTION: SYSTEM TABLE LOCATIONS AND AVAILABLE LINKED MEMORY INFORMATION

CALLING MODULE: OPCOMMAND

CALLING PROCEDURE: CXMON

PARAMETERS PARAMETER DESCRIPTION

P1=F(%1032)=@CST(0)-@DST(0)
=DISPLACEMENT TO CODE
P2=F(%1033)=@CST(LAST)-@DST(0)
=DISPLACEMENT TO SHARABLE
P3=LOGICAL(TOTAL&DLSK(4))=LINKED MEMORY SIZE

EVENT -224 -(%340)

EVENT NAME: SYSPINS
DESCRIPTION: LOGICAL PROCESS TABLE

CALLING MODULE: OPCOMMAND

CALLING PROCEDURE: CXMON

PARAMETERS PARAMETER DESCRIPTION

P1=ABSOLUTE(%1141)=PROGEN'S PCBENTRY NUMBER
P2=ABSOLUTE(%1142)=MAM'S PCB ENTRY NUMBER
P3=ABSOLUTE(%1143)=UCOP'S PCB ENTRY NUMBER

EVENT -225 (-%341)

EVENT NAME: SYSPINS(CNTD.)
DESCRIPTION: LOGICAL PROCESS TABLE

CALLING MODULE: OPCOMMAND

CALLING PROCEDURE: CXMON

PARAMETERS PARAMETER DESCRIPTION

P1=ABSOLUTE(%1144)=PFAIL'S PCB ENTRY NUMBER
P2=ABSOLUTE(%1145)=DEVREC'S PCB ENTRY #
P3=ABSOLUTE(%1146)=PRMSG'S PCB ENTRY #

EVENT -226 (-%342)

EVENT NAME: SYSPINS(CNTD.)
DESCRIPTION: LOGICAL PROCESS TABLE

CALLING MODULE: OPCOMMAND

CALLING PROCEDURE: CXMON

PARAMETERS PARAMETER DESCRIPTION

P1=ABSOLUTE(%1147)=STMSG'S PCB ENTRY #
P2=ABSOLUTE(%1150)=LOG'S PCB ENTRY #
P3=ABSOLUTE(%1151)=LOAD'S PCB ENTRY #

EVENT -227 (-%343)

```
EVENT  NAME: SYSPINS(CNTD.)
DESCRIPTION: LOGICAL PROCESS TABLE

  CALLING MODULE: OPCOMMAND

      CALLING PROCEDURE: CXMON

                  PARAMETERS      PARAMETER DESCRIPTION

                      P1=ABSOLUTE(%1152)=IOMESSPROC'S PCB ENTRY #
                      P2=ABSOLUTE(%1153)=SYSIOPROC'S PCB ENTRY #
                      P3=ABSOLUTE(%1154)=MEMLOGP'S PCB ENTRY #
```

EVENT -228 (%344)

```
EVENT  NAME: TIMESTAMP
DESCRIPTION: TIMESTAMP

  CALLING MODULE: OPCOMMAND

      CALLING PROCEDURE: CXMON

                  PARAMETERS      PARAMETER DESCRIPTION

                      P1=CALENDER      (0:7)=YEAR OF CENTURY
                                       (7:9)=DAY OF YEAR
                      P2=CLOCK(WORD1).(0:7)=HOUR OF DAY
                                       (8:8)=MINUTE OF HOUR
                      P3=CLOCK(WORD2).(0:7)=SECONDS INTO MINUTE
                                      .(8:8)=TENTHS OF SECONDS
```

EVENT -229 (-%345)

```
EVENT  NAME: MONOFF
DESCRIPTION: END EVENT TRACING

  CALLING MODULE: OPCOMMAND

      CALLING PROCEDURE: CXMON

                  PARAMETERS      PARAMETER DESCRIPTION

                      P1=0
                      P2=0
                      P3=0
```

****

MMSTAT EVENT GROUP 23
TERMINAL I/O

****

EVENT 230 (%346)

EVENT NAME: TERMREAD
DESCRIPTION: TERMINAL READ COMPLETION

CALLING MODULE: HARDRES
CALLING PROCEDURE: TIP

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = READ DURATION	
P3 = BYTES READ	

EVENT 231 (%347)

EVENT NAME: DC1DC2ACK
DESCRIPTION: DC1/DC2 HAS BEEN SATISFIED

CALLING MODULE: HARDRES
CALLING PROCEDURE: TIP

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = DURATION (BETWEEN START AND DC2)	
P3 = BYTES READ (EXCLUDING DC2)	

EVENT 232 (%350)

EVENT NAME: TERMWRITE
DESCRIPTION: WRITE COMPLETION

CALLING MODULE: IOTERM0
CALLING PROCEDURE: TERMIOM

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = 0	
P3 = BYTE COUNT OF TRANSFER	

EVENT 233 (%351)

EVENT NAME: BINREAD
DESCRIPTION: BINARY READ COMPLETED

CALLING MODULE: HARDRES
CALLING PROCEDURE: TIP

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = DURATION	
P3 = BYTES READ	

EVENT 234 (%352)

EVENT NAME: TERMLOGON
DESCRIPTION: TERMINAL JUST LOGGING ON

CALLING MODULE: IOTERMO
CALLING PROCEDURE: TERMIOM

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = 0	
P3 = 0	

EVENT 235 (%353)

EVENT NAME: TERMLOGOFF
DESCRIPTION: TERMINAL JUST LOGGED OFF

CALLING MODULE: IOTERMO
CALLING PROCEDURE: TERMIOM

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = 0	
P3 = 0	

EVENT 236 (%354)

EVENT NAME: SPECCHAR
DESCRIPTION: PROCESSED SPECIAL CHARACTER

CALLING MODULE: HARDRES
CALLING PROCEDURE: TIP

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = SPECIAL CHARACTGER PROCESSED	
P3 = 0	

EVENT 237 (%355)

EVENT NAME: BREAK
DESCRIPTION: PROCESSED BREAK

CALLING MODULE: HARDRESS
CALLING PROCEDURE: TIP

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = DSTATE	
P3 = 0	

EVENT 238 (%356)

EVENT NAME: SPECREAD
DESCRIPTION: SPECIAL READ TERMINATION CHARACTER DETECTED

CALLING MODULE: HARDRES
CALLING PROCEDURE: TIP

PARAMETERS	PARAMETER DESCRIPTION
P1 = LDEV	
P2 = DURATION	
P3 = BCNT	

HEWLETT
PACKARD

Part No. 32002-90003
Printed in U.S.A. 4/81