OPT/3000 - What It Is & What It Does

by Tom Idema

I. Introduction

A. What is OPT/3000?

OPT/3000 is Hewlett-Packard's On-line Performance Tool for use with HP3000 computers using the MPE operating system. Its primary uses include performance measurement, system utilization and tuning. As as package, OPT/3000 consists of two interdependent products, the OPT/3000 Software and OPT/3000 System Performance Training Course. It is designed to be interactive, although it has certain batch capabilities and on-line help capabilities as well. OPT/3000 is a powerful tool to aid the trained user in monitoring and improving the performance of the HP3000.

B. How does OPT/3000 help me?

OPT/3000 is an invaluable tool which allows the system manager to look deep inside the HP3000 and monitor almost everything going on. OPT/3000 is used in our facility for collecting system utilization data and for characterizing system performance by charting and comparing current data with previous samples over time. I've found OPT/3000 to be far superior to the old "crystal ball" approach, (which was about all that was available to system managers prior to the introduction of OPT/3000 as a product), especially when it comes to isolating problem areas, be it disc I/O, memory, or whatever.

In the area of system management, OPT/3000 is used to monitor the system performance and assist with system fine tuning. It helps with the identification of processing bottle necks, helps improve overall system preformance and helps in the area of capacity planning. For instance, prior to the introduction of MPE IV, our HP3000 Series III was showing signs of saturation with an average CPU utilization of around 50% during a 24 hour work day as shown in Figure 1; and, indications were that a more powerful CPU would be needed in the near future. After installing MPE IV on this (*) machine, however, the performance data obtained from OPT/3000 indicated a CPU utilization of slightly over 25%, which meant that the replacement of the current operating equipment could be postponed for some time (See Figure 2). (*)

Although this is only one example, it should be noted that with OPT/3000 almost all aspects of the HP3000 can be monitored and it allows you to consider your system as a whole.

II. OPT/3000 Functions

OPT/3000 can generate over twenty unique displays, each showing a different aspect of system performance data. These are grouped into six major categories or functions which will be discussed briefly.

A. Globals

The Globals function shows summary level information describing present CPU usage, memory utilization, disc I/O rates (Figure 3),

and a summary of jobs and sessions currently running (Figure 4). (*)

These are two Global displays which allow you to quickly identify potential problem areas or to monitor general system activity and determine trends in resource usage. For instance, current CPU utilization can be found by adding CPU Busy and the Overhead percentages. Figure 5 shows a HP3000 series 44 that is 86% busy with 14% of Overhead...100% current CPU utilization. (*)

However, there was a problem program running at this time which was in a hard loop. Figure 6 shows the same CPU only 16% busy seven minutes later after the problem program was aborted. (*)

A hard copy summary report is also available within the Global function which provides an overall view of the system (See Figure 7). (*)

This can be generated interactively or in batch mode. It is from 1/2 hour summary reports generated on a random 24 hour basis that I plot the average CPU utilizations such as shown in Figure 8; in this case an HP3000 series 64 with 4MB of memory and over 35 interactive terminals. (*)

After consulting the Global displays, which are presented first when executing OPT/3000, more detailed displays from the other functional areas can be used for isolation or verification of potential performance problems.

B. Memory

The Memory function has displays which provide information about the usage of memory and its segmentation. These displays provide not only the use and contents of memory, but histograms as to the size and distribution of code segments, stack data, etc. The entire contents of memory can be displayed, or that of a specific bank, according to your needs.

Figure 9 shows the summary usages of all memory, linked memory and code, stack and data segments. Should a high percentage of linked memory be locked or frozen, then the memory manager could have problems finding space, depending on the location of the frozen area. (*)

Memory contents shown in Figure 10 provide a clearer picture of overall memory content and usage. Note the frozen areas in Bank 01 indicated by the "///'s". In this case they present no problem due to location. (*)

Should a detailed image of a specific bank of memory be required, Figure 11 provides an example. (*)

Figure 12 displays three of the histograms available for analysis of code, stack and extra data segments. If the charts indicate a large number of segments over 10K in size, the memory manager may have problems in satisifying requirements for absent segments. (*)

C. CPU-Memory Manager

This function provides information related to CPU usage and memory management activity as percentages of time in various states and process execution rates. The various rates include CPU time for execution, memory management, overhead processing, waiting and CPU idle time.

Notice in Figure 13, the CPU Usage Display, that "paused for swap" is not present, indicating that memory is not a problem at this time, but that the "paused for disc" is greater than the 10% optimum range indicating that disc I/O may, indeed, be a problem and bears watching. (*)

The other displays, Figures 14 & 15, support the fact that memory is probably sufficient for the current workload on the system. (*)

D. I/O Function

The I/O displays provide disc I/O completion rates and data relative to printer and tape activity as well. The I/O completion rate for each type of device is displayed for both the current and overall time intervals. Information can be displayed down to a specific device and allows you to determine the balance of your I/O load across devices.

The I/O Activity Report provides an overall I/O summary by device type as shown in Figure 16. In this case only user disc I/O, at the rate of 54 per second, is taking place. (*)

A closer look at disc drives, 1 through 4 in Figure 17, shows both the overall performance and the Read/Write activity currently taking place on the listed devices. Here it is important to look at the distribution of the I/O load to see if certain devices are getting all of the activity, and then to see what applications or files are in use to determine if better file placement might decrease disc contention, etc. (*)

E. Processes

The Process function provides information about process and program activity on the system, including file names, file sizes, program segments, number of users and working set data. Detailed information regarding each process is also available including process stack and space utilization.

The Program File Display in Figure 18 identifies all program files which are allocated or currently in use. The "#PS" in this case shows the number of process sharing a given program file. Figure 19, the User Summary Display gives the detail with (*) regard to these same processes. Note PIN #115; this is the process with the 28K stack as shown in figure 12 displayed earlier. (*)

The Process State Report summarizes the information about all processes known to the system as shown in Figure 20. Here, if the dispatch wait lists are greater than 5, it is possible to have CPU contention; disc contention if the short wait list is greater than 5. (*)

The Process Display, Figure 21, is the most detailed of the process function displays. In this display stack utilization, system status, files, data segments and even stack marker information can be analyzed. (*)

F. System Tables

The System Tables function has two displays which provide both the current and maximum utilization of all configurable system tables.

These displays give you an opportunity to see what the present and past table utilization has been, and from that establish an optimum set for your system which minimizes both memory usage and the risk of system failures caused by tables configured too small.

Tables, (See Figure 22), which consistantly have low utilization of thirty percent or less over a lengthly period of time, could possibly be reconfigured smaller, and thereby free up real memory. However, peak loads must be considered before reduction of table sizes. Conversely, tables with consistantly high rates of utilization (over ninety percent), could cause poor performance and probably should be made larger in order to improve system performance. (*)

Figure 23, shows a graphic representation of the table usages and provides a quick and dirty indication of present and peak usages shown in detail in Figure 22. (*)

III. System Performance Training Course

A. An HP Requirement

Hewlett Packard requires that at least one person from a site attend their eight day course at initial installation of the OPT/3000 package.

B. The Course Covers

The eight day System Performance Training Course required by Hewlett Packard is conducted by an HP Performance Specialist, and covers the internals of the MPE operating system and the techniques of performance analysis. Proper interpretation of OPT/3000 data requires an understanding of the MPE operating system that can only be obtained through such a course.

The internals course is required because OPT/3000 presents detailed information which often must be analyzed or interpreted by the System Manager. The operating system and processes, their tables, relationships and uses are covered in great detail along with the memory manager, scheduler, dispatcher and system I/O.

Time is also spent on the functions of the file system and in performance measurement where system configurations, scheduling and operation management are covered, along with tuning, upgrade planning, software evaluation and general control of system resources.

IV. Conclusion:

A. Cost

1. OPT/3000 software 32238A.....$6,400

2. System Performance Training 22809B.....$1,640

B. Is It For You ?

HOW'S YOUR SYSTEM PERFORMANCE ??

Personally, I'd be lost without OPT/3000. I maintain all three of my HP3000's on a regular basis, and as a result, have been able to keep them quite well tuned; and my performance has been good. But, OPT/3000 has also helped me to isolate and/or avoid various problems before they have become serious and caused the system to degrade.

OPT/3000 is just one tool and by itself will not substitute for the regular and deliberate application of "system management" functions such as disc management, scheduling, housekeeping, and good application design. But, with OPT/3000, the System Manager has one very powerful tool with which to "manage and monitor" the HP3000 computer systems.

(*) Pertains to diagrams for the document.

Biographical Information

of

Tom Idema

Tom Idema is Manager of MIS Technology Services for the Furniture Systems Division of Westinghouse Electric Corporation. He is a graduate of Ole Miss, with an MBA from Western Michigan University. Tom served with the Marines and flew jets in Viet Nam before launching his data processing career first with General Foods, and later with Hewlett-Packard, prior to joining Westinghouse. He has served as President of both the Westinghouse Corporate HP Users' Group and the Lake Michigan Regional Users' Group which serves the western Michigan area.

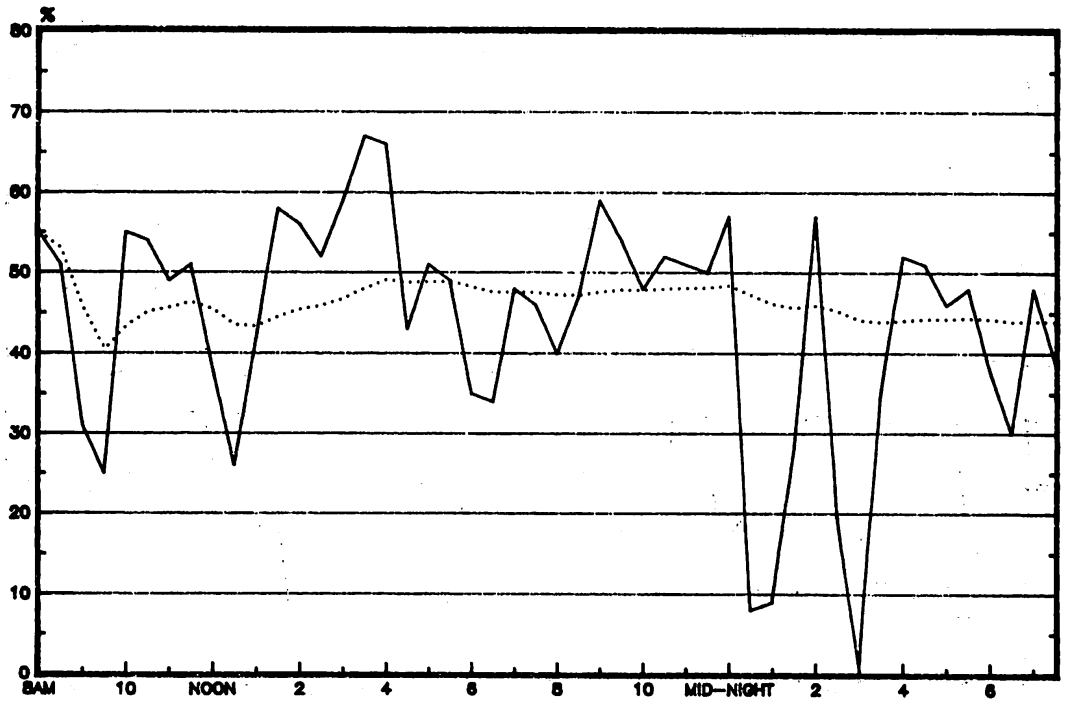
Tom is a member of the faculty of Grand Rapids Junior College, and has taught data processing classes for the past nine years. He has also had several articles published in a national data processing journal.

For the past two years he has served as a member of the HPIUG Affiliate Council.

M.I.S. TECHNICAL SERVICES

SYSTEM "A" CPU UTILIZATION

PERCENT BUSY ——— AVG. PCT. BUSY .....



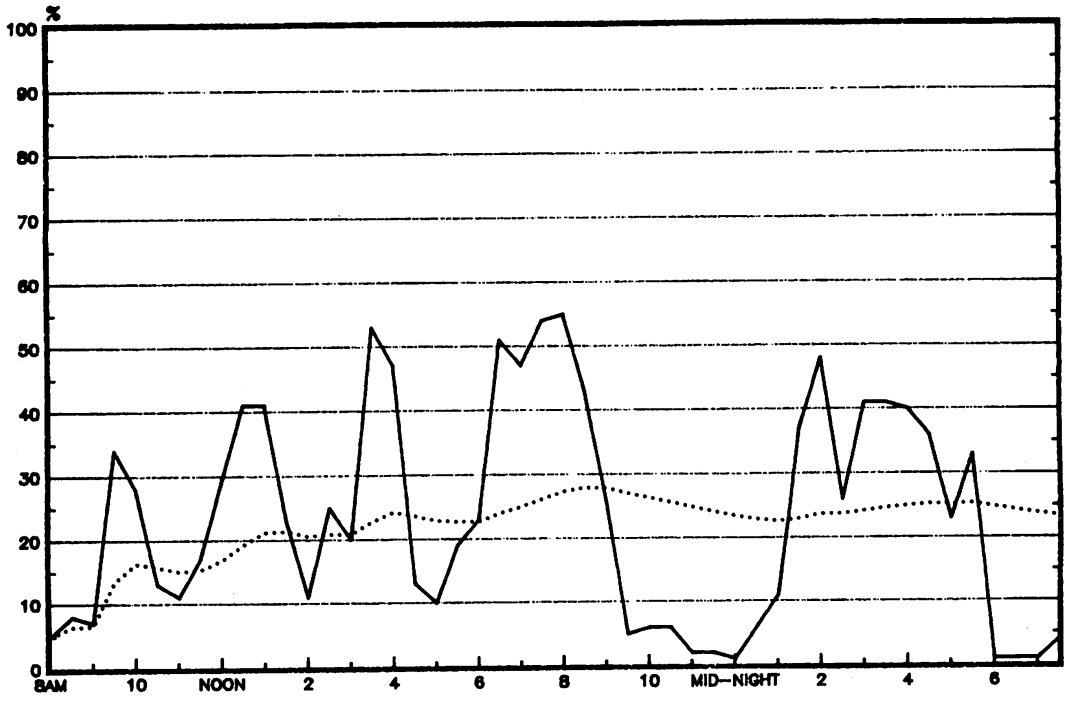
MAY 18, 1982

M.I.S. TECHNICAL SERVICES

SYSTEM "A" CPU UTILIZATION

PERCENT BUSY

AVG. PCT. BUSY



NOVEMBER 10, 1982

```
PROCESS SUMMARY DISPLAY      HP32238A.00.10  OPT/3000          MON, OCT 31, 1983, 11:29 AM      PAGE   2
(C) HEWLETT-PACKARD COMPANY 1979, 1980          WESTINGHOUSE SYSTEM 'C'
NUMBER OF CURRENT PROCESSES: 90

                  10        20        30        40        50        60        70        80        90       100
                  ----------!
ACTIVE SESSIONS   !         !                                                                                  (22/22)
                  ----------!
                  ----
ACTIVE JOBS       !  !                                                                                       (3/3)
                  ----

                  ----------!
SYSTEM PROCESSES  !         !                                                                                  (21/21)
                  ----------!
                  -----
CI PROCESSES      !   !                                                                                      (4/4)
                  -----
                  ----------!
USER PROCESSES    !         !                                                                                (21/21)
                  ----------!
                  ----------!
CREATED PROCESSES !         !                                                                                (23/23)
                  ----------!

                  -----
IN DISPATCH QUEUE !   !                                                                                      (4/4)
                  -----
                  ----------------------------------------------------------------------------------!
IN NO QUEUE       !                                                                                 !        (86/86)
                  ----------------------------------------------------------------------------------!


LEGEND:   ---
          ! ! CURRENT COUNT
          ---

          ---
          !/! MAXIMUM OBSERVED WHILE IN THIS DISPLAY
          ---
```

```
     RESOURCE USAGE DISPLAY      HP32238A.00.10  OPT/3000                          MON, OCT 31, 1983, 11:29 AM       PAGE   1
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    WESTINGHOUSE SYSTEM 'C'
   CURRENT INTERVAL:    11.7 SECONDS          OVERALL INTERVAL:   105.6 MINUTES

ACTIVITY IN CURRENT INTERVAL

                      10        20        30        40        50        60        70        80        90       100%
      MEMORY USAGE MMC----------------------------------CS----------------------------SD----------D          (2/40/32/18)

         CPU STATE B-------------------------------------------------BP-----------------------------PO----------O (50/36/14)

                      10        20        30        40        50        60        70        80        90       100 per second
 DISC I/O ACTIVITY U-------------------------------------------------U                                          (54)

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ACTIVITY OVER ALL INTERVALS
                      10        20        30        40        50        60        70        80        90       100%
         CPU STATE B-----------------------------------BP-----------------------------PI------IO----------O (42/38/8/12)

                      10        20        30        40        50        60        70        80        90       100 per second
 DISC I/O ACTIVITY U-----------------------------------------U                                                 (50)



MEMORY USAGE LEGEND:
  M  Resident MPE
  C  Code segments
  S  Stack segments
  D  Data segments

CPU STATE LEGEND:

  B  Busy on processes
  P  Paused for user and/or memory management disc I/O
  I  Idle
  G  Garbage collection
  O  Memory allocation and ICS overhead

DISC I/O ACTIVITY LEGEND:

  U  User disc I/O
  M  Memory management disc I/O
```

```
      RESOURCE USAGE DISPLAY      HP32238A.00.10  OPT/3000                        FRI, SEP  9, 1983,  5:57 PM       PAGE   1
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    SHPHUNG
   CURRENT INTERVAL:     15.9 SECONDS          OVERALL INTERVAL:      5.3 MINUTES

ACTIVITY IN CURRENT INTERVAL

                        10        20        30        40        50        60        70        80        90        100%
      MEMORY USAGE MMC----------------------------------CS--------------------SD----------D                    (2/36/24/14

         CPU STATE B-------------------------------------------------------------------------------------BO----------O (86/14)

                        10        20        30        40        50        60        70        80        90        100 per second
 DISC I/O ACTIVITY UU                                                                                              (2)
-------------------------------------------------------------------------------------------------------------------------------
ACTIVITY OVER ALL INTERVALS
                        10        20        30        40        50        60        70        80        90        100%
         CPU STATE B-------------------------------------------------------------------------------------------BO--O (98/4)

                        10        20        30        40        50        60        70        80        90        100 per second
 DISC I/O ACTIVITY U--U                                                                                            (4)



MEMORY USAGE LEGEND:
  M  Resident MPE
  C  Code segments
  S  Stack segments
  D  Data segments

CPU STATE LEGEND:

  B  Busy on processes
  P  Paused for user and/or memory management disc I/O
  I  Idle
  G  Garbage collection
  O  Memory allocation and ICS overhead

DISC I/O ACTIVITY LEGEND:

  U  User disc I/O
  M  Memory management disc I/O
```

```
     RESOURCE USAGE DISPLAY      HP32238A.00.10  OPT/3000                    FRI, SEP  9, 1983,  6:04 PM       PAGE   4
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    SHPHUNG
   CURRENT INTERVAL:     3.8 SECONDS          OVERALL INTERVAL:    12.1 MINUTES

ACTIVITY IN CURRENT INTERVAL
                        10        20        30        40        50        60        70        80        90        100%
      MEMORY USAGE MMC----------------------------------CS--------------------SD----------D                    (2/34/22/14)
         CPU STATE B--------------BI-------------------------------------------------------------------------------I (16/88)
                        10        20        30        40        50        60        70        80        90        100 per second
 DISC I/O ACTIVITY UU                                                                                             (2)
-------------------------------------------------------------------------------------------------------------------------
ACTIVITY OVER ALL INTERVALS
                        10        20        30        40        50        60        70        80        90        100%
         CPU STATE B-------------------------------------------------------------------------------BPPIIO----O (90/2/2/6)
                        10        20        30        40        50        60        70        80        90        100 per second
 DISC I/O ACTIVITY U------------U                                                                                 (14)



MEMORY USAGE LEGEND:
  M  Resident MPE
  C  Code segments
  S  Stack segments
  D  Data segments

CPU STATE LEGEND:

  B  Busy on processes
  P  Paused for user and/or memory management disc I/O
  I  Idle
  G  Garbage collection
  O  Memory allocation and ICS overhead

DISC I/O ACTIVITY LEGEND:

  U  User disc I/O
  M  Memory management disc I/O
```

SUMMARY REPORT HP32238A.00.10 OPT/3000 MON, OCT 31, 1983, 11:48 AM REPORT 9
(C) HEWLETT-PACKARD COMPANY 1979, 1980 WESTINGHOUSE SYSTEM 'C'
INTERVAL LENGTH: 1045.867 SECONDS (17.4 MINUTES)

CPU ACTIVITY SUMMARY

CPU STATE	MEAN	MAX	LENGTH	COUNT	TOTAL TIME
CPU BUSY	59%	71%	.006	107426	605.737
PAUSE DISC & SWAP	1%	5%	.023	314	7.219
PAUSE DISC	17%	54%	.019	9397	181.895
PAUSE SWAP	0%	0%	.020	8	.163
PAUSE IDLE	2%	30%	.064	404	25.771
GARBAGE COLLECTION	0%	0%		0	.000
MEMORY ALLOCATION	0%	1%	.003	444	1.473
ICS OVERHEAD	21%				223.609

MEMORY ALLOCATION SUMMARY

RESULT	MEAN	COUNT
RECOVERY	1%	2
FREE SPACE	99%	372
OVERLAY CAND	0%	0
GIVE UP	0%	0
HARD REQUEST	0%	0

LAUNCH ACTIVITY AND ADDITIONAL MEMORY MANAGEMENT ACTIVITY SUMMARY

	PROCESS LAUNCHES	PROCESS SWAP-INS	PROCESS PREEMPTS	MEMORY ALLOCS	SPECIAL REQUESTS	MM I/O READS	MM I/O WRITES	RELEASE DATA SEG	RELEASE CODE SEG	CLOCK CYCLES
COUNT	107426	444	33963	373	175	371	115	0	0	0
RATE	102.7	.4	32.5	.4	.2	.4	.1	.0	.0	.0
MAX RATE	128	2	46	2	1	2	1	0	0	0

SUMMARY OF DISC ACTIVITY

	COUNT/RATE ALL I/O	READS	WRITES	CONTROL OPS	MAXIMUM RATE (USER/MM) READS	WRITES	CONTROL OP
ALL DISC	24488/ 23.4	17247/ 16.5	6766/ 6.5	475/ .5	33/ 2	12/ 1	2
DISC 1 (LDEV 1)	3427/ 3.3	3027/ 2.9	366/ .3	34/ .0	19/ 0	2/ 0	1
DISC 2 (LDEV 2)	2567/ 2.5	1892/ 1.8	642/ .6	33/ .0	5/ 0	4/ 0	0
DISC 3 (LDEV 3)	2998/ 2.9	1796/ 1.7	1155/ 1.1	47/ .0	14/ 1	3/ 1	0
DISC 4 (LDEV 4)	7550/ 7.2	6391/ 6.1	1068/ 1.0	91/ .1	22/ 1	2/ 0	1
DISC 5 (LDEV 5)	2001/ 1.9	877/ .8	1072/ 1.0	52/ .0	2/ 0	2/ 0	0
DISC 6 (LDEV 11)	1406/ 1.3	727/ .7	608/ .6	71/ .1	4/ 0	2/ 0	1
DISC 7 (LDEV 12)	2805/ 2.7	1535/ 1.5	1188/ 1.1	82/ .1	17/ 0	3/ 0	0
DISC 8 (LDEV 13)	1734/ 1.7	1002/ 1.0	667/ .6	65/ .1	2/ 0	1/ 0	0

SUMMARY OF LP ACTIVITY

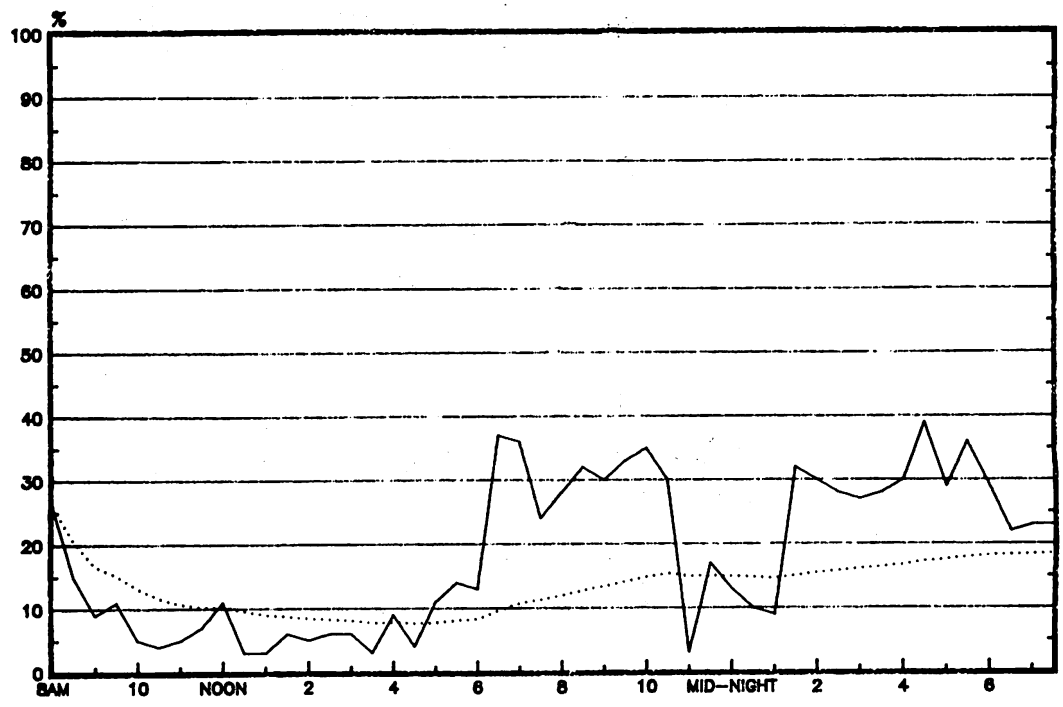
	COUNT/RATE ALL I/O	WRITES	CONTROL OPS	MAXIMUM RATE WRITES	CONTROL OP
ALL LP	0/ .0	0/ .0	0/ .0	0	0

SUMMARY OF TAPE ACTIVITY

	COUNT/RATE ALL I/O	READS	WRITES	CONTROL OPS	MAXIMUM RATE READS	WRITES	CONTROL OP
ALL TAPE	61/ .1	0/ .0	61/ .1	0/ .0	0	0	0
TAPE 1 (LDEV 7)	61/ .1	0/ .0	61/ .1	0/ .0	0	0	0

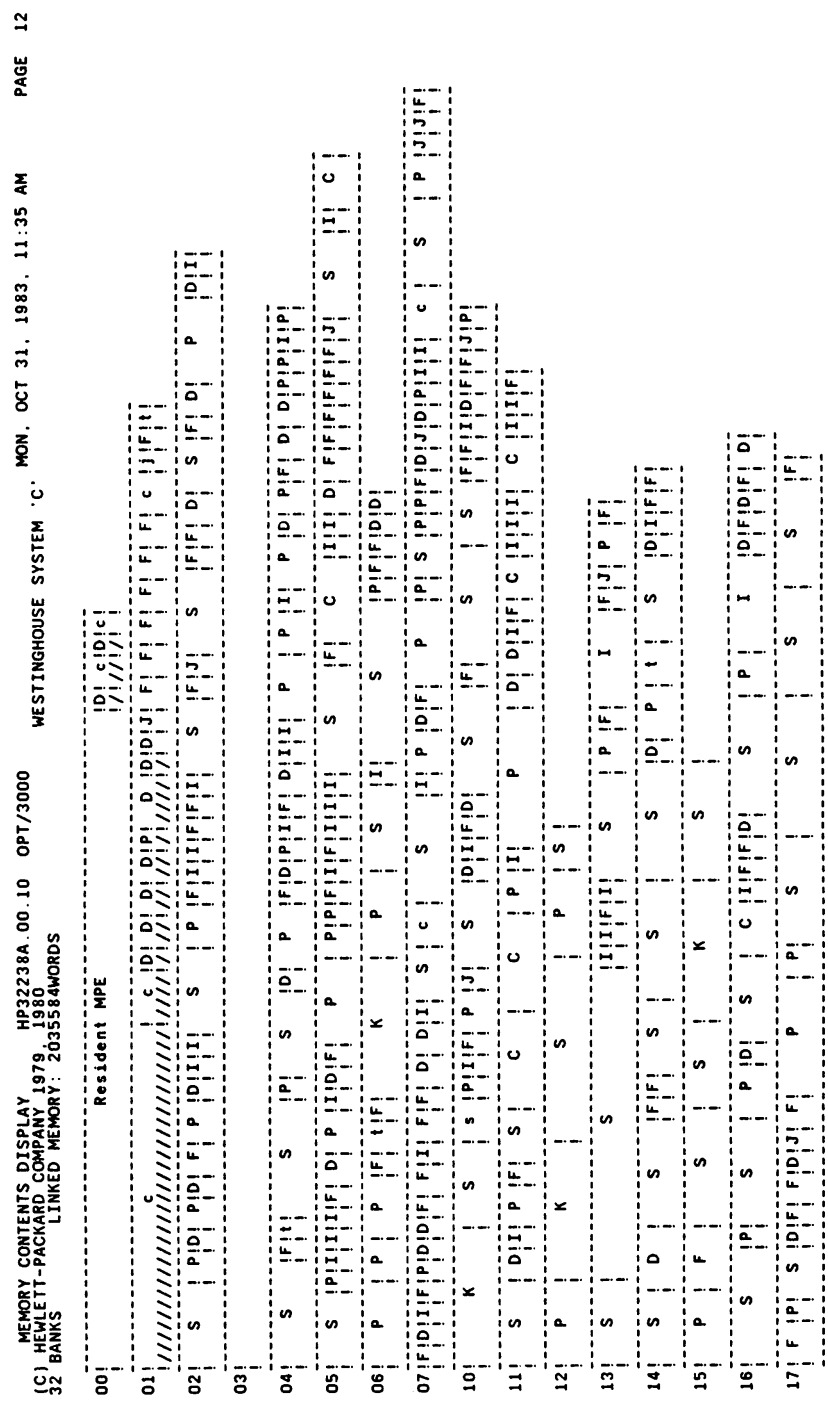
M.I.S. TECHNOLOGY SERVICES

SYSTEM "A" CPU UTILIZATION



AUGUST 8, 1983

```
      MEMORY REPORT DISPLAY      HP32238A.00.10  OPT/3000                    MON, OCT 31, 1983, 11:36 AM       PAGE  14
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    WESTINGHOUSE SYSTEM 'C'
32 BANKS        LINKED MEMORY: 2035584WORDS

                          10        20        30        40        50        60        70        80        90       100%
        ALL MEMORY M-MC-----------------------------------CS-------------------------------SD-----------------D         (3/38/31/20)

     LINKED MEMORY F-FA-------------------------------------------------------------------------------------A         (3/89)

     CODE SEGMENTS U-----------------------------------------------------US-----------------------------------------S (55/45)
                   P---------------------------------PC-------------------------------------------------------------C (35/65)

    STACK SEGMENTS U-------------------------------------------------------------------------------------------US--S (96/4)

     DATA SEGMENTS U-------------------------------------------------------------------------------------------US---S (95/5)

LEGEND:

ALL MEMORY - Includes all of memory

   M  Resident MPE
   C  Code Segments
   S  Stack Segments
   D  Extra Data Segments

LINKED MEMORY - All memory except for Resident MPE
   A  Active Segments
   O  Segments marked as Overlay Candidates
   F  Frozen, Locked, or I/O Frozen Segments

CODE, STACK, & EXTRA DATA SEGMENTS

   U  User Segments
   S  System Segments
   P  Program File Segments
   C  Code Segments from CST
   N  Non-special Extra Data Segments  (usage unknown)
   F  File System Segments
   J  Job Management Segments
   I  Image Segments
   K  KSAM Segments
   T  System Table Segments  (only those that are in linked memory)
```


MEMORY CONTENTS DISPLAY HP32238A.00.10 OPT/3000 WESTINGHOUSE SYSTEM 'C' MON, OCT 31, 1983, 11:35 AM PAGE 12
(C) HEWLETT-PACKARD COMPANY 1979, 1980
32 BANKS LINKED MEMORY: 2035584WORDS
Resident MPE

```
    MEMORY CONTENTS DISPLAY      HP32238A.00.10  OPT/3000                                    MON, OCT 31, 1983, 11:35 AM       PAGE  13
(C) HEWLETT-PACKARD COMPANY 1979, 1980                          WESTINGHOUSE SYSTEM 'C'
```

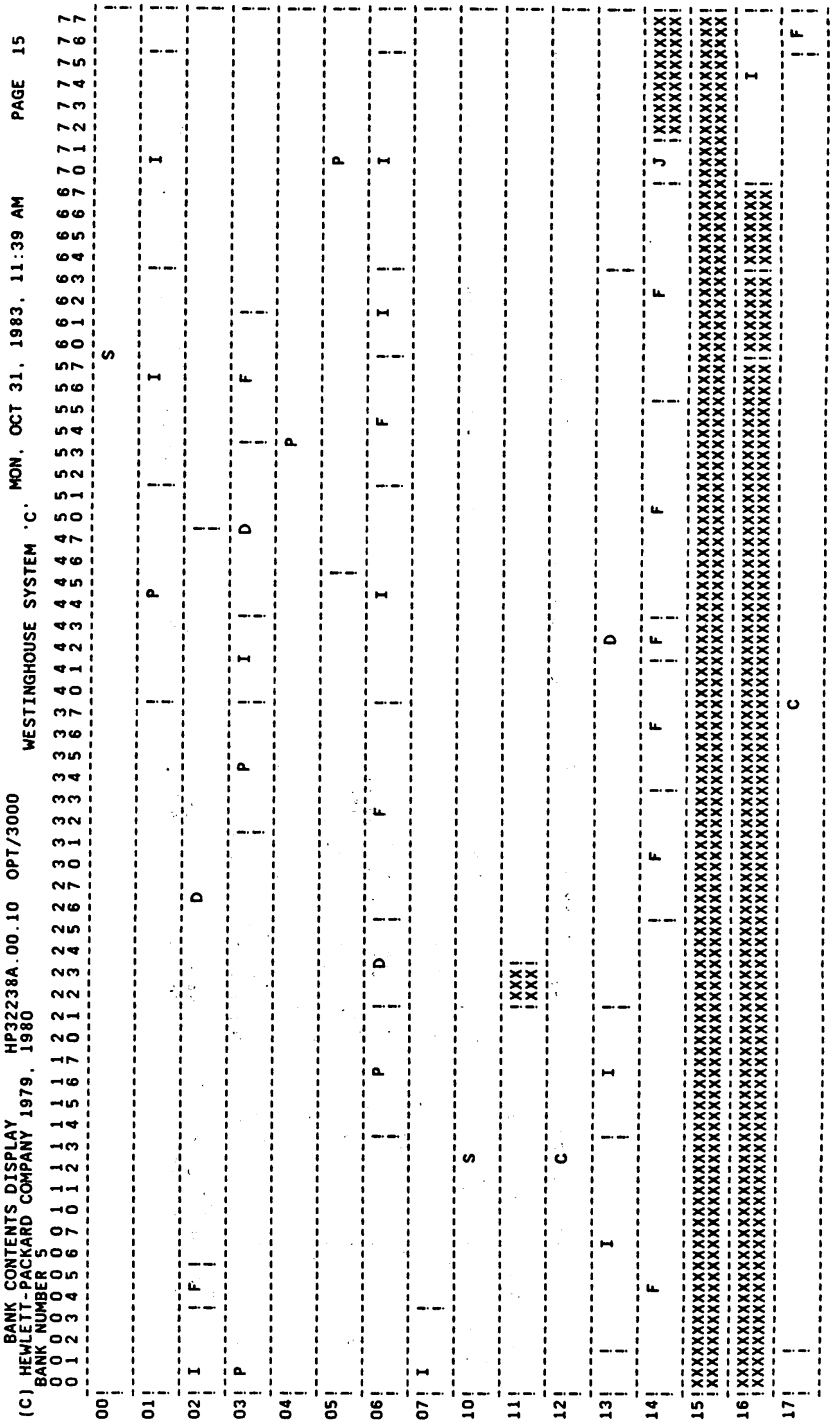
LEGEND AND SUMMARY STATISTICS

Each space represents 1K words of memory (rounded to the nearest 1K words, with segments smaller than 1K always rounded up to 1K)
Lower case denotes a system segment

SYMBOL	SEGMENT COUNT	% OF LINKED MEMORY	DESCRIPTION
S	48	19.4	Stack
C	14	4.3	Code Segment from CST
P	52	8.3	Code Segment from Program File
T	4	.3	System Table Data Segment
F	71	3.1	File System Data Segment
J	11	.1	Job Management Data Segment
I	47	1.9	Image Data Segments
K	4	2.4	KSAM Data Segments
D	50	2.9	Data Segment (usage unknown)
	301	42.6	Active Segment
*	0	.0	Segment on Overlay Candidate List
/	12	2.5	Segment that is Frozen, Locked or I/O Frozen

% OF MEMORY ACTIVE IN EACH BANK:

BANK 0:100.0	BANK 1: 99.6	BANK 2: 93.4	BANK 3: .0	BANK 4: 97.5	BANK 5: 98.7	BANK 6: 93.0	BANK 7: 97.1
BANK 10: 97.7	BANK 11: 99.0	BANK 12: 70.9	BANK 13: 96.1	BANK 14: 99.2	BANK 15: 77.7	BANK 16: 99.2	BANK 17:100.0


BANK CONTENTS DISPLAY HP32238A.00.10 OPT/3000 WESTINGHOUSE SYSTEM 'C' MON, OCT 31, 1983, 11:39 AM PAGE 15
(C) HEWLETT-PACKARD COMPANY 1979, 1980
BANK NUMBER 5

BANK CONTENTS DISPLAY HP32238A.00.10 OPT/3000 MON, OCT 31, 1983, 11:39 AM PAGE 16
(C) HEWLETT-PACKARD COMPANY 1979, 1980 WESTINGHOUSE SYSTEM 'C'

LEGEND AND SUMMARY STATISTICS

Each position represents 64 words of memory. The starting and ending address of the segment are rounded to the nearest 64 word increment, so that the numbers above and to the left of the display specify the starting address of each segment.
Lower case denotes a system segment

SYMBOL	SEGMENT COUNT	% OF LINKED MEMORY	DESCRIPTION
S	2	23.2	Stack
C	2	16.6	Code Segment from CST
P	6	22.1	Code Segment from Program File
T	0	.0	System Table Data Segment
F	11	9.2	File System Data Segment
J	1	.2	Job Management Data Segment
I	11	8.4	Image Data Segments
K	0	.0	KSAM Data Segments
D	4	7.8	Data Segment (usage unknown)
	37	87.5	Active Segment
*	0	.0	Segment on Overlay Candidate List
/	0	.0	Segment that is Frozen, Locked or I/O Frozen
X	4	12.5	Free Area

```
   OVERALL HISTOGRAM DISPLAY      HP32238A.00.10  OPT/3000                MON, OCT 31, 1983, 11:34 AM       PAGE  11
(C) HEWLETT-PACKARD COMPANY 1979, 1980                      WESTINGHOUSE SYSTEM 'C'
  48-                                   !   48-
                                        !
                                        !
F       X                               ! F
  40-   X                               !   40-
R      XX                               ! R
       XX                               !
E      XX                               ! E
  32-X XX                               !   32-
Q    X XX                               ! Q
     XXXX                               !
U    XXXXX                              ! U
  24-XXXXX                              !   24-
E    XXXXX                              ! E
     XXXXX X                            !           X
N    XXXXX X                            ! N         X
  16-XXXXX XX                           !   16-     X
C    XXXXX XX                           ! C         X  X
     XXXXXXXX                           !          XX  X
Y    XXXXXXXX                           ! Y        XX  X X
   8-XXXXXXXX                           !    8-  XXXXX X X
     XXXXXXXX                           !        XXXXX X X
     XXXXXXXX                           !       XXXXXX XXX
     XXXXXXXXXX X                       !       XXXXXXXXXXXXX  X   X       X
        4   8  12  16  20  24  28  32   !         4   8  12  16  20  24  28  32
                                        !
    CODE SIZES (1K word increments)     !     STACK SIZES (1K word increments)
----------------------------------------------------------------------------------
                                        !
  48-X                                  ! TYPE    COUNT  MEAN    MAX  # IN MEMORY
     X                                  !
     X                                  ! CODE     216   3608  12184        216
F    X                                  ! STACK     90   6950  28860         90
  40-X                                  ! EDS      359    850  22432        359
R    X                                  !
     X X                                ! *********
E    X X                                ! *PRESENT*
  32-X X                                ! *       *
Q    X X                                ! *       *
     X X                                ! *ONLY   *
U    X X                                ! *********
  24-X X                                !
E    X X                                !
     X X                                !
N    X X                                !
  16-X X                                !
C    XXX                                !
     XXX                                !
Y    XXX                                !
   8-XXXX                               !
     XXXX                               !
     XXXXX                              !
     XXXXX XX  X          X             !
        4   8  12  16  20  24  28  32   !
                                        !
    EDS SIZES (1K word increments)      !
```

```
          CPU USAGE DISPLAY      HP32238A.00.10  OPT/3000                          MON, OCT 31, 1983, 11:31 AM       PAGE   3
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    WESTINGHOUSE SYSTEM 'C'
   CURRENT INTERVAL:     11.7 SECONDS          OVERALL INTERVAL:      1.3 MINUTES

                        10        20        30        40        50        60        70        80        90       100%
 CURRENT CPU STATE B----------------------------------------------BPPD----------------------------------------DO----------O (46/2/38/14)
 OVERALL CPU STATE B----------------------------------------------BPPD----------------------------------------DO----------O (52/2/30/16)

                        10        20        30        40        50        60        70        80        90       100 per second
                  ------------------------------------------------------------------------------------------------
   PROCESS LAUNCHES !                                                                                !/////////!          (77/86)
                  ------------------------------------------------------------------------------------------------
                  ----------------------
   PROCESS PREEMPTS !                  *!!                                                                           (19/20)
                  ----------------------

CPU STATE INFORMATION
                    AVG TIME IN STATE(ms)   STATE PERCENTAGES          AVERAGE CPU
                      CURRENT    OVERALL   CURRENT   OVERALL          TIME PER
            CPU BUSY        6          6     46.2%     50.0%          TRANSACTION
PAUSED DISC & SWAP         22         22      1.5%      2.0%          OF INTERACTIVE
   PAUSED FOR DISC         20         19     37.3%     30.7%          PROCESSES
   PAUSED FOR SWAP                           .0%       .0%
              IDLE                           .0%       .0%          CURRENT:  116 MS
GARBAGE COLLECTION                           .0%       .0%          MAXIMUM:  267 MS
 MEMORY ALLOCATION         3          3      .2%       .2%


LEGEND FOR PROCESS LAUNCHES AND PREEMPTS:

---               ---               ---
! ! CURRENT RATE  !/! MAXIMUM RATE  !*! OVERALL RATE
---               ---               ---

CPU STATE LEGEND:

  B  Busy on process
  P  Paused for disc and swap
  D  Paused for disc
  S  Paused for swap
  I  Idle
  G  Garbage collection
  M  Memory allocation
  O  ICS overhead
```

```
      MAM ACTIVITY DISPLAY      HP32238A.00.10  OPT/3000                          MON, OCT 31, 1983, 11:31 AM       PAGE   4
(C) HEWLETT-PACKARD COMPANY 1979, 1980                  WESTINGHOUSE SYSTEM 'C'
   CURRENT INTERVAL:     6.0 SECONDS          OVERALL INTERVAL:  &a01r55C dONDS

                        10        20        30        40        50        60        70        80        90       100%
CURRENT MM ACTION F-------------------------------------------------------------------------------------------F        (6)
OVERALL MM ACTION RRF-----------------------------------------------------------------------------------------F        (67)

                        10        20        30        40        50        60        70        80        90       100 per second
                       --
MEMORY ALLOCATIONS    *!                                                                                          (1/1)
                       --
                       --
  PROCESS SWAP-INS    *!                                                                                          (1/1)
                       --


                       --
     MM I/O  READS    *!                                                                                          (1/1)
                       --
                       --
     MM I/O WRITES    !!                                                                                          (1/1)
                       --


  RELEASE DATA SEG

  RELEASE CODE SEG

SPECIAL REQUESTS-  CURRENT:   .67/second       CLOCK CYCLE RATE- CURRENT:    .00/second
PERCENT:  25.84%   OVERALL:   .25/second                         OVERALL:    .00/second

LEGEND FOR EVENT RATES:

---                ---                ---
! ! CURRENT RATE   !/! MAXIMUM RATE   !*! OVERALL RATE
---                ---                ---

MM ACTION LEGEND:

  R  Recovered overlay candidate
  F  Found free region
  O  Made overlay candidates
  G  Give up
  H  Hard request
```

```
     CPU-MAM REPORT DISPLAY      HP32238A.00.10  OPT/3000                    MON, OCT 31, 1983, 11:31 AM       PAGE   5
(C) HEWLETT-PACKARD COMPANY 1979, 1980                          WESTINGHOUSE SYSTEM 'C'
   CURRENT INTERVAL:     5.8 SECONDS          OVERALL INTERVAL:     1.8 MINUTES

                        10        20        30        40        50        60        70        80        90       100 per second
                       ----------------------------------------------------------------------------------------------------
  PROCESS LAUNCHES     !                                                                      !//////////////////!      (76/94)
                       ----------------------------------------------------------------------------------------------------
                       --
  PROCESS SWAP-INS     *!                                                                                               (1/1)
                       --


                       --
MEMORY ALLOCATIONS     *!                                                                                               (1/1)
                       --

                        10        20        30        40        50        60        70        80        90       100%
 CURRENT CPU STATE B---------------------------------------------------BD--------------------------DO----------------O (54/28/18)
 OVERALL CPU STATE B---------------------------------------------BPPD----------------------------DO----------------O (50/2/30/18)

 CURRENT MM ACTION F-------------------------------------------------------------------------------------------------F       (2)
 OVERALL MM ACTION RRF----------------------------------------------------------------------------------------------F      (72)

LEGEND FOR LAUNCHES, SWAP-INS, AND MEMORY ALLOCATIONS:

---       ---       ---
! ! CURRENT RATE    !/! MAXIMUM RATE    !*! OVERALL RATE
---       ---       ---

CPU STATE LEGEND:

  B  Busy on process
  P  Paused for disc and swap
  D  Paused for disc
  S  Paused for swap
  I  Idle
  G  Garbage collection
  M  Memory allocation
  O  ICS overhead

MM ACTION LEGEND:
  R  Recovered overlay candidate
  F  Found free region
  O  Made overlay candidates
  G  Give up
  H  Hard request
```

```
 I/O ACTIVITY REPORT DISPLAY      HP32238A.00.10  OPT/3000                          MON, OCT 31, 1983, 11:32 AM       PAGE   6
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    WESTINGHOUSE SYSTEM 'C'
   CURRENT INTERVAL:    13.5 SECONDS          OVERALL INTERVAL:       .2 MINUTES

ACTIVITY IN CURRENT INTERVAL

                          10        20        30        40        50        60        70        80        90        100 per second
 DISC I/O ACTIVITY U----------------------------------------------------U                                              (54)

 TAPE I/O ACTIVITY

  PRINTER ACTIVITY

-------------------------------------------------------------------------------------------------------------------------------
ACTIVITY OVER ALL INTERVALS

                          10        20        30        40        50        60        70        80        90        100 per second
 DISC I/O ACTIVITY U----------------------------------------------------U                                              (54)

 TAPE I/O ACTIVITY

  PRINTER ACTIVITY


LEGEND FOR DISC I/O ACTIVITY:

  U  User disc I/O
  M  Memory management disc I/O
```

```
      DISC ACTIVITY DISPLAY      HP32238A.00.10  OPT/3000                          MON, OCT 31, 1983, 11:33 AM       PAGE  10
(C) HEWLETT-PACKARD COMPANY 1979, 1980                    WESTINGHOUSE SYSTEM 'C'
   CURRENT INTERVAL:      4.3 SECONDS          OVERALL INTERVAL:      1.2 MINUTES

                        10        20        30        40        50        60        70        80        90       100 per second
 CURRENT ALL DISC  R-------------------------------------------------------------R                                 (66)
 OVERALL ALL DISC  R-----------------------------------------RW--------W                                          (44/10)

   CURRENT LDEV  1 R----------------------------R                                                                (30)
   OVERALL LDEV  1 R------R                                                                                     (8)

   CURRENT LDEV  2
   OVERALL LDEV  2

   CURRENT LDEV  3
   OVERALL LDEV  3 RRWW                                                                                         (2/2)

   CURRENT LDEV  4 R---------------------------------R                                                           (34)
   OVERALL LDEV  4 R-------------------------RWW                                                                 (26/2)
```

MAXIMUM RATES:	ALL	LDEV 1	LDEV 2	LDEV 3	LDEV 4
READS	33/ 1	15/ 0	1/ 0	4/ 1	22/ 0
WRITES	8/ 1	1/ 0	1/ 0	1/ 1	2/ 0
CONTROL	1	0	0	0	1

LEGEND FOR I/O OPERATION RATES:
- R Read operation
- W Write operation
- C Control operation

MAXIMUM RATES FOR READ AND WRITE OPERATIONS ARE SHOWN IN THE FORM 'USER I/O / MEMORY MANAGEMENT I/O'

PROGRAM FILE DISPLAY HP32238A.00.10 OPT/3000 MON, OCT 31, 1983, 11:43 AM PAGE 21
(C) HEWLETT-PACKARD COMPANY 1979, 1980 WESTINGHOUSE SYSTEM 'C'
PROGRAM FILE DISPLAY 11:43 AM

	NAME OF PROGRAM FILE	CODE SEG INFO COUNT	SIZE	#PS	COMBINED WORKING SET INFORMATION CST	PROG	DST	STACK	TOTAL SIZE
SP	SYSTEM PROCESSES			21	6	4	40	18	194180
CI	COMMAND INTERPRETER			7	0	0	23	7	71244
1	DSMON .PUB .SYS	3	3484	2	1	0	10	2	45300
2	*GRM0003P.PRODUCTN.MARKETNG	2	7344	9	0	0	16	9	113068
3	MPMON .PUB .SYS	8	23004	3	0	0	14	3	55616
4	LRISP11P.PRODUCTN.MARKETNG	5	15332	1	0	0	6	1	36920
5	GRSC060P.PRODUCTN.MARKETNG	8	20784	1	0	0	6	1	39912
6	LRISP09P.PRODUCTN.MARKETNG	1	4916	1	0	0	7	1	36296
7	LRISP71P.PRODUCTN.MARKETNG	2	14116	13	3	1	35	13	191516
8	LRISP70P.PRODUCTN.MARKETNG	1	1748	1	0	0	2	1	4044
9	SAMPLER .PUB .SYS	6	14488	1	0	0	2	1	7464
10	LRISP08P.PRODUCTN.MARKETNG	9	9604	10	0	3	32	10	108552
11	User Program File	8	10136	1	0	0	1	1	16104
12	OPT .PUB .SYS	36	125664	1	0	4	3	1	24344
13	P03P180A.PUB .SYS	1	448	1	0	1	3	1	11392
14	GRSC050P.PRODUCTN.MARKETNG	11	17928	1	0	0	5	1	20416
15	User Program File	4	11796	1	0	0	3	1	21296
16	LRISP07P.PRODUCTN.MARKETNG	4	6252	1	0	0	4	1	8348

USER SUMMARY DISPLAY HP32238A.00.10 OPT/3000 MON, OCT 31, 1983, 11:42 AM PAGE 20
(C) HEWLETT-PACKARD COMPANY 1979, 1980 WESTINGHOUSE SYSTEM 'C'
USER SUMMARY REPORT 11:42 AM

PIN	USER.ACCT	PROGRAM NAME (command)	CPU	%	PRI	WORKING SET INFO CSTSZ	STKSZ	DSTSZ
11	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	60784	0	152	0	8948	34140
17	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	21356	2	152	1932	8948	3880
20	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	37452	0	152	0	8948	26064
21	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	14711	0	152	10656	8948	25752
29	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	18984	2	152	0	8948	724
30	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	15188	0	152	0	8948	724
31	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	24196	0	152	0	8948	5928
32	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	34392	0	152	0	8948	724
33	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	47002	0	152	4392	8948	772
34	MANAGER.SYS	user program file	221	0	149	448	2568	8376
36	PILOT.MARKETNG	GRSC050P.PRODUCTN.MARKETNG	1482	0	162	0	11964	8452
39	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	23243	0	152	0	6080	16032
41	PILOT.MARKETNG	LRISP09P.PRODUCTN.MARKETNG	1638	0	156	0	2804	33492
42	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	30732	0	152	0	6080	7760
43	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	7592	0	152	0	6080	160
45	MANAGER.SYS	user program file	61	0	150	0	4072	3712
46	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	8525	1	152	0	6080	8944
47	PILOT.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	5580	1	152	0	10388	4420
49	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	25007	2	152	0	6080	1636
50	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	177	0	152	3060	4200	3712
51	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	6914	0	152	0	8948	5944
53	USER.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	1134	0	152	0	11872	4628
54	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	52783	0	152	0	6080	16344
55	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	181	0	152	3060	4200	3712
56	PILOT.MARKETNG	LRISP08P.PRODUCTN.MARKETNG	131175	2	194	0	6080	9360
58	USER.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	2004	0	152	0	10388	4392
60	USER.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	2360	0	152	0	10388	4260
61	USER.MARKETNG	GRSC140P.PRODUCTN.MARKETNG	490	1	152	2724	5168	3712
63	USER.MARKETNG	GRSC060P.PRODUCTN.MARKETNG	179653	0	152	0	21156	18756
65	PILOT.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	1729	0	152	0	10388	4420
72	USER.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	2560	0	152	0	10388	4260
76	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	29103	0	152	0	8948	5944
82	PILOT.MARKETNG	LRISP07P.PRODUCTN.MARKETNG	9261	2	152	0	7004	1344
94	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	13318	0	152	0	8948	5992
97	MANUFACT.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	16455	0	152	0	10388	13208
102	MANAGER.SYS	user program file	4054	0	152	0	4308	3156
103	PILOT.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	2796	0	152	0	10388	4420
107	USER.MARKETNG	GRMO003P.PRODUCTN.MARKETNG	1011	0	152	0	10388	4260
108	MANAGER.MARKETNG	OPT.PUB.SYS	181478	4	200	8116	12748	1176
111	SHPOUT.SHPLOCTR	user program file	744	0	152	0	14924	1180
115	PILOT.MARKETNG	LRISP11P.PRODUCTN.MARKETNG	193989	4	152	0	28860	8080
116	SHPIN.SHPLOCTR	user program file	50984	2	152	0	13720	7576
126	USER.MARKETNG	LRISP70P.PRODUCTN.MARKETNG	3480	0	158	0	2724	1320
127	USER.MARKETNG	LRISP71P.PRODUCTN.MARKETNG	26308	0	152	0	8948	26064

```
PROCESS STATE REPORT DISPLAY     HP32238A.00.10  OPT/3000      WESTINGHOUSE SYSTEM 'C'  MON, OCT 31, 1983, 11:44 AM     PAGE  23
(C) HEWLETT-PACKARD COMPANY 1979, 1980
   SESSIONS:  23          SYSTEM PROCESSES:  21   DISPATCH QUEUE:   4
       JOBS:   3             CI PROCESSES:   6        NO QUEUE:  87
                           USER PROCESSES:  20
 IN BREAK:   0        CREATED PROCESSES:  24
-------------------------------------------------------------------------------

                    DISTRIBUTION OF PROCESS STATES

                    DISPATCH QUEUE    NO QUEUE
                    --------------    --------
          SHORT WAIT                1
           LONG WAIT                1        71
      TERM READ WAIT                1        40
    BLOCKED I/O WAIT                         40
        I/O WAIT                              5

         MEMORY WAIT                          1
            SON WAIT                         25
         FATHER WAIT                          7
            RIN WAIT
            SIR WAIT
          IMPEDED                             4
      SCHED ATTN REQ
```

```
            PROCESS DISPLAY      HP32238A.00.10  OPT/3000                    MON, OCT 31, 1983, 11:48 AM       PAGE  27
(C) HEWLETT-PACKARD COMPANY 1979, 1980                                  WESTINGHOUSE SYSTEM 'C'
PIN:  11  LRISP71P.PRODUCTN.MARKETNG  USER: USER.MARKETNG               (J   17)  11:48 AM
-------------------------------------------------------------------------------------------------
        STACK INFORMATION          !   CPU TIME:  60811 MSEC ! STATUS FLAGS:
     DST:   263* SYSOV:   1195 13.4% !                         !
    SIZE:  8948  DL-DB:     92  1.0% !   PRIORITY: 152         !
 MAXDATA:  9581  DB-QI:   6063 67.8% !                         !  BIO
MAX Z-DL:  7753   QI-Q:    398  4.4% !   CAP:                  !
                  Q-S:      6   .1% !    LG ND SF             !
                  S-Z:   1194 13.3% !    IA BA                !
-------------------------------------------------------------------------------------------------
XDS USAGE      SON
DST#   SIZE    PROCESS    OPEN FILES
-----------    -------    ----------
 216*   548               $STDIN    $STDLIST SCOEDB    LRISCT    ISR23A02 LRISD16P
 215* 22440               SCOEDB    LRISD17P LRMCD12P  DCTERM02  SCOEDB05 LRISCT01
 337*   252               LRISCT12  SCOEDB06 LRISCT05  LRISCT04  LRISCT09 LRISCT08
 307* 10928               SCOEDB11  SCOEDB05 LRISCT07  LRISCT06  SCOEDB04 SCOEDB02
 352*   548               SCOEDB13  SCOEDB12
 215* 22440

CST #   SIZE            CSTX #   SIZE            DST #    SIZE
-------------------------------------------------------------------
                                                 307*   10928
                                                 215*   22440
                                                 514*     772
                                                 263*S   8948

STACK MARKER INFORMATION:

ADDRESS   Q-7    Q-6    Q-5    Q-4     X    DELTAP STATUS DELTAQ SEGMENT-NAME
-------------------------------------------------------------------------------

014475  000263 000000 000200 000001 001053 015604 101014 000017 HARDRES
014456  000000 000040 000020 003777 027555 014662 140014 000033 HARDRES
014423  177634 000001 000000 120001 000144 006320 140473 000163 FILESYS1A
014240  000000 000020 013737 177634 000004 002153 142473 000112 FILESYS1A
014126  000000 000012 013737 177634 000003 001733 060622 000010 DCAINTR
014116  013737 013726 013723 013725 000003 007375 060222 000174 DCAINTR
013722  004214 004221 004223 004215 000172 026065 060301 000037 (user segment)
013663  016017 000000 000000 000000 000000 000000 140105 000004 MORGUE
```

TABLE INFORMATION DISPLAY HP32238A.00.10 OPT/3000 MON, OCT 31, 1983, 11:40 AM PAGE 17
(C) HEWLETT-PACKARD COMPANY 1979, 1980 WESTINGHOUSE SYSTEM 'C'

	CONFIGURED ENTRIES	CURRENT USAGE IN USE	CURRENT USAGE UTIL	MAXIMUM USAGE OBSVD	MAXIMUM USAGE IN USE	MAXIMUM USAGE UTIL	ENTRY SIZE
CODE SEGMENT TABLE	192	149	77.6%	149	150	78.1%	4 W
EXTENDED CST	512	173	33.8%	173	187	36.5%	4 W
DATA SEGMENT TABLE	1024	497	48.5%	497	510	49.8%	4 W
PROCESS TABLE	128	92	71.9%	92	97	75.8%	16 W
I/O QUEUE TABLE	160	52	32.5%	52	72	45.0%	11 W
DISC REQUEST TABLE	120	4	3.3%	4	14	11.7%	16 W
TERMINAL BUFFERS	255	32	12.5%	32	54	21.2%	32 W
ATP TERM BUFFERS							
SYSTEM BUFFERS	24		%		1	4.2%	129 W
SWAP TABLE	750	549	73.2%	549	549	73.2%	5 W
CST BLOCK TABLE	58	27	46.6%	27	28	48.3%	1 W
PRIMARY MSG TABLE	25	1	4.0%	1	1	4.0%	5 W
SECONDARY MSG TBLE	25	1	4.0%	1	1	4.0%	5 W
SPECIAL RQST TABLE	25	1	4.0%	1	1	4.0%	5 W
INTERRUPT CTRL STK	1024		%		375	36.6%	1 W
UCOP REQUEST QUEUE	48		%		0	.0%	2 W
TIMER REQUEST LIST	60	24	40.0%	24	33	55.0%	4 W
BREAK POINT TABLE	80		%		0	.0%	VAR
RIN TABLE	64	28	43.8%	28	28	43.8%	2 W
JOB PROC CNT TABLE	45	26	57.8%	26	26	57.8%	1 B
VIRTUAL MEMORY	30	18	60.0%	18	19	63.3%	1024 S
SPOOLER DISC SPACE	100	5	5.0%	5	5	5.0%	1000 S

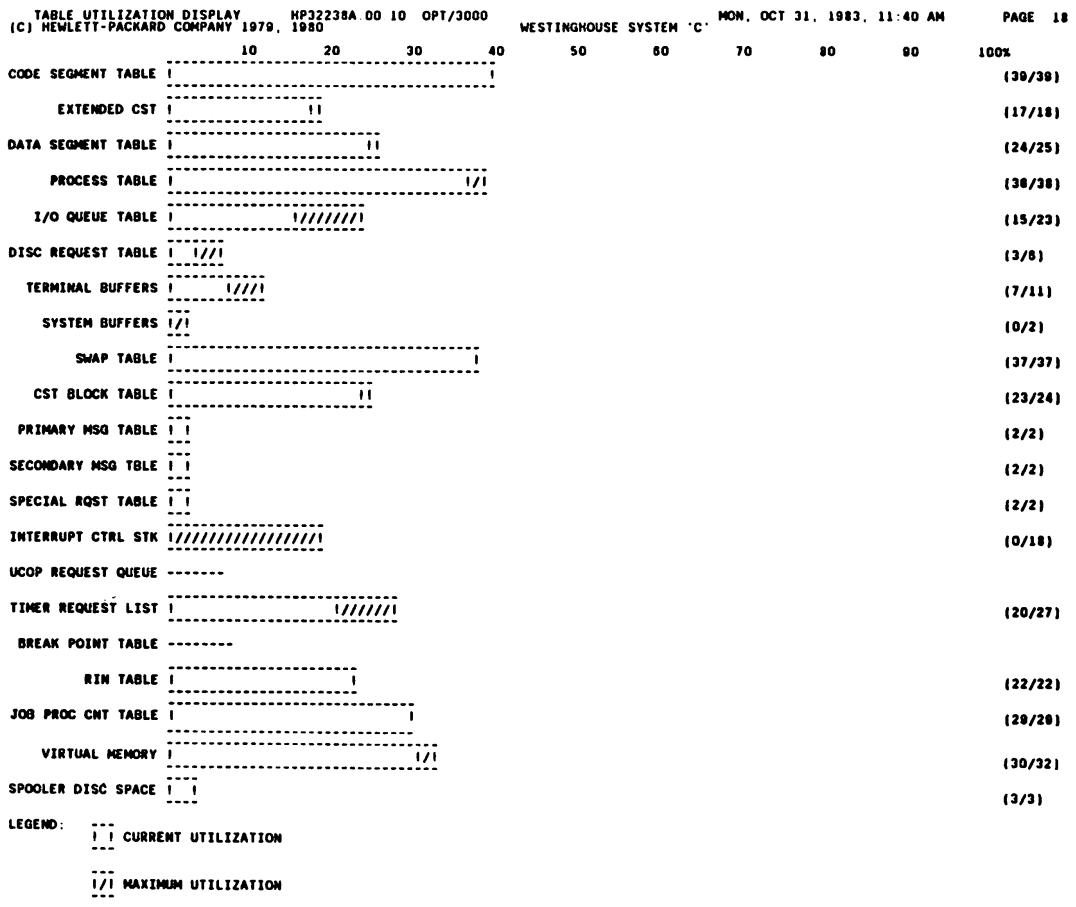


TABLE UTILIZATION DISPLAY HP32238A.00.10 OPT/3000 MON, OCT 31, 1983, 11:40 AM PAGE 18
(C) HEWLETT-PACKARD COMPANY 1979, 1980 WESTINGHOUSE SYSTEM 'C'
10 20 30 40 50 60 70 80 90 100%
CODE SEGMENT TABLE (39/39)
EXTENDED CST (17/18)
DATA SEGMENT TABLE (24/25)
PROCESS TABLE (38/38)
I/O QUEUE TABLE (15/23)
DISC REQUEST TABLE (3/6)
TERMINAL BUFFERS (7/11)
SYSTEM BUFFERS (0/2)
SWAP TABLE (37/37)
CST BLOCK TABLE (23/24)
PRIMARY MSG TABLE (2/2)
SECONDARY MSG TBLE (2/2)
SPECIAL RQST TABLE (2/2)
INTERRUPT CTRL STK (0/18)
UCOP REQUEST QUEUE
TIMER REQUEST LIST (20/27)
BREAK POINT TABLE
RIN TABLE (22/22)
JOB PROC CNT TABLE (29/29)
VIRTUAL MEMORY (30/32)
SPOOLER DISC SPACE (3/3)
LEGEND:
CURRENT UTILIZATION
MAXIMUM UTILIZATION