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SOS/3000 Performance Advisor

User Guide

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SOS/3000 Performance Advisor version G.03

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1

SOS PERFORMANCE ADVISOR

Welcome to SOS Performance Advisor

Welcome to the SOS/3000 Performance Advisor® software package by Lund Performance Solutions. SOS/3000 Performance Advisor, also referred to as SOS/3000, is the industry-standard performance monitoring and management application for HP e3000 Enterprise servers.

This software collects and measures HP e3000/MPE/iX, TurboIMAGE, and ScopeUtil performance data and provides system managers comprehensive, real-time and historical information in easy-to-read displays.

Product Features

SOS/3000 is a full-featured, performance monitoring and managing tool. The current release includes exclusive features contained only within SOS/3000 and through Lund Performance Solutions.

Annual Review

If you own SOS/3000 Performance Advisor and a current subscription to technical support, you are entitled to one free Annual Review of your HP e3000 by Lund Consulting Services for each year your system is covered by support. LUND's system professionals will provide an expert assessment of your system's health in the following areas: CPU, memory, disc, and workload distribution.

Each custom report begins with a Report Card, which grades each component of your system on a green, yellow, or red scale based on industry-accepted standards of performance known as Pulse Points.

An in-depth Executive Summary follows, which ties together all of the information gleaned from the 10 full-color, presentation-quality graphs included in separate sections of the report. The graphs, created in Performance Gallery Gold, vividly illustrate vital statistics affecting the system's performance and are analyzed individually and thoroughly throughout the report.

The Annual Review addresses software and hardware upgrades, response time issues, available bandwidth for growth, and other concerns with a professional, real-world perspective. Soon after the report is delivered, a LUND performance specialist will make a follow-up phone call to answer any questions you may have about the report, expand on our recommendations, and suggest options or vendors if upgrades are necessary.

ImageStats

ImageStats™ is a new component of SOS/3000 Performance Advisor that provides comprehensive, real-time TurboIMAGE performance information. It is available as an SOS module or as a standalone program.

ImageStats displays intrinsic counts, CPU timings, and overall timings—shown per database, per dataset, and per process. The busiest databases and processes are identified as well as the intrinsics that are slowing down applications.

SOS/3000 with ImageStats delivers the facts that system managers need in order to isolate and solve application performance problems.

SOSLOGX

SOSLOGX is the historical data counterpart to SOS. It provides the means for reviewing performance data stored in the log files that SOSMONJ has collected. The user interface is similar in many ways to SOS. The main difference is that the SOSLOGX screens do not display current samples of online performance data. Instead, they display historical data collected by SOS.

The primary functions of SOSLOGX are:

- To browse through the data recorded in your log files using a variety of screens. This is usually done to identify and analyze periods of system activity that may have been problematic.
- To prepare logged performance data from the log files for Performance Gallery Gold®, a 32-bit, full-color graphical analysis and reporting application from Lund Performance Solutions.

For more information regarding SOSLOGX, see “SOSLOGX” on page 191.

ScopeUtil

ScopeUtil™ is LUND's special conversion utility for data captured in Scope files on the HP e3000. It is a program within SOS/3000 that converts HP Scope Collector data to SOS/3000 collector data files (SL files). These files can be viewed through either the SOSLOGX historical data utility or LUND's Windows-based graphing utility, Performance Gallery Gold®. For full details regarding the ScopeUtil feature, see “ScopeUtil File Converter” on page 253

System Performance Advice

The Advice Section of the Global Screen is designed to inform you of resource usage status and other significant events occurring on the system. These messages are broken down into two groups: informational and excessive.

Each message has a reference number. When referenced in this manual or in the on-line help facility, it will provide you with a more detailed explanation of a particular event. This section can be used alone to alert you to only events that warrant attention.

If there are particular events or information of which you want to be alerted, you can add to or alter the SOSADVIC file located in the PUB.LPS Group /Account (if you used the default installation procedure). See "SOSADVIC File" on page 41.

For example: if you want a message to be sent to your session or to the console when average system utilization exceeds 90 percent, you can alter the advice catalog so that the necessary personnel will be notified.

Product Support

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When you call, please be at your computer, have the product documentation in hand, and be prepared to provide the following information:

- Product name and version number.
- Type of computer hardware you are using.
- Software version number of your operating system(s).
- Exact wording of any messages that appear on your screen.
- What you were doing when the problem occurred.
- How you have tried to solve the problem.

Lund Performance Solutions Documentation Team

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For information about Lund Consulting Services, please review our website, send an e-mail message to **lcs@lund.com**, or contact your account manager.

Product Documentation

User’s Guide

This document accompanies the SOS/3000 Performance Advisor software as a guide for the new user and as a quick reference for experienced users. This guide assumes that you have a working knowledge of the MPE/iX operating environment.

Online Help System

In the online Help system, you will find explanations of the many features of SOS Performance Advisor, as well as tips to guide you through the program's basic functionality.

2

TECHNICAL OVERVIEW

SOS Performance Advisor Architecture

SOS Performance Advisor is comprised of several programs and files. The relationships between the most significant programs and files are illustrated in Figure 2.1 and described on page 7.

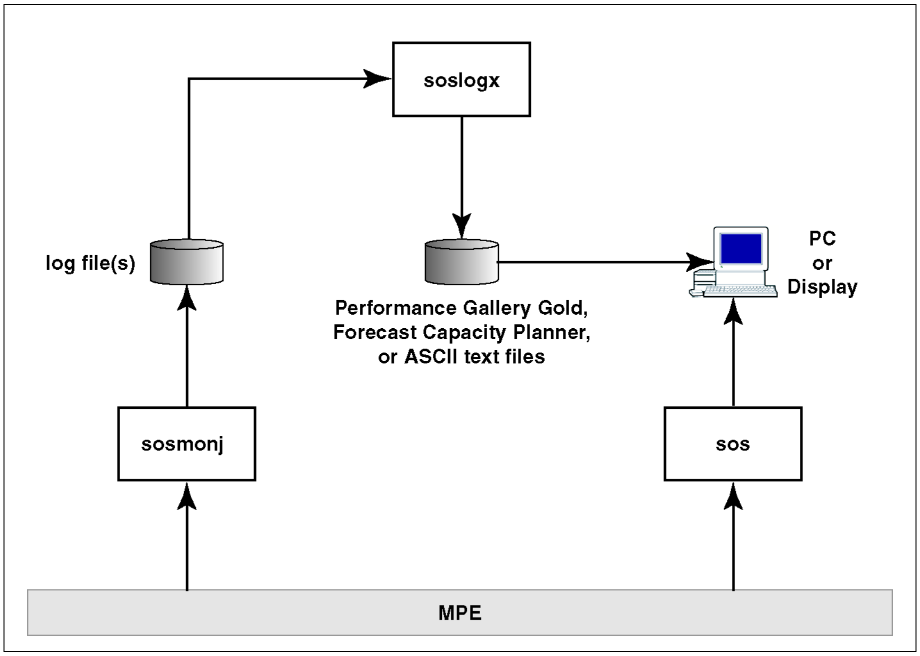

soslogx
log file(s)
Performance Gallery Gold,
Forecast Capacity Planner,
or ASCII text files
PC
or
Display
sosmonj
sos
MPE

Figure 2.1 *SOS/3000 Performance Advisor relationships between key processes and files*

The SOS process displays real-time performance data to the user.

SOSMONJ is a batch job. Its function is to periodically write performance data to log files for later historical analysis. It also stores informational, warning, and error messages in the lps.log file.

The SOSLOGX process reads the log files created by SOSMONJ. SOSLOGX displays this information to the user, and also allows the user to convert that information to other file formats:

- *.txt, ASCII text, to export data to spreadsheet applications such as MS Excel.
- *.col, to export data to Forecast Capacity Planner, a performance and capacity planning tool by Lund Performance Solutions.
- *.pfg, to export data to Performance Gallery Gold, a trend analysis and graphical reporting applications by Lund Performance Solutions.

For information about Forecast Capacity Planner or Performance Gallery Gold, please refer to the product documentation or contact your LUND account manager (see "Lund Performance Solutions Sales Team" on page 4).

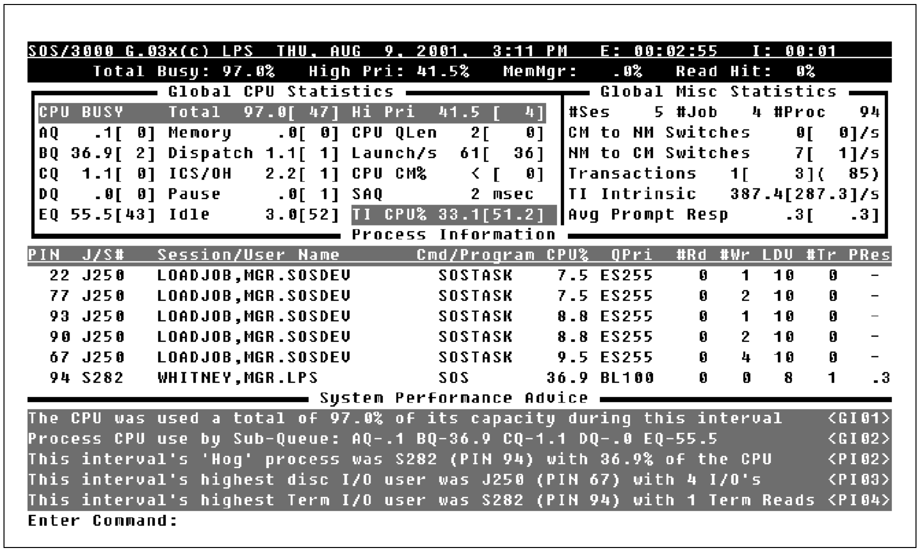
3

SOS

The Real-time Performance Data Utility

SOS is the character-based tool that will monitor and report system performance online and in real time. To start SOS, type **SOS** from the MPE command prompt.

Figure 3.1 shows the Global Summary screen, the main data screen displayed in SOS.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:11 PM   E: 00:02:55   I: 00:01
         Total Busy: 97.0%   High Pri: 41.5%   MemMgr:   .0%   Read Hit:  0%
 ━━━━━━━━━━━━ Global CPU Statistics ━━━━━━━━━━━━━━━ Global Misc Statistics ━━
 CPU BUSY    Total  97.0[ 47] Hi Pri  41.5 [  4] #Ses    5 #Job   4 #Proc   94
 AQ   .1[ 0] Memory    .0[ 0] CPU QLen   2[   0] CM to NM Switches    0[  0]/s
 BQ 36.9[ 2] Dispatch 1.1[ 1] Launch/s  61[  36] NM to CM Switches    7[  1]/s
 CQ  1.1[ 0] ICS/OH   2.2[ 1] CPU CM%    < [  0] Transactions    1[    3]( 85)
 DQ   .0[ 0] Pause     .0[ 1] SAQ        2 msec  TI Intrinsic   387.4[287.3]/s
 EQ 55.5[43] Idle     3.0[52] TI CPU% 33.1[51.2] Avg Prompt Resp     .3[   .3]
 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ Process Information ━━━━━━━━━━━━━━━━━━━━
PIN  J/S#    Session/User Name         Cmd/Program CPU%  QPri   #Rd #Wr LDU #Tr PRes
  22 J250    LOADJOB,MGR.SOSDEV          SOSTASK      7.5 ES255    0   1  10   0    -
  77 J250    LOADJOB,MGR.SOSDEV          SOSTASK      7.5 ES255    0   2  10   0    -
  93 J250    LOADJOB,MGR.SOSDEV          SOSTASK      8.8 ES255    0   1  10   0    -
  90 J250    LOADJOB,MGR.SOSDEV          SOSTASK      8.8 ES255    0   2  10   0    -
  67 J250    LOADJOB,MGR.SOSDEV          SOSTASK      9.5 ES255    0   4  10   0    -
  94 S282    WHITNEY,MGR.LPS             SOS         36.9 BL100    0   0   8   1   .3
━━━━━━━━━━━━━━━━━━━━━━━━━━━ System Performance Advice ━━━━━━━━━━━━━━━━━━━━━━━━━━
The CPU was used a total of 97.0% of its capacity during this interval    <GI01>
Process CPU use by Sub-Queue: AQ-.1 BQ-36.9 CQ-1.1 DQ-.0 EQ-55.5          <GI02>
This interval's 'Hog' process was S282 (PIN 94) with 36.9% of the CPU     <PI02>
This interval's highest disc I/O user was J250 (PIN 67) with 4 I/O's      <PI03>
This interval's highest Term I/O user was S282 (PIN 94) with 1 Term Reads <PI04>
Enter Command:
```

Figure 3.1 *SOS Global Summary screen*

Data Screens

The SOS application generates a variety of useful data screens. Each screen is outlined in “SOS Screen Selection Menu” on page 13, then described in detail in Chapters 8 through 23.

Screen Conventions

The conventions used in SOS data screens are listed and described in Table 3.1.

Table 3.1 *SOS screen conventions*

Convention	Description
/	A forward slash character (/) indicates a rate. For example, "Page Fault/s" denotes "Page Fault per second".
k or K	A "k" or a "K" indicates the corresponding value is measured in kilobytes.
m or M	An "m" or an "M" indicates the corresponding value is measured in megabytes.
ms	"ms" indicates the corresponding value is measured in milliseconds.
s	An "s" indicates the corresponding value is measured in seconds.
min	"min" indicates the corresponding value is measured in minutes.
Labels	The eight labels across the bottom of any screen, reading from left to right, correspond to the function keys F1 through F8 on the keyboard.
<	A "<" sign means the value displayed is greater than zero and less than 0.1.
>>	">>" indicates a data value that cannot be converted by SOS, because the value is less than or greater than the eligible range.
[ ]	The number outside the brackets ([ ]) is the value for the current session and the value inside the brackets is the average or accumulated value since SOS/3000 was last reset or started.

NOTE Most functions and commands may be entered in either upper or lower case.

4

SOS COMMANDS

Each of the SOS command (shortcut) keys is listed and explained in Table 4.1.

Table 4.1 *SOS command keys*

Key	Usage
blank	Refresh screen
D	Toggle Global Disc statistics
E	Exit
F	Freeze/unfreeze display
G	Toggle graphic/tabular display
H	Contextual help
J	Jump to screen prompt
L	Print hardcopy
M	Toggle Global Memory Statistics display
O	Option Subsystem
P	Shortcut to Process Detail screen
Q	Queue jump
S	Jump to SOS Screen Selection menu
T	Display process tree
U	Display file users
W	Display workload definitions
X	Exit
Y	Toggle extended process line

Key	Usage
Z	Zero cumulative totals
1	Display all processes at one time
2	Shortcut to CPU Hog Process Detail screen
!	Execute shell commands
:	Execute shell commands
?	Contextual help
#	Display job/session tree
CTRL T	Toggle timer status

5

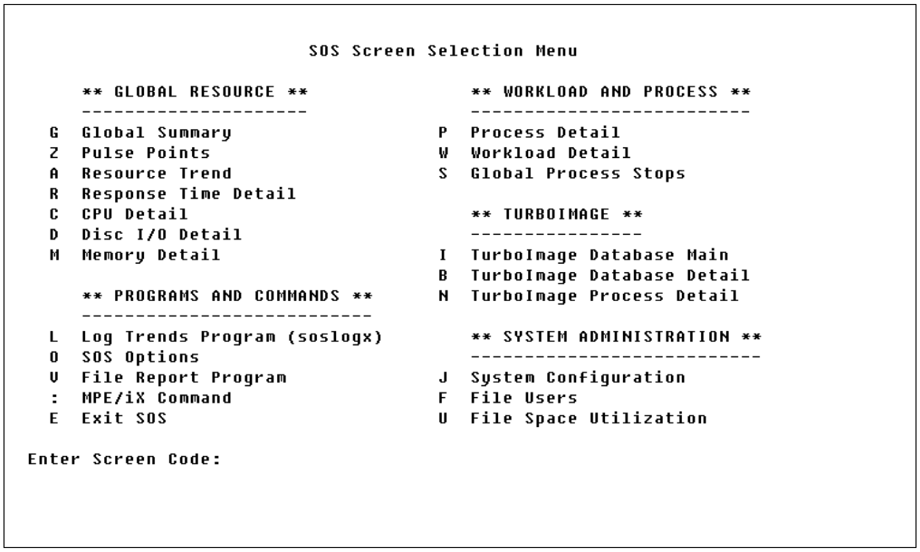
SOS SCREEN SELECTION MENU

To access the Screen Selection Menu screen from any SOS display screen:

- Type **S** at the SOS Enter command: prompt.

  OR

- Press the SCREEN MENU function key at the bottom of the screen (F7).



```
                          SOS Screen Selection Menu

     ** GLOBAL RESOURCE **               ** WORKLOAD AND PROCESS **
     ---------------------               --------------------------
  G  Global Summary                   P  Process Detail
  Z  Pulse Points                     W  Workload Detail
  A  Resource Trend                   S  Global Process Stops
  R  Response Time Detail
  C  CPU Detail                          ** TURBOIMAGE **
  D  Disc I/O Detail                     ----------------
  M  Memory Detail                    I  TurboImage Database Main
                                      B  TurboImage Database Detail
     ** PROGRAMS AND COMMANDS **      N  TurboImage Process Detail
     ---------------------------
  L  Log Trends Program (soslogx)        ** SYSTEM ADMINISTRATION **
  O  SOS Options                         ---------------------------
  V  File Report Program              J  System Configuration
  :  MPE/iX Command                   F  File Users
  E  Exit SOS                         U  File Space Utilization

Enter Screen Code:
```

Figure 5.1 *SOS Screen Selection Menu*

To return to the SOS program from the Screen Selection Menu screen, press Enter.

NOTE If the SOS Turbo Image screens are not active (options *16) Make Turbo Image performance data available* and *17 Make Turbo Image performance data available* from the SOS/3000 Main Option Menu), then the TurboIMAGE screen options in the Screen Selection Menu will be marked with an asterisk (*).

Screen Selection Commands

To view one of the screens listed in the Screen Selection Menu, type the screen's corresponding command key at the Enter Screen Code: command prompt. Each screen is described briefly in Table 5.1. More detailed explanations are presented later.

NOTE The "Enter Screen Code:" is available from two places within SOS:

1 - at the bottom of screen selection menu

2 - after entering J at the "Enter command:" prompt which is on most SOS screens

Table 5.1 *SOS Screen Selection Menu command keys*

Key	Usage	Comment	Reference
O	SOS Options	The SOS Main Options screen displays a variety of options that control which performance indicators are collected and displayed on the Global Summary Screen.	page 17
G	Global Summary	Displays a basic, overall picture of your system's performance.	page 55
Z	Pulse Points	Lists the key indicators of performance that appear on the Global Summary screen and categorizes their current levels of performance as acceptable, questionable, or unacceptable.	page 85
A	Resource Trend	The five Resource Trend screens display performance data for the current SOS/3000 session: • CPU Trends • Main Memory Trends • Disc I/O Utilization Trends • Response and Transaction Trends • Mode Switch Trends	page 89

Key	Usage	Comment	Reference
R	Response Time Detail	Displays prompt response time, first response time, and total transactions for the collection interval.	page 99
C	CPU Detail	Reports the general state of the CPU.	page 103
D	Disc I/O Detail	Provides the utilization percentage and I/O rate for each disc device configured on the system.	page 107
M	Memory Detail	Shows rates and total counts for page faults, overlay candidates, posts, and prefetches.	page 113
P	Process Detail	Provides an in-depth view of a specific process' performance during the current interval.	page 119
W	Workload Detail	Reports detailed information for a specific workload group.	page 135
S	Global Process Stops	Provides information that shows why system, session and job processes are giving up use of CPU.	page 147
I	TurboImage Database Main	The TurboIMAGE Database Main Screen summarizes activity of all processes against all databases. It also lists activity by database of all processes.	page 155
B	TurboImage Database Detail	The TurboIMAGE Database Detail Screen summarizes activity of all processes against a single database. It also lists activity by process against that database.	page 163
N	TurboImage Process Detail	The TurboIMAGE Process Detail Screen summarizes activity of a single process against all databases. It also lists activity by database and dataset of that process.	page 169

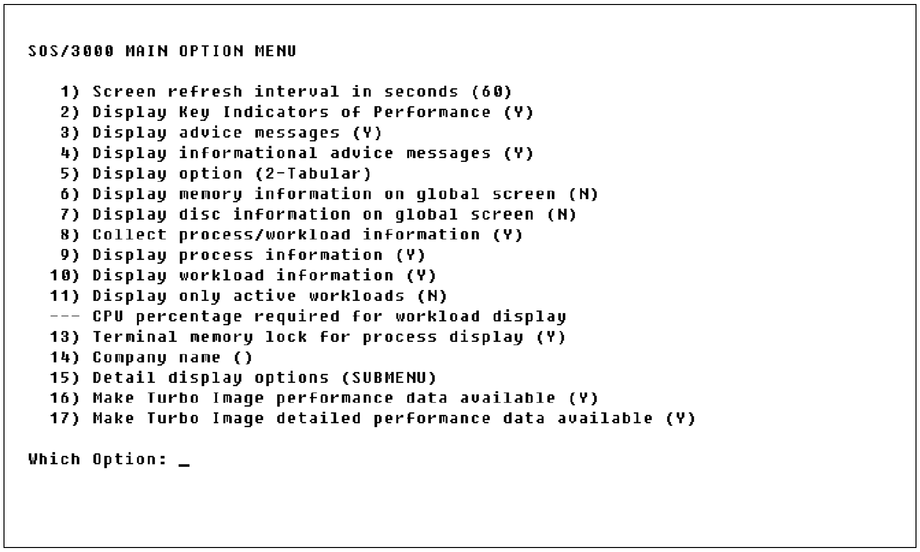
Key	Usage	Comment	Reference
J	System Configuration	The System Configuration Screen shows significant system configuration parameters.	page 175
F	File Users	The File Users Screen displays the users of the file entered.	page 181
U	File Space Utilization	The File Space Utilization Screen displays information about disc space usage, transient space and disc space fragmentation	page 185
L	Log Trends Program (SOSLOGX)	The Log Trends Program (SOSLOGX) displays the historical data counterpart to SOS.	page 191
V	File Report Program	Starts the File Report Program.	
Enter	Return to previous screen	Self explanatory.	
E or X	Exit	This terminates SOS/3000 and returns you to the MPE/iX prompt.	
!	Execute Shell Commands	This takes you to an MPE/iX.	
:	Execute Shell Commands	This takes you to an MPE/iX.	

6

SOS MAIN OPTION MENU

The SOS/3000 Main Option Menu screen contains a set (and several subsets) of options that enable the user to configure the SOS program.

To access the SOS/3000 Main Option Menu screen, enter **O** from any SOS display screen.



```
SOS/3000 MAIN OPTION MENU

    1) Screen refresh interval in seconds (60)
    2) Display Key Indicators of Performance (Y)
    3) Display advice messages (Y)
    4) Display informational advice messages (Y)
    5) Display option (2-Tabular)
    6) Display memory information on global screen (N)
    7) Display disc information on global screen (N)
    8) Collect process/workload information (Y)
    9) Display process information (Y)
   10) Display workload information (Y)
   11) Display only active workloads (N)
   --- CPU percentage required for workload display
   13) Terminal memory lock for process display (Y)
   14) Company name ()
   15) Detail display options (SUBMENU)
   16) Make Turbo Image performance data available (Y)
   17) Make Turbo Image detailed performance data available (Y)

Which Option: _
```

Figure 6.1 *SOS/3000 Main Option Menu screen*

Main Option Commands

To modify a main option, either temporarily or permanently:

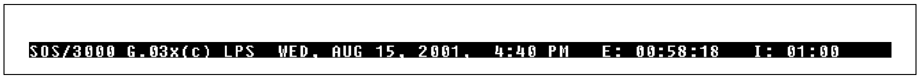
1. Type the option command key from the SOS/3000 Main Option Menu screen and press Enter.
2. Enter a new parameter at the secondary command prompt. Press Enter.
3. Press Enter again to exit the SOS Main Option Menu screen, or press **F8**.
4. At the "Should these options be saved permanently?" prompt:

- Press Enter to return to the SOS program without saving the modifications permanently.
- Enter **Y** (Yes) to save the changes permanently.

Information about each of the main options is provided to assist you.

Screen refresh interval in seconds

The SOS banner shows the length of the current interval (I: mm:ss) in minutes (mm) and seconds (ss). In the following example, the banner indicates the measurements reported in the screen are updated every minute (60 seconds). The banner is always displayed and cannot be suppressed.



```
SOS/3000 G.03x(c) LPS  WED, AUG 15, 2001,  4:40 PM   E: 00:58:18   I: 01:00
```

Figure 6.2 *SOS banner: current interval (I: 01:00)*

Setting the Length of the Interval

The SOS program refreshes (updates) the performance measurement data every 60 seconds. This default can be changed to an interval ranging from 10 to 3600 seconds.

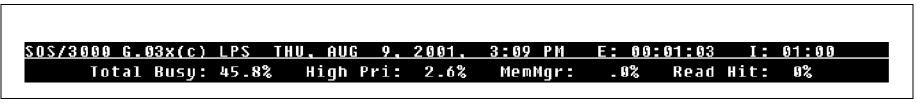
IMPORTANT SOS runs at a very high priority. Setting a short refresh interval or updating the screen too frequently may burden the system and result in skewed performance measurements. The default setting of 60 seconds is recommended for most systems.

To adjust the length of the interval:

1. From the SOS/3000 Main Option Menu screen, select the Screen refresh interval in seconds option (option 1). Press Enter.
2. At the next prompt, enter a positive integer from 10 to 3600 (seconds). Press Enter.

Display Key Indicators of Performance

The Key Indicators of Performance (KIP) line can be displayed immediately below the SOS banner in all SOS screens.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:09 PM   E: 00:01:03   I: 01:00
     Total Busy: 45.8%   High Pri:  2.6%   MemMgr:   .0%   Read Hit:  0%
```

KIP Line

Figure 6.3 *SOS Key Indicators of Performance (KIP) line*

The configuration of the KIP line is discussed in "Key Indicators of Performance (KIP) Line" on page 58.

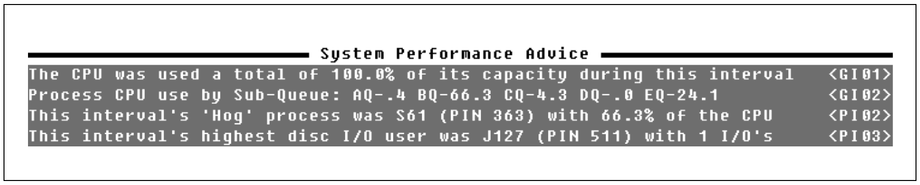
Displaying Key Indicators of Performance

By default, the key indicators of performance are suppressed. To show the key indicators of performance (KIP) line in all screen displays:

1. From the SOS/3000 Main Option Menu screen, select the Display Key Indicators of Performance option (option 2). Press Enter.
2. At the next prompt, enter **Y** (Yes).

Display advice messages

System Performance Advice messages displayed in the Global Summary screen deliver a basic interpretation of significant system performance events. By default, this option is turned on.



```
─────────────────────────── System Performance Advice ───────────────────────────
The CPU was used a total of 100.0% of its capacity during this interval   <GI01>
Process CPU use by Sub-Queue: AQ-.4 BQ-66.3 CQ-4.3 DQ-.0 EQ-24.1          <GI02>
This interval's 'Hog' process was S61 (PIN 363) with 66.3% of the CPU     <PI02>
This interval's highest disc I/O user was J127 (PIN 511) with 1 I/O's     <PI03>
```

Figure 6.4 *SOS Global Summary screen: System Performance Advice messages*

Advice messages are discussed further in “System Performance Advice” on page 82.

Suppressing All Advice Messages

To suppress all advice messages in the Global Summary screen:

1. From the Main Option Menu screen, select the Display advice messages option (option 3). Press Enter.
2. At the next prompt, enter **N** (No).

Display informational advice messages

By default, SOS provides both informational and excessive use advice messages in the System Performance Advice section of the Global Summary screen. See “Performance Advice Message Catalog” on page 267 for details regarding these message codes.

- An "I" in the message ID code (for example, GI01) denotes an *informational* advice message. Informational messages usually state current performance levels for the current interval.
- An "E" in the message ID code (for example, GE09) denotes an *excessive use* advice message. This type of advice message alerts the user to a situation where system resources are overtaxed.

Suppressing Informational Advice Messages

To suppress informational advice messages from the Global Summary screen:

1. From the SOS/3000 Main Option Menu screen, select the Display informational advice messages option (option 4). Press Enter.

   This option is available only when advice messages (option 3) are displayed in the SOS/3000 Main Option Menu screen.
2. At the next prompt, enter **N** (No).

Display option

The Display option determines how the Global Statistics portion of the Global Summary screen is formatted. See "SOS Main Option Menu" on page 17 for more information. The Global Statistic can be displayed in a reduced graphic format (default), a detailed tabular format, or can be suppressed entirely. By choosing (1) Graphic, you will see eight important global performance statistics in a graphic bar chart format. By choosing (2) Tabular, data will present a detailed listing with cumulative values of essential performance data in a tabular abbreviated format. This option should be enabled when more specific, detailed information is desired for global performance statistics. Selecting (3) Suppress, will skip the display of CPU information. Choose this option when you want to conserve screen space for process, workload, and/or advice display.

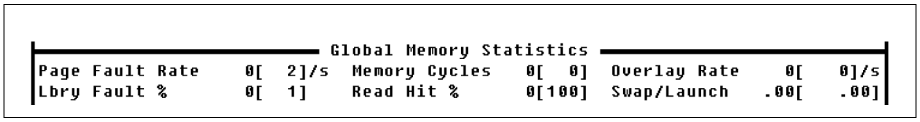
Changing Display Formats

To choose one of the Global Statistics display formats:

1. From the SOS/3000 Main Option Menu screen, select Display option (option 5). Press Enter.
2. Enter the option number:
   - To view a graphical display, type **1** (1-Graphic). Press Enter.
   - To view a tabular display, type **2** (2-Tabular). Press Enter.
   - To skip displaying the CPU information, type **3** (3-Suppress). Press Enter.

Display memory information on global screen

This option allows you to enable the Global Memory Statistics section on the Global Screen. This option is only available if option 5 (Display option) is set to 2 (Graphic) or 3 (Tabular).



```
|------------------------------ Global Memory Statistics ---------------------------|
|Page Fault Rate      0[   2]/s  Memory Cycles    0[   0]  Overlay Rate      0[    0]/s|
|Lbry Fault %         0[   1]    Read Hit %       0[100]  Swap/Launch     .00[   .00]|
```

Figure 6.5 *SOS Global Summary screen: Memory statistics*

Suppressing memory information on global screen

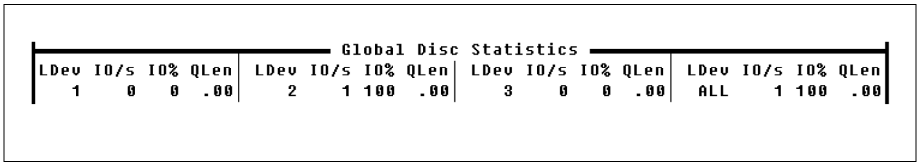
To suppress memory information from the Global Summary screen:

1 From the SOS/3000 Main Option Menu screen, select the Display memory information on global screen option (option 6).

2 At the next prompt, enter **N** (No).

Display disc information on global screen

This option allows you to enable the Global Disc Statistics section on the Global Summary screen. This option is only available if option 5 (Display option) is set to 2 (Graphic) or 3 (Tabular).



```
──────────────────────────────── Global Disc Statistics ──────────────────────────────
LDev IO/s IO% QLen| LDev IO/s IO% QLen| LDev IO/s IO% QLen| LDev IO/s IO% QLen
   1    0   0  .00|    2    1 100  .00|    3    0   0  .00|  ALL    1 100  .00
```

Figure 6.6 *SOS Global Summary screen: Disc statistics*

Global disc statistics are discussed further in "Global Disc Statistics (tabular format)" on page 72.

Suppressing disc information on global screen

To suppress disc information from the Global Summary screen:

1 From the SOS/3000 Main Option Menu screen, select the Display disc information on global screen option (option 7).

2 At the next prompt, enter **N** (No).

Collect process/workload information

This option allows you to enable the data collection process by SOS of process level and workload level performance statistics.

Enabling process/workload data collection

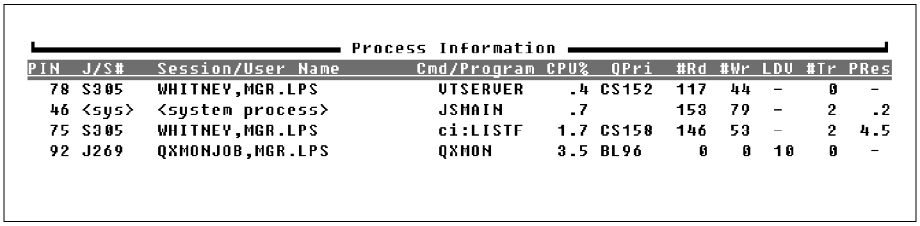
To enable process/workload data collection:

1 From the SOS/3000 Main Option Menu screen, select Collect process/workload information (option 8).

2 At the next prompt, enter **Y** (Yes).

Display process information

Process information is provided in the Process Information section of the Global Summary screen.This information can be suppressed. This option is only available if option 8 (Collect process/workload information) is set to **Y**.



```
------------------------------ Process Information ---------------------------
PIN  J/S#   Session/User Name       Cmd/Program CPU%  QPri  #Rd #Wr LDV #Tr PRes
  78 S305   WHITNEY,MGR.LPS           VTSERVER    .4 CS152  117  44  -    0   -
  46 <sys>  <system process>          JSMAIN      .7        153  79  -    2   .2
  75 S305   WHITNEY,MGR.LPS           ci:LISTF   1.7 CS158  146  53  -    2  4.5
  92 J269   QXMONJOB,MGR.LPS          QXMON      3.5 BL96     0   0  10   0   -
```

Figure 6.7 *SOS Global Summary screen: Process Information*

Global process statistics are discussed further in "Process Information" on page 74.

Suppressing Process Information

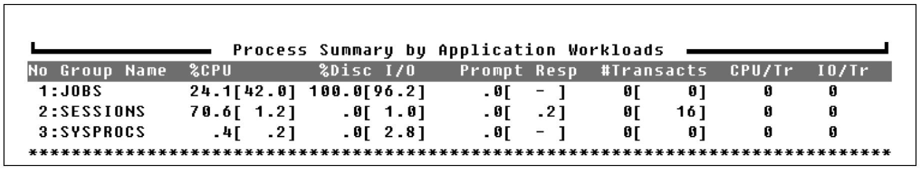
To suppress the Process Information section of the Global Summary screen:

1. From the SOS/3000 Main Option Menu screen, select Display process information (option 9). Press Enter.
2. At the next prompt, enter **N** (No).

NOTE If you suppress the collection of Process Information, the associated process level advice messages will not be present. You do not need this option enabled to display application workload summaries.

Display workload information

By default, information about application workloads is not included in the Global Summary screen graphical display. This information can be displayed. This option is only available if option 8 (Collect process/workload information) is set to **Y.**



```
----------------  Process Summary by Application Workloads  ------------------
No Group Name  %CPU        %Disc I/O    Prompt Resp  #Transacts  CPU/Tr  IO/Tr
 1:JOBS        24.1[42.0] 100.0[96.2]      .0[  - ]     0[    0]     0     0
 2:SESSIONS    70.6[ 1.2]    .0[ 1.0]      .0[  .2]     0[   16]     0     0
 3:SYSPROCS      .4[  .2]    .0[ 2.8]      .0[  - ]     0[    0]     0     0
********************************************************************************
```

Figure 6.8 *SOS Global Summary screen: Process Summary by Application Workloads*

Workload statistics are discussed further in “Process Summary by Application Workloads” on page 81.

Displaying Workload Information

To display workload information:

1. From the SOS/3000 Main Option Menu screen, select Display workload information (option 10). Press Enter.
2. At the next prompt, enter **Y** (Yes).

Display only active workloads

The Display only active workloads option is available only when options 8 and 10 are set to **Y** in the SOS/3000 Main Option Menu screen.

By default, all workloads defined in the SOSWKDEF (workload definitions) file are included in the Process Summary by Application Workloads section of the Global Summary screen, even if they used 0.0% of the total CPU time in the current sample interval. The display can be configured to show only active workloads (workloads that used more than 0.0% of the total CPU time).

Displaying Only Active Workloads

To display active workloads and suppress inactive workloads in the Global Summary screen:

1. From the SOS/3000 Main Option Menu screen, select Display only active workloads (option 11). Press Enter.
2. At the next prompt, enter **Y** (Yes).

CPU percentage required for workload display

This option is available only when workload information is displayed in the Global Summary screen and eligibility is restricted to active workloads.

When this option is disabled (default setting), all workloads that consumed 0.1% or more of the total CPU time in the current sample interval will be included in the Process Summary by Application Workloads section of the Global Summary screen. A higher minimum CPU percentage can be specified.

Resetting the Minimum CPU Requirement

To set a new minimum CPU percentage requirement:

1. From the SOS/3000 Main Option Menu screen, select CPU percentage required for workload display (option 12). Press Enter.
2. At the next prompt, enter a value from 0.0 to 100 percent. Press Enter.

Terminal memory lock for process display

One of the design philosophies of SOS/3000 is to provide as much relevant performance data on one screen as possible. Consequently, the default Global Summary screen allows Global, Disc, Process and Advice data to coexist on one screen. You can accomplish this by causing Process and Advice data to scroll under the Global and Disc data via the memory lock function on Hewlett-Packard and compatible terminals.

Suppressing terminal memory lock for process display

If you want to look at as many process as possible on one screen, even though it causes Global and Disc data to roll off the top of the display:

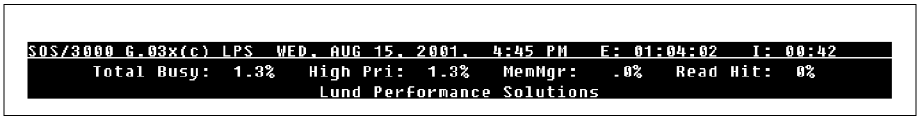
1. From the SOS Main option menu screen, select Terminal memory lock for process display (option 13). Press Enter.
2. At the next prompt, enter **N** (No).

Company name

By default, the company name is not included in the SOS screens, reports or output. It can be added.

Adding a Company Name to the SOS Banner

1. From the SOS/3000 Main Option Menu screen, select Company name (option 14). Press Enter.
2. At the next prompt, type a company name or system name (up to 43 alpha-numeric characters) to display just below the SOS banner.



```
SOS/3000 G.03x(c) LPS  WED, AUG 15, 2001,  4:45 PM   E: 01:04:02   I: 00:42
        Total Busy:  1.3%    High Pri:  1.3%   MemMgr:   .0%   Read Hit:  0%
                              Lund Performance Solutions
```

Figure 6.9 *SOS Company Name example (Lund Performance Solutions)*

Detail display options (SUBMENU)

To access the Detail display options submenu screen:

1. From the SOS/3000 Main Option Menu screen, type 15 to select Detail display options (SUBMENU). Press Enter.
2. Select one of the following submenu options:
    - 1) Process display options (SUBMENU)
    - 2) Pulse Points display options (SUBMENU)

See "SOS Detail Display Options Menu" on page 27 for more detailed information regarding this submenu.

Make TurboIMAGE performance data available

Two options have been added to the SOS/3000 Main Option Menu (see Figure 6.1 - option 16 and option 17) to display the TurboIMAGE performance statistics. By default, these options are set to N (No).

In order for the ImageStats data to be collected and shown, this option must be set to Y (Yes).

Displaying TurboIMAGE performance data

To display Turbo Image performance data in any SOS-TurboIMAGE screen:

1. From the SOS/3000 Main Option Menu screen, select Make Turbo Image performance data available (option 16).
2. At the next prompt, enter **Y** (Yes).

Make TurboIMAGE detailed performance data available

In order to see detailed performance data—data about process access to data sets, this option must be set to **Y** (Yes). Be careful about enabling this option. It consumes memory and CPU in proportion to the number of process-dataset combinations—this could be a very large number. This option is only available if option 16 is also set to **Y**.

This option has a direct influence on the Turbo Image Database Detail screen and on the Turbo Image Process Detail screen.

If this option is set to N (No), in the Turbo Image Database Detail screen will not display Hog dataset information, and the Turbo Image Process Detail screen will not contain dataset information. For more details, see “SOS TurboImage Database Detail” on page 163 and “SOS TurboIMAGE Process Detail” on page 169.

IMPORTANT! If you enable this option, the CPU load on your system can be increased substantially.

Displaying Turbo Image detailed performance data

To display Turbo Image detailed performance data in any SOS-TurboIMAGE screen:

1. From the SOS/3000 Main Option Menu screen, select Make Turbo Image detailed performance data available (option 17).
2. At the next prompt, enter **Y** (Yes).

7

SOS DETAIL DISPLAY OPTIONS MENU

To access the Detail display options submenu screen:

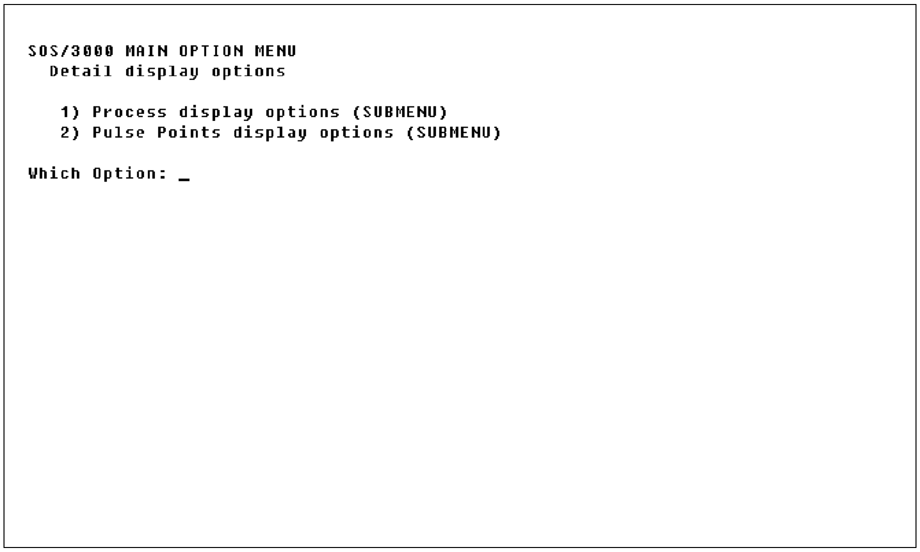
1 Press **O** to access the SOS/3000 Main Option Menu screen.

2 From the SOS/3000 Main Option Menu screen, type 15 to select Detail display options (SUBMENU). Press Enter.

3 Select one of the following submenu options:

- 1) Process display options (SUBMENU)
- 2) Pulse Points display options (SUBMENU)

4 Press Enter.



```
SOS/3000 MAIN OPTION MENU
  Detail display options

   1) Process display options (SUBMENU)
   2) Pulse Points display options (SUBMENU)

Which Option: _
```

Figure 7.1 *SOS Detail display options submenu screen*

Process Display Options

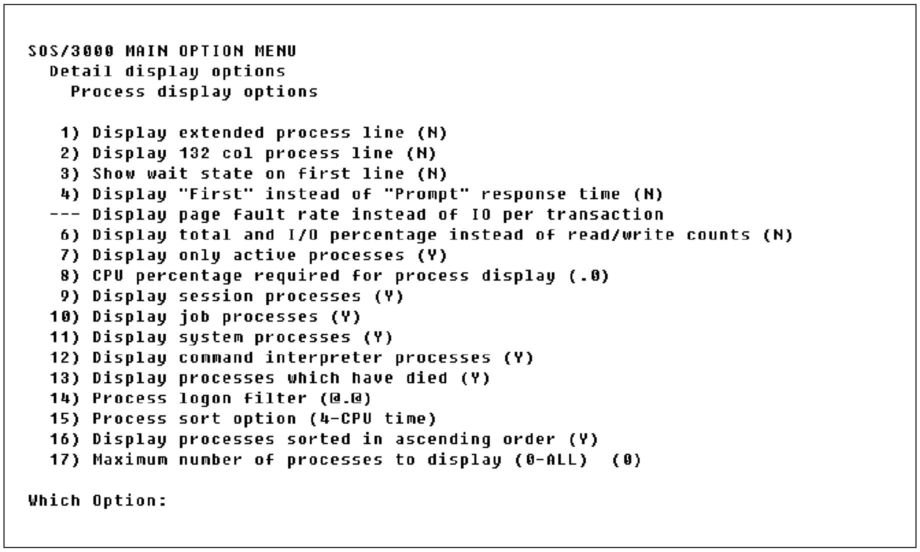
To access the Process display options submenu screen from any SOS screen:

1 Type **O** from the SOS Enter command: prompt to view the SOS/3000 Main Option Menu screen.

2 Ensure the Display process information option is enabled.

3 From the SOS/3000 Main Option Menu screen select option 15 - Detail display options and press Enter.

4 From the Detail display options submenu screen, select Process display options (option 1) and press Enter. The Process Display Options submenu screen will display.



```
SOS/3000 MAIN OPTION MENU
  Detail display options
    Process display options

   1) Display extended process line (N)
   2) Display 132 col process line (N)
   3) Show wait state on first line (N)
   4) Display "First" instead of "Prompt" response time (N)
  --- Display page fault rate instead of IO per transaction
   6) Display total and I/O percentage instead of read/write counts (N)
   7) Display only active processes (Y)
   8) CPU percentage required for process display (.0)
   9) Display session processes (Y)
  10) Display job processes (Y)
  11) Display system processes (Y)
  12) Display command interpreter processes (Y)
  13) Display processes which have died (Y)
  14) Process logon filter (@.@)
  15) Process sort option (4-CPU time)
  16) Display processes sorted in ascending order (Y)
  17) Maximum number of processes to display (0-ALL)  (0)

Which Option:
```

Figure 7.2 *SOS Process display options submenu screen*

Process display option Commands

To modify a process display option, either temporarily or permanently:

1 Type the option command key from the Process display options submenu screen and press the Enter key.

2 Enter a new parameter at the secondary command prompt. Press the Enter key.

3 Press Enter to exit the Process display options submenu screen.

4 Press Enter to exit the Detail display options submenu screen.

5 Press Enter to exit the SOS/3000 Main Option Menu screen.

6 At the Should these options be saved permanently? prompt:

  - Press Enter to return to the SOS program without saving the modifications permanently.
  - Enter **Y** (Yes) to save the changes permanently.

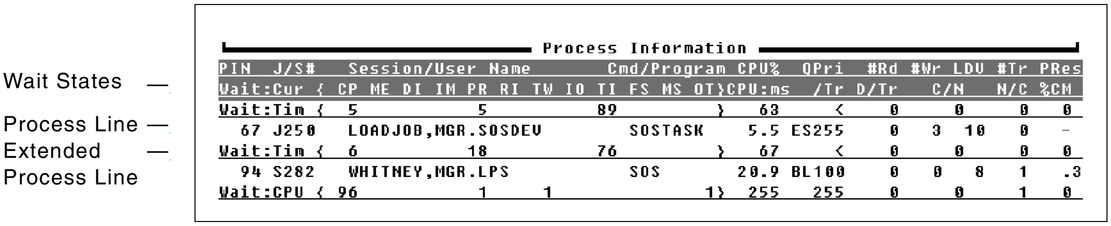
Information about each of the process display options is provided to assist you.

Display extended process line

Additional process information can be displayed in the Process Information section of the Global Summary screen.

The extended Process Information display includes:

- An extended process line below each process line, which shows the percentage of time the corresponding process spent in each wait state.
- The wait states column headings for the wait state statistics displayed in the extended process lines.



```
                         Process Information
PIN  J/S#   Session/User Name       Cmd/Program CPU%  QPri  #Rd #Wr LDV #Tr PRes
Wait:Cur { CP ME DI IM PR RI TW IO TI FS MS OT}CPU:ms  /Tr D/Tr   C/N   N/C %CM
Wait:Tim {  5           5          89         }   63     <    0     0     0   0
  67 J250   LOADJOB,MGR.SOSDEV        SOSTASK    5.5 ES255    0   3 10    0   -
Wait:Tim {  6          18          76         }   67     <    0     0     0   0
  94 S282   WHITNEY,MGR.LPS           SOS       20.9 BL100    0   0   8   1  .3
Wait:CPU {  96         1     1              1}  255   255    0     0     1   0
```

Figure 7.3 *SOS Global Summary screen: wait states headings & extended process lines*

The wait states headings line includes all possible wait states in which the current processes can spend CPU time ({CP, ME,..., OT}). For detailed information about each wait state, see “Wait State Codes” on page 316.

Extending the Process Information

To extend the Process Information portion of the Global Summary screen:

1. From the Process display options submenu screen, select Display extended process line (option 1). Press Enter.
2. At the next prompt, enter **Y** (Yes).

Display 132 col process line

Your terminal must be configured to 132 characters to see this entire display. Wait state statistics start at the 82nd character. This option is not avaliable if option 1 - Display extended process line is set to **Y**.

Displaying the process line on 132 characters

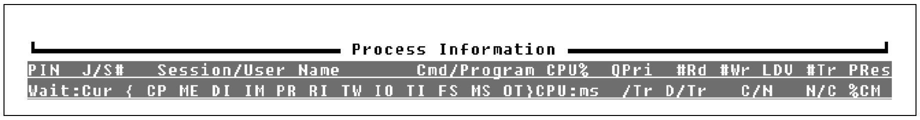
To display the process line on 132 characters:

1 From the Process display options submenu screen, select Display 132 col process line (option 2). Press Enter.

2 At the next prompt, enter **Y** (Yes).

Show wait state on first line

If you answer **Y** (Yes) to Show wait state on first line option (option 3), the current wait state will display on the first line of the process information. It will replace #Wr (number of writes) which will be consolidated with #Rd (number of reads) to give the #IO (number of I/O's) statistic. The wait indicator shows what the process is waiting on (i.e., a disc, a RIN, the CPU etc.) (see Figure 7.4). This option is not avaliable if option 1 - Display extended process line or option 2 - Display 132 col process line are set to **Y**.



```
                               Process Information
PIN  J/S#   Session/User Name       Cmd/Program CPU%  QPri  #Rd #Wr LDV #Tr PRes
Wait:Cur { CP ME DI IM PR RI TW IO TI FS MS OT}CPU:ms  /Tr D/Tr   C/N   N/C %CM
```

Figure 7.4 *SOS Process Information: wait state on first line*

Display "First" instead of "Prompt" response time

This option allows you to view process response time in one of two different ways. First response is the time lapsed from when the C/R or Enter key was pressed to when the first character appears on the screen. Prompt response is the time lapsed from when the C/R or Enter key was pressed to the first available user data entry prompt.

Displaying First response time

To display First response time:

1 From the Process display options submenu screen, select Display "First" instead of "Prompt" response time (option 4). Press Enter.

2 At the next prompt, enter **Y** (Yes).

Display page fault rate instead of I/O per transaction

This option is available if Display extended process line is set to **Y** (Yes). Page Fault Rate is a memory pressure indicator. When we display the page fault memory statistic on the extended process display, D/Tr (disc I/Os that were performed per user terminal read) is replaced by PF/s (page faults per second).

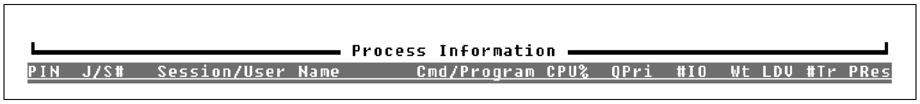
Displaying Page Fault Rate

To display Page Fault Rate:

1. From the Process display options submenu screen, select Display page fault rate instead of IO per transaction (option 5). Press Enter.
2. At the next prompt, enter **Y** (Yes).

Display total and I/O percentage instead of read/write counts

The default column headings for the Process Information section of the Global Summary screen are shown in Figure 7.3. I/O information can be displayed, by switching to an alternative set of column headings (see Figure 7.5). The Display Total IO% instead of Read/Write counts option will be unavailable if wait states are displayed (option 3).



```
                         Process Information
PIN  J/S#   Session/User Name        Cmd/Program CPU%  QPri  #IO  Wt LDV #Tr PRes
```

Figure 7.5 *SOS Process Information column headings (alternative)*

Switching the Process Information Column Headings

To replace total reads (#Rd) with total I/O's (#IO) and total writes (#Wr) with I/O percentage (IO%):

1. From the Process display options submenu screen, select Display total and I/O percentage instead of read/write counts (option 6). Press Enter.
2. At the next prompt, enter **Y** (Yes).

Display only active processes

An *active* process is defined as a process that used more than 0.0 percent of total CPU time during the current sample interval.

By default, only active processes are included in the Process Information section of the Global Summary screen. Inactive processes can be included.

RECOMMENDATION The default setting, Y (display only active processes), is recommended.

Displaying Both Active and Inactive Processes

To display all processes currently on the system, both active and inactive:

1. From the Process display options submenu screen, select Display only active processes (option 7). Press Enter.
2. At the next prompt, enter **N** (No).

You can also display all processes one time by choosing the DISP ALL PROCS-1X key (OPTION KEYS).

CPU percentage required for process display

The CPU percentage required for process display option is possible when only active processes are included in the Process Information portion of the Global Summary screen (option 7). This option enables you to set a minimum threshold value (a minimum percentage of CPU time) that a process must meet or exceed to be included in the Process Information section of the Global Summary screen.

The default parameter of 0.0 percent will allow all active processes in the current sample interval to be displayed, including processes in the run queue (even though they did not use any CPU time). Entering a greater threshold value, for example 10 percent, will exclude all active processes that used less than 10 percent of the total CPU time.

RECOMMENDATION If you are doing general system monitoring, a CPU threshold value of less than 5.0 percent is recommended. If you are trying to pinpoint the top CPU "hog" processes, a value of 5.0 to 15.0 percent is recommended.

Setting the CPU percentage required for a process to display

To set the minimum CPU percentage:

1. From the Process display options submenu screen, select CPU percentage required for process display (option 8). Press Enter.
2. At the next prompt, enter a value between 0.0 and 100. Press Enter.

Display session processes

Session processes are listed in the Process Information section of the Global Summary screen. These processes can be suppressed.

Suppressing Session Processes

To exclude session processes from the screen display:

1. From the Process display options submenu screen, select Display session processes (option 9). Press Enter.
2. At the next prompt, enter **N** (No).

Display job processes

Job processes are listed in the Process Information section of the Global Summary screen. These processes can be suppressed.

Suppressing Job Processes

To exclude job processes from the screen display:

1. From the Process display options submenu screen, select the Display job processes option (option 10). Press Enter.
2. At the next prompt, enter **N** (No).

Display system processes

System processes are listed in the Process Information section of the Global Summary screen.

Since various parts of the MPE operating system run as processes, you will usually see low-numbered PIN's displayed. These are processes like loader processes, logging processes, etc. All of these belong to the family of MPE system processes. Each of these processes usually execute as a very high priority and do not consume much CPU horsepower. However, if you suspect a system Hog or want to snoop around various datacomm processes (some of which are considered to be system processes) you should enable this filter. If you really want to see all the system processes on the system, answer **N** (No) to the question Display only active processes (**N**)? (described above) and **Y** (Yes) to the prompt: Display system processes (**Y**).

Entering **N** (No) to this question will suppress the display of system processes even if one or more were active during the last interval. We recommend that you leave this option enabled for routine system monitoring.

Suppressing System Processes

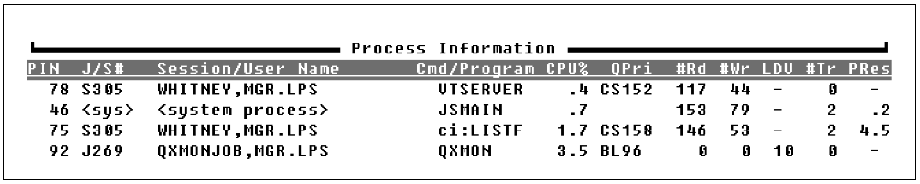
To exclude system processes from the screen display:

1. From the Process display options submenu screen, select the Display system processes option. Press the Enter key.
2. At the next prompt, enter N (No).

Display command interpreter processes

A Command Interpreter process is created for each HELLO or JOB command initiated. If you want to see the last command or job step a user or job performed, enable the Command Interpreter Process display.

Another useful feature of SOS/3000 is its ability to see the last MPE command performed by a Command Interpreter Process. The example in the Figure 7.6 illustrate this.



```
 ________________________ Process Information ________________________
PIN  J/S#   Session/User Name        Cmd/Program CPU%  QPri   #Rd  #Wr LDV  #Tr PRes
  78 S305   WHITNEY,MGR.LPS           VTSERVER     .4 CS152  117   44  -     0    -
  46 <sys>  <system process>          JSMAIN       .7        153   79  -     2   .2
  75 S305   WHITNEY,MGR.LPS           ci:LISTF    1.7 CS158  146   53  -     2  4.5
  92 J269   QXMONJOB,MGR.LPS          QXMON       3.5 BL96     0    0  10    0    -
```

Figure 7.6 *SOS Command Interpreter process (example)*

You can see that user WHITNEY issued the LISTF command as the last command before SOS/3000 took a picture of the system.

Suppressing Command Interpreter Processes

To exclude Command Interpreter processes from the screen display:

1. From the Process display options submenu screen, select Display command interpreter processes (option 12). Press Enter.
2. At the next prompt, enter **N** (No).

Display processes which have died

The Process Information section displays all processes which have died. These processes are labeled "Dea" next to the column "Wait" in the extended Process Detail section. This feature allows you to see the last will and testament of a terminating process. Notice that the process priority will appear as "---". These processes can be suppressed.

Suppressing Dead Processes

To exclude dead processes from the screen display:

1. From the Process display options submenu screen, select the Display processes which have died option (option 13). Press Enter.
2. At the next prompt, enter **N** (No).

Process logon filter

The default login filter (@.@) allows all users and all processes to be displayed on the SOS screens. If you supply a USER and/or ACCOUNT for this option, only jobs and sessions that qualify will be displayed. This allows you to target a set of specific users and/or applications. Input here should be in the form of:

<sessions>,<user>.<account>,<group>

The <session> and <group> names are optional. The <user> and <account> names are required. The "@" sign may be used for user or account.

Specifying a Process Logon Filter

To limit displayed processes to those of just one login:

1. From the Process display options submenu screen, select Process logon filter (option 14). Press Enter.
2. At the next prompt, enter the logon. Press Enter.

This option allows more wildcarding capability. The "#", "?" and "@" are fully supported as long as no more than one "@" appears in any one part.

Process sort option

The process sort option enables the user to select the order in which the qualifying processes will be displayed. By default, the processes are shown sorted by CPU time utilized.

Selecting a Process Sort Option

1. From the Process display options submenu screen, select Process sort option (15). Press Enter.
2. At the next prompt, type the key command that corresponds to the desired sort option (described in Table 7.1). Press Enter.

Table 7.1 *SOS process sort options*

Option	Sort Option Description	Column
1-PIN#	Sort by process identification number.	PIN
2-Job/Session#	Sort by Job/Session number.	J/S#
3-Workload group	Sort by the application workload group to which the process belongs.	N/A
4-CPU time	Sort by the percentage of CPU time utilized by the process.	CPU%
5-Disc I/O	Sort by the total number of disc I/O’s performed by the process.	#IO
6-Term Reads	Sort by the number of terminal reads.	#Tr
7-Priority	Sort by process priority.	QPri
8-Response time	Sort by the average of Response time, either First or Prompt.	FRes or PRes
9-N/C	Sort by the number of native mode to compatibility mode switches	N/C

Option	Sort Option Description	Column
10-C/N	Sort by the number of compatibility mode to native mode switches	C/N
11-CM%	Sort by the percentage of process time due to compatibility mode CPU usage.	%CM
12-Wait state	Sort by the activity or sleep state a process is in.	Wait

Display processes sorted in ascending order

By default, the processes displayed will be sorted in descending order.

Displaying Processes in Ascending Order

To sort and display processes in descending order:

1. From the Process display options submenu screen, select Display processes sorted in ascending order (option 16). Press Enter.
2. At the next prompt, enter **Y** (Yes).

Maximum number of processes to display

To specify a maximum number of processes to be displayed:

1. From the Process display options submenu screen, select the Maximum number of processes to display option (option 17). Press Enter.
2. At the next prompt, enter a whole numeric value between 0 and 999.

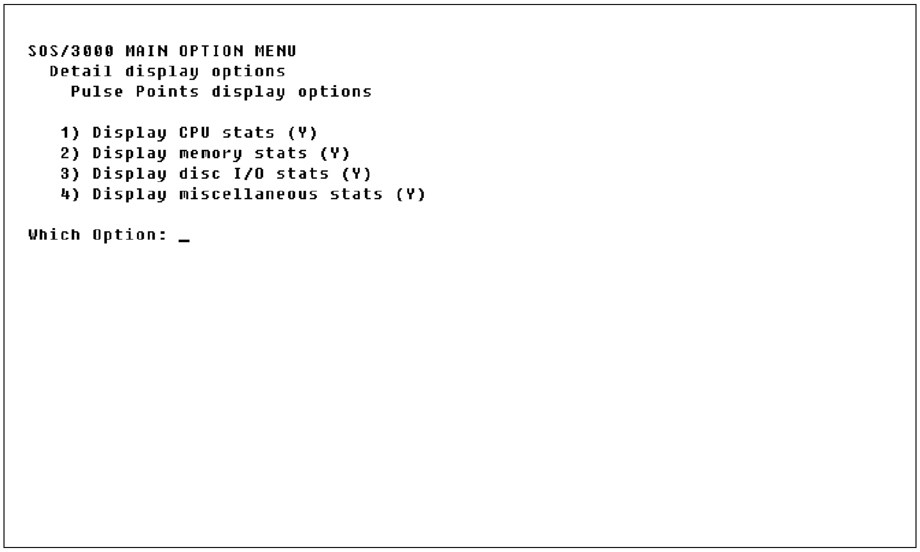
For example, to show the ten processes that consume the most CPU time, set the following three parameters:

1. Set the Process sort option to 4-CPU time to sort the processes by CPU time utilized.
2. Set the Display processes sorted in ascending order option to N, to display the processes in descending order.
3. Set the Maximum number of processes to 10, to display the ten processes using the most CPU time. (The default value, 0, will allow all eligible processes to be displayed.)

Pulse Points display options

To access the Pulse Points display options submenu screen from any SOS display screen:

1. Type **O** from the SOS Enter command: prompt to view the SOS/3000 Main Option Menu screen.
2. Ensure the Display process information option is enabled.
3. From the SOS/3000 Main Option Menu screen, select option 15 - Detail display options (SUBMENU) and press Enter.
4. From the Detail display options submenu screen, select Pulse Points display options (option 2) and press Enter. The Pulse Points display options submenu screen will display (Figure 7.7).



```
SOS/3000 MAIN OPTION MENU
  Detail display options
    Pulse Points display options

   1) Display CPU stats (Y)
   2) Display memory stats (Y)
   3) Display disc I/O stats (Y)
   4) Display miscellaneous stats (Y)

Which Option: _
```

Figure 7.7 *SOS Pulse Points display options submenu screen*

Pulse Points display option Commands

To modify a Pulse points display option, either temporarily or permanently:

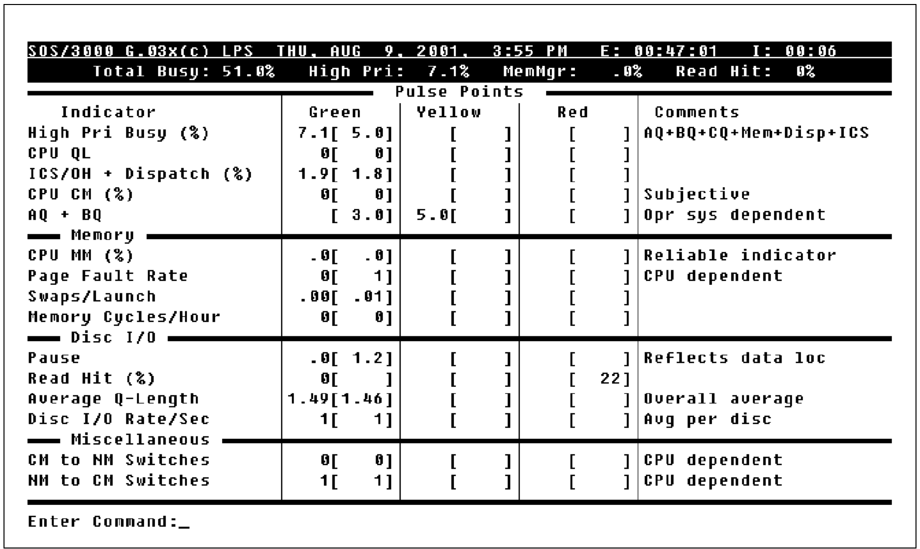
1. Type the option command key from the Pulse Points display options submenu screen and press Enter.
2. Enter a new parameter at the secondary command prompt. Press Enter.
3. Press Enter to exit the Pulse Points display options submenu screen.
4. Press Enter to exit the Detail display options submenu screen.
5. Press Enter to exit the SOS/3000 Main Option Menu screen.
6. At the Should these options be saved permanently? prompt:
   - Press the Enter key to return to the SOS program without saving the modifications permanently.

- Enter **Y** (Yes) to save the changes permanently.

Information about each of the Pulse points display options is provided to assist you.

Display CPU stats

CPU statistics are displayed in the Pulse Points screen.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:55 PM   E: 00:47:01   I: 00:06
      Total Busy: 51.0%   High Pri:  7.1%   MemMgr:   .0%   Read Hit:  0%
-------------------------------- Pulse Points --------------------------------
   Indicator           |   Green   | Yellow    |   Red     | Comments
High Pri Busy (%)      | 7.1[ 5.0]|    [    ]|    [    ]|AQ+BQ+CQ+Mem+Disp+ICS
CPU QL                 |   0[   0]|    [    ]|    [    ]|
ICS/OH + Dispatch (%)  | 1.9[ 1.8]|    [    ]|    [    ]|
CPU CM (%)             |   0[   0]|    [    ]|    [    ]|Subjective
AQ + BQ                |    [ 3.0]| 5.0[    ]|    [    ]|Opr sys dependent
---- Memory -------------------------------------------------------------------
CPU MM (%)             |  .0[  .0]|    [    ]|    [    ]|Reliable indicator
Page Fault Rate        |   0[   1]|    [    ]|    [    ]|CPU dependent
Swaps/Launch           | .00[ .01]|    [    ]|    [    ]|
Memory Cycles/Hour     |   0[   0]|    [    ]|    [    ]|
---- Disc I/O -----------------------------------------------------------------
Pause                  |  .0[ 1.2]|    [    ]|    [    ]|Reflects data loc
Read Hit (%)           |   0[    ]|    [    ]|    [  22]|
Average Q-Length       |1.49[1.46]|    [    ]|    [    ]|Overall average
Disc I/O Rate/Sec      |   1[   1]|    [    ]|    [    ]|Avg per disc
---- Miscellaneous ------------------------------------------------------------
CM to NM Switches      |   0[   0]|    [    ]|    [    ]|CPU dependent
NM to CM Switches      |   1[   1]|    [    ]|    [    ]|CPU dependent
-------------------------------------------------------------------------------
Enter Command:_
```

Figure 7.8 *SOS Pulse Points screen*

Suppressing CPU Statistics

To suppress CPU statistics from the Pulse Points screen:

1. From the Pulse Points display options submenu screen, select Display CPU stats (option 1). Press Enter.
2. At the next prompt, enter **N** (No).

Display memory stats

Memory statistics are displayed in the Pulse Points screen (refer to Figure 7.8).

Suppressing Memory Statistics

To suppress memory statistics from the Pulse Points screen:

1. From the Pulse Points display options submenu screen, type **2** for the Display memory stats option. Press Enter.
2. At the next prompt, enter **N** (No).

Display disc I/O stats

Disc I/O statistics are displayed in the Pulse Points screen. To see an example of this screen, refer to Figure 7.8 on page 38.

Suppressing Disc I/O Statistics

To suppress disc I/O statistics from the Pulse Points screen:

1. From the Pulse Points display options submenu screen, select the Display disc I/O stats option (option 3). Press Enter.
2. At the next prompt, enter **N** (No).

Display miscellaneous stats

Miscellaneous statistics are displayed in the Pulse Points screen.

Suppressing Miscellaneous Statistics

To suppress miscellaneous statistics from the Pulse Points screen:

1. From the Pulse Points display options submenu screen, select Display miscellaneous stats (option 4). Press Enter.
2. At the next prompt, enter **N** (No).

8

SOS HOST-SPECIFIC CONFIGURATION FILES

SOSADVIC File

In the System Performance Advice portion of the Global Summary screen (see “System Performance Advice” on page 82), advice messages are displayed based upon system activity that occurred during the current interval. The advice messages and display criteria are maintained in the SOSADVIC file (a portion of which is shown below) located in PUB.LPS.

User Notification Command —

```
################################################################################

MODEL 900-999999

TELLOP

TELL MANAGER.SYS
```

Default Advice Specification Block —

```
<GI01>The CPU was used a total of %s of its capacity during this interval

ALWAYS

CPU-BUSY%
```

Figure 8.1 *SOSADVIC configuration file (example)*

The SOS program can display a single-line message for each item-name variable (a data item selected from the ITEMLIST file) placed in the advice file. For a list of the data items in the ITEMLIST file, see “SOS/3000 Data Items” on page 287.

During each current interval, SOS compares the value of each variable being monitored to the threshold criteria placed in the advice file. If the monitored value meets its threshold criteria, the message associated with that variable is displayed in the System Performance Advice portion of the Global Summary screen.

NOTE Please note that the lower and upper bounds of the thresholds for the MODERATE, HEAVY, and EXCESSIVE categories of each default advice message in the advice file are suggested values. It may be appropriate to adjust these values to reflect your system's performance criteria.

Advice Message Specification Blocks

Advice message specification blocks are constructed in accordance with specific configuration rules and syntax. The rules for configuring advice message specification blocks within the advice file are listed in “Configuration Rules” on page 43. The syntax of the specification blocks is outlined below using the default ME04 advice message as an example.

Example

```
<ME04>Memory indicator #4 (Page Fault rate) reveals %s %s memory load
PAGE-FAULT/S (10-50)
PAGE-FAULT/S | 20 an | 15 a | 10 a |
PAGE-FAULT/S | 20 EXCESSIVE | 15 HEAVY | 10 moderate |
```

Syntax

```
<message-id><message-text>
item-name (min-max)
item-name [|<value1><string1>|<value2><string2>|<value3><string3>|]
item-name [|<value1><string1>|<value2><string2>|<value3><string3>|]
```

Where:

- <message-id> is a unique, four-character message identification code.
- <message-text> is the actual advice message text.
- item-name is the itemlist value to be used to determine the text string.
- (min-max) is the minimum and maximum item threshold values required for the message to display.
- The last two lines in the example are each single-line text qualifiers that correspond to the text place-holder(s) (%s) in the message-text.
    - The first place-holder in the message-text corresponds to the first text qualifier in the specification block.

      In the example, the first place-holder in the message-text line:

      ```
      <ME04>Memory indicator #4 (Page Fault rate) reveals %s %s memory load
      ```

      is determined by the value thresholds in the corresponding text-qualifier:

```
PAGE-FAULT/S | 20 an | 15 a | 10 a |
```

- The second conversion specifiers in the <message-text> corresponds to the second text qualifier line in the block, and so on.

  In the example, the first place-holder in the message-text line:

  `<ME04>Memory indicator #4 (Page Fault rate) reveals %s **%s** memory load`

  is determined by the value thresholds in the corresponding text-qualifier:

  ```
  PAGE-FAULT/S | 20 EXCESSIVE | 15 HEAVY | 10 moderate |
  ```

The item-name <value> determines which <string> text is inserted into the printed advice message.

Configuration Rules

1. Comment lines must be preceded by a number sign character (#).
2. The first line of the SOSADVIC file:
   - Specifies the HP 3000 models for which this advice file is valid. If there is no advice specification file, or if the model specified does not match the model on which SOS is being run, SOS will print a warning message and will not display any configured advice messages.
   - Is formatted:

     Model xxxxxxxx (to specify a single hardware model)

     or

     Model xxxxxxxx-xxxxxxxx (to specify a range of hardware models)

   Example

   ```
   MODEL 900-999999
   ```
3. The first line is followed by any number of user notification commands, terminated by a blank line. Advice messages are displayed on a terminal screen or in STDLIST in the case of batch. You can also send messages to the console and to individual sessions via the TELLOP and TELL commands, respectively. All selected advice messages will be sent to a list of users and/or the system console. The TELL function is implemented as follows:

   ```
   TELLOP

   TELL MANAGER.SYS

   TELL MGR.FINANCE

   <GI01>The CPU was ...
   ```
4. The rest of the file contains any number of message advice specification blocks separated by one or more blank lines. Each advice specification block must contain a message-id code followed by the actual advice message-text on the first line. Subsequent lines contain threshold criteria.

5 The message-id code is made up of the following components:

- A type code, which denotes the specific system activity monitored.
    - D for disc activity
    - G for global activity
    - M for memory activity
    - W for workload activity
    - P for process activity
- A user-defined priority code assigned to the <variable>
    - I indicates the advice message is informational.
    - E indicates the performance level is exceptional or excessive.
- A unique two-digit identification number (00-99)

6 The <message-id> code is followed by the message text (<message-text>).

Example

```
<CE01> The CPU Queue length indicates %s %s CPU bottleneck
```

The message identification code precedes the message text in the specification file, but follows the message text in the actual advice message display.

7 Conversion specifications in the <message-text> specification must be introduced by the percent sign character (%). After the % character, a conversion character (either s or %) will indicate the type of conversion to by applied.

- %s (percent sign followed immediately by a lower-case s) indicates the argument is a string and characters from the string will be printed until the end of the string.
- %% (percent sign followed immediately by a percent sign) will print a % character; no argument is converted.

For *each variable text or value* to be included in the message text, a single-line text qualifier must follow the basic advice specification.

8 If the advice message should always be displayed, the second line of the advice specification block can be replaced with the word ALWAYS to specify the message should always be generated. The <item-name> from the ITEMLIST file would then be the only entry on the third line of the block.

Example

```
<GI02>Process CPU use by Sub-Queue: AQ-%s BQ-%s CQ-%s DQ-%s EQ-%s
ALWAYS
AS-PROCESS%
BS-PROCESS%
CS-PROCESS%
DS-PROCESS%
ES-PROCESS%
```

9 The item-name specification used to determine the text string is usually, but not necessarily, the same as the advice threshold item. An item-name can be selected from block types 0, 6, 7, 8, 10, 12, 14, or 15 in the ITEMLIST file. Or, it can be one of six special item-names preceded by a percent sign (%item-name).

The following three items can only be used as variable text item-names. They will be replaced with a string of the form #nnn (nnn=PIN) to identify the appropriate process:

- %CPU-HOG, which identifies the CPU hog process
- %DISC-HOG, which identifies the disc hog process
- %TERM-HOG, which identifies the terminal read hog process

The next three special items can be used anywhere as a regular item-name can be used:

- %HOG-CPU, the CPU percentage used by %CPU_HOG
- %HOG-Disc, the disc I/O’s performed by %DISC_HOG
- %HOG-TERM, the terminal reads performed by %TERM_HOG

A special construct is used to configure advice messages when workload group response time service level objectives are exceeded. For these messages the second line should be the work "WORKLOAD(x)", where "x" is:

- **F** to specify a first response time exceeded objective
- **P** to specify a prompt response time exceeded objective
- **C** to specify a CPU time exceeded objective

The following special item names can be used for workload messages only:

- %WORKLOAD, the name of workload group
- %ACTUAL, the actual group average response time
- %LIMIT, the response time service level objective

10 An item-name preceded by an exclamation character (!item-name), specifies that all occurrences of this advice message will be sent through user-notification commands.

Pulse Points - SOSADVIC File

The SOSADVIC file also contains the Pulse Point configuration information for the Pulse Points screen. For information about Pulse points, see “SOS/3000 Pulse Points” on page 263

```
#########################################################################################
```

CPU Pulse Points Indicator Lines —

```
$PP_CPU     HIGH-PRI-BUSY%          "Hi-Pri Busy(%)"      50,85     "AQ+BQ+CQ+Mem+Disp+ICS"
$PP_CPU     QUEUE-LEN               "CPU QL"               5,15     ""
$PP_CPU     OVERHEAD%+DISPATCHER%   "ICS/OH+Dispatch(%)"  10,15     ""
$PP_CPU     CPU-CM                  "CPU CM(%)"           10,15     "Subjective"
$PP_CPU     AS-PROCESS%+BS-PROCESS% "AQ+BQ"                5, 8     "Opr sys dependent"
```

Memory Pulse Points Indicator Lines —

```
$PP_MEMORY  MEM-MANAGER%            "CPU MM(%)"            4,10     "Reliable indicator"
$PP_MEMORY  PAGE-FAULTS             "Page Fault Rate"     10,25     "CPU dependent"
$PP_MEMORY  SWAPS/LAUNCH            "Swaps/Launch"        40,80     ""
$PP_MEMORY  MEM-CYCLES              "Memory Cycles/Hour"   4,10     ""
```

Disc Pulse Points Indicator Lines —

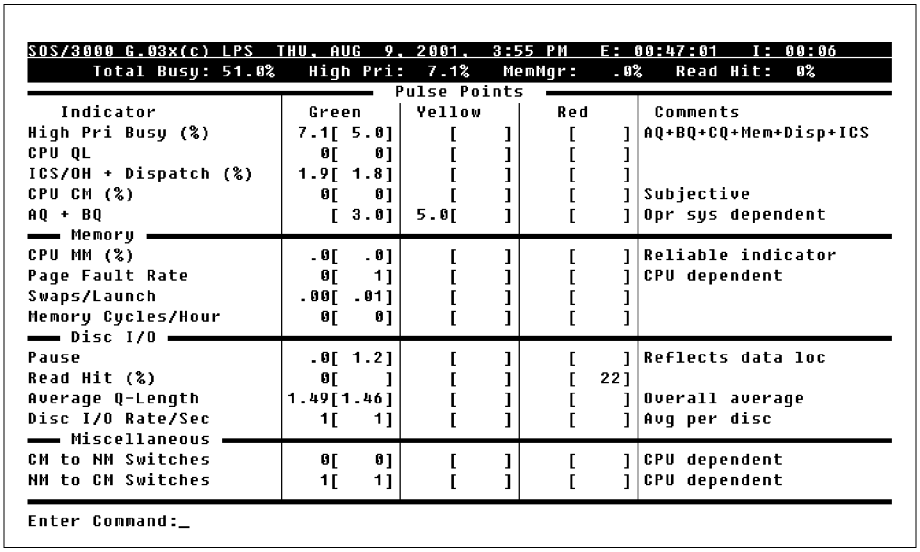
```
$PP_DISC    PAUSE%                  "Pause"                5,15     "Reflects data loc"
$PP_DISC    READ-HIT%               "Read Hit(%)"         95,85     ""
$PP_DISC    DISC-QUEUE-LEN          "Average Q-Length"     5,10     "Overall average"
$PP_DISC    DISC-IO-RATE            "Disc I/O Rate/Sec"   10,25     "Avg per disc"
```

Misc. Pulse Points Indicator Lines —

```
$PP_MISC    C/N-SWITCHES            "CM to NM Switches"  200,500    "CPU dependent"
$PP_MISC    N/C-SWITCHES            "NM to CM Switches"   25,75     "CPU dependent"
```

Figure 8.2 *SOSADVIC - Pulse Points configuration file (example)*

An example of the Pulse Points screen is shown in Figure 8.3.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:55 PM   E: 00:47:01   I: 00:06
      Total Busy: 51.0%   High Pri:  7.1%   MemMgr:   .0%   Read Hit:  0%
                                  Pulse Points
   Indicator              Green     Yellow       Red       Comments
High Pri Busy (%)        7.1[ 5.0]     [    ]     [    ] AQ+BQ+CQ+Mem+Disp+ICS
CPU QL                     0[   0]     [    ]     [    ]
ICS/OH + Dispatch (%)    1.9[ 1.8]     [    ]     [    ]
CPU CM (%)                 0[   0]     [    ]     [    ] Subjective
AQ + BQ                     [ 3.0]  5.0[    ]     [    ] Opr sys dependent
    Memory
CPU MM (%)                .0[  .0]     [    ]     [    ] Reliable indicator
Page Fault Rate            0[   1]     [    ]     [    ] CPU dependent
Swaps/Launch             .00[ .01]     [    ]     [    ]
Memory Cycles/Hour         0[   0]     [    ]     [    ]
    Disc I/O
Pause                     .0[ 1.2]     [    ]     [    ] Reflects data loc
Read Hit (%)               0[    ]     [    ]     [  22]
Average Q-Length        1.49[1.46]     [    ]     [    ] Overall average
Disc I/O Rate/Sec          1[   1]     [    ]     [    ] Avg per disc
    Miscellaneous
CM to NM Switches          0[   0]     [    ]     [    ] CPU dependent
NM to CM Switches          1[   1]     [    ]     [    ] CPU dependent

Enter Command:_
```

Figure 8.3 *SOS Pulse Points screen (example)*

By default, the Pulse point thresholds and messages are configured for you. You can edit the SOSADVIC file in order to:

- Add, delete, or reorder the Pulse point indicators (variables) that appear in each section
- Modify the Green (normal), Yellow (problematic), and Red (unacceptable) threshold values
- Modify the comments associated with each Pulse point indicator

Pulse Point Indicator Lines

Example

```
$PP_MEMORY  MEM-MANAGER%  "CPU MM(%)"   4,10   "Reliable indicator"
```

Syntax

```
<section><value-spec><label><yellow-threshold, red-threshold><comment>
```

Configuration Rules

All the comments lines in the file start with a "#". The information for pulse points can be placed anywhere in the SOSADVIC file, but it is currently organized in the front section. All pulse point variables start with "$PP" and are in uppercase. Do not change or delete these variable names; new names must follow the same format.

1 The first line of the SOSADVIC file:

- Specifies the HP 3000 models for which this advice file is valid. If there is no advice specification file, or if the model specified does not match the model on which SOS is being run, SOS will print a warning message and will not display any configured advice messages.
- Is formatted:

  Model xxxxxxxx (to specify a single hardware model)

  or

  Model xxxxxxxx-xxxxxxxx (to specify a range of hardware models)

Example

```
MODEL 900-999999
```

2 The first line is followed by any number of user notification commands, terminated by a blank line. Advice messages are displayed on a terminal screen or in STDLIST in the case of batch. You can also send messages to the console and to individual sessions via the TELLOP and TELL commands, respectively. All selected advice messages will be sent to a list of users and/or the system console. The TELL function is implemented as:

```
TELLOP
```

```
TELL MANAGER.SYS
```

3 Any Pulse points variable that you want to display in the Pulse Points screen must be defined in the SOSADVIC file.

4 The first four specification fields in the Pulse points indicator line must be completed. The <comments> field may be omitted.

5 Commas, spaces, or tabs must separate the specification fields in the Pulse points indicator line to allow for "white space" in the display.

6 Each indicator line must begin with the name of the section in which the variable will appear in the Pulse Points screen. The section name in the <section> field must be preceded by "$PP_". The valid section names are:

• $PP_ CPU	(CPU section)
• $PP_MEMORY	(Memory section)
• $PP_DISC	(Disc I/O section)
• $PP_MISC	(Miscellaneous section)

7 The <value-spec> field is composed of a variable and an (optional) operator in the format:

```
<variable>[<operator><variable>]...[<operator><variable>]
```

Where:

- <variable> is either the SOS variable name being monitored and displayed in the Pulse Points screen, or the SOS variable being used after the operator. A variable name must meet the following qualifications:
    - It must be included in the ITEMLIST file.
    - It must have block numbers 1, 6, 7, 8, 10, 12 or 14.
    - It must have item types less than 1000.
    - Information referenced from block 1 will be averages
- <operator> is either the addition (+) or subtraction (-) function applied to the corresponding variable within the indicator line. White space (achieved by inserting a comma, a space, or a tab) must exist on both sides of the operator within the indicator line.

8 The <label> field is the text that describes the <variable> on the Pulse Points screen. For example, in the indicator line:

```
$PP_MEMORY  MEM-MANAGER%  "CPU MM(%)"  4,10 "Reliable indicator"
```

"CPU MM(%)" is the <label> that describes the <variable>, MEM-MANAGER%.

9 The <yellow-threshold, red-threshold> field follows the <label> field in a Pulse points indicator line. The values entered for the yellow- and red-thresholds should be in the scale or unit appropriate for the <variable>.

- Green

  To display in the Green (normal) column in the Pulse Points screen, the value of the <variable> must be less than the value for the yellow-threshold when the scale is from low to high (the yellow-threshold value is less than the red threshold value). See Example 1 page 50.

  When the scale is from high to low (the yellow-threshold value is greater than the red-threshold value), the value of the <variable> must be greater than the value for the yellow threshold. See Example 2 on page 50.

- Yellow

  To display in the Yellow (problematic) column in the Pulse Points screen, the value of the <variable> must be equal to or greater than the yellow threshold value and less than the red threshold value when the scale is low to high. See Example 1.

  When the scale is from high to low, the <variable> must be equal to or less than the yellow threshold value and greater than the red threshold value. See Example 2.

- Red

  To display in the Red (unacceptable) column in the Pulse Points screen, the value of the <variable> must be equal to or greater than the red threshold value when the scale is set from low to high. See Example 1.

  When the scale is from high to low, the <variable> must be equal to or less than the red threshold value. See Example 2.

Example 1

```
$PP_CPU   HIGH-PRI-BUSY%  "High Pri Busy(%)" 50,85  "AQ+BQ+CQ+Mem+Disp+ICS"
```

The Pulse points for this example indicator line would be interpreted as:

- HIGH-PRI-BUSY% data values less than 50 will appear in the Green column in the Pulse Points screen.
- HIGH-PRI-BUSY% data values equal to or greater than 50 and less than 85 will appear in the Yellow column in the Pulse Points screen.
- HIGH-PRI-BUSY% data values greater than 85 will appear in the Red column in the Pulse Points screen.

Example 2

```
$PP_DISC  READ-HIT%         "Read Hit(%)"          95,80     ""
```

The Pulse points for this second example would be interpreted as:

- READ-RHIT% data values greater than 95 will appear in the Green column in the Pulse Points screen.
- READ-RHIT% data values equal to or less than 95 and greater than 80 will appear in the Yellow column in the Pulse Points screen.
- READ-RHIT% data values less than 80 will appear in the Red column in the Pulse Points screen.

10 The <comment> field (optional) can be used to assist in the interpretation of the Pulse points indicator. Any comments must be enclosed in quotation characters (" "). For example, in the indicator line:

```
$PP_MEMORY  PAGE-FAULT/S  "Page Fault Rate"  10,25 "CPU dependent"
```

The comment, "CPU dependent", tells the user the Page Fault Rate is dependent of the CPU.

HOLIDAYS File

The HOLIDAYS file contains a list of dates that will not be included in historical SOSLOGX data. By default, the file contains exclusion dates for the following holidays in the years1996 through 2010:

- New Year's Day (January 1)
- Presidents' Day (3rd Monday in February)
- Memorial Day (last Monday in May)
- Independence Day (July 4)
- Labor Day (1st Monday in September)
- Veterans' Day (November 11)
- Thanksgiving Day (4th Thursday in November)
- Christmas Day (December 25)

The portion of the HOLIDAYS file that excludes holidays for the year 2001 is provided as an example:

```
! 2001 Holidays

!

01/01/01    New Year’s

02/19/01    President’s Day

05/28/01    Memorial Day

07/04/01    Independence Day

09/03/01    Labor Day

11/11/01    Veteran’s Day

11/23/01    Thanksgiving

12/25/01    Christmas
```

Figure 8.4 *SOS HOLIDAYS configuration file (example)*

The purpose of the HOLIDAYS file is to eliminate atypical computer performance data from the statistical analysis done by SOSLOGX. To add, delete, or modify the contents of this file, use the configuration rules listed below.

Configuration Rules

When you know in advance that computer resources used on particular date will not be typical and don’t want that day’s performance to skew performance statistics, exclude that date from SOSLOGX’s computations by doing the following:

1. Add the date to the HOLIDAYS file.
   a. Use the format MM/DD/YY.
   b. Precede any comment lines with an exclamation character (!).
2. Enable Exclusions in SOSLOGX.
3. Enable Holiday Exclusions in SOSLOGX. See Table 26.7 on page 213.

SOSKIP File

The SOSKIP file contains the configuration information for the KIP (Key Indicators of Performance) line displayed in all SOS screens. For information see “Key Indicators of Performance (KIP) Line” on page 58.

```
# Var_name              row,column,width

TOT-BUSY%               1,12,5

HIGH-PRI-BUSY%          1,30,5

MEM-MANAGER%            1,46,5

READ-HIT%               1,64,3
```

Figure 8.5 *SOSKIP configuration file (example)*

Configuration Rules

The SOSKIP configuration file requires one text line for each data item displayed in the KIP line.

Example

```
TOT-BUSY%               1,12,5
```

Syntax

```
<variable>              row,column,width
```

Where <variable> is the SOS variable name being monitored and displayed in the KIP line.

All SOSKIP variable items:

- Must be found in the ITEMLIST file.
- Must have block numbers: 6,7,8,10,12, or 14.
- Must have item types less than 1000.

Attribute Commands

The following attribute commands can be applied when editing the SOSKIP file. The default setting is $LEFT, $INVERSE, $UNDERLINE.

Table 8.1 *SOS SOSKIP attribution commands*

Command	Description
$TEXT	A required line and $END is a required line. Blank lines are not ignored between $TEXT and $END.

Command	Description
$BLINK	Makes the KIP line flash.
$INVERSE	Displays the KIP line in reverse video.
$UNDERLINE	Underlines the KIP line.
$HALF	Displays the line in half bright mode.
$NORMAL	Displays the line in normal text mode (overrides all previous attribute commands).
$LEFT	Left-justifies text lines.
$RIGHT	Right-justifies text lines.
$CENTER	Centers text lines.

9

SOS GLOBAL SUMMARY

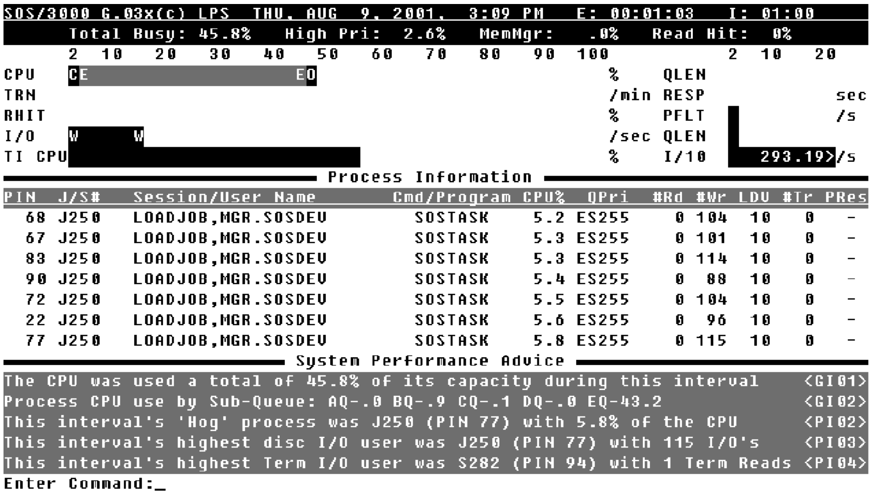
The SOS Global Summary screen is the first screen to display when you start SOS and the usual starting point for any review of system activity and performance. The screen can be displayed in either graphical or tabular format.

To access the Global Summary screen from any SOS display screen:

1. Type **S** from the SOS Enter command prompt to view the Screen Selection Menu.
2. From the Screen Selection Menu, enter **G** (Global Summary).
3. To toggle between the graphical and tabular display formats, press the **G** key again.

Graphical Format

Figure 9.1 shows an example of the Global Summary screen in graphical format.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:09 PM   E: 00:01:03   I: 01:00
      Total Busy: 45.8%   High Pri:  2.6%   MemMgr:   .0%   Read Hit:  0%
      2  10   20   30   40   50   60   70   80   90  100         2  10   20
CPU   CE                    EO                            %    QLEN
TRN                                                       /min RESP            sec
RHIT                                                      %    PFLT            /s
I/O   W      W                                            /sec QLEN
TI CPU                                                    %    I/10     293.19>/s
─────────────────────────── Process Information ──────────────────────────────
PIN  J/S#   Session/User Name        Cmd/Program CPU%  QPri   #Rd #Wr  LDV #Tr PRes
   68 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.2 ES255    0 104  10   0   -
   67 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.3 ES255    0 101  10   0   -
   83 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.3 ES255    0 114  10   0   -
   90 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.4 ES255    0  88  10   0   -
   72 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.5 ES255    0 104  10   0   -
   22 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.6 ES255    0  96  10   0   -
   77 J250   LOADJOB,MGR.SOSDEV        SOSTASK     5.8 ES255    0 115  10   0   -
───────────────────────── System Performance Advice ──────────────────────────
The CPU was used a total of 45.8% of its capacity during this interval    <GI01>
Process CPU use by Sub-Queue: AQ-.0 BQ-.9 CQ-.1 DQ-.0 EQ-43.2             <GI02>
This interval's 'Hog' process was J250 (PIN 77) with 5.8% of the CPU      <PI02>
This interval's highest disc I/O user was J250 (PIN 77) with 115 I/O's    <PI03>
This interval's highest Term I/O user was S282 (PIN 94) with 1 Term Reads <PI04>
Enter Command:_
```

Figure 9.1 *SOS Global Summary screen (graphical format)*

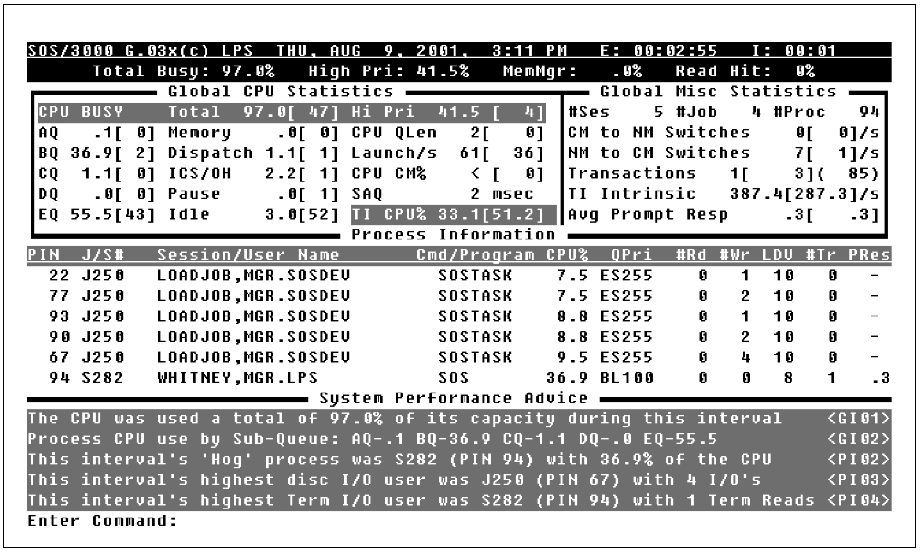
This example screen contains the following information;

- The SOS banner
- The Key Indicators of Performance
- Global statistics
- Process information (optional)
- System Performance Advice (optional)

Each of these features is described in “Global Screen Display Items” on page 57.

Tabular Format

To toggle between the graphical and tabular format options, press the **G** key from the Global Summary screen. Figure 9.2 shows an example of the Global Summary screen in tabular format.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:11 PM   E: 00:02:55   I: 00:01
      Total Busy: 97.0%   High Pri: 41.5%   MemMgr:   .0%   Read Hit:  0%
 ----------- Global CPU Statistics ---------------- Global Misc Statistics ---
|CPU BUSY    Total  97.0[ 47] Hi Pri  41.5 [  4]|#Ses    5 #Job   4 #Proc   94|
|AQ   .1[ 0] Memory    .0[ 0] CPU QLen   2[   0]|CM to NM Switches    0[  0]/s|
|BQ 36.9[ 2] Dispatch 1.1[ 1] Launch/s  61[  36]|NM to CM Switches    7[  1]/s|
|CQ  1.1[ 0] ICS/OH   2.2[ 1] CPU CM%    < [  0]|Transactions    1[    3]( 85)|
|DQ   .0[ 0] Pause     .0[ 1] SAQ         2 msec|TI Intrinsic   387.4[287.3]/s|
|EQ 55.5[43] Idle     3.0[52] TI CPU% 33.1[51.2]|Avg Prompt Resp      .3[   .3]|
 ------------------------------ Process Information --------------------------
PIN  J/S#   Session/User Name         Cmd/Program CPU%  QPri  #Rd #Wr LDV #Tr PRes
  22 J250   LOADJOB,MGR.SOSDEV          SOSTASK    7.5 ES255    0   1  10   0   -
  77 J250   LOADJOB,MGR.SOSDEV          SOSTASK    7.5 ES255    0   2  10   0   -
  93 J250   LOADJOB,MGR.SOSDEV          SOSTASK    8.8 ES255    0   1  10   0   -
  90 J250   LOADJOB,MGR.SOSDEV          SOSTASK    8.8 ES255    0   2  10   0   -
  67 J250   LOADJOB,MGR.SOSDEV          SOSTASK    9.5 ES255    0   4  10   0   -
  94 S282   WHITNEY,MGR.LPS             SOS       36.9 BL100    0   0   8   1  .3
------------------------ System Performance Advice ----------------------------
The CPU was used a total of 97.0% of its capacity during this interval    <GI01>
Process CPU use by Sub-Queue: AQ-.1 BQ-36.9 CQ-1.1 DQ-.0 EQ-55.5          <GI02>
This interval's 'Hog' process was S282 (PIN 94) with 36.9% of the CPU     <PI02>
This interval's highest disc I/O user was J250 (PIN 67) with 4 I/O's      <PI03>
This interval's highest Term I/O user was S282 (PIN 94) with 1 Term Reads <PI04>
Enter Command:
```

Figure 9.2 *SOS Global Summary screen (tabular format)*

The tabular Global Summary screen provides:

- The SOS banner
- The Key Indicators of Performance
- Global CPU Statistics
- Global Misc. Statistics
- Global Memory Statistics (optional, and not displayed in Figure 9.2)

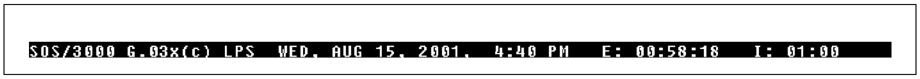
- Global Disc Statistics (optional, and not displayed in Figure 9.2)
- Process Information (optional)
- Process Summary by Application Workloads (optional, and not displayed in Figure 9.2)
- System Performance Advice messages (optional)

Each of these components is described in detail in the next section, "Global Screen Display Items."

Global Screen Display Items

SOS Banner

The SOS banner is always displayed at the top of all SOS data display screens.



```
SOS/3000 G.03x(c) LPS  WED, AUG 15, 2001,  4:40 PM   E: 00:58:18   I: 01:00
```

Figure 9.3 *SOS Global Summary screen: SOS banner*

The SOS banner contains information about the SOS program, the host system, the elapsed interval, and the current interval.

Product Version Number (SOS 3000 V.nnx)

The first item displayed in the SOS banner (reading left to right) is the product version number, SOS 3000.Vnnx). The version number denotes the following about the product:

- SOS 3000 is the name of the product.
- V denotes the major version level.
- nn denotes the minor version level.
- x denotes the fix level.

The SOS version number displayed in the example (refer to Figure 9.3 on page 57) is G.03x. When contacting technical support, please provide the product version number of the software installed on your system.

System Name

The second item displayed in the SOS banner line is the name of the system given during the installation of the operating system. The name of the system used in the example shown in Figure 9.3 is LPS.

Current Date and Time (DDD, MMM DD YYYY, HH:MM)

The third item in the SOS banner line is the current date and time:

- DDD denotes the day of the week.
- MMM denotes the month.
- DD denotes the day of the month.
- YYYY denotes the year.
- HH:MM denotes the hour and minutes.

Elapsed Time (E: HH:MM:SS)

The fourth item displayed in the SOS banner line is the elapsed time (E: HH:MM:SS), which is the time counted in hours, minutes, and seconds that has passed since the current session of SOS Performance Advisor was started.

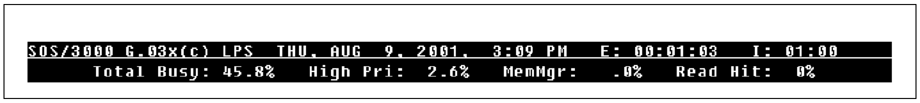
Current Interval (I: MM:SS)

The last item displayed in the banner line is the current interval (I: MM:SS). The current interval is the amount of time in minutes and seconds accumulated since SOS last updated the screen. The measurements reported on any SOS display screen are valid for the current interval.

By default, the interval refresh rate is 60 seconds. The rate can be adjusted from the Main Options menu screen. For further information, refer to “Screen refresh interval in seconds” on page 18.

Key Indicators of Performance (KIP) Line

The Key Indicators of Performance (KIP) line can be displayed just below the SOS banner.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:09 PM   E: 00:01:03   I: 01:00
        Total Busy: 45.8%   High Pri:  2.6%   MemMgr:   .0%   Read Hit:  0%
```

Figure 9.4 *SOS Global Summary screen: Key Indicators of Performance (KIP) line*

The purpose of the KIP line is to display statistics associated with the primary indicators of performance for the current interval—by default, Total (CPU) Busy, High Pri, MemMgr, and Read Hit data (described below). To configure the KIP line, follow the instructions in “Display Key Indicators of Performance” on page 18.

Table 9.1 *SOS Global Summary screen: Key Indicators of Performance (KIP) line data*

Data Item	Description
Total Busy	The percentage of time the CPU spent executing all processes during the current interval.
High Pri	The percentage of time the CPU spent executing high priority processes during the current interval.
MemMgr	The percentage of time the CPU spent managing memory.
Read Hit	The read hit percentage for the current interval.

NOTE By editing the SOSKIP.PUB.LPS file you can redefine the variables to display in the KIP line. For information about editing the SOSKIP file, see "SOSKIP File" on page 52.

Global Statistics (graphical format)

On the graphical version of the Global Summary screen, the Global Statistics block contains system-wide CPU, memory, and disc data The graphical format uses a bar graph to display data either in percentages or total numbers. Each block displayed reflects a value of 2 or 2%. Disc I/O queue length statistics is measured as 0.2.

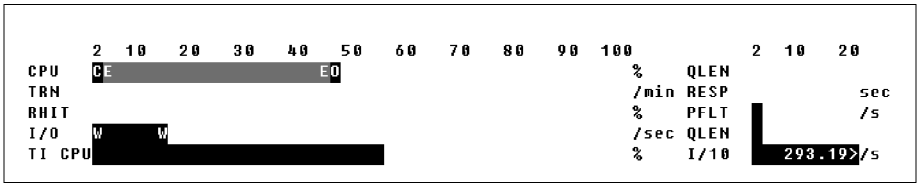


Figure 9.5 *SOS Global Summary screen (graphical format): Global Statistics*

The graphical format is easier to read than the tabular display (see "Tabular Format" on page 56) but contains less detailed information.

Table 9.2 *SOS Global Summary screen (graphical format): Global Statistics*

Data Item	Description
CPU%	The percentage of CPU resource used in the major CPU states. The letter codes are described in Table 9.3 on page 61. Space between the end of the video bar and the percent sign (%) denotes the percentage of time the CPU was idle.
TRN/min	The estimated number of terminal reads per minute (roughly equivalent to user transactions) based on the number of actual terminal reads performed during the current interval.
RHIT%	The percentage of time data requests are satisfied in main memory, without having to perform a disk I/O.
IO/sec	The total number of disc I/Os performed on all disc devices, broken down into reads (R) and writes (W). For a detailed explanation of these statistics, see “Disc Data Items” on page 72.
TI CPU%	The percentage of utilized CPU resource that is dedicated to performing DBI calls (successful or not) by all processes. If option 16 in the SOS Main Option Screen is not set to Y (yes), then this statistic will not be displayed. See “SOS TurboIMAGE Database Main” on page 155 for more information on TurboIMAGE statistics.
QLEN	The average number of processes waiting to use the CPU during this interval. See “CPU QLen nn[nn]” on page 64 for a detailed explanation of this statistic.
RESP sec	The average global user prompt response time for terminal transactions. It is the time elapsed from when C/R or ENTER is pressed to the time the user receives a prompt.
PFLT/s	The number of memory page faults that occur per second. This indicates whether or not there is enough memory. See “Memory Data Items” on page 69.
QLEN	The average number of disk I/O requests pending for all disc drives combined during the current interval. Each character position in the bar represents an average queue length of 0.2 requests. See “Disc Data Items” on page 72.

Data Item	Description
I/10/sec	The number of DBI calls (intrinsics) performed by all processors per second, divided by 10. See “SOS TurboIMAGE Database Main” on page 155.

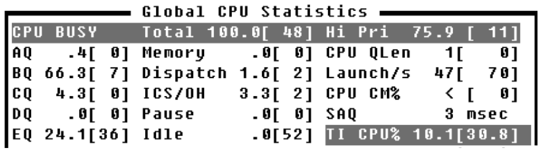
Table 9.3 *SOS Global Summary: CPU states*

Letter	Description
A,B,C,D,E	These letters indicate how much CPU time for the current interval is used to execute user and system code on behalf of those processes running in each respective scheduling queue. This is the time the CPU works constructively on our behalf as opposed to performing overhead tasks. MPE/iX system processes usually run in the A and B queues. The C queue is typically reserved for interactive user processes. Batch jobs usually run in the D and E queues. See “AQ, BQ, CQ, DQ, EQ nn.n[nn]” on page 62.
M	The percentage of CPU resource spent on managing main memory. See “Memory nn.n[nn]” on page 63.
O	The percentage of time the CPU spends scheduling and dispatching processes and dealing with external device activity. See “ICS/OH nn.n[nn]” on page 63.
P	The percentage of time the CPU was waiting for disc I/Os to complete. See “Pause nn.n[nn]” on page 63.

Global CPU Statistics (tabular format)

On the Global Summary screen, the first main section of data is the Global CPU Statistics. This block of data contains system-wide CPU, memory, and disc statistics.

The Global Statistics block can be toggled between graphical and tabular display formats by pressing the **G** key while on the Global Screen. The tabular format may also be obtained by setting option 5 (Display Option) in the Main Options menu to **2 - Tabular**.



```
                    Global CPU Statistics
CPU BUSY     Total 100.0[ 48] Hi Pri   75.9 [ 11]
AQ    .4[ 0] Memory     .0[ 0] CPU QLen    1[   0]
BQ 66.3[ 7] Dispatch 1.6[ 2] Launch/s  47[  70]
CQ  4.3[ 0] ICS/OH   3.3[ 2] CPU CM%    < [   0]
DQ    .0[ 0] Pause      .0[ 0] SAQ          3 msec
EQ 24.1[36] Idle       .0[52] TI CPU% 10.1[30.8]
```

Figure 9.6 *SOS Global Summary screen (tabular format): Global CPU Statistics*

Total: nnn.n[nnn]

The Total value displayed is the sum of CPU BUSY percentages for all queues, memory, dispatch, and ICS/OH.

Performance Tip

> If this number consistently exceeds 85%, and the majority of this time is consumed by interactive user processing, it is possible that the CPU is creating a bottleneck on the system. It is important to gather this data over a period of time and not base a diagnosis on any single spike of activity. If the majority of this value is due to batch activity, this usually implies there is ample CPU capacity for interactive users.

Hi Pri nnn.n[nnn]

This is the percentage of CPU time spent on a combination of AQ, BQ, CQ, Memory, Dispatcher, and ICS/OH processes.

Performance Tip

> It is generally understood that measuring the high priority busy time is a better indicator of CPU saturation that total busy. If Hi Pri processes are consistently using 65% or more of the CPU's time, the CPU may be near saturation levels, as this would leave very little bandwidth for critical batch processes or expected growth to the processes or users on the system.

AQ, BQ, CQ, DQ, EQ nn.n[nn]

These statistics indicate how much CPU time is spent executing user and system program codes within the respective scheduling queues. These statistics do not include time spent managing main memory, dispatching processes, or executing other overhead activity.

Performance Tip

> If the sum of these percentages (particularly AQ, BQ, and CQ) are very large and there is little to no time spent in any active or paused states, it is possible that one or more processes are experiencing difficulties completing, such as a looping condition. The offending process(es) should be identified by finding the highest CPU user (use the HOG PROC ZOOM key for this). If the sum of these numbers is very low and other active or passive statistics are very high, then an overhead task may be consuming the CPU and should be researched further. A low number in these process states counters (when other busy and paused counters are low) means that there is plenty of CPU capacity available for more processing (batch or interactive). It is important to note the spread of CPU in various queues. The AQ and BQ should have a very low percentage of the CPU, except for brief spikes. It is best to see that CQ, DQ, and EQ obtain the majority of the CPU because other activities typically represent overhead activity, thus unproductive, tasks.

Memory nn.n[nn]

This figure represents how much CPU time is spent handling memory page activity. This counter includes time spent on memory allocations for user processes that cannot be launched (obtain the CPU) until necessary segments are present in memory.

Performance Tip

A slight memory load is indicated by memory manager percentages of between 5-8%. Problematic percentages are between 8-12%, and unacceptable readings are 12% and higher. These are simply rough guidelines, and should be taken into consideration with other memory and disc pulse point indicators. See "SOS Memory Detail" on page 113 for more information on memory. The memory manager percentage tends to be more reliable on MPE/iX systems than on MPE V systems.

Dispatch nn.n[nn]

This statistic represents the amount of time the CPU spends on scheduling and dispatching processes.

Performance Tip

If this value rises above 8%, it may mean that MPE/iX is spending an inordinate amount of time dealing with process launch and process stop activity. Correlate this figure with Launch/s, Individual Stop Detail, and Global Stops Detail to gain more insight as to why this is happening. If this figure becomes excessive, response times may increase.

ICS/OH nn.n[nn]

This statistic represents the time the CPU spends dealing with external device activity. Pressing RETURN or ENTER to get an MPE/iX prompt is one such interrupt. Time spent handling disc I/O completions are also included here. Interrupt Control Stack (ICS) requires service time by the CPU.

Performance Tip

If this value rises above 8%, it may mean that MPE/iX is spending too much time on the DT subsystem, disc, or other datacomm interrupt activity. Locating processes guilty of excessive terminal reads (DTC activity) or processes with large numbers of disc I/Os will be helpful. A small ICS/OH value is desirable.

Pause nn.n[nn]

This statistic reveals the percentage of time the CPU spends waiting for disc I/Os to complete. This event is essentially a roadblock for further activity to take place, as no other functions can occur during this waiting period. This is time in which processes could have had work performed on their behalf, but could not because of the relative slowness of the disc drives in performing an I/O.

Performance Tip

A large pause percentage indicates that the CPU could have been busier, but because data was not found in main memory, the CPU had to wait on a disc I/O request and was not able to continue processing requests. If the pause percentage exceeds 10%, it may indicate either a disc I/O bottleneck or an inadequate memory configuration. It is best to correlate high pause readings with other memory and disc indicators to identify the true cause of the bottleneck.

Idle nn.n[nn]

If the CPU is not actively working on processes and not waiting for any disc I/Os to complete, it is considered to be in an idle state. Simply stated, this is leftover CPU bandwidth.

Performance Tip

If a system has a consistently high amount of idle time, it is not being used to its full potential. While it is not desirable to overload the processor, having a system that is too powerful for the processing that is required of it is not cost-effective. If idle time is very low due to a large amount of batch activity, then the system has bandwidth available for batch or interactive growth. However, if the idle time is very low due to mostly interactive processing, then the system may be overloaded. Reducing processes, balancing processes to off-shift or low-use hours, or upgrading the processor will help reduce the load on the system during peak utilization hours.

CPU QLen nn[nn]

This statistic represents the average number of processes that are waiting for service from the CPU.

Performance Tip

A CPU queue length is like going to the bank. If, when you walk in, a teller is immediately available, there is no line (queue), and you are serviced immediately. If there is only one teller available, however, and three people walked in ahead of you, the teller would help the first person to walk in, and you'd be standing in a line of three people. If, however, there are four tellers available, all four customers could be immediately served. An efficient bank teller will process transactions quickly, so that even as customers filter in to the bank, the line is always kept to a minimum.

A consistently large CPU queue length indicates a CPU bottleneck. This could be caused by an inadequate model or fewer processors than necessitated by the amount of processing. It could also be caused by a very high job limit or too many jobs scheduled to start up concurrently. Ideally, this number will always be under five, but may reach as high as 10 during moderate to heavy processing. A consistent reading of 10 or higher should be investigated and addressed.

Launch/s nn[nn]

A process launch occurs when a process gains exclusive access to the CPU. When that process has to stop for an event, (a disc I/O is most common) it relinquishes the CPU and another process is launched instead. The launch rate indicates the amount of CPU sharing that is taking place on the system. If a single process is launched many times, it is included in this number.

Performance Tip

A high launch rate should be evaluated to find out why processes are giving up the CPU so often. If processes are waiting on certain events, (memory, disc I/O, etc.) it is possible that not enough resources are available to adequately service all requests. The Extended Process section (Wait Heading or Wait States) will further explain why processes are having to share the CPU so often. The Global Stops screen is helpful because the Process Launches will be roughly equivalent to the number of Process Stops. The ideal situation is that a process never has to give up the CPU and is processed to completion unhindered. Acceptable numbers of process launches are dependent upon the size of the processor.

CPU CM%

This statistic represents the average amount of time the CPU spends in Compatibility Mode program code.

Performance Tip

This number can assist with optimizing performance from an MPE V migration. It is important to have as many programs as possible compiled in Native Mode to take full advantage of the Hewlett-Packard Precision Architecture (HP-PA - also known as RISC). The time the CPU spends in Compatibility Mode represents wasted time because code translations must take place. If the programs are compiled with a native language compiler, the translation is done once for all programs at compile time. There may not be a right or wrong value for this indicator on your system. The ability to go "native" is often dependent upon third-party software. If a third-party vendor has not made the switch from MPE V to MPE/iX, then you must remain in Compatibility Mode. This means a performance compromise. It is best to target a value of less than 20%.

SAQ

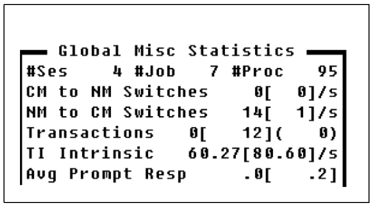
This is the System Average Quantum. This is similar to the ASTT (Average Short Transaction Time) on MPE V systems. It is an ongoing average of the amount of CPU used by transactions and is considered to be short in nature. It includes the last 100 or so terminal transactions the system has tracked. This number is a valuable indicator of the type of activity taking place in the CS scheduling queue. For example, if the SAQ is 11 milliseconds, (extremely small) this means the amount of CPU time used by interactive processes to accomplish their transactions was very low.

TI CPU% nn.n[nn.n]

This is the percentage of utilized CPU resource that is being dedicated for all DBI calls performed on the system by all processes on any database.

Global Misc Statistics (tabular format)

The Global Misc Statistics portion of the tabular global screen provides statistics to further analyze the condition of your system. These statistics, while often helping to indicate a bottleneck in any of the three main components of the system, (CPU, memory, and disc) are not directly related to any of them, and so fall into their own "miscellaneous" category. See Table 9.4 for details on these data items.



```
  Global Misc Statistics
#Ses     4 #Job    7 #Proc    95
CM to NM Switches     0[   0]/s
NM to CM Switches    14[   1]/s
Transactions    0[    12](    0)
TI Intrinsic    60.27[80.60]/s
Avg Prompt Resp      .0[    .2]
```

Figure 9.7 *Global Summary screen (tabular format): Global Misc Statistics*

Miscellaneous Display Options

The Miscellaneous Statistics are, by default, displayed on the Global Tabular screen. To suppress the display of Miscellaneous Statistics:

1. Press **O** from the Global Summary screen to access the SOS Main Options menu.
2. Select option 5 - Display option.
3. Type 3. This will suppress the Display option. Press Enter.
4. Press Enter again and type **Y** if you want to save these options permanently, or press Enter again to exit the options without saving.

Miscellaneous Data Items

Table 9.4 *SOS Global Summary screen (tabular format): Global Misc Statistics*

Data Item	Description
#Ses	The number of sessions logged on to the system during the current interval.
#Job	The number of batch jobs logged on to the system during the current interval.
#Proc	The number of processes present during the current interval. One job or session may spawn several processes. MPE/iX requires many processes for normal operation.

Data Item	Description
CM to NM Switches/sec	These values represent the number of Compatibility Mode to Native Mode switches performed per second for the current interval, as well as cumulatively. ***Performance Tip*** A CM to NM switch occurs when a piece of code that is executed reverts from Compatibility Mode to Native Mode. This operation is not as expensive to perform as is NM to CM switching. Depending on the system size, more than 200 per second can be sustained without being an excessive overhead drain on the CPU.
NM to CM Switches/sec	These values represent the number of Native Mode to Compatibility Mode switches performed per second during the current interval, as well as cumulatively. ***Performance Tip*** An NM to CM switch occurs when a piece of code that is executed reverts from Native Mode to Compatibility Mode. This operation is quite expensive to perform and should be minimized. Depending on the system size, more than 50 per second may indicate an overhead drain on the CPU. It is best to "go native" whenever possible. However, this can cause an increased dependency on the application design.
Transactions	This line contains three statistics regarding terminal reads. The first value is the number of terminal reads performed by all interactive terminal users for the current interval. The second value (within brackets) is the total number of terminal reads performed since SOS/3000 was initially started. The third value (within parentheses) is the estimated number of terminal reads per minute based on the current interval’s workload. ***Performance Tip*** It is essential to understand MPE/iX’s definition of a terminal read. A terminal read occurs any time a terminal receives input from a user (C/R or ENTER). The true number of transactions, as we define transactions, is likely to be less than what is reported on this line by SOS. If you are using Character Mode and your application defines a transaction as being delimited by a single carriage return, these numbers will represent interactive activity. VPLUS applications will have accurate transaction counts.

Data Item	Description
TI Intrinsic/s	The average number of DBI calls performed on the system by all processes. The value outside the brackets is the number of DBI calls processed per second during the current interval. The value inside the brackets is the number of DBI calls performed per second since SOS was started.
Avg Prompt Resp	The average system response time for all processes that execute terminal reads. It is the time it takes from when a user presses C/R or ENTER to when the user is supplied a new prompt. Current and cumulative values are displayed. This value includes both Command Interpreter and Application Process response times. Average response time will not be displayed if the option to collect process information is turned off (option 8 in the SOS Main Option menu).

Performance Tip

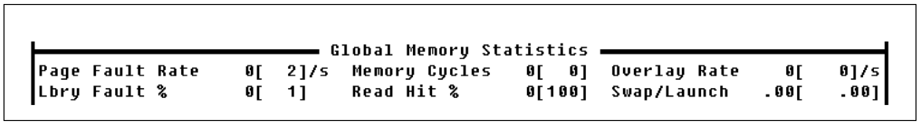
There are some important things to consider when evaluating average response times. First, applications that perform multiple Character Mode terminal reads to issue a single user transaction will have varied response times reported. For example, is a user enters data into 20 fields on a screen, and then presses a final RETURN, this is considered to be a single transaction by the user. However, MPE/iX counts 21 terminal reads, and SOS will report 21 transactions, 20 for the fields and 1 for the carriage return.

Second, Command Interpreter times are included in these numbers. When a user or job logs on, a process called Command Interpreter (CI) is created by MPE/iX on behalf of that user. This process communicates with the user at the terminal by means of the MPE/iX prompt. When a program such as EDITOR.PUB.SYS is started, another processes is created. The response time of the CI process envelops the second process. so that when you look at the process's response time at the process level, it will probably be very large. It is not usually a helpful number when a significant number of CI processes are included. Basically, any process that creates a son process that performs terminal I/Os will have its response time elevated by the son's total time.

Finally, notice that this value is especially important if users perform a great deal of on-line terminal reporting. Charting this value, especially when contrasted with terminal reads, will provide insight into what kind of response times the users are actually experiencing.

Global Memory Statistics (tabular format)

The Global Memory Statistics section of the Global Screen focuses on indicators that are primarily memory related. To view specific memory statistics, refer to the "SOS Memory Detail" screen.



```
 ─────────────────────────────── Global Memory Statistics ──────────────────────────────
|Page Fault Rate     0[   2]/s  Memory Cycles     0[   0]  Overlay Rate     0[    0]/s|
|Lbry Fault %        0[   1]    Read Hit %        0[100]  Swap/Launch    .00[    .00]|
```

Figure 9.8 *SOS Global Summary screen (tabular format): Global Memory Statistics*

Memory Display Options

To display or suppress the Global Memory Statistics in the Global screen, enable or disable option 6 - "Display memory information on global screen"- in the SOS Main Options Menu screen.

Memory Data Items

The data items presented in the Global Memory Statistics portion of the Global screen are described in Table 9.5.

Table 9.5 *SOS Global Summary screen (tabular format): Global Memory Statistics*

Data Item	Description
Page Fault Rate	The current and cumulative number of times per second that memory page faulting occurs. A page fault occurs when a process needs a memory object (code or data) that is absent from main memory. Acceptable ranges depend on system size. See Table 9.6.
Lbry Fault %	The percentage of all page faults that occurred because system libraries were not present in memory (XL.PUB.SYS, NL.PUB.SYS, SL.PUB.SYS). A system library page fault is counted when a process needs code from a library that is absent from main memory. ***Performance Tip*** An consistent value of more than 10% of page faults due to library faults can indicate memory shortage or an inappropriate demand on memory.

Data Item	Description
Memory Cycles	The number of times the memory manager cycles through main memory looking for adequate space to satisfy requests for memory, during the current interval and cumulatively. A large number indicates that the requests for memory are not being satisfied efficiently. A low number implies that there is adequate memory. If this value is blank or zero, (0) that means that the clock was not active during this interval. This is the best possible situation.
Read Hit %	The percentage of time that requests for data or code were satisfied in main memory without having to resort to a disc I/O. While this indicator reflects memory efficiency, read hit percentage also can reveal disc bottlenecks. ***Performance Tip*** A high percentage is desirable. See "SOS/3000 Pulse Points" on page 263.
Overlay Rate	The number of memory overlay candidates occurring per second. An overlay candidate is a memory object that is flagged as temporarily non-essential and subject to being overwritten in order to allow higher priority processes to be attended to. ***Performance Tip*** A low rate is desirable. For instance, a poorly sized Image Master Set can lead to poor distribution of records in the Set. The records may be bunched together leaving large areas of unused space in the file. Consequently, a large overlay rate may reflect on this problem, since pages of data brought into memory may come from these areas of blank pages and are immediately marked as overlay candidates.
Swap/Launch	The ratio of swap-ins to the number of launches during the current interval. ***Performance Tip*** A large ratio means that for every time a process gained access to the CPU, necessary segments were not present in main memory, thus disabling the process. A consistent number that is higher than 0.5 could indicate a possible memory shortage. Correlate this value with other memory indicators to determine if this is the case.

Table 9.6 *Page Fault Rates*

Performance Indicator	Performance Ranges		
	Normal	**Problematic**	**Unacceptable**
Page Faults/second			
Small, single processor HP 3000 series models 920, 922, 925, 932, 935	less than 4	4 to 8	greater than 8
Medium, max. 2-way HP 3000 series models 917, 927, 937, 947, 918, 928, 929, 939, 949	less than 8	8 to 12	greater than 12
Moderate, max. 2-way HP 3000 series models 950, 955, 957, 967, 977, 987, 960, 968	less than 13	13 to 19	greater than 19
Large, max. 2-way HP 3000 series models 959, 978, 980, 988, 990	less than 20	20 to 40	greater than 40
Larger, max. 4-way HP 3000 series models 959, 969, 979, 989, 992, 995, 996, 997	less than 40	40 to 60	greater than 60
Even larger max. 6-way HP 3000 series models 969, 979, 989, 992, 995, 996, 997	less than 100	100 to 150	greater than 150
Very large max. 8-way HP 3000 series models 969, 979, 989, 992, 995, 996, 997	less than 150	150 to 200	greater than 200
Note: Performance ranges for HP 3000 series models 996/900-996/1200 may vary depending upon the application.			

Global Disc Statistics (tabular format)

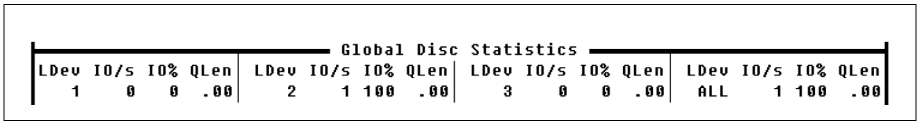
The Global Disk Statistics portion of the tabular Global Screen presents statistics for each configured disc drive on the system. This information addresses the following issues:

- How balanced are the I/Os across the discs?
- Is one disc accessed more frequently than others?
- Are disc I/Os exceeding acceptable limits?

The Global Disc Statistics screen (Figure 9.9) contains the first level of magnification of disc statistics. To access more detailed individual disc information:

1. Press **F7** function key to access the Screen Menu, or press **J** to receive a Screen Selection Prompt.
2. Press **d** (case insensitive) to access the Disc I/O Detail screen.

NOTE In this section, *disc* and *drive* are used interchangeably.



```
|---------------------------------- Global Disc Statistics ---------------------------------|
|LDev IO/s IO% QLen| LDev IO/s IO% QLen| LDev IO/s IO% QLen| LDev IO/s IO% QLen|
|   1    0   0  .00|    2    1 100  .00|    3    0   0  .00|  ALL    1 100  .00|
```

Figure 9.9 *SOS Global Summary screen (tabular format): Global Disc Statistics*

Disc Display Options

To display or suppress the Global Disc Statistics in the Global screen, enable or disable option 7 - "Display disc information on global screen"- in the SOS Main Options Menu screen.

Disc Data Items

The data items presented in the Global Disc Statistics portion of the Global screen are described in Table 9.7.

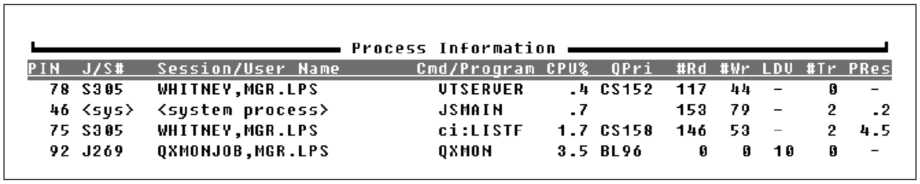
Table 9.7 *SOS Global Summary screen (tabular format): Global Disc Statistics*

Data Item	Description
LDev	The Logical Device (disc) number.

Data Item	Description
IO/s	The total rate of both reads and writes per second to each disc and all discs combined. ***Performance Tip*** A typical single disc drive can sustain I/O rates upward of 25-30 per second. If rates consistently exceed this number, it is possible that a disk I/O exists. The CPU pause for disc I/O values should be investigated and correlated with these readings. If one or more disc drives is consistently sustaining a majority of I/O hits, then balancing files to other less active drives will likely alleviate the bottleneck. Check the Disc I/O Detail screen for cumulative values to gain a long term-view of the situation.
IO%	The percentage of all disc I/Os performed by each drive. ***Performance Tip*** The I/O% statistics are helpful in determining how balanced the I/O distribution is across the drives. A drive that performs a substantially higher percentage of total I/O may contain files that are more actively accessed than files on other discs.
QLen	The average length of the request queue for each disc drive when another request arrives at that disc. See "CPU QLen nn[nn]" on page 64 for a detailed description of queue length. ***Performance Tip*** In terms of queue length, zero (0) is ideal, but is rarely the case on an active system. An average queue length of 1.0 or greater is unacceptable. Keep in mind that brief, substantial increases throughout the day are normal. If one drive has consistently high queue lengths, explore the following possibilities: • There is excessive disc arm movement due to frequently accessed files. These files may depend on each other and are on the same disc drive. Heavily accessed files should be distributed across different drives. • There are database file inefficiencies. Dynamic databases are constantly changing; files are added and deleted, forcing the drive arm to search over the platter to find all the data. Repacking the database may alleviate these issues. • The disc drive itself is too slow for the activity requested of it.

Process Information

After reviewing the general state of the global resources, the next logical step in analyzing a system's performance is to observe individual processes. It is important to find out which users are running which programs, and to determine the resources utilized by those processes. The primary purpose of the Process Information section of the global screen is to identify key resources consumed by various processes on the system. Figure 9.10 represents a sample Process Information section of the Global screen.



```
───────────────────────────── Process Information ──────────────────────────────
PIN  J/S#   Session/User Name       Cmd/Program CPU%  QPri  #Rd #Wr LDV #Tr PRes
  78 S305   WHITNEY,MGR.LPS           VTSERVER    .4 CS152  117  44  -    0   -
  46 <sys>  <system process>          JSMAIN      .7        153  79  -    2   .2
  75 S305   WHITNEY,MGR.LPS           ci:LISTF   1.7 CS158  146  53  -    2  4.5
  92 J269   QXMONJOB,MGR.LPS          QXMON      3.5 BL96     0   0 10    0   -
```

Figure 9.10 *SOS Global Summary screen: Process Information*

The Process Information section displays information about three types of processes:

- System processes.
- Command Interpreter.
- User Processes.

Process Information Display Options

To display or suppress the Process Information in the Global screen, enable or disable option 9 - "Display process information- in the SOS Main Options Menu screen. If other options (advice messages and/or workload information) are also set to Y in the SOS Main Option Menu, all this information not be immediately visible. Scrolling or paging up through the sections may be necessary.

By default, only processes that have used CPU time will be displayed. All processes, whether they have utilized the CPU or not, can be viewed one time. To see all processes:

1. Press the OPTION KEYS function key (F5) from the Main Keys screen.
2. Press the DISP ALL PROCS - 1X function key (F7).

All processes will be listed, although most will not be visible unless the screen is scrolled up.

There are many ways to configure the Process Display section. For further information, please see "Process Display Options" on page 28. Try a variety of display options to see what best suits your performance monitoring needs.

Process Information Data Items

The data items presented in the Process Information portion of the Global screen are described in Table 9.8.

Table 9.8 *SOS Global Summary screen: Process Information*

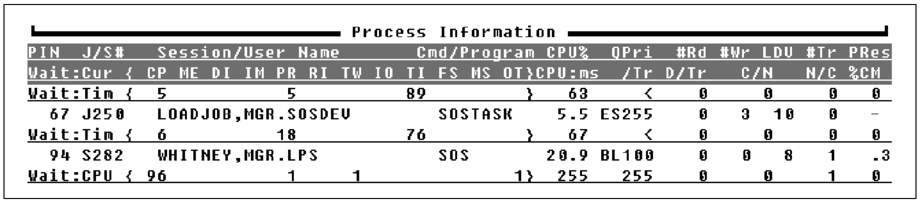
Data Item	Description
PIN	The process identification number that uniquely identifies each process running on the system. These processes can be executed by MPE/iX, a user, or batch job. These unique numbers allow processes to be identified and investigated. A single job or session can have many processes associated with it. In order to see all processes in the Process Tree: 1 Press **UTILITY KEYS (F6)**. 2 Choose **PROCESS TREE (F4)** or **JOB/SESS TREE (F5)**. 3 Enter the PIN number of the process and press Enter.
J/S#	The job or session number of a particular process. If the process is spawned by the system, **<sys>** will appear in this column.
Session/User Name	The logon sequence as initiated by the users or job, minus the logon group. Once again, if the process was spawned by MPE/iX, then **<system process>** will be shown here.
Cmd/Program	This is the program or last MPE/iX command executed by the user. Some system type program names will be uniquely identified, such as "Spooler." If the process is a Command Interpreter process, a **ci:**, followed by the last MPE/iX command issued by the user, will appear in this column. Notice that the actual command will only appear for root level CI processes, and not for subsequent CI processes in the process tree.
CPU%	The amount of CPU resource used by this process during the current interval. If a process uses more than 0%, but less or equal to 0.1%, then this value will be reflected as ".>%." ***Performance Tip*** The highest CPU users (the "Hog") is displayed in the Performance Advice section (see “System Performance Advice” on page 82). If you want to zoom in on the hog process, press HOG PROC ZOOM (F4). If a process is using an inordinate amount of CPU for an extended period of time, it is possible that the process is looping. If a process should be getting CPU time, but isn’t, look at the Wait state (Process Detail screen) to find out why.

Data Item	Description
QPri	This column displays two items of importance. The first is the particular MPE/iX Dispatcher subqueue in which the process is executing. This is displayed with two letters. The first indicates the subqueue, while the second indicates whether the subqueue in linear ("L") or circular ("S"). If a process is in a circular subqueue, the priority can be changed. If it is in a linear subqueue, then the priority is fixed. The second is the absolute priority number that the Dispatcher uses to determine which process will receive CPU attention next. This will be a one, two, or three digit number.
#Rd	The absolute number of logical disc reads (usually not the same as physical) performed by this process during the current interval.
#Wr	The absolute number of logical disc writes (usually not the same as physical) performed by this process during the current interval. ***Performance Tip*** These values are important because they can help identify a process that is performing excessive disc I/O. This number will not usually be the same as the actual number of physical disc reads because data may be pre-fetched, thus eliminating some I/O. The System Performance Advice section will report the high I/O (reads and writes) process for the current interval. When these processes are identified, it must be determined whether these I/Os are necessary or not. Please refer to the Disc I/O and TurboIMAGE chapters of Taming the HP 3000 for a list of areas to explore.
LDV	The logical device number of the device at which the process was created. Batch jobs will have a "-" for the root Command Interpreter process and the rest of the processes in the tree will show the Stream Device number (usually 10). System processes will also display a "-." The LDV column is helpful in tracking down a user whose process exhibits unique traits. You may see an erroneous number here when jobs are in the process of terminating.

Data Item	Description
#Tr	The current number of terminal transactions (possibly equivalent to terminal reads) performed by the process to a particular terminal device. Under certain conditions, this number will represent the actual number of user transactions, (posting a payment, inquiring on an account, etc.). An inaccurate number will be displayed if multiple carriage returns per screen are used for data entry. VPLUS status checks are not counted by the measurement interface (which SOS accesses). Therefore, transaction counts for VPLUS applications will be accurate. The best way to determine if terminal reads and transactions are equivalent is to test them. A user can enter a certain number of transactions as defined from the user’s standpoint and track that activity via SOS to see if there is a discrepancy. ***Performance Tip*** Any high number here (depending on the length of the display interval) should be investigated. Heavy terminal activity can drain the CPU’s attention with non-productive overhead tasks. Sometimes, an application design problem can be identified if a large number of terminal reads occur when very little useful activity is taking place.
PRes	This is the terminal read response time for interactive users. This can be displayed as either Prompt Response time (PRes) or First Response time (FRes) in the Process Display Options submenu. First response time is measured from the time the user pressed C/R or ENTER to the time the first character appears on screen. Prompt response times are measured from the moment a user presses C/R or ENTER to the time when the user is supplied a new prompt. ***Performance Tip*** Excessively high response times should be investigated. It is important to analyze the wait state percentages as shown in the Extended Process Display line, or at the Process Detail screen for the process experiencing excessive response times. If on-line reporting is typical on the system, then prompt response times may be excessive, thus skewing the true system response time. In this case, first response times will be more meaningful for tracking the rate at which the system is sending data back to the user’s terminal.

Extended Process Display

There is an option to display a second line of detail for each process. This is called the Extended Process line and provides more in depth information about each individual process. Figure 9.11 represents a sample Extended Process Information section of the Global screen.



```
|---------------------------- Process Information -----------------------------|
PIN  J/S#   Session/User Name       Cmd/Program CPU%  QPri  #Rd #Wr LDV #Tr PRes
Wait:Cur { CP ME DI IM PR RI TW IO TI FS MS OT}CPU:ms  /Tr D/Tr   C/N   N/C %CM
Wait:Tim {  5           5          89         }   63     <    0     0     0   0
  67 J250   LOADJOB,MGR.SOSDEV        SOSTASK    5.5 ES255    0   3  10   0   -
Wait:Tim {  6          18          76         }   67     <    0     0     0   0
  94 S282   WHITNEY,MGR.LPS           SOS       20.9 BL100    0   0   8   1   .3
Wait:CPU { 96           1     1              1}  255   255    0     0     1   0
```

Figure 9.11 *SOS Global Summary screen: Extended Process Information*

Extended Process Information Display Options

There are two ways to display the Extended Process line.

1. Press the OPTION KEYS function key (F5).
2. Press the EXTENDED PROCESS function key (F5).

OR

1. Press the OPTION KEYS function key (F5).
2. Press the MAIN OPTIONS function key (F1).
3. Type 15 (Detail display options) and press ENTER.
4. Type1 (Process display options) and press ENTER.
5. Type 1 to select the option.
6. Type "**Y**" to enable the extended process line and press ENTER.
7. Press the EXIT OPTIONS function key (F8) to return to the Global screen.

Extended Process Information Data Items

The data items presented in the Process Information portion of the Global screen are described in Table 9.9.

Table 9.9 *SOS Global Summary screen: Extended Process Information*

Data Item	Description
Wait:Cur	The state of the process at the instant that SOS took a sample of the system. When processes are "stuck," this information can help pinpoint why. Keep in mind this wait state indicator is only the first line of defense. If a process is being impeded, the process's wait state breakdown or the Process Detail screen will contain useful information to further analyze the problem. These wait states can also change every few seconds. See "Wait State Description" on page 275. ***Performance Tip*** If a process is always in a particular wait condition, it can indicate resource shortage or possibly a logical program problem (i.e. database locking strategy). For example, if the Mem flag is on for multiple processes, this could indicate a memory shortage.
Wait: {CP,...OT}	This banner represents the wait states in which a process can be spending time. If a process is experiencing eight-second response times, the percentage displayed in these wait state categories represent the various delay or servicing reasons. Ideally, processes would conclude unhindered. However, a process usually encounters several hindrances over the course of its life. These hindrances could include a missing memory segment, disc data, or perhaps prevented access to a TurboIMAGE database. If a particular user's process is receiving poor response times, or a batch job is taking more time to complete than is reasonable, examine these wait states. These can be found on the Extended Process line or in the individual Process Detail screen. Cumulative wait state figures are also provided on the Process Detail screen. See "Wait State Description" on page 275.

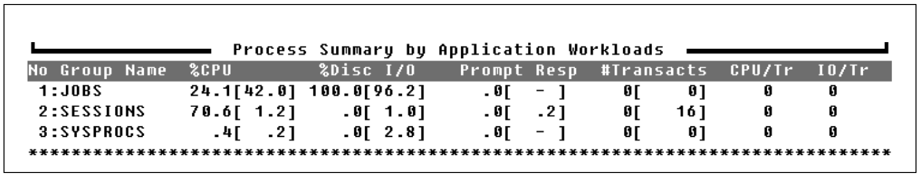
Data Item	Description
CPU:ms	The amount of CPU milliseconds consumed by the process for the current interval. These milliseconds are the time that the process spends at the CPU receiving service. Current means the interval specified by the I:nn:nn on the Banner Line (see “SOS Banner” on page 57). A cumulative total can be found on the Process Detail screen. ***Performance Tip*** If the current value is zero, (0) then the process was not active during the last interval. This number will also display in a quantitative fashion which processes are consuming the most and least CPU resource.
/Tr	The number of CPU milliseconds used by the process per terminal transaction. This will always be blank for batch jobs because batch jobs do not perform terminal transactions. This number is calculated by dividing the total number of terminal transactions into the total amount of CPU used for the current interval. ***Performance Tip*** This statistic reveals which applications are costing the most CPU cycles for each transaction. Keep in mind that the concept of a terminal read versus a user's perception of a transaction may be different.
D/Tr	The number of physical disc I/Os that were performed per user terminal read (Tr). If you have redefined a terminal read to mean a user transaction, then this value will reflect the average number of disc I/Os performed by the process per user transaction. ***Performance Tip*** This statistic reveals which applications are costing the most disc I/Os for each transaction. This value is helpful in capacity planning. By obtaining an average reading of the number of disc I/Os used per transaction over time, "what if" questions like, "How will overall performance be affected if general ledger transactions increase by 40%?" Keep in mind that the concept of a terminal read versus a user's perception of a transaction may be different.
PF/s	The number of page faults per second. A page fault occurs when a needed object (code or data) in not in main memory. A very low number is ideal.

Data Item	Description
C/N	The number of Compatibility Mode to Native Mode switches incurred by the process during the current interval. See Table 9.4 on page 66 for more information.
N/C	The number of Native Mode to Compatibility Mode switches incurred by the process during the current interval. See Table 9.4 on page 66 for more information.
%CM	The average amount of time the CPU spends in Compatibility Mode for this process. See “CPU CM%” on page 65 for more information and performance tips.

Additional information about a process can be viewed in the Process Detail screen, which is discussed in “SOS Process Detail” on page 119.

Process Summary by Application Workloads

SOS Performance Advisor is able to track process statistics by application workloads. Vital performance statistics will be gathered and displayed according to the defined workloads specified in the SOSWKDEF file. Figure 9.12 displays the information contained in the Process Summary by Application Workloads section of the Global screen.



```
                  Process Summary by Application Workloads
No Group Name  %CPU          %Disc I/O     Prompt Resp  #Transacts  CPU/Tr  IO/Tr
 1:JOBS        24.1[42.0] 100.0[96.2]      .0[  - ]      0[     0]      0      0
 2:SESSIONS    70.6[ 1.2]     .0[ 1.0]     .0[  .2]      0[    16]      0      0
 3:SYSPROCS      .4[  .2]     .0[ 2.8]     .0[  - ]      0[     0]      0      0
*********************************************************************************
```

Figure 9.12 *SOS Global Summary screen: Process Summary by Application Workloads*

Workload Display Options

Workload statistics can be displayed by doing the following:

1. Press the OPTION KEYS function key (F5).
2. Press the MAIN MENU function key (F1).
3. Type 10 - "Display workload information." Press Enter.
4. Type **Y** (Yes) and press Enter.
5. By default, all workloads running on the system are included in this process summary. To show only the active workloads, type 11 - "Display only active workloads," and press Enter. You may enter a minimum CPU value (between 0.0 and 100%) by selecting option 12.
6. Type **Y** (Yes) and press Enter.

7 Press Enter again.

8 If you'd like to save these settings permanently, press **Y** again. Otherwise, type **N**.

9 Press Enter to return to the main screen.

Workload Data Items

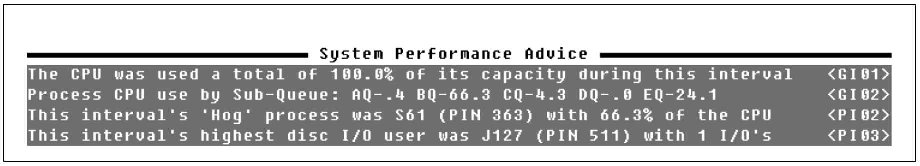
The data items found in the Process Summary by Application Workload portion of the Global screen are listed in Table 9.10.

Table 9.10 *SOS Global Summary screen: Process Summary by Application Workloads*

Data Item	Description
No	The workload numbers in ascending order as they appear in the SOSWKDEF definition file.
Group Name	The name assigned to each workload as it appears in the SOSWKDEF file.
%CPU	The percentage of CPU time used by the workload for the current and cumulative intervals.
%Disc I/O	The percentage of the workload's activity that was spent on disc I/O.
Prompt Resp	The average response time during the current interval and cumulatively.
#Transacts	The number of terminal reads or transactions performed by this workload during the current interval and cumulatively.
CPU/Tr	The CPU milliseconds per transaction.
IO/Tr	Disc I/Os per transaction.

System Performance Advice

These System Performance Advice messages are easy-to-understand "one-liners" designed to help system administrators focus in on potential performance issues.



```
─────────────────────────── System Performance Advice ───────────────────────────
The CPU was used a total of 100.0% of its capacity during this interval   <GI01>
Process CPU use by Sub-Queue: AQ-.4 BQ-66.3 CQ-4.3 DQ-.0 EQ-24.1          <GI02>
This interval's 'Hog' process was S61 (PIN 363) with 66.3% of the CPU     <PI02>
This interval's highest disc I/O user was J127 (PIN 511) with 1 I/O's     <PI03>
```

Figure 9.13 *SOS Global Summary screen: System Performance Advice*

At the end of each advice message is a four character message identification code (for example, <GI01> or <GE09>). The identification code of any standard advice message can be referenced in “Performance Advice Message Catalog” on page 267 to obtain a more detailed explanation of the ascribed event.

Two types of advice messages can be generated: informational and excessive.

- An informational message (denoted by an uppercase I in the message identification code) summarizes a particular aspect of the system’s performance during the current interval.
- An excessive message (denoted by and uppercase E) alerts the user to an excessive condition - a situation or problem that could require immediate action.

To receive more information about a situation described in an advice message, refer to the Global Statistics block or Process Information portions of the Global screen.

System Performance Advice Display Options

To enable System Performance Advice messages, enter **Y** for the Display advice messages option (option 3) in the SOS Main Options Menu screen.

By default, the System Performance Advice messages include both information messages and excessive use messages. To suppress the information messages, enter **N** for the Display information advice messages option (option 4) in the SOS Main Options Menu screen.

System Performance Advice Message Configuration

If there are particular events or information of which you want to be alerted, add to or alter the SOSADVIC file located on the PUB.LPS group/Account (if you used the default installation). For example, to send a message when average CPU utilization exceeds 90%, alter the advice catalog so that necessary personnel will be notified. Instructions are found in “SOSADVIC File” on page 41.

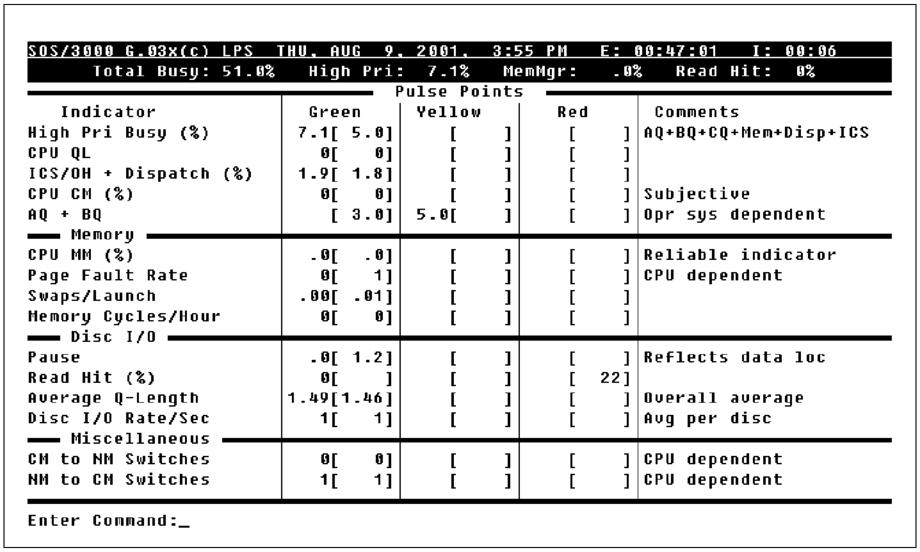
10

SOS PULSE POINTS

The Pulse Points screen displays the current performance levels of key performance indicators. The performance level of each indicator is categorized as acceptable (Green), questionable (Yellow), or unacceptable (Red), based on criteria set in the ppoints configuration file (see “Pulse Points - SOSADVIC File” on page 46).

To access the Pulse Points Screen from any SOS display screen:

1. Type **S** from the SOS Enter command: prompt or press the function key F7 - SCREEN MENU to view the Screen Selection Menu.
2. From the Screen Selection Menu, type **Z** (Pulse Points Screen). An example of this screen is shown in Figure 10.1.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:55 PM   E: 00:47:01   I: 00:06
      Total Busy: 51.0%   High Pri:  7.1%   MemMgr:   .0%   Read Hit:  0%
-------------------------------- Pulse Points ----------------------------------
   Indicator              Green     Yellow         Red        Comments
High Pri Busy (%)       7.1[ 5.0]     [    ]     [    ] AQ+BQ+CQ+Mem+Disp+ICS
CPU QL                    0[   0]     [    ]     [    ]
ICS/OH + Dispatch (%)   1.9[ 1.8]     [    ]     [    ]
CPU CM (%)                0[   0]     [    ]     [    ] Subjective
AQ + BQ                    [ 3.0]  5.0[    ]     [    ] Opr sys dependent
--- Memory ---------------------------------------------------------------------
CPU MM (%)               .0[  .0]     [    ]     [    ] Reliable indicator
Page Fault Rate           0[   1]     [    ]     [    ] CPU dependent
Swaps/Launch            .00[ .01]     [    ]     [    ]
Memory Cycles/Hour        0[   0]     [    ]     [    ]
--- Disc I/O -------------------------------------------------------------------
Pause                    .0[ 1.2]     [    ]     [    ] Reflects data loc
Read Hit (%)              0[    ]     [    ]     [  22]
Average Q-Length       1.49[1.46]     [    ]     [    ] Overall average
Disc I/O Rate/Sec         1[   1]     [    ]     [    ] Avg per disc
--- Miscellaneous --------------------------------------------------------------
CM to NM Switches         0[   0]     [    ]     [    ] CPU dependent
NM to CM Switches         1[   1]     [    ]     [    ] CPU dependent
--------------------------------------------------------------------------------
Enter Command:_
```

Figure 10.1 *SOS Pulse Points screen*

Pulse Points Screen Keys

The Pulse Points Screen keys are listed and explained in Table 10.1.

Table 10.1 *Pulse Points Screen keys*

Key	Usage
Enter	Refresh screen
!	Execute shell commands
:	Execute shell commands
?	Help system
Ctrl+T	Toggle Timer Status
E	Return to Global Summary screen
F	Screen freeze
H	Help system
J	Jump to new screen
L	Print hardcopy
O	Pulse Points Option menu
S	Jump to the Screen Selection screen.
X	Exit
Z	Zero cumulative totals

The Option Subsystem keys are listed and explained in Table 10.2.

Table 10.2 *Option Subsystem keys*

Key	Usage
Enter	Return to previous screen
!	Execute Shell Commands
:	Execute Shell Commands
?	Help System
A	Change all options

Key	Usage
B	Return to previous screen
E	Return to previous screen
H	Help system
L	Print Hardcopy

Pulse Points Screen Column Headings

The column headings for the Pulse Points screen are described in Table 10.3.

Table 10.3 *SOS Pulse Points screen column headings*

Heading	Description
Indicator	The Indicator column in the Pulse Points screen displays the name associated with each pulse point data item.
Green	All pulse point indicator values that are within the range configured as "acceptable" are displayed in the Green column.
Yellow	All pulse point indicator values that are within the range configured as "questionable" are displayed in the Yellow column.
Red	All pulse point indicator values that are within the range configured as "unacceptable" are displayed in the Red column.
Comments	Any comments provided for a pulse point indicator will be displayed in the Comments column.

Pulse Points Screen Display Items

Data items displayed in the Pulse Points screen are described in “SOS/3000 Pulse Points” on page 263. If the meaning of a pulse point indicator is unclear, please refer to the documentation for the indicator’s corresponding SOS screen. For example, for information about the Page Fault indicator, refer to “SOS Memory Detail” on page 113.

The pulse points indicators are configurable. For configuration guidelines, refer to “Pulse Points - SOSADVIC File” on page 46.

11

SOS CURRENT RESOURCE TRENDS

SOS/3000 has five Current Resource Trends screens that allow you to quickly see the trend of key performance areas over the duration of the current SOS/3000 session:

- CPU Utilization Trends screen (Figure 11.1)
- Main Memory Utilization Trends screen (Figure 11.2)
- Disc I/O Utilization Trends screen (Figure 11.3)
- Response and Transaction Trends screen (Figure 11.4)
- Mode Switch Trends screen (Figure 11.5)

Current Resource Trend Screen Keys

Each of the Current Resource Trend Screen key is listed and explained in the following table.

Table 11.1 *Current Resource Trend Screen command keys*

Key	Usage
blank	Refresh screen
B	Beginning data request
C	CPU trend data
D	Disc trend data
E	Return to SOS Global screen
J	Jump to new screen
L	Print hardcopy
M	Memory trend data
S	Jump to the SOS Screen Selection menu.
T	Response trend data
V	Live data request

Key	Usage
W	Mode switches trend data
X	Exit
!	Execute shell commands
:	Execute shell commands
*	Switch function key sets
/	Select time request
}	Scroll backward request
[	Skip forward request
]	Skip backward request

Current Resource Trend Search Keys

From each Current Resource Trend screen, there will be a set of search keys available for navigation.

Table 11.2 *SEARCH KEYS*

Search Key	Description
F1 - SCROLL AHEAD	This key displays the next page of data.
F2 - SCROLL BACK	This key displays the previous page of data.
F3 - SKIP AHEAD	This key produces a prompt for the number of samples to skip. After entering a valid number, that number of samples will be bypassed in a forward direction. The data displayed will be from that point forward.
F4 - SKIP BACK	This key performs like the SKIP AHEAD. When a valid number is entered, that number of samples will be skipped backward. The data displayed will then be from that point forward.
F5 - SELECT TIME	This key prompts for a time at which you want to begin examining data.
F6 - START OF DATA	This key will take you to the first interval available in the Current Trends.
F7 - END OF DATA	This key will take you to the current interval.

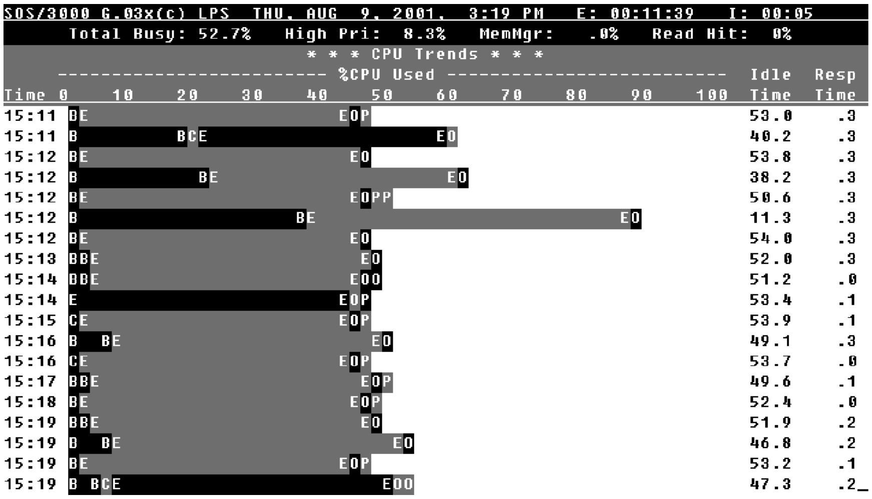
Search Key	Description
F8 - MAIN KEYS	This key will return you to the main keys in the Current Trends screen.

The SOS Resource Trend screen data items are described on the next pages.

CPU Trends Screen

To access the CPU Trends screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu.
2. From the Screen Selection Menu, type **A** (Current Resource Trend Screen). A sample of this screen is shown in Figure 11.1.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:19 PM   E: 00:11:39   I: 00:05
      Total Busy: 52.7%   High Pri:  8.3%   MemMgr:   .0%   Read Hit:  0%
                            * * * CPU Trends * * *
     ------------------------- %CPU Used --------------------------  Idle  Resp
Time 0    10    20    30    40    50    60    70    80    90    100  Time  Time
15:11 BE                       EOP                                   53.0    .3
15:11 B         BCE                     EO                           40.2    .3
15:12 BE                        EO                                   53.8    .3
15:12 B           BE                     EO                          38.2    .3
15:12 BE                        EOPP                                 50.6    .3
15:12 B                    BE                            EO          11.3    .3
15:12 BE                        EO                                   54.0    .3
15:13 BBE                        EO                                  52.0    .3
15:14 BBE                       EOO                                  51.2    .0
15:14 E                        EOP                                   53.4    .1
15:15 CE                       EOP                                   53.9    .1
15:16 B  BE                       EO                                 49.1    .3
15:16 CE                       EOP                                   53.7    .0
15:17 BBE                        EOP                                 49.6    .1
15:18 BE                        EOP                                  52.4    .0
15:19 BBE                        EO                                  51.9    .2
15:19 B  BE                         EO                               46.8    .2
15:19 BE                       EOP                                   53.2    .1
15:19 B BCE                        EOO                               47.3    .2_
```

Figure 11.1 *SOS CPU Trends screen*

The CPU Trends screen presents the following CPU utilization data collected in 10-second time intervals:

- Percentage of CPU utilized
- Percentage of idle time
- Response time in seconds

Each letter-width space on the CPU utilization bar graph represents approximately 2 percent of the CPU's time for the current interval. The code letters correspond to the CPU activities described in Table 11.3 on page 92. Where a block of spaces on the bar graph is bordered by two instances of one code letter (e.g., S...S), that corresponding activity (e.g., executing system calls and code) would account for the CPU% range bordered by the two letters. For example, in the example above, the CPU utilization for 10-second interval beginning 15:11 (the first line) shows:

- Approximately 2 percent of CPU time was spent executing stem processes and carefully placed high priority user processes in the BS queue.
- Approximately 42 percent of the CPU time was spent executing lower priority jobs in the ES queue.
- Approximately 2 percent was spent managing overhead.
- Approximately 2 percent of the time the CPU was paused while waiting for disc I/O.
- 53 percent of the time the CPU was idle.
- Response time for that interval averaged 0.3 seconds.

The code letters used in the CPU utilization bar graph are described in the next table.

Table 11.3 *CPU Trend states or activities*

Code	Statistic	Description
A	AS queue %	The percentage of CPU time spent executing high priority system processes.
B	BS queue %	The percentage of CPU time spent executing both system processes and some high priority user processes.
C	CS queue %	The percentage of CPU time spent executing interactive user processes.
D	DS queue %	The percentage of CPU time spent executing high priority batch jobs.
E	ES queue %	The percentage of CPU time spent executing lower priority jobs.
M	Memory management %	The percentage of CPU time spent managing memory.
O	Overhead %	The percentage of CPU time spent managing overhead (ICS/OH and dispatch).
P	Paused for Disc %	The percentage of time the CPU was paused, waiting for disk I/O.
	Idle %	The space between the end of the bar and the 100% point indicates the percentage of time the CPU was idle.

Code	Statistic	Description
	Resp Time	The average response time for that interval.

Function Keys

The other four Current Resource Trends screens are accessed via function keys at the bottom of the CPU Utilization Trends screen. The function keys under the CPU Utilization Trends screen are shown in the following table.

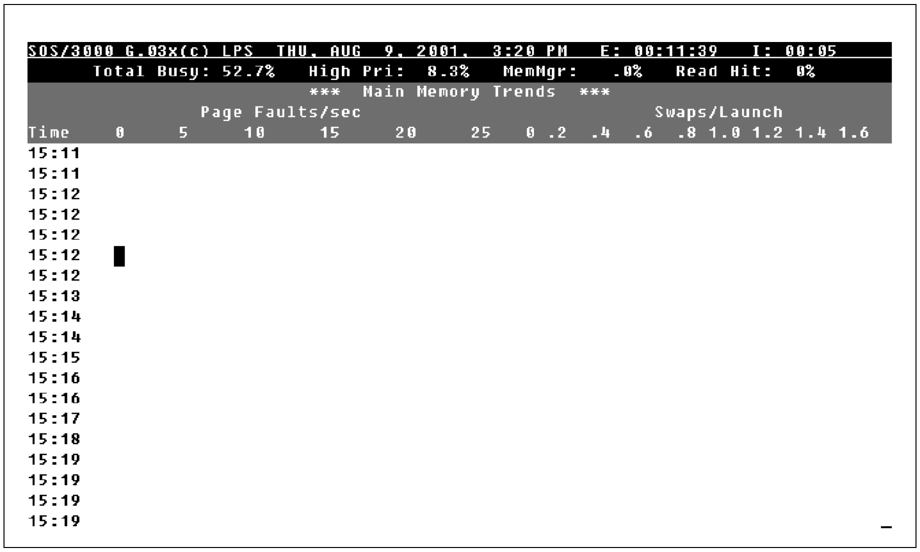
Table 11.4 *CPU Utilization Trends screen function keys*

Key	Description
F1 - LIST HARDCOPY	Prints a hardcopy of the displayed trend report.
F2 - CPU TREND	Displays the CPU Utilization Trends screen (Figure 19.1). This screen reports CPU.
F3 - MEMORY TREND	Displays the Main Memory Utilization Trends screen (Figure 19.2). This screen reports memory clock cycle and swaps per launch ratio.
F4 - DISC TREND	Displays the Disc I/O Utilization Trends screen (Figure 19.3). This screen reports Read and Write disc I/O rate and average disc queue length.
F5 - RESPONSE TREND	Displays the Response and Transaction Trends screen (Figure 19.4). This screen reports Transaction rates per minute.
F6 - MODE SWITCHES	Displays the Mode Switch Trends screen (Figure 19.5). This screen reports NM to CM and CM to NM mode switch rates.
F7 - SEARCH KEYS	Discussed in Table 11.2
F8 - MAIN SCREEN	Return to SOS/3000 main screen.

NOTE When you exit SOS/3000 all of the Currents Trends data will be lost. If you want to review past data, see “SOSLOGX” on page 191.

Main Memory Trends Screen

The Main Memory Trends screen displays statistics pertaining to memory utilization in 10-second time intervals.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:20 PM   E: 00:11:39   I: 00:05
      Total Busy: 52.7%   High Pri:  8.3%   MemMgr:   .0%   Read Hit:  0%
                          ***  Main Memory Trends  ***
                Page Faults/sec                           Swaps/Launch
Time     0     5     10      15     20      25    0 .2  .4  .6  .8 1.0 1.2 1.4 1.6
15:11
15:11
15:12
15:12
15:12
15:12    █
15:12
15:13
15:14
15:14
15:15
15:16
15:16
15:17
15:18
15:19
15:19
15:19
15:19                                                                          _
```

Figure 11.2 *SOS Main Memory Utilization Trends screen*

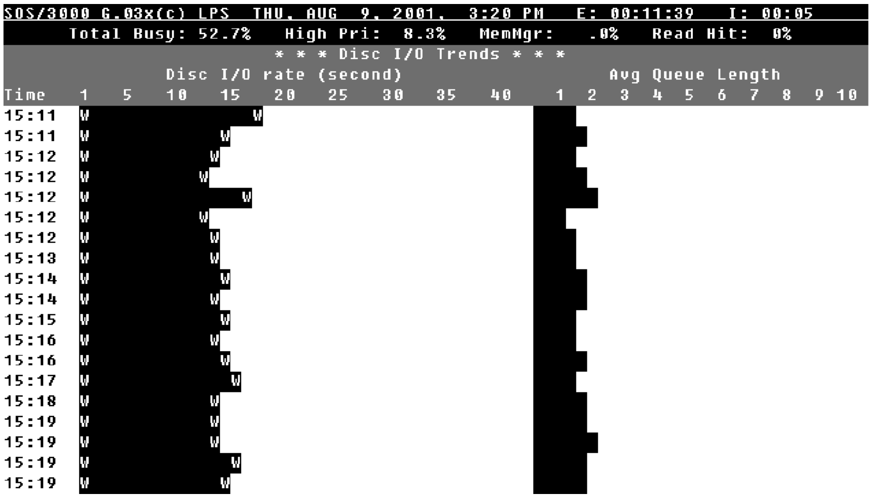
The data items presented in the Main Memory Trends screen are described in Table 11.5.

Table 11.5 *SOS Main Memory Utilization Trends data items*

Data Item	Description
Page Faults/sec	This bar graph shows the average memory page faults per second during the 10-second interval. Each character space in the bar graph represents two page faults per second. If the number exceeds the range of the graph, a greater-than character (>) will display. The page fault rate indicates whether or not there is adequate memory. A low number is desirable.

Data Item	Description
Swaps/Launch	This is the ratio of the number of swap-ins to the number of launches that occurred during the interval. This can also be a good indicator of memory pressure. ***Performance Tip*** A large swaps per launch ratio means that for every time a process came up to bat with the CPU, necessary segments were not present in main memory, and the process was disabled. A ratio consistently greater than.5 indicates a possible memory shortage. Check other memory indicators for confirmation. If your memory is indeed inadequate, you can either reduce the memory load or increase memory hardware.

Disc I/O Utilization Trends Screen



```
SOS/3000 G.03x(c) LPS   THU, AUG  9, 2001,   3:20 PM    E: 00:11:39    I: 00:05
        Total Busy: 52.7%    High Pri:  8.3%    MemMgr:    .0%    Read Hit:  0%
                                 * * * Disc I/O Trends * * *
                    Disc I/O rate (second)                          Avg Queue Length
Time     1    5    10   15   20   25   30   35   40      1  2  3  4  5  6  7  8  9 10
15:11
15:11
15:12
15:12
15:12
15:12
15:12
15:13
15:14
15:14
15:15
15:16
15:16
15:17
15:18
15:19
15:19
15:19
15:19
```

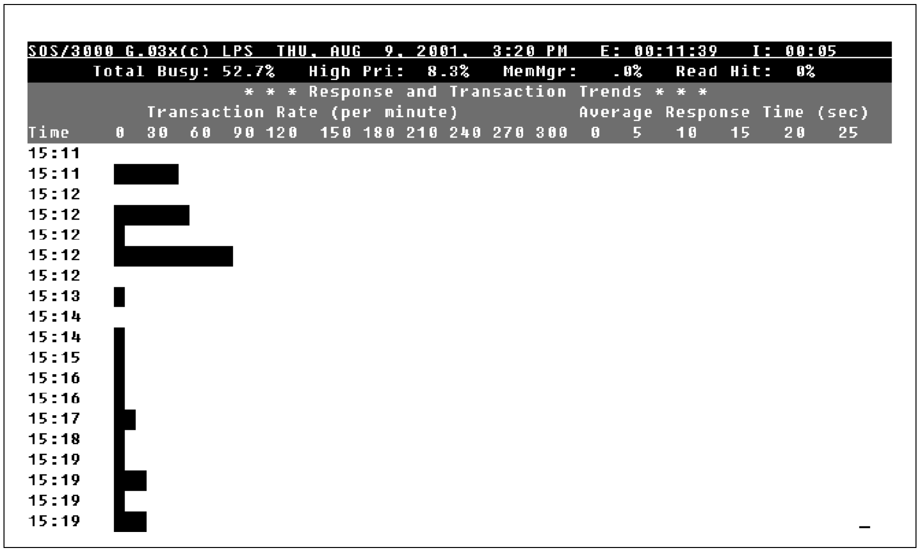
Figure 11.3 *SOS Disc I/O Utilization Trends screen*

The data items presented in the Disc I/O Utilization Trends screen are described in Table 11.6.

Table 11.6 *SOS Disc I/O Utilization Trends data items*

Data Item	Description
Disc I/O rate (second)	A total rate of both reads and writes per second (Rt). These numbers reflect the actual physical transfers between main memory and a particular disc device (Ldv-n).
Avg Queue Length	The average length of the request queue for that particular disc drive when another disc I/O request arrives at that drive.

Response and Transaction Trends Screen



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:20 PM   E: 00:11:39   I: 00:05
         Total Busy: 52.7%   High Pri:  8.3%   MemMgr:   .0%   Read Hit:  0%
                        * * * Response and Transaction Trends * * *
                Transaction Rate (per minute)                Average Response Time (sec)
Time     0  30  60  90 120  150 180 210 240 270 300  0   5   10   15   20   25
15:11
15:11
15:12
15:12
15:12
15:12
15:12
15:13
15:14
15:14
15:15
15:16
15:16
15:17
15:18
15:19
15:19
15:19
15:19
```

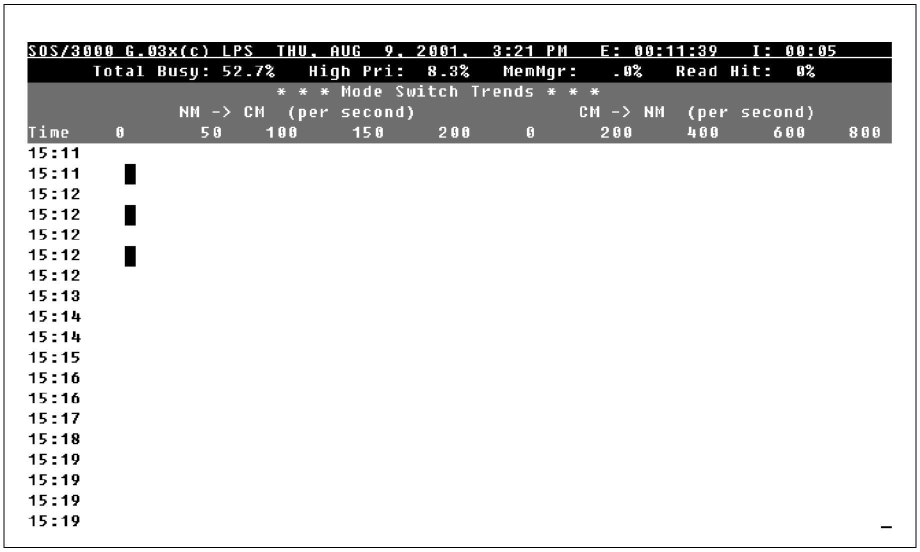
Figure 11.4 *SOS Response and Transaction Trends screen*

The data items presented in the Response and Transaction Trends screen are described in Table 11.7.

Table 11.7 *SOS Response and Transaction Trends data items*

Data Item	Description
Transaction Rate (per minute)	This is an estimated number of terminal reads per minute based on the current interval's workload.
Average Response Time (sec)	This is the average time it takes from pressing the C/R or Enter key to when the user is supplied prompt.

Mode Switch Trends Screen



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:21 PM   E: 00:11:39   I: 00:05
      Total Busy: 52.7%   High Pri:  8.3%   MemMgr:   .0%   Read Hit:  0%
                       * * * Mode Switch Trends * * *
              NM -> CM  (per second)               CM -> NM  (per second)
Time    0       50    100     150     200     0      200     400     600     800
15:11
15:11    █
15:12
15:12    █
15:12
15:12    █
15:12
15:13
15:14
15:14
15:15
15:16
15:16
15:17
15:18
15:19
15:19
15:19
15:19                                                                          _
```

Figure 11.5 *SOS Mode Switch Trends screen*

The data items presented in the Mode Switch Trends screen are described in Table 11.8.

Table 11.8 *SOS Mode Switch Trends data items*

Data Item	Description
NM -> CM (per second)	These numbers represent the number of native mode (NM) to compatibility mode (CM) switches performed per second for the current interval, as well as cumulatively. ***Performance Tip*** A native mode to compatibility mode switch occurs when a piece of code that is executed reverts from native mode language to a translated form (compatibility mode). This operation is quite expensive for the system to perform and should be minimized. Depending on the system size, about 50 per second may indicate an overhead drain on the CPU. It is best to "go native" whenever possible; but, going native can cause an increased dependency on the application design.
CM -> NM (per second)	These numbers represent the number of compatibility mode to native mode switches performed per second for the current interval, as well as cumulatively. ***Performance Tip*** A compatibility mode to native mode switch occurs when a piece of code that is executed reverts from compatibility mode to native mode. This operation is not as expensive to perform as is NM to CM switching. The system can sustain many more without excessive degradation to the system. Depending on the system size, more than about two hundred per second can be sustained without being an excessive overhead drain on the CPU.

General Comments

The default number of the intervals to be displayed for Current Trends is 1440. This number can be raised or lowered via a MAXTRENDS job control word. For example, to set this number to 600, type the following prior to running SOS/3000:

```
:SETJCW MAXTRENDS=600
```

This will reduce the number of stored intervals thereby reducing memory requirements. If you raise this number from the default of 1440, more intervals will be available on-line, but memory requirements will increase.

12

SOS RESPONSE TIME DETAIL

The Response Time screen presents various aspects of Global System Response Times.

To access the Response Time Distribution Screen from the global screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **R** (Response Time Screen). The Response Time Distribution Screen will display.
3. To toggle between a Graphic and Tabular display format press the **G** key or press the F4 function key.

Examples of the Response Time Distribution Screen are provided in “SOS Response Time Distribution screen (graphical format)” on page 100 and “SOS Response Time Distribution screen (tabular format)” on page 101.

Both Prompt and First Responses are provided. Response time is defined as that time from when the Enter key is pressed until the time the user begins entering data. First Response is measured from the time the Enter key is pressed to when the very first character shows up on the screen.

Response Time Screen Keys

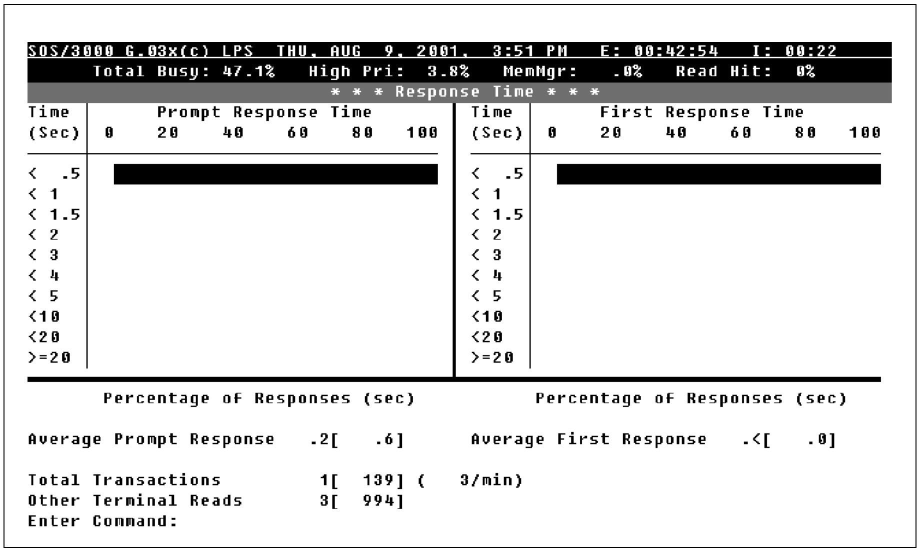
All of the Response Time Screen keys are identical with the keys of the CPU Detail Screen. See “CPU Detail Screen Keys” on page 103 for details.

Response Time Screen Display Items

The Response Time screen can be displayed in both "Graphical Format." and "Tabular Format." Once the Response Time Detail screen is displayed, pressing the F4 function key will toggle the screens between each format.

Graphical Format

Figure 12.1 shows an example of the Response Time Distribution screen in graphical format.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:51 PM   E: 00:42:54   I: 00:22
      Total Busy: 47.1%   High Pri:  3.8%   MemMgr:   .0%   Read Hit:  0%
                               * * * Response Time * * *
Time        Prompt Response Time            Time        First Response Time
(Sec)  0    20     40     60     80    100  (Sec)  0    20     40     60     80    100

<  .5                                       <  .5
< 1                                         < 1
< 1.5                                       < 1.5
< 2                                         < 2
< 3                                         < 3
< 4                                         < 4
< 5                                         < 5
<10                                         <10
<20                                         <20
>=20                                        >=20

       Percentage of Responses (sec)               Percentage of Responses (sec)

Average Prompt Response   .2[   .6]      Average First Response   .<[   .0]

Total Transactions         1[  139] (   3/min)
Other Terminal Reads       3[  994]
Enter Command:
```

Figure 12.1 *SOS Response Time Distribution screen (graphical format)*

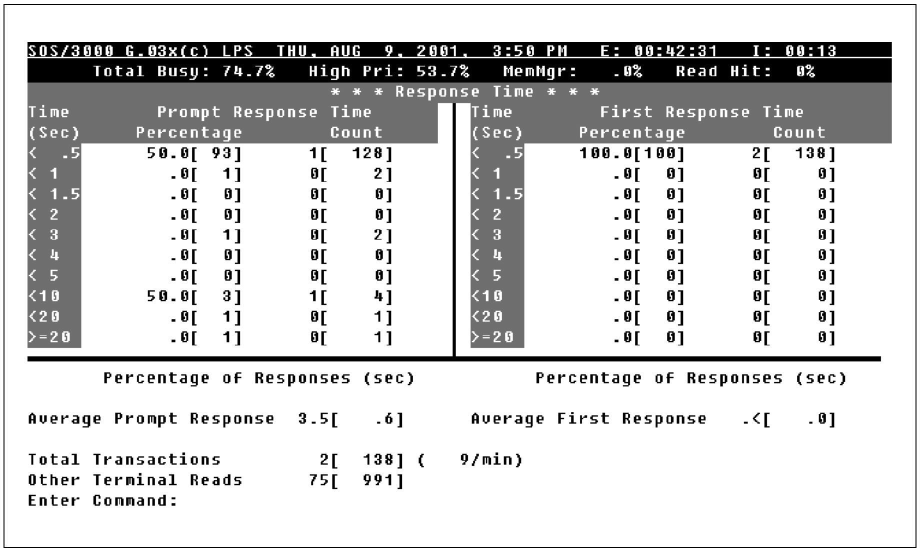
Response Time Distribution (graphical format)

There are three main sections on the Graphic Response Time screen. Prompt Response, First Response and Other data are included on the lower part of the display. The primary purpose of the two upper sections is to inform you of how well overall response time service levels are being met.

The Response Time Distribution data items are described in Table 12.1 on page 101.

Tabular Format

The Tabular screen (Figure 12.2) contains the absolute number of responses (Count) that make up the current set of statistics. The average and cumulative values are also provided on the Tabular screen. These numbers are displayed in brackets ([nnn]). Percentage averages and Count represent values that have been tabulated since SOS/3000 was initiated or since the last time the RESET TOTALS function key was pressed, whichever occurred last.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:50 PM   E: 00:42:31   I: 00:13
      Total Busy: 74.7%   High Pri: 53.7%   MemMgr:   .0%   Read Hit:  0%
                             * * * Response Time * * *
Time        Prompt Response Time          Time        First Response Time
(Sec)     Percentage        Count         (Sec)     Percentage        Count
<  .5      50.0[ 93]      1[   128]      <  .5     100.0[100]    2[   138]
< 1          .0[  1]      0[     2]      < 1           .0[  0]    0[     0]
< 1.5        .0[  0]      0[     0]      < 1.5         .0[  0]    0[     0]
< 2          .0[  0]      0[     0]      < 2           .0[  0]    0[     0]
< 3          .0[  1]      0[     2]      < 3           .0[  0]    0[     0]
< 4          .0[  0]      0[     0]      < 4           .0[  0]    0[     0]
< 5          .0[  0]      0[     0]      < 5           .0[  0]    0[     0]
<10        50.0[  3]      1[     4]      <10           .0[  0]    0[     0]
<20          .0[  1]      0[     1]      <20           .0[  0]    0[     0]
>=20         .0[  1]      0[     1]      >=20          .0[  0]    0[     0]

       Percentage of Responses (sec)           Percentage of Responses (sec)

Average Prompt Response  3.5[   .6]      Average First Response   .<[   .0]

Total Transactions         2[  138] (   9/min)
Other Terminal Reads      75[  991]
Enter Command:
```

Figure 12.2 *SOS Response Time Distribution screen (tabular format)*

Response Time Distribution (tabular format)

The data items in the Response Time Distribution screen are described in the following table.

Table 12.1 *SOS Response Time data items*

Data Item	Description
Time (Sec)	These columns represent a distribution breakdown of terminal responses on a global basis. All terminal activity is taken into consideration. The first row (<.5) shows which percentage of all response times are less than 0.5 seconds. Depending on what your service level objectives are, the percentage in this category will be high for normal terminal activity. In the above example, 50.0 percent of all prompt response times are under 0.5 seconds. The next distribution level (<1) includes responses that were greater than or equal to 0.5 seconds but less than 1.5 seconds, etc.

Data Item	Description
Percentage	This label appears only when the Tabular option is chosen. These values are response proportions spread out over the <.5 through >=20 second categories. These will add up vertically to 100% with a very small rounding error. Both current and cumulative values are given when the tabular option is selected.
Count	This label appears only when the Tabular option is chosen. These numbers represent the actual number (one per user depression of the Enter key) of responses used in the percentage calculations. Both current and cumulative values are given when the Tabular option is selected.
Average Prompt Response	This is the overall Current and Cumulative Prompt Response Time. These values are the same as those on the Main screen in the Global Misc Statistics section. Prompt Response Times will usually be greater than First Response Times. This is because it takes time to paint the screen before a user prompt can be supplied. So, if you have a lot of long screen reporting, you will see large Prompt Response Time values, and small First Response Time values.
Average First Response	This is the overall current and cumulative First Response Time. For reasons explained in the Average Prompt Response section above, the first response tends to better measure how long it takes the computer system to actually perform user transactions. This value is usually smaller than the Prompt Response value.
Total Transaction	These numbers represent the current, cumulative, and rate of terminal reads per minute occurring on the system. A terminal read is defined as being equivalent to a user depression of the Enter key. These values do not include VPLUS status reads or SOS/3000 automatic refresh terminal reads. Other timer-triggered programs are also excluded. The cumulative values are tabulated from the time that SOS/3000 was initiated or from the last time the RESET TOTALS function key was pressed, whichever occurred last.
Other Terminal Reads	These two values represent terminal read activity that is not user-induced. These include session programs that automatically refresh the screen (like SOS/3000) and VPLUS-like programs that perform terminal status reads when the Enter key is not pressed.

13

SOS CPU DETAIL

The information displayed in the CPU Detail Screen reveals the general state of the CPU. This information is similar to that included on the Global Screen, except that it handles multiple CPU's.

To access the CPU Detail screen from the Global Summary screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **C** (CPU Detail Screen). The CPU Detail Screen will display.

Figure 13.1 shows an example of the CPU Detail screen.

CPU Detail Screen Keys

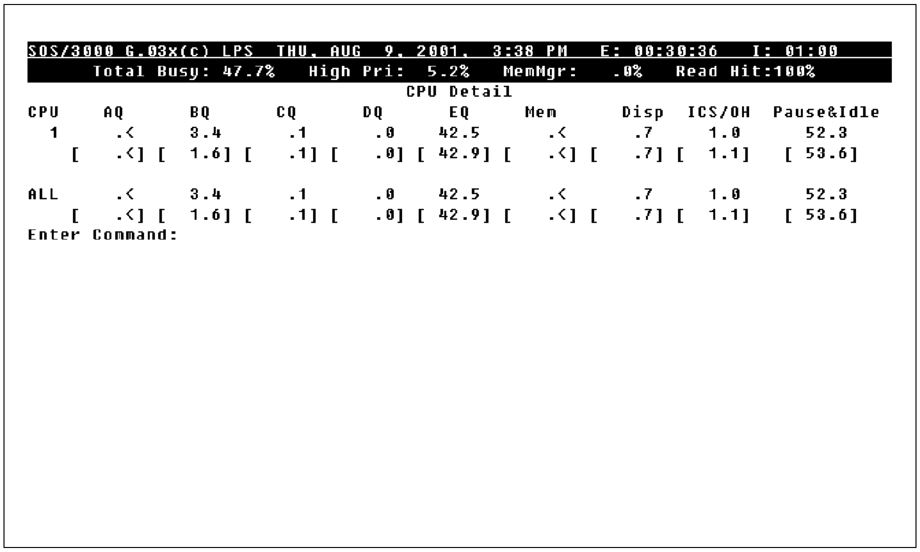
The CPU Detail Screen keys are listed and explained in Table 13.1.

Table 13.1 *CPU Detail Screen keys*

Key	Usage
Enter	Refresh screen
E	Return to Global Summary screen
F	Toggle Screen Freeze
J	Jump to new screen
H	Help System
L	Print Hardcopy
S	Jump to SOS Screen Selection menu
X	Exit SOS
Z	Zero Cumulative Totals
!	Execute Shell Commands
:	Execute Shell Commands

Key	Usage
?	Help System
CTRL T	Toggle Timer Status

CPU Detail Screen Display Items



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:38 PM   E: 00:30:36   I: 01:00
      Total Busy: 47.7%   High Pri:  5.2%   MemMgr:   .0%   Read Hit:100%
                                   CPU Detail
CPU    AQ      BQ      CQ      DQ      EQ     Mem      Disp  ICS/OH  Pause&Idle
  1     .<     3.4      .1      .0    42.5      .<      .7     1.0      52.3
    [   .<] [  1.6] [   .1] [   .0] [ 42.9] [   .<] [   .7] [  1.1]   [ 53.6]

ALL     .<     3.4      .1      .0    42.5      .<      .7     1.0      52.3
    [   .<] [  1.6] [   .1] [   .0] [ 42.9] [   .<] [   .7] [  1.1]   [ 53.6]
Enter Command:
```

Figure 13.1 *SOS CPU Detail screen*

For each CPU you will see the following performance measurements:

AQ, BQ, CQ, DQ, EQ nn.n[nn]

These statistics indicate how much CPU time is spent executing user and system program codes on behalf of processes running in respective scheduling queues. For the current interval, this is the time the CPU works constructively on our behalf as opposed to performing overhead tasks (described later). MPE/iX system process time is usually measured within the AQ and BQ counters. Some user processes might run in the B queue (like SOS/3000). The queue is usually where interactive processes run. The D and E queues are typically where batch jobs run.

Performance Tip

> If the sum of these percentages (particularly AQ, BQ, and CQ) are very large and there is little or no time spent in any active or paused states, it is possible that one or more processes are hung. Perhaps a looping condition exists. The offending process(es)

should be identified by finding the highest CPU user (use the HOG PROC ZOOM key for this). If the sum of these numbers is very low and other active or passive statistics are very high, then an overhead task(s) is consuming the CPU's attention and should be researched further. A low number in these process states counters (when other busy and paused counters are low) means that there is plenty of CPU capacity available for more processing (batch or interactive). It is important to note the spread of CPU in various queues. The AQ and BQ should have very low amounts of CPU utilization, except for brief spikes. It is best to see that CQ, DQ and EQ obtain the majority of CPU because other areas usually represent overhead, thus unproductive tasks.

Mem nn.n[nn]

This statistic represents how much CPU time is spent handling memory page activity. This counter includes time spent on memory allocations for user processes that cannot be launched (obtain the CPU) until necessary segments are present in memory.

Performance Tip

A slight memory load is indicated by a figure of 5-8% in this state, moderate if 8-12%, and heavy if it is greater than 12%. Remember, these are rough guidelines. A "shades of gray" principle applies here. A memory shortage may exist if this number is consistently greater than 5-8% and if other memory shortage indicators are present. See "SOS Memory Detail" on page 113 for more on memory shortage diagnosis. This number tends to be a more reliable indicator of memory shortages on MPE/iX systems than they are on MPE V systems.

Disp nn.n[nn]

This statistic represents the amount of time the CPU spends on scheduling and dispatching processes.

Performance Tip

If this value rises above 8%, it can mean that MPE/iX is spending an inordinate amount of time dealing with process launch and process stop activity. Look at Launch/s (this section), Individual Process Stop Detail (Extended Process or Detailed Process displays), and Global Stops Detail to gain more insight as to why this is happening. This indicator is worth watching. If it becomes excessive, response times can increase.

ICS/OH nn.n[nn]

This statistic represents the time the CPU spends dealing with external device activity. Pressing RETURN to get an MPE/iX prompt is one such interrupt. Time handling disk I/O completions are included here. Interrupt Control Stack activity (ICS) requires service time by the CPU.

Performance Tip

If this value rises above 8%, it can mean that MPE/iX is spending an inordinate amount of time on the DT subsystem, disk, or other datacomm interrupt activity. Locating processes guilty of excessive terminal reads (DTC activity) or processes with large numbers of disk I/O's will be helpful. A small value is desirable here.

Pause&Idle nn.n[nn]

This statistic reveals the percentage of time the CPU spends waiting for disk I/O's to complete. This event is essentially a roadblock for further activity to take place. No other functions can occur during this waiting period. This number represents time in which processes could have had work performed on their behalf, but could not because of the relative slowness of the disk drives in retrieving I/O.

Performance Tip

> The number indicated by this counter provides a good aspect of the state of the I/O system. A large number here basically indicates that the CPU could have been busier, but because of I/O requests that were not serviced rapidly, it could not. Big is bad. Small is good! If this number is above 10%, it is possible that an I/O bottleneck exists. A shortage of main memory can also induce an excessive amount of disk activity. It is best to look at some of the memory adequacy indicators to verify whether or not memory is the culprit. Also be sure to identify the high disk I/O user (Advice Module and Process Display). A large amount of disk I/O write activity can induce an excessive value here. We have seen a number of cases where this number has skyrocketed virtually causing the majority of CPU to become paralyzed. So, a Series 948 may only be operating at the level of the Series 920 because of excessive CPU Pause time for disk activity.

This statistic also includes the percentage of time the CPU is not actively working on processes and not waiting for any disk I/O's to complete. Simply stated, this is the amount of processing capacity you have "in the bank."

Performance Tip

> If there is a large amount of idle time consistently on your system, this means your CPU is on vacation most of the time. Although it is not desirable to swamp the processor, it should earn it's keep by performing to capacity. Ample idle time indicates spare processor capacity. If idle time is zero (or close to it) most of the time, and a significant amount of the CPU's processing is due to batch job activity, then you can sustain some growth in interactive transaction volume. If the lack of idle time is primarily due to session activity, then the system may be overloaded. Either reduce processing or obtain more CPU horsepower via an upgrade. It is helpful to observe entire days of idle time values for a system. You may have plenty of idle time at noon, but no idle time between 3:00 and 4:00 p.m. Shifting workloads (batch scheduling, user work hours) will help bring the peak period utilization down.

14

SOS DISC I/O DETAIL

The Disc I/O Detail screen is designed to allow you to gain detailed information on each of the disc devices configured on your system and to analyze the disc I/O performance indicators. Since some of the higher level data is provided on the Main screen (and Extended Disc line) you can use this screen to see cumulative counters, percentages of all I/O's that are performed by each disc, and queue lengths, etc. Cumulative counters may be reset by selecting the RESET TOTALS key (F5).

This screen is useful for zeroing-in on detailed disc I/O data. All of your disc drives are displayed with an array of disc-related statistics.

To access the Disc I/O Detail Screen from the global screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **D** (Disc I/O Detail). The Disc I/O Detail screen will display.

Disc I/O Detail Screen Keys

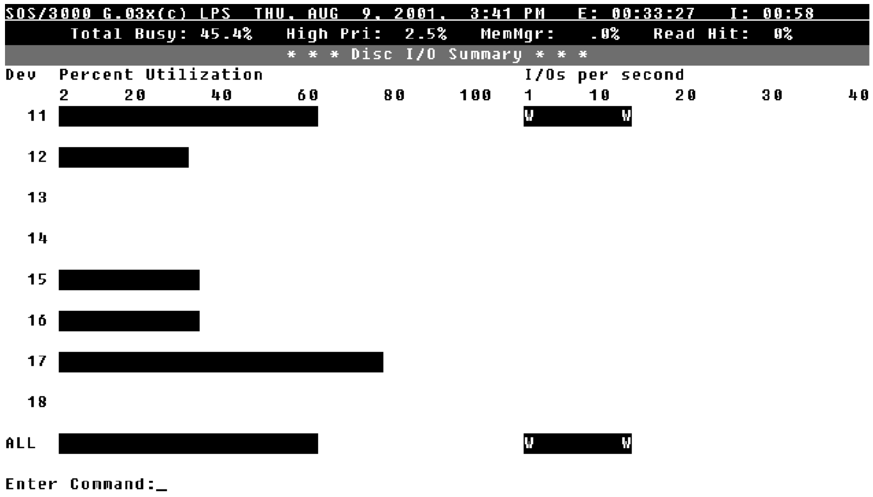
All of the Disc I/O Detail screen keys are identical to the keys of the CPU Detail Screen. See “CPU Detail Screen Keys” on page 103 for details.

Disc I/O Detail Screen Display Items

The Disc I/O Detail screen can be viewed in two formats. Examples of the Disc I/O Detail screen are provided in “Graphical Format” on page 108 and “Tabular Format” on page 109. To toggle between a Graphic and Tabular display format press the **G** key or press the F4 function key (GRAPHIC DISPLAY/TABULAR DISPLAY).

Graphical Format

Figure 14.1 shows an example of the Disc I/O Detail screen in graphical format. The graphic format of the Disc I/O Detail screen displays information on a drive-by-drive basis regarding overall drive utilization and I/O rates per second.



```
SOS/3000 G.03x(c) LPS   THU, AUG  9, 2001,  3:41 PM   E: 00:33:27   I: 00:58
         Total Busy: 45.4%   High Pri:  2.5%   MemMgr:   .0%   Read Hit:  0%
                               * * * Disc I/O Summary * * *
Dev   Percent Utilization                                I/Os per second
      2     20      40      60      80     100   1     10      20      30      40
  11                                                 W         W

  12

  13

  14

  15

  16

  17

  18

ALL                                                  W         W

Enter Command:_
```

Figure 14.1 *SOS Disc I/O Detail screen (graphical format)*

Disc I/O Detail (graphical format)

The Disc I/O Detail data items are described in the following table.

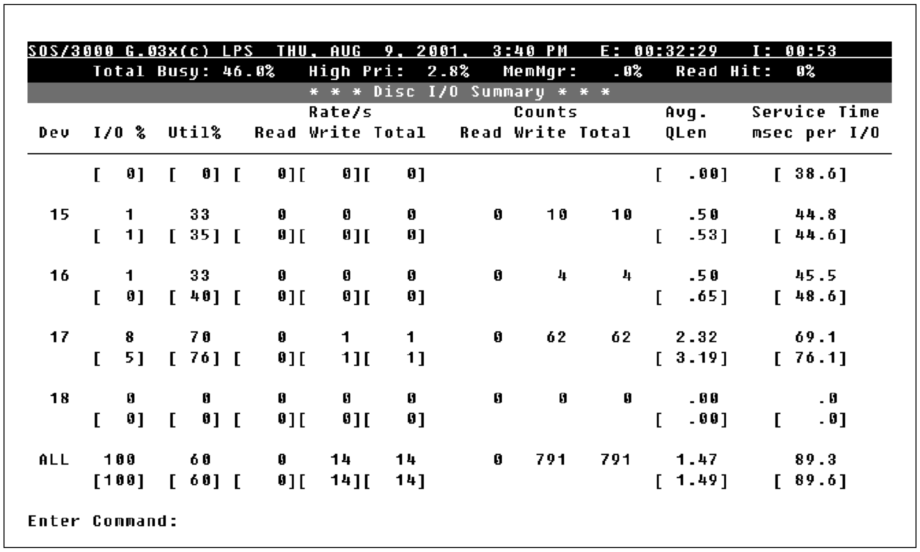
Table 14.1 *SOS Disc I/O Detail data items*

Data Item	Description
Dev	This is the logical device number of the disc drive. If this is "ALL" then the values reported will represent averages for all disc drives.
Percent Utilization	A disc drive's utilization measures the percentage of time a disc drive is in use. ***Performance Tip*** There is a correlation between disc utilization and disc queue lengths. In other words as utilization rises, there is more of a chance that I/O's will begin to queue up behind an executing I/O. This can be helpful in your disc drive forum.

Data Item	Description
I/Os per second	This column of data represents three disc I/O statistics: • **R** Physical reads per second. • **W** Physical writes per second. • **T** Total rate of both reads and writes per second. These numbers reflect the actual physical transfers between main memory and a particular disc device. ***Performance Tip*** A typical single disc drive (for example a 7937) can sustain I/O rates upward of 20-30 per second (total I/O). If rates consistently top this number it is possible that an I/O bottleneck exists. A disc bottleneck may exist even if the rates are not high, but this is an area of concern. The CPU wait for disc I/O time should be cross referenced (check the Global Screen CPU Statistics). If one or more disc drives are consistently deriving the majority of the activity while others are inactive, consider off-loading some of the busier files onto less active drives.

Tabular Format

Figure 14.2 shows the Disc I/O Detail tabular screen.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:40 PM   E: 00:32:29   I: 00:53
      Total Busy: 46.0%   High Pri:  2.8%   MemMgr:   .0%   Read Hit:  0%
                          * * * Disc I/O Summary * * *
                          Rate/s             Counts        Avg.    Service Time
 Dev  I/O %  Util%   Read Write Total   Read Write Total   QLen    msec per I/O

      [  0]  [  0] [   0][   0][   0]                     [  .00]    [ 38.6]

  15     1     33      0     0     0       0    10    10     .50       44.8
      [  1]  [ 35] [   0][   0][   0]                     [  .53]    [ 44.6]

  16     1     33      0     0     0       0     4     4     .50       45.5
      [  0]  [ 40] [   0][   0][   0]                     [  .65]    [ 48.6]

  17     8     70      0     1     1       0    62    62    2.32       69.1
      [  5]  [ 76] [   0][   1][   1]                     [ 3.19]    [ 76.1]

  18     0      0      0     0     0       0     0     0     .00         .0
      [  0]  [  0] [   0][   0][   0]                     [  .00]    [   .0]

 ALL   100     60      0    14    14       0   791   791    1.47       89.3
      [100]  [ 60] [   0][  14][  14]                     [ 1.49]    [ 89.6]

Enter Command:
```

Figure 14.2 *SOS Disc I/O Detail screen (tabular format)*

Disc I/O Detail (tabular format)

The following table contains a description of each component of the Disc I/O Detail tabular screen.

Table 14.2 *SOS Disc I/O Summary data items*

Data Item	Description
I/O %	These numbers represent the percentage of all disc I/O performed by this disc device during the current and cumulative intervals. ***Performance Tip*** The cumulative number is especially helpful to determine how well balanced your disc drives are over a long period of time. It is nearly impossible to perfectly balance disc I/O among devices, but they can be balanced within some limit. If you notice that one or more drives are either greatly under-utilized or greatly over-utilized you should move files from one drive to another.
Util %	A disc drive's utilization measures the percentage of time a disc drive is in use. ***Performance Tip*** There is a correlation between disc utilization and disc queue lengths. In other words as utilization rises, there is more of a chance that I/O's will begin to queue up behind an executing I/O. This can be helpful in your disc drive forum.
Rate/s: • Read • Write • Total	This section of data represents three disc I/O statistics: • **R** Physical reads per second. • **W** Physical writes per second. • **T** Total rate of both reads and writes per second. These numbers reflect the actual physical transfers between main memory and a particular disc device. Bracketed numbers represent an average for each indicator.
Counts: • Read • Write • Total	This section indicates the total number of disc reads, writes and a total of both reads and writes per second. These numbers reflect the actual physical transfers between main memory and a particular disc device (Dev - n).

Data Item	Description
Avg. QLen	This is the average length of the disc request queue for a particular disc device when another disc I/O request arrives at the drive. Disc I/O requests come in two flavors: cheap or expensive. While no disc I/O is a good I/O, those requiring more work from the disc devices are bad for performance. Sequentially reading an MPE file is relatively easy for a disc drive because the drive's arm mechanism moves very little thus incurring shorter queues. If the mechanism moves wildly over the device's platter to jump from a TurboIMAGE master set to a detail set, the cost for those particular I/O's is substantially more and will usually incur longer queue depths. ***Performance Tip*** An average queue length of one (1.0) or greater is not acceptable. Keep in mind that it is normal to have rush hour situations during a day when the queues have high averages. This is especially true when a transaction manager reaches a check point and does a large amount of write posting. It is consistently long queue depths that are a bad sign. If you notice that a particular disc drive has consistently high queue depths you should explore the following possibilities: • Excessive disc arm movement because of heavily hit files on the same disc drive that depend on each other (balance files better!). • Database files inefficiencies (better housekeeping!). • Too much demand on a particular file (application design problem). • The disc drive is too slow of a model for your particular application (not very likely).
Service Time msec per I/O	This is the amount of time in milliseconds required to service one I/O. ***Performance Tip*** If the service time is higher on one disc drive than the others, check data locality. Your data may need to be "balanced" between disc drives.

15

SOS MEMORY DETAIL

The Memory Detail Screen is useful when you want to analyze memory activity from either a tabular or graphic view point.

To access the Memory Detail Screen from the global screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **M** (Memory Detail Screen). The Memory Detail Screen will display.

These screens are designed to give you a specialized look at memory management activities. You can look at these events via a graphic display or in a tabular format by pressing the appropriate function key. The tabular format provides more detail along with cumulative numbers. The graphic format is easier to observe over time.

Memory Detail Screen Keys

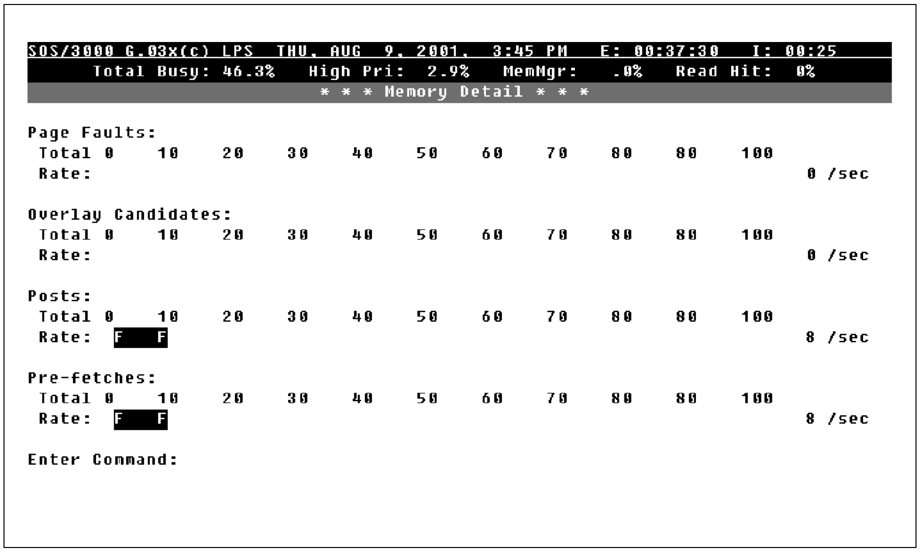
All of the Memory Detail Screen keys are identical with the keys of the CPU Detail Screen. See "CPU Detail Screen Keys" on page 103 for details.

Memory Detail Screen Display Items

The Memory Detail screen can be displayed in two formats. Examples of the Memory Detail Screen are provided in "Graphical Format" on page 114 (next page) and "Tabular Format" on page 116.To toggle between a Graphic and Tabular display format press the **G** key or press the F4 function key.

Graphical Format

Figure 15.1 shows an example of the Memory Detail screen in graphical format.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:45 PM   E: 00:37:30   I: 00:25
      Total Busy: 46.3%   High Pri:  2.9%   MemMgr:   .0%   Read Hit:  0%
                          * * * Memory Detail * * *

Page Faults:
 Total 0    10     20     30     40     50     60     70     80     80     100
 Rate:                                                                     0 /sec

Overlay Candidates:
 Total 0    10     20     30     40     50     60     70     80     80     100
 Rate:                                                                     0 /sec

Posts:
 Total 0    10     20     30     40     50     60     70     80     80     100
 Rate:  F   F                                                              8 /sec

Pre-fetches:
 Total 0    10     20     30     40     50     60     70     80     80     100
 Rate:  F   F                                                              8 /sec

Enter Command:
```

Figure 15.1 *SOS Memory Detail screen (graphical format)*

Memory Detail (graphical format)

Each character on the graphic bar represents approximately two events per second. All values are expressed in number of events per second. The key to each graphic bar and tabular column is shown in the next table.

Table 15.1 *SOS Memory Detail screen keys*

Key	Description
C	Native mode and compatibility mode code segments (NM code and CM code).
D	Transient and permanent data segments (Tran Data and Perm Data).
F	File object faults (all types: Image, KSAM, etc.).
L	Native mode and compatibility mode system libraries such as XL.PUB.SYS, SL.PUB.SYS, etc. (NM Sys and M Sys).

Key	Description
S	Native mode and compatibility mode data stacks (NM stack and CM stack).
X	Compatibility mode extra data segments (CM Xds).

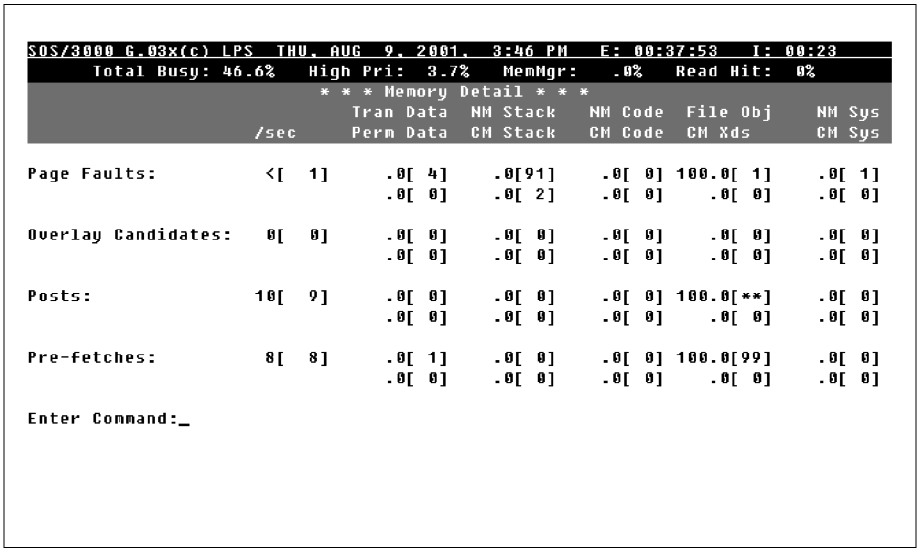
The Memory Detail data items are described in the following table.

Table 15.2 *SOS Memory Detail data items*

Data Item	Description
Page Faults	This event represents the number of memory page faults occurring per second. A page fault occurs when an object necessary for a process to continue to run is not present in memory.
Overlay Candidates	This event represents the number of memory overlay candidates occurring per second. An overlay candidate is a memory object that has been flagged as temporarily non-essential, thus expendable to overwrite. This frees up memory for more urgent requests.
Posts	This event represents the number of times processes request memory pages to be posted to disc. This can be for file pieces, etc.
Pre-fetches	This event represents the total number of pre-fetch reads on behalf of processes. This event is similar to MPE V disc caching. More data is brought into memory than is essential so that future trips to disc can be avoided. Additionally, cumulative counters are available on the Tabular screen. You should watch these numbers over time to determine interpreting guidelines.

Tabular Format

The Tabular screen (Figure 15.2) further breaks down memory events that occur on the system by supplying cumulative values ([nn]) along with current interval statistics.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:46 PM   E: 00:37:53   I: 00:23
      Total Busy: 46.6%   High Pri:  3.7%   MemMgr:   .0%   Read Hit:  0%
                           * * * Memory Detail * * *
                              Tran Data  NM Stack   NM Code  File Obj    NM Sys
                     /sec     Perm Data  CM Stack   CM Code  CM Xds      CM Sys

Page Faults:          <[   1]    .0[ 4]    .0[91]    .0[ 0] 100.0[ 1]    .0[ 1]
                                 .0[ 0]    .0[ 2]    .0[ 0]    .0[ 0]    .0[ 0]

Overlay Candidates:   0[   0]    .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]
                                 .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]

Posts:               10[   9]    .0[ 0]    .0[ 0]    .0[ 0] 100.0[**]    .0[ 0]
                                 .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]

Pre-fetches:          8[   8]    .0[ 1]    .0[ 0]    .0[ 0] 100.0[99]    .0[ 0]
                                 .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]    .0[ 0]

Enter Command:_
```

Figure 15.2 *SOS Memory Detail screen (tabular format)*

Memory Detail (tabular format)

The data items in the Memory Detail screen are described in the following table. The events are those described in Table 15.2.

Table 15.3 *SOS Memory Detail data items*

Data Item	Description
Tran Data	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by Transient Data.
Perm Data	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by Permanent Data.
NM Stack	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by a native mode stack.

Data Item	Description
CM Stack	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by a compatibility mode stack.
NM Code	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by a native mode programming code.
CM Code	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by compatibility mode programming code.
File Obj	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by File.
CM Xds	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by a CM_POST.
NM Sys	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by a native mode system task.
CM Sys	The number of events (within the current interval and cumulative) caused by memory waiting to complete for this process by a compatibility mode system task.

16

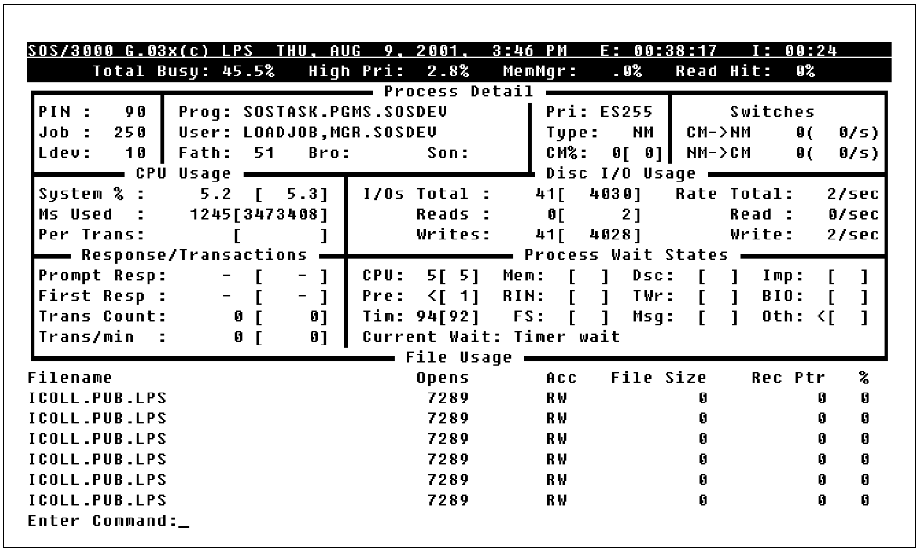
SOS PROCESS DETAIL

The Process Detail screen allows you to see, in microscopic view, one particular process at a time. Although some of the statistics are the same as those on the Process or Extended Process Display lines, many new data items are provided. Additionally, this screen also displays averaged data.

To access the Process Detail screen from the Global Summary screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen or press **P**. You also may use the HOG PROC ZOOM key (F4).
2. From the Screen Selection Menu screen, enter **P** (Process Detail Screen). You will see this prompt: “Enter process identification number of process to display:”. By entering a valid PIN number the Process Detail Screen will appear. HOG PROC ZOOM automatically inputs the PIN of the process using the most CPU. Figure 16.1 shows an example of the screen.

One feature provided on this screen is the family lineage for the current process. By pressing the UTILITY KEYS function key (F6), and then the PROCESS TREE function key (F4), you will see a graphic format of the father and its related son processes. This will be helpful when dealing with process-handling issues.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:46 PM   E: 00:38:17   I: 00:24
      Total Busy: 45.5%   High Pri:  2.8%   MemMgr:   .0%   Read Hit:  0%
 ──────────────────────────────── Process Detail ─────────────────────────────
│PIN :   90 │ Prog: SOSTASK.PGMS.SOSDEV        │ Pri: ES255 │    Switches     │
│Job :  250 │ User: LOADJOB,MGR.SOSDEV         │ Type:   NM │ CM->NM    0(  0/s)│
│Ldev:   10 │ Fath:  51   Bro:         Son:    │ CM%:  0[ 0]│ NM->CM    0(  0/s)│
│────────── CPU Usage ──────────────────────── Disc I/O Usage ─────────────────│
│System % :      5.2  [  5.3]│ I/Os Total :    41[  4030]   Rate Total:   2/sec│
│Ms Used  :     1245[3473408]│      Reads :     0[     2]        Read :   0/sec│
│Per Trans:          [      ]│      Writes:    41[  4028]        Write:   2/sec│
│─── Response/Transactions ──────────────── Process Wait States ───────────────│
│Prompt Resp:      -  [   - ]│ CPU:  5[ 5]  Mem:  [  ]  Dsc:  [  ]  Imp:  [  ]│
│First Resp :      -  [   - ]│ Pre:  <[ 1]  RIN:  [  ]  TWr:  [  ]  BIO:  [  ]│
│Trans Count:        0 [   0]│ Tim: 94[92]   FS:  [  ]  Msg:  [  ]  Oth: <[  ]│
│Trans/min  :        0 [   0]│ Current Wait: Timer wait                        │
 ─────────────────────────────────── File Usage ──────────────────────────────
Filename                                    Opens       Acc   File Size     Rec Ptr   %
ICOLL.PUB.LPS                                7289       RW            0           0   0
ICOLL.PUB.LPS                                7289       RW            0           0   0
ICOLL.PUB.LPS                                7289       RW            0           0   0
ICOLL.PUB.LPS                                7289       RW            0           0   0
ICOLL.PUB.LPS                                7289       RW            0           0   0
ICOLL.PUB.LPS                                7289       RW            0           0   0
Enter Command:_
```

Figure 16.1 *SOS Process Detail screen*

Process Detail Screen Keys

Each of the Process Detail Screen key is listed and explained in the following table.

Table 16.1 *Pulse Points Screen keys*

Key	Usage
Enter	Refresh screen
E	Return to Global Summary screen
F	Screen Freeze
H	Help System
J	Jump to new screen
L	Print Hardcopy
M	Toggle Memory Lock
O	Toggle Show Other File Opens
P	New Process Detail Screen

Key	Usage
Q	Queue Jump
R	Toggle Stack Trace
S	Jump to SOS Screen Selection menu
T	Display Process Tree
U	Display File Users
V	Launch FILERPT
X	Exit
Z	Zero Cumulative Totals
!	Execute Shell Commands
:	Execute Shell Commands
#	Display Job/Session Tree
?	Help System
CTRL T	Toggle Timer Status
CTRL W	Toggle Wait Index Info

Process Detail Screen Display Items

The data items are described in Table 16.2.

Table 16.2 *SOS Process Detail data items*

Data Item	Description
PIN	This number stands for the Process Identification Number (PIN). Each process is uniquely identified by its own PIN. The easiest way to locate processes is by knowing this number. A single job or session can have many processes associated with it.
Sess/Job	The job or session number associated with the particular process. If the process is a system type (not originating from a user job or session), **<sys>** will appear in this column.

Data Item	Description
LDev	The logical device number of the device where the process was created. Batch jobs will display the streams device number here (usually 10). System processes will have a "-." This column is helpful to track down a particular user whose process is exhibiting unique traits. Jobs or processes that are in the process of terminating may display an erroneous number here. This does not indicate a problem.
Prog	The program or last MPE/iX command executed by the user. Some system-type program names will be uniquely identified, such as "Spooler". If the process is a Command Interpreter, then "ci:xxxx" will appear in this column, where "xxxx" is the last MPE/iX command the user or job issued.
User	The logon sequence as initiated by the user or job minus the logon group. Once again, if the process was spawned by MPE and not with a session or job, System Process will be displayed. The name of that process will be provided at the Program name.
Fath/Bro/Son	These numbers are the Process Identification Numbers (PIN) for the father process that created the current process. Next, the brother— if any—was created by the father, and the first son process—if any—was created by the current process. By traversing the process tree you can identify all relatives associated with the current process. You may also press the PROCESS TREE function key to see the lineage of the current process in graphic format.
Pri	The first two letters signify the particular dispatch subqueue in which the process is executing. The following number is an absolute priority that the MPE dispatcher uses to determine what process gets the CPU's attention next. This number is ultimately used to determine the CPU's next process customer. The first letter is the queue. The second indicates whether the process has a fixed priority subqueue (L for linear or S for circular). Only C, D, and E queues can have the S subqueue. The possible letters for the queue are described in Table 16.3.
Type	This label indicates whether the process began in compatibility mode (CM) or native mode (NM). This flag will not indicate the current mode of the program.
CM%	The percentage of the CPU used for compatibility mode operations when this process was using the CPU.
CM->NM	The number and rate per second (nnn/s) of compatibility mode to native mode switches performed by the process.

Data Item	Description
NM->CM	The number and rate per second (nnn/s) of native mode to compatibility mode switches performed by the process.

Table 16.3 *SOS Queue items*

Queue Item	Description
AL	A very high priority linear subqueue. This queue is usually reserved for highest priority MPE system processes that need immediate and adequate CPU time. Linear means that the process priority does not usually change. It is fixed.
BL	A high priority queue. This queue is used by some lower priority MPE system processes and by some very high priority user processes. For example, logging on a system with a “PRI=BS” parameter will allow your terminal to receive more CPU attention than those in lower queues. You should be cautious when running processes in this queue. If a looping condition takes place often, the only remedy is to restart the system! This is because processes in the A and B queues generally will not give up control of the CPU until they are through with it. This queue is generally linear, but it is possible to assign a process to the circular queue with priorities falling in the B queue range.
CS	This subqueue is the one in which normal interactive sessions run. When you log on at a terminal, your Command Interpreter Process (the process that allows you to dialogue with an MPE/iX prompt) is assigned a priority of 152 in the queue unless the default queue settings have been altered. As your process uses more CPU time than the average last 100 transactions, your priority is decremented (increased numerically - logically lower in priority). The net effect is that HOG interactive transactions are penalized. They have less chance of getting CPU time. Short transactions are rewarded by maintaining a higher priority. It is by this method that MPE/iX tries to fairly allocate resources among competing processes.
DS	This subqueue is commonly used for high priority batch jobs. The rules for this and the E queue are described below and are similar to that of the C queue. Processes fall in priority as they exceed the filter values. In the CS queue this is the dynamically calculated SAQ (System Average Quantum) value. For the D and E queues these values are the MINQUANTUM and MAXQUANTUM.

Queue Item	Description
ES	This subqueue is typically used for lower priority batch jobs. Processes running at low priority will only get table scraps of CPU time. Processes running at higher priorities leave leftovers for these lower priority processes. ***Performance Tip*** If you see a process in the linear queue that consumes a lot of CPU time, it is possibly the culprit causing a bottleneck. If other processes are congregating at a low priority and are not getting enough CPU time you should use the TUNE command to help them derive more. You can manipulate the TUNE command to perform several actions. Do not be afraid to take advantage of its capabilities.

CPU Usage

The CPU Usage portion of the Process Detail screen contains information and explanations of a process' CPU resource usage. Each data item is described in the next table.

Table 16.4 *SOS CPU Usage data items*

Data Item	Description
System%	This percentage reflects the amount of the total CPU capacity consumed by this process during the current interval. If a process uses more than zero but less than or equal to 0.1 then .<% is displayed. This is to let you know that some time was spent on the process although very little (between 0 and 0.1). ***Performance Tip*** The high CPU user, HOG, is displayed in the Advice Section. It is very important to isolate the currently active, high CPU consumer because it is often the performance problem. It is possible to spot a program looping condition if it consumes a lot of the CPU's attention and breaks little or not at all for other events. An even distribution of the CPU among processes over a period of time is desirable. If a process should be getting CPU time and is not, you should look at the Current Wait reason (discussed below) to see why not. This process may be waiting on resources to be released in order to continue. Looking at the Process Wait states will reveal even more.

Data Item	Description
Ms Used	These numbers represent the current and cumulative amount of CPU milliseconds consumed by the process respectively. These milliseconds represent the time processes spent at the CPU watering hole for service. "Current" means the interval specified by the I:nn:nn at the top banner line. The cumulative number is unique because it represents the total number of CPU milliseconds that were consumed since the process was created and not just since SOS/3000 started. So if the process under study was started hours ago you will see a large cumulative value for the "CPU Ms Used". ***Performance Tip*** One of the first things you can tell about a process is whether or not it has received any CPU attention during the last interval. If the current value is zero then the process was not active during the last interval. These numbers will also quantitatively indicate which processes are consuming the most and the least CPU.
Per Trans	The average number of CPU milliseconds consumed by the process per transaction.

Disc I/O Usage

The Disc I/O Usage portion of the Process Detail screen includes data describing the various aspects of a process' disc I/O resource usage. Within the frame work of MPE/iX, disc I/O is usually not a bottleneck. However, it is important to pay close attention to applications exhibiting abnormally high disc I/O activity. Each data item is described in Table 16.5.

Table 16.5 *SOS Disc I/O Usage data items*

Data Item	Description
I/Os Total	The first value of this pair is the total number of physical disc I/Os generated by the process during the current interval. The second "[n]" is the cumulative number of I/O's for the process since it began. If SOS/3000 was started after the process began this value will reflect disc I/O's that accumulated since the beginning of SOS/3000.
Reads	The first value of this pair is the number of logical read disc I/Os generated by the process during the current interval. The second "[n]" is the cumulative number of read I/Os for the process since the process began. If SOS/3000 was started after the process began, this value will reflect the disc I/Os that accumulated since the beginning of SOS/3000.

<table>
<tr><th>Data Item</th><th>Description</th></tr>
<tr><td>Writes</td><td>The first value of this pair is the number of logical write disc I/Os generated by the process during the current interval. The second “[n]” is the cumulative number of write I/Os for the process since the process began. If SOS/3000 was started after the process began, this value will reflect the disc I/Os that accumulated since the beginning of SOS/3000.</td></tr>
<tr><td colspan="2"><i>Performance Tip</i>
These absolute logical I/O numbers will help you characterize processes in terms of trips to disc. In the case of MPE/iX pre-fetching some I/Os will be eliminated. Only those I/Os unsatisfied in memory will be retrieved from disc and will be reflected in these numbers.</td></tr>
<tr><td>Rate Total</td><td>This value is the average number of total logical disc I/Os per second generated by the process during the current interval.</td></tr>
<tr><td>Read</td><td>This value is the average number of logical disc I/O reads per second generated by the process during the current interval.</td></tr>
<tr><td>Write</td><td>This value is the average number of logical disc I/O writes per second generated by the process during the current interval.</td></tr>
<tr><td colspan="2"><i>Performance Tip</i>
These I/O rates will help you characterize processes in terms of the rate of physical trips to disc. In the case of MPE/iX pre-fetching some I/O’s will be eliminated. Only those I/Os unsatisfied in memory will be retrieved from disc and be reflected in these numbers.</td></tr>
</table>

Response and Transaction Statistics

Each data item from the Response/Transaction portion of the Process Detail screen is described in Table 16.6.

Table 16.6 *SOS Response/Transaction data items*

Data Item	Description
Prompt Resp First Resp	These numbers represent the terminal read response times for interactive users. First Resp is the response time for the user from the time C/R or Enter is pressed to when the first character appears on the screen. Prompt Resp is the response time for the user from when C/R or Enter is pressed to when the first prompt appears at which the user can enter a new transaction. There are a number of things to keep in mind when discussing response times. Refer to the discussion of Transactions and Response Times, under "Global Misc Statistics (tabular format)" on page 66 for a detailed explanation. ***Performance Tip*** Excessively high response times should be investigated. Heavy terminal activity can drain the CPU's attention with nonproductive overhead tasks. Impedances can cause excessive response times. It is important to analyze the Wait State percentages. These are shown on the Extended Process Display line or at the Process Detail screen (Process Wait States). Be sure you understand the difference between First and Prompt response times. If you have a lot of on-line reporting the Prompt response times will be substantially larger thus skewing the true system response time. In this case the First response will be more meaningful in tracking the rate at which the system is sending data back to the user's terminal.
Trans Count Trans Rate/min	These numbers represent the current number of terminal transactions (possibly equivalent to terminal reads) performed by the process to a particular terminal device, a cumulative average, and an estimated rate per minute based on the current interval. Under certain conditions these numbers will represent the actual number of user transactions (e.g., posting a payment, inquiring on an account, etc.). An inaccurate reading will occur if multiple carriage returns per screen are used for data entry. VPLUS status checks are not counted by measurement interface which SOS/3000 accesses. Transaction counts for VPLUS applications will be quite accurate. These numbers will provide a consistent transaction count for VPLUS applications and are a fairly accurate count for character mode transactions. The best way to tell if terminal reads and transactions are equivalent is to test them. You can have a user enter a specific number of transactions defined from the users standpoint and track that activity via SOS/3000 to check for discrepancies.

Process Wait State Statistics

These counters represent the Wait States in which processes can spend time. In other words, if a process is experiencing eight second response times, the percentages displayed in these Wait state categories represent the delay or servicing reasons. It is ideal for a process to continue unhindered. However, a process is usually impeded over the course of its life.

A hindrance could mean a missing memory segment, disc data, or perhaps prevented access to a TurboIMAGE database. If you notice that a particular user's process is receiving poor response times, or a batch job is taking more time to complete than is reasonable, examine these wait reasons. You can view them in the Extended Process line or on the individual Process Detail Screen. Cumulative Wait State figures are also provided on the Process Detail Screen.

The most ideal throughput for a process is derived when it does not have to stop for any reason. In other words, it derives full use of the CPU. The following discussion describes the other "brick walls" that can slow down a process' progress (with the exception of CPU).

Each data item is described in Table 16.7.

Table 16.7 *SOS Process Wait State data items*

Data Item	Description
CPU	This Wait State is the percentage of the process' response time due to being serviced by the CPU. It takes a certain amount of CPU time to perform the various commands of processes. ***Performance Tip*** For processes that are computation-intensive, you will usually see a high number in this category. It is possible that a process exhibiting close to 100% here is in a looping state, especially if the program is not completing as desired.
Mem	This Wait State is the percentage of the process' response time due to waiting for missing memory segments to be brought into main memory. When a process wants to continue to run but cannot because memory segments are missing, it is blocked. Memory fault stop time is counted in this category. ***Performance Tip*** For systems having an inadequate amount of main memory to support current demands, numbers may be greater than 10% in this category. Systems exhibiting severe memory shortage will show most user processes in this bucket as high memory wait percentages, even those needing modest amounts of memory. If only a few processes report values greater than or equal to 20-30% you should look at their individual memory requirements. A particular application may be gorging itself on memory space. If this is so, a redesign of that program is warranted. Remember that when dealing with process "brick walls" (in this case, absent memory segments), small percentages are desirable. Less than 10% in this Wait State is preferable.

Data Item	Description
Dsc	This Wait State is the percentage of the process' response time due to waiting for missing data to be brought into main memory from disc. An I/O "brick wall" occurs when a process wants to continue running but cannot due to necessary user-requested data missing from disc. Since a process is literally stopped and the CPU is taken away when a physical disc access is performed it is absolutely necessary to minimize this percentage. ***Performance Tip*** If you notice that most of the time the CPU pause for disc I/O time (Global Section) is rising above 10-15%, you will usually find that one or more processes are spending a moderate-to-high percentage of their processing time waiting for disc I/O's to complete. If a process is consistently waiting more than 20-30% of its time on disc I/O servicing then you should find out why. There are a number of reasons why I/O bottlenecking can take place. Some common culprits are: • TurboIMAGE master and detail set inefficiencies. • Inefficient pre-fetching operation (lack of CPU, memory, poor I/O locality). • Too many I/O-demanding processes running concurrently, etc.

Data Item	Description
Imp	This Wait State is the percentage of the process' response time due to being impeded by various lock and latch control mechanisms. This category includes many stop reasons. An impede occurs when a process tries to gain access to a software table or control structure and cannot because other processes arrived first. TurboIMAGE access is one of the most common sources of impedes. When a process tries to gain entry to a particular dataset and another process has that set locked via the DBLOCK intrinsic, the waiting process is counted as having been impeded. It must wait until the prior process is finished with its current operation before it can continue. Any file can have only one disc request outstanding. That is, in order for a process to access even a simple MPE/iX flat file it must first gain control of that file's control block. This access is not by the FLOCK intrinsic, which is the case in the other wait state bucket. Rather, only one user—regardless of programmatic locking—can gain access at a time. Other sources of impedes include unavailable system table entries, terminal buffers, etc. ***Performance Tip*** The interpretation of impedes can be difficult because there are potentially many causes and interrelationships between processes and resources. First of all it is best to determine the overall global impede rate. Do this by looking at the Impede Value on the Global Process Stop Reasons screen. If the global impede percentage is consistently high it is important to look at individual processes that have high impede percentages as part of their processing time. Processes accessing the same database in applications where poor locking strategies are implemented tend to spend a very large percentage of their time being impeded. It is not uncommon to see values in excess of 60% for processes in the impeded Wait State. A large percentage may point to poor locking or can simply indicate that a great deal of competition exists for a particular file.
Pre	This is the percentage of the process' response time due to preemption by other processes. A preemption occurs when a process is forced to give up use of the CPU because a higher priority process is ready to execute. ***Performance Tip*** If both interactive and batch processes are running, batch processes in lower queues will receive a higher number of preemptions than those running in the interactive queue. If interactive users are spending too much response time being preempted it is possible that there is not enough CPU horsepower to go around. Backing off on demand or increasing the supply are the only recourses. Doling out the CPU resource by means of the TUNE command or a queue manager program may help. The basic strategy is to give less CPU attention to those who can stand it and provide more to those who really need it.

Data Item	Description
RIN	The percentage of time the process is waiting for a Resource Identification Number.
TWr	The percentage of time the process is waiting for terminal writes to complete. Since terminal output is usually buffered this will only accumulate time if the system runs out of terminal buffers or if the program is blocking on terminal output.
BIO	The percentage of time the process is waiting for non-disc I/O to complete (e.g., tape drive activity). Datacomm overhead is accumulated in this bucket as well.
Tim	The percentage of time the process is waiting for a programmatic timer (such as the PAUSE intrinsic) to complete.
FS	The percentage of time the process is waiting on a father and/or son wait.
Msg	The percentage of time the process is waiting on a message file, port, or sendmail/receivemail wait.
Oth	The percentage of time the process is waiting on other events not covered by the above definitions.
Current Wait	This item represents the state of the process when SOS/3000 took a picture of the system for the current interval. This number is helpful because if a process is hindered you can find out why. Keep in mind that this single wait state indicator is only a first line of defense if you suspect an impedance problem. You should take an in-depth look at that process' Wait State breakdown or go the Process Detail screen for that process. Keep in mind that the Wait State of a process over even a few seconds can change radically. These states are defined in Table 16.8. ***Performance Tip*** If a process is always in a particular wait condition this could be a sign of resource shortage or a logical program problem (database locking strategy issue). For example, if the Mem flag is on for multiple processes it can point to a memory shortage condition for the entire system.

Table 16.8 *SOS Current Wait data items*

Data Item	Description
BIO	Waiting for non-disc I/O to complete.
CPU	Currently active in the CPU resource.

Data Item	Description
Dead	This process has terminated and will not show during the next interval.
Disc	Waiting for a disc I/O to complete.
FS	Waiting for activation by its father or son process.
Imp	Waiting due to unavailable resources. An example is database locks, lack of system table entries, etc.
Mem	Waiting for a segment(s) to be brought into memory.
Msg	Waiting for message file I/O.
Pre	This process has been preempted by a higher priority process.
RIN	Waiting for a RIN to become available.
Time	Waiting for a timer to expire.
Trd	Waiting for a terminal read to complete.
TW	Waiting on a terminal write to complete.
Oth	Waiting for a miscellaneous condition to complete.

File Usage

In this section, information is displayed regarding any files that a process has open. The current record pointer and the number of times the file has been opened by processes (globally) are provided.

Performance Tip

It is often helpful to find out which files a job or session has opened. Notice, for example, that the system is exhibiting an abnormally high pause for disc I/O process for a particular job. The next logical step is to find out what files it has accessed. If one of the main files is a database you should be suspicious of its internal efficiency. The record pointer (Rec Ptr) may be helpful in determining progress through a serially read MPE file and not a TurboIMAGE database. If the file name is followed by a "T" the file in question is a temporary file. The completed number (%) is helpful for serially read MPE files because it will indicate how far a process has progressed through that file. This number will not be useful if the file is being randomly accessed.

Each data item is described in Table 16.9.

Table 16.9 *SOS File Usage data items*

Data Item	Description
Filename	The name of the file that is opened and used by a process.
Opens	The total number of files opened by all processes that are outstanding against this file.
Acc	The code that represents how the file is being accessed by the process. **R** means read. **W** means write. **L** means lock.
File Size	The size of the file.
Rec Ptr	The current record number being accessed.
%	The number that will indicate how far a process has progressed through that file.

Other Process Detail Information

SOS/3000 provides additional aids to examine process related situations. They are the OPTION KEYS and UTILITY KEYS. The Option Keys are shown in the Table 16.10.

Option Keys

The option keys are described in Table 16.10.

Table 16.10 *Option Keys*

Key	Description
F1 - Memory Lock	When enabled, Terminal Memory Lock is turned on below FILE USAGE. This causes the file display to scroll under FILE USAGE.
F2 - Stack Trace/Open Files	This function key acts as a toggle between Stack Marker Tracing and an Opens Files Display. When F2 is pressed while Labeled Stack Trace is showing, a process Stack Trace markers list is displayed for the process. Notice that the first time this command is executed in an SOS/3000 session it can take 30 seconds or more for the initial display. Also notice that when you access Stack Trace, Memory Lock is disabled. Pressing F2 again will toggle to open file usage (discussed above). Only users with PM capability can display Stack Trace markers, but all users can see Open Files.
F3 - Other Opens	When enabled, this key will show all other accessories to files opened by this process.

Key	Description
F8 - Main Keys	When executed in this context the function key labels will revert to those within the Process Detail Display.

The Utility Keys are shown in the Table 16.11.

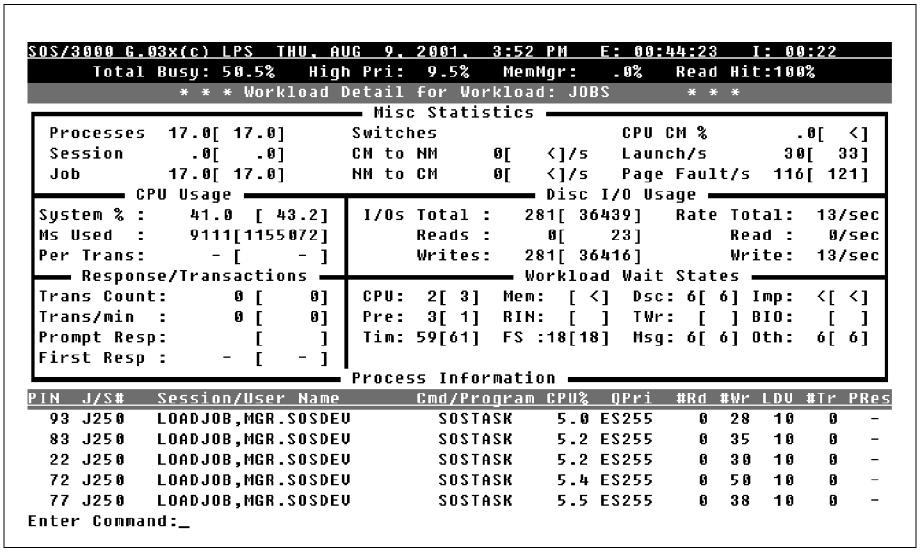
Table 16.11 *Utility Keys*

Key	Description
F1 - MPE/iX Command	Enter the SOS/3000/MPE/iX command interface.
F3 - Queue Jump	Alters the priority or queue of an executing process.
F4 - Process Tree	Graphically represents the PROCESS TREE showing the father and sons of the selected process.
F5 - Job/Sess Tree	Entering a job or session number in the form of “Jnnn” or “Snnn” will display PROCESS TREE for the requested job or session.
F6 - File Users	Entering an adequately qualified file name will result in a display of all users who are currently accessing that file. (The same function as the "File Users Screen" described in “SOS File Users” on page 181.) It is obtained by pressing F on the SOS/3000 Screen Selection Menu.
F7 - Filerpt Analysis	This command will cause the programmatic execution of the program FILERPT. SOS will attempt to run the program from UTIL.LPS then UTIL.SYS and finally PUB.SYS. The program is included as an unsupported utility program with your SOS/3000 software.
F8 - Main Keys	When executed in this context the function key labels will revert to those within the Process Detail Display.

17

SOS WORKLOAD DETAIL

Defining your processes into workload groups gives you a method by which you can report system performance in units more compatible with business issues than with technical ones.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:52 PM   E: 00:44:23   I: 00:22
      Total Busy: 50.5%   High Pri:  9.5%   MemMgr:   .0%   Read Hit:100%
              * * * Workload Detail for Workload: JOBS        * * *
 ------------------------------ Misc Statistics -----------------------------
 | Processes  17.0[ 17.0]     Switches                CPU CM %        .0[  <]|
 | Session      .0[   .0]     CM to NM     0[   <]/s  Launch/s        30[  33]|
 | Job        17.0[ 17.0]     NM to CM     0[   <]/s  Page Fault/s  116[ 121]|
 |------- CPU Usage -----------------------------  Disc I/O Usage ----------|
 |System % :     41.0  [ 43.2]| I/Os Total :   281[ 36439]   Rate Total: 13/sec
 |Ms Used  :     9111[1155072]|      Reads :     0[    23]        Read :  0/sec
 |Per Trans:        - [     - ]|      Writes:   281[ 36416]        Write: 13/sec
 |---- Response/Transactions -|-------------- Workload Wait States ---------|
 |Trans Count:        0 [     0]| CPU:  2[ 3]  Mem:  [ <]  Dsc: 6[ 6] Imp:  <[ <]|
 |Trans/min  :        0 [     0]| Pre:  3[ 1]  RIN:  [  ]  TWr:  [  ] BIO:   [  ]|
 |Prompt Resp:          [      ]| Tim: 59[61]  FS :18[18]  Msg: 6[ 6] Oth:  6[ 6]|
 |First Resp :       -  [    - ]|                                            |
 ---------------------------- Process Information ---------------------------
PIN  J/S#    Session/User Name           Cmd/Program CPU%  QPri   #Rd #Wr LDU #Tr PRes
  93 J250    LOADJOB,MGR.SOSDEV            SOSTASK     5.0 ES255    0  28  10   0   -
  83 J250    LOADJOB,MGR.SOSDEV            SOSTASK     5.2 ES255    0  35  10   0   -
  22 J250    LOADJOB,MGR.SOSDEV            SOSTASK     5.2 ES255    0  30  10   0   -
  72 J250    LOADJOB,MGR.SOSDEV            SOSTASK     5.4 ES255    0  50  10   0   -
  77 J250    LOADJOB,MGR.SOSDEV            SOSTASK     5.5 ES255    0  38  10   0   -
Enter Command:_
```

Figure 17.1 *SOS Workload Detail screen: JOBS*

To access the Workload Detail screen from the global screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **W** (Workload Detail Screen). You will be prompted: **Enter workload group name: (Enter @ for a list of workloads)**. The Workload detail screen will appear.

Figure 17.1 shows an example of the screen.

Workload Detail Screen Keys

Each of the Workload Detail Screen key is listed and explained in the following table.

Table 17.1 *Workload Detail Screen keys*

Key	Usage
Enter	Refresh screen
D	Display Workload Definitions
E	Return to Global Summary screen
F	Screen Freeze
H	Help System
J	Jump to new screen
K	Toggle first response option
L	Print Hardcopy
O	Option Subsystem
S	Jump to the SOS Screen Selection menu
W	New Workload Detail screen
X	Exit
Y	Toggle Extended Process Line
Z	Zero Cumulative Totals
1	Display All Processes One Time
!	Execute Shell Commands
:	Execute Shell Commands
?	Help System
*	Toggle Switch Function Key Sets
CTRL T	Toggle Timer Status

Workload Detail Screen Display Items

Miscellaneous Statistics

The data items presented in the Misc Statistics portion of the Workload Detail screen are described in the following table.

Table 17.2 *SOS Misc Statistics data items*

Data Item	Description
Processes	This is the number of processes running in this workload and the cumulative average during this interval sample.
Session	This is the number of sessions running in this workload and the cumulative average during this interval sample.
Job	This is the number of jobs running in this workload and the cumulative average during this interval sample.
CM to NM	This is the number and rate per second (nnn/s) of compatibility mode to native mode switches performed by processes within the workload. ***Performance Tip*** A compatibility mode (CM) to native mode (NM) switch occurs when a piece of code that is executed reverts from CM to NM. This operation is not as expensive to perform as is NM to CM switching. The system can sustain many CM to NM switches without excessive degradation to the system. Depending on the system size, more than about 200 (for a small system) to 1000 or more (for a large system) can be sustained without being an excessive overhead drain on the CPU. So if a workload has 200 CM to NM switches occurring, it might be wise to check the system CM to NM switches on the "Global Misc Statistics (tabular format)" on page 66.
NM to CM	This is the number and rate per second (nnn/s) of native mode to compatibility mode switches performed by processes within the workload. ***Performance Tip*** A native mode (NM) to compatibility mode (CM) switch occurs when a piece of code that is executed reverts from NM to a translated form (CM). This operation is quite expensive for the system to perform and should be minimized. Depending on the system size, about 50 per second may indicate an overhead drain on the CPU. A single workload with 50 NM to CM switches per second should be investigated.

Data Item	Description
CPU CM%	This is the percentage of time within the current interval that processes within this workload have been in compatibility mode program code. ***Performance Tip*** This number can be a big help to you if you are trying to optimize performance from a migration standpoint. It is important that as many programs as possible be compiled in Native Mode to take full advantage of the performance advantages of the Hewlett-Packard Precision Architecture HP-PA (also known as RISC). The time the CPU spends in the compatibility mode represents wasted time because code translations must take place. If the programs are compiled with a native language compiler, the translation is done once for all programs at compile time. There may be no right or wrong value for this number on your system. It depends on what you find is acceptable and on your ability to go "native." If you have third party software and your vendor has not made the switch from MPE V to MPE/iX, then you are stuck with compatibility mode code. This means a performance compromise. It is best to target values of less than 20%.
Launch/s	This is the number of launches per second within this workload. This is the activity that refers to a process receiving exclusive use of the CPU. A launch occurs when the MPE dispatcher has determined which process is ready to run and has the highest priority if there are many such processes ready. Typically, this activity will occur many times in the life of a process. A launch implies that a process stop occurred. After a process is launched, it is considered to be executing. ***Performance Tip*** Excessive launch activity implies excessive process stops. Each launch incurs CPU overhead (especially due to dispatcher activity). A low launch rate is desirable.
Page Fault/s	This value represents the current and cumulative number of times per second that memory page faulting occurred for processes within this workload. A Page Fault is counted when a process needs a memory object (code or data) that is absent from main memory. ***Performance Tip*** A consistent value of more than 25 page faults per second should alert you to the possibility of a memory shortage and other memory indicators should be checked (this is system wide). A range on systems that have adequate memory is 0-5 per second (system wide). If a workload has more than 5, the cause should be investigated. Be sure to check the Memory Detail screen for more insight into memory activity.

CPU Usage

The data items presented in the CPU Usage portion of the Workload Detail screen are described in the following table.

Table 17.3 *SOS CPU Usage data items*

Data Item	Description
System%	This percentage reflects the amount of the total CPU capacity consumed by workload processes during the current interval. If a process uses more than zero but less than or equal to 0.1 then .<% is displayed. ***Performance Tip*** The high CPU user (the "Hog") is displayed in the Advice Section in the Global Summary screen. It is very important to isolate the currently active, high CPU consumer because it is often the performance problem. It is possible to spot a program looping condition if it consumes a lot of the CPU’s attention and breaks little or not at all for other events. An even distribution of the CPU among processes over a period of time is desirable. If a process should be getting CPU time and is not, you should look at the Current Wait reason (discussed below) to see why not. This process may be waiting on resources to be released in order to continue. Looking at the Process Wait states will reveal even more.
Ms Used	These numbers represent the current and cumulative amount of CPU milliseconds consumed by the workload processes, respectively. These milliseconds represent the time processes spent at the CPU watering hole for service. “Current” means the interval specified by the I:nn:nn at the top banner line. The cumulative number is unique because it represents the total number of CPU milliseconds that were consumed since the process was created and not just since SOS/3000 started. So if the process under study was started hours ago you will see a large cumulative value for the “CPU Ms Used”. ***Performance Tip*** One of the first things you can tell about a process is whether or not it has received any CPU attention during the last interval. If the current value is zero then the process was not active during the last interval. These numbers will also quantitatively indicate which processes are consuming the most and the least CPU.

Data Item	Description
Per Trans	This value is the number of CPU milliseconds used by the workload per each terminal transaction. This will always be blank for batch jobs because batch jobs do not perform terminal transactions. This number is calculated by dividing the total number of terminal transactions into the total amount of CPU used by the workload for the current interval. ***Performance Tip*** You can discover which applications are costing the most CPU cycles for each transaction. This number is helpful if you are trying to perform capacity planning. By obtaining an average reading of the amount of CPU used per transaction, over time you can use queuing network math or simple spreadsheet calculations to help you answer "what if" questions like: "How will my overall performance be affected if I increase my general ledge transaction volume by 40%?" Keep in mind that the concept of a terminal read versus a user's perception of a transaction may be different. Please refer to the Transaction and Response Time discussion in "Global Misc Statistics (tabular format)" on page 66 for more insight.

Disc I/O Usage

The Disc I/O Usage portion of the Workload Detail screen includes data describing the various aspects of a workload's disc I/O resource usage within the workload. Within the framework of MPE/iX, disc I/O is usually not a bottleneck. However, it is important to pay close attention to applications exhibiting abnormally high disc I/O activity. Each data item is described in Table 17.4.

Table 17.4 *SOS Disc I/O Usage data items*

Data Item	Description
I/Os	
Total	The first value of this pair is the total number of physical disc I/Os generated by the workload during the current interval. The second "[n]" is the cumulative number of I/Os for the workload processes since they began. If SOS/3000 was started after the workload began, this value will reflect disc I/Os that accumulated since the beginning of SOS/3000.
Reads	The first value of this pair is the number of physical read disc I/Os generated by the workload processes during the current interval. The second "[n]" is the cumulative number of read I/Os for the workload processes since the workload processes began. If SOS/3000 was started after the process began, this value will reflect the disc I/Os that accumulated since the beginning of SOS/3000.

Data Item	Description
Writes	The first value of this pair is the number of physical write disc I/Os generated by the workload processes during the current interval. The second "[n]" is the cumulative number of write I/Os for the workload processes since the workload processes began. If SOS/3000 was started after the process began, this value will reflect the disc I/Os that accumulated since the beginning of SOS/3000.
Performance Tip These absolute physical I/O numbers will help you characterize workload in terms of trips to disc. In the case of MPE/iX pre-fetching, most I/Os will be eliminated. Only those I/Os unsatisfied in memory will be retrieved from disc and will be reflected in these numbers.	
Rate	
Total	This value is the average number of total physical disc I/Os per second generated by the workload processes during the current interval.
Read	This value is the average number of physical disc I/O reads per second generated by the workload processes during the current interval.
Write	This value is the average number of physical disc I/O writes per second generated by the process during the current interval.
Performance Tip These I/O rates will help you characterize workload processes in terms of the rate of physical trips to disc. In the case of MPE/iX pre-fetching some I/Os will be eliminated. Only those I/Os unsatisfied in memory will be retrieved from disc and reflected in these numbers.	

Response and Transaction Statistics

Each data item from the Response/Transaction portion of the Workload Detail Screen is described in Table 17.5.

Table 17.5 *SOS Response/Transaction data items*

Data Item	Description
Trans Count Trans Rate/min	These numbers represent the current number of terminal transactions (possibly equivalent to terminal reads) performed by the workload processes to a particular terminal device, a cumulative average, and an estimated rate per minute based on the current interval. Under certain conditions these numbers will represent the actual number of user transactions (e.g., posting a payment, inquiring on an account, etc.). An accurate reading will occur if multiple carriage returns per screen were used for data entry. VPLUS status checks are not counted by measurement interface which SOS/3000 accesses. Transaction counts for VPLUS applications will be quite accurate. These numbers will provide a consistent transaction count for VPLUS applications and are a questionable count for character mode transactions. The best way to tell if terminal reads and transactions are equivalent is to test them. Have a user enter a specific number of transactions defined from the user's standpoint and track that activity via SOS/3000 to check for discrepancies.
Prompt Resp First Resp	These numbers represent the terminal read response times for interactive users within the workload. First Resp is the response time for the user from the time C/R or Enter is pressed to when the first character appears on the screen. Prompt Resp is the response time for the user from when C/R or Enter is pressed to when the first prompt appears at which the user can enter a new transaction. There are a number of things to keep in mind when discussing response times. Refer to the discussion of Transactions and Response Times, under "Global Misc Statistics (tabular format)" on page 66 for a detailed explanation. ***Performance Tip*** Excessively high response times should be investigated. Heavy terminal activity can drain the CPU's attention with nonproductive overhead tasks. Impedances can cause excessive response times. It is important to analyze the Wait State percentages. These are shown on the Extended Process Display line or at the Process Detail screen (Process Wait States). Be sure you understand the difference between First and Prompt response times. If you have a lot of on-line reporting, the Prompt response times will be substantially larger thus skewing the true system Response time. In this case the First response will be more meaningful in tracking the rate at which the system is sending data back to the user's terminal.

Workload Wait State Statistics

These counters represent the Wait States in which processes within a workload can spend time. In other words, if a process is experiencing eight second response times, the percentages displayed in these Wait State categories represent the delay or servicing reasons. It is ideal for a process to continue unhindered. However, a process usually hits many brick walls over the course of its life.

A brick wall could mean a missing memory segment, disc data, or perhaps prevented access to a TurboIMAGE database. If you notice that a particular user's process is receiving poor response times, or a batch job is taking more time to complete than is reasonable, examine these wait reasons. You can view them in the Extended Process line or on the individual Process Detail Screen. Cumulative Wait State figures are also provided on the Process Detail Screen.

The most ideal throughput for a process is derived when it does not have to stop for any reason. In other words, it derives full use of the CPU. The following discussion describes the other "brick walls" that can slow down a process' progress (with the exception of CPU).

Each data item is described in Table 17.6.

Table 17.6 *SOS Workload Wait State data items*

Data Item	Description
CPU	This Wait State is the percentage of the workload process' Response time due to being serviced by the CPU. It takes a certain amount of CPU time to perform the various commands of processes. ***Performance Tip*** For processes that are computation-intensive you will usually see a high number in this category. It is possible that a process exhibiting close to 100% here is in a looping state especially if the program is not completing as desired.

Data Item	Description
Mem	This Wait State is the percentage of the workload process' Response time due to waiting for missing memory segments to be brought into main memory. When a process wants to continue to run but cannot because necessary memory segments are missing, that process is blocked. Memory fault stop time is counted in this category. ***Performance Tip*** For systems having an inadequate amount of main memory to support current demands, numbers may exceed 10% in this category. Systems exhibiting severe memory shortage will show most user processes, even those needing modest amounts of memory, as high memory wait percentages in this bucket. If only a few processes report values greater than or equal to 20-30% you should look at their individual memory requirements. A particular application may be gorging itself on memory space. If this is so, a redesign of that program is warranted. Remember that when dealing with process "brick walls" (in this case absent memory segments), small percentages are desirable. Less than 10% in this Wait State is preferable.
Dsc	This Wait State is the percentage of the workload process' Response time due to waiting for missing data to be brought into main memory from disc. An I/O "brick wall" occurs when a process wants to continue running but cannot due to necessary user-requested data missing from disc. Since a process is literally stopped and the CPU is taken away when a physical disc access is performed it is absolutely necessary to minimize this percentage. ***Performance Tip*** If you notice that most of the time the CPU Pause for Disc I/O time (Global Screen) is rising above 10-15% most of the time, you will usually find that one or more processes are spending a moderate-to-high percentage of their processing time waiting for disc I/O's to complete. If a process is consistently waiting more than 20-30% of its time on disc I/O servicing then you should find out why. There are a number of reasons why I/O bottlenecking can take place. Some common culprits are: • TurboIMAGE master and detail set inefficiencies. • Inefficient pre-fetching operation (lack of CPU, memory, poor I/O locality). • Too many I/O-demanding processes running concurrently, etc.

Data Item	Description
Imp	This Wait State is the percentage of the workload process' Response time due to being impeded by various lock and latch control mechanisms. This category includes many stop reasons. An impede occurs when a process tries to gain access to a software table or control structure and cannot because other processes arrived first. TurboIMAGE access is one of the most common sources of impedes. When a process tries to gain entry to a particular dataset and another process has that set locked via the DBLOCK intrinsic, then the waiting process is counted as having been impeded. It must wait until the prior process is finished with its current operation before it can continue. Any file can have only one disc request outstanding. For a process to access even a simple MPE/iX flat file, it must first gain control of that file's control block. This access is not by the FLOCK intrinsic, which is the case in the other wait state bucket. Rather, only one user at a time can gain access, regardless of programmatic locking. Other sources of impedes include unavailable system table entries, terminal buffers, etc. ***Performance Tip*** The interpretation of impedes can be difficult because there are potentially many causes and interrelationships between processes and resources. First of all, it is best to determine the overall global impede rate. Do this by looking at the Impede Value on the Global Process Stop Reasons screen. If the global impede percentage is consistently high it is important to look at individual processes that have high impede percentages as part of their processing time. Processes accessing the same database in applications where poor locking strategies are implemented, tend to spend a very large percentage of their time being impeded. It is not uncommon to see values in excess of 60% for processes in the Impede Wait State. A large percentage may point to poor locking or can simply indicate that a great deal of competition exists for a particular file.
Pre	This Wait State is the percentage of the workload process' Response time due to preemption by other processes. A preemption occurs when a process is forced to give up use of the CPU because a higher priority process is ready to execute. ***Performance Tip*** If both interactive and batch processes are running, batch processes in lower queues will receive a higher number of preemptions than those running in the interactive queue. If interactive users are spending too much Response time being preempted, it is possible that there is not enough CPU horsepower to go around. Backing off on demand or increasing the supply are the only recourses. It may help to sparingly distribute the CPU resource by means of the TUNE command or through a program. The basic strategy is to give less CPU attention to those who can stand it and provide more to those who need it most.

Data Item	Description
RIN	This Wait State is the percentage of time the processes within the workload are waiting for a RIN (Resource Identification Number).
TWr	This Wait State is the percentage of time the processes within the workload are waiting for terminal writes to complete. Since terminal output is usually buffered, this will only accumulate time if the system runs out of terminal buffers or if the program is blocking on terminal output.
BIO	The BIO (i.e., Block for I/O) Wait State is the percentage of time the processes within the workload are waiting for a programmatic timer (such as the PAUSE intrinsic) to complete.
Tim	This Wait State is the percentage of time the process is waiting for a programmatic timer (such as the PAUSE intrinsic) to complete.
FS	This Wait State is the percentage of time the process is waiting on a father and/or son wait.
Msg	This Wait Sate is the percentage of time the process is waiting on a message file, port, or sendmail/receivemail wait.
Oth	This Wait State is the percentage of time the process is waiting on other events not covered by the above definitions.

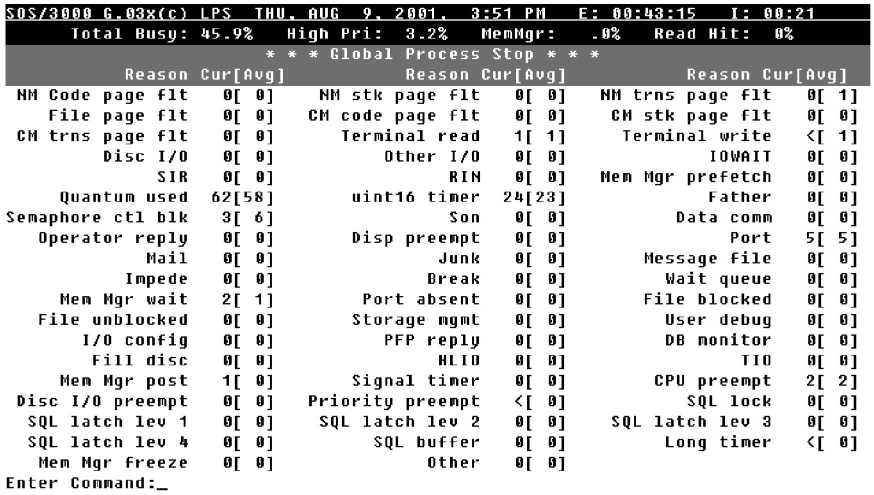
Process Information

See “Process Information” on page 74 for details.

18

SOS GLOBAL PROCESS STOPS

The Global Process Stops screen provides information that helps to determine why processes are being impeded. This information shows why system, session and job processes are giving up use of CPU. Keep in mind that a process will continue to use the CPU until one or more events occur to impede its progress.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:51 PM   E: 00:43:15   I: 00:21
      Total Busy: 45.9%   High Pri:  3.2%   MemMgr:   .0%   Read Hit:  0%
                        * * * Global Process Stop * * *
           Reason Cur[Avg]            Reason Cur[Avg]          Reason Cur[Avg]
 NM Code page flt   0[ 0]    NM stk page flt   0[ 0]   NM trns page flt   0[ 1]
    File page flt   0[ 0]   CM code page flt   0[ 0]    CM stk page flt   0[ 0]
 CM trns page flt   0[ 0]      Terminal read   1[ 1]     Terminal write   <[ 1]
         Disc I/O   0[ 0]          Other I/O   0[ 0]             IOWAIT   0[ 0]
              SIR   0[ 0]                RIN   0[ 0]   Mem Mgr prefetch   0[ 0]
     Quantum used  62[58]       uint16 timer  24[23]             Father   0[ 0]
Semaphore ctl blk   3[ 6]                Son   0[ 0]          Data comm   0[ 0]
   Operator reply   0[ 0]       Disp preempt   0[ 0]               Port   5[ 5]
             Mail   0[ 0]               Junk   0[ 0]       Message file   0[ 0]
           Impede   0[ 0]              Break   0[ 0]         Wait queue   0[ 0]
     Mem Mgr wait   2[ 1]        Port absent   0[ 0]       File blocked   0[ 0]
   File unblocked   0[ 0]       Storage mgmt   0[ 0]         User debug   0[ 0]
       I/O config   0[ 0]          PFP reply   0[ 0]         DB monitor   0[ 0]
        Fill disc   0[ 0]               HLIO   0[ 0]                TIO   0[ 0]
     Mem Mgr post   1[ 0]       Signal timer   0[ 0]        CPU preempt   2[ 2]
 Disc I/O preempt   0[ 0]   Priority preempt   <[ 0]           SQL lock   0[ 0]
  SQL latch lev 1   0[ 0]    SQL latch lev 2   0[ 0]    SQL latch lev 3   0[ 0]
  SQL latch lev 4   0[ 0]         SQL buffer   0[ 0]         Long timer   <[ 0]
   Mem Mgr freeze   0[ 0]              Other   0[ 0]
Enter Command:_
```

Figure 18.1 *SOS Global Process Stop screen*

To access the Global Process Stop screen from the Global Summary screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **S** (Global Stop Screen). The Global Process Stop screen will display (refer to Figure 18.1).

A simple example of this is when a single program reads principal balances from disc and calculates dividends. The CPU provides service to the program unless the program indicates that it no longer needs any or unless a stop event occurs. One of the most common stop events occurs when a trip to disc is necessary for the process to continue. The CPU recognizes that it is poor use of time to be monopolized by a single process (waiting for the disc I/O to occur) when it can be more productive (servicing other processes, housekeeping, etc.).

Although there are more stop reasons (fifty-five and an "other" category!) it is common to see a small number of reasons representing the majority of stop activity. Due to the scarcity of internal information available on MPE/iX we can only provide surface definitions for most of the stop reasons. If you notice a consistent amount of stop activity in a counter that you cannot determine or account for please call us. We will keep you updated on any new information concerning these obscure activities via bulletins and future releases.

Global Stop Screen Keys

All of the Global Stop Screen keys are identical to the keys of the CPU Detail Screen. See "CPU Detail Screen Keys" on page 103 for details.

Global Process Stop Data Items

Notice that there are two statistics for each stop reason: the **Current Stop** percentage and the **Average Stop** percentage (in brackets). The average represents a value that has been accumulated since SOS/3000 was initiated or since the last time the RESET TOTALS function key was pressed, whichever occurred last.

Table 18.1 *SOS Global Process Stop Data Items*

Data Item	Description
NM Code page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a native mode code page fault.
NM stk page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a native mode stack page fault.
NM trns page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a native mode transient page fault (heap, swapable table).
File page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a file page fault.
CM code page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a compatibility mode code page fault.

Data Item	Description
CM stk page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a compatibility mode stack page fault.
CM trns page flt	The percentage of all stops due to processes blocking (stopped) for a disc I/O to complete on a compatibility mode transient page fault.
Terminal read	The percentage of all stops due to processes blocking (stopped) for terminal reads.
Terminal write	The percentage of all stops due to processes blocking (stopped) for terminal writes. These include events such as console messages or general TELL and WARN messages to other sessions.
Disc I/O	The percentage of all stops due to processes blocking (stopped) for I/O to disc devices.
Other I/O	The percentage of all stops due to processes blocking (stopped) for I/O to non-disc devices. These devices include tape drives and printers.
IOWAIT	The percentage of all stops due to processes blocking (stopped) on IPC (interprocess communication) with transaction completed as one option. An example of this is use of the IOWAIT intrinsic.
SIR	The percentage of all stops due to processes blocking (stopped) for SIR's (System Internal Resource). It is used much like taking a number at a hardware store. SIR's provide a way to control which processes get access to special system services and tables. The system Group/Account is an example of one such resource.
RIN	The percentage of all stops due to processes blocking (stopped) for RIN's (Resource Identification Number). RIN's are used to coordinate file locking for files that are accessed by multiple processes.
Mem Mgr prefetch	The percentage of all stops due to processes blocking (stopped) for a memory manager prefetch action to a disc device.
Quantum used	The percentage of all stops due to the process consuming its entire time quantum.

Data Item	Description
Uint16 timer	The percentage of all stops due to processes blocking (stopped) for a time-out or pause (e.g., PAUSE intrinsic) with one second or less.
Father	The percentage of all stops due to processes blocking (stopped) which are waiting to be wakened by one or more son processes.
Semaphore ctl blk	The percentage of all stops due to processes blocking (stopped) for a control block on a semaphore.
Son	The percentage of all stops due to processes blocking (stopped) which are waiting to be wakened by their father process.
Data comm	The percentage of all stops due to processes blocking (stopped) for data communication.
Operator reply	The percentage of all stops due to processes blocking (stopped) which are waiting for an Operator reply (RIT wait).
Disp preempt	The percentage of all stops due to preemption by dispatcher to work on higher priority system processes (power failure, grey page cleanup, replenish critical pool, fetch IO, or system fetch).
Port	The percentage of all stops due to processes blocking (stopped) for a port. This is the default IPC wait.
Mail	The percentage of all stops due to processes blocking (stopped) for MAIL. MAIL is an older type of an IPC (inter-process communication) interface that existed before the message file implementation.
Junk	The percentage of all stops due to processes blocking (stopped) for a JUNK wait. This is a special system process stop activity.
Message file	The percentage of all stops due to processes blocking (stopped) for a MESSAGE. A MESSAGE is the basic IPC message file wait reason.
Impede	The percentage of all stops due to processes blocking (stopped) for file impedes. An impede is used by the file system to synchronize access to files.

Data Item	Description
Break	The percentage of all stops due to processes blocking (stopped) because they are in break mode. This means that either the BREAK key was pressed at a terminal or the BREAKJOB command was issued against an executing job.
Wait queue	The percentage of all stops due to processes blocking (stopped) for PORTS. This happens when a system table management runs out of entries and waits for additional space to be allocated.
Mem Mgr wait	The percentage of all stops due to processes blocking (stopped) for proper disc I/O synchronization. This excludes activity such as a user I/O requesting a POST.
Port absent	The percentage of all stops due to processes blocking (stopped) for requested ports from the PORTS facility to become available.
File blocked	The percentage of all stops due to processes blocking (stopped) on a port when posting pages to disc through the call CM_POST.
File unblocked	The percentage of all stops due to a wait for a file to be unblocked.
Storage mgmt	The percentage of all stops due to processes blocking (stopped) on a port through the storage management facility.
User debug	The percentage of all stops due to processes (CI's - Command Interpreters) blocking (stopped) due to breakpoint contention. This is usually because of using DEBUG breakpoints.
I/O config	The percentage of all stops due to processes blocking (stopped) devices are being configured or released.
PFP reply	The percentage of all stops due to processes blocking (stopped) because the port facility process needs to be created, initialized or checked.
DB monitor	The percentage of all stops due to processes blocking (stopped) because the database monitor (for SQL) is waiting for the DB_CLEAN_UP to finish cleaning up the aborted processes before closing the database.

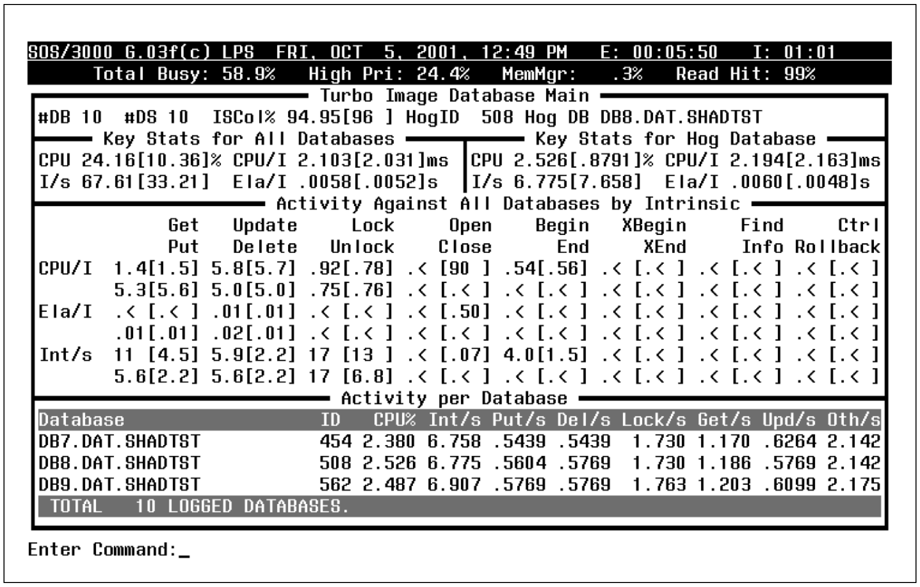
Data Item	Description
Fill disc	The percentage of all stops due to processes blocking (stopped) HLIO is waiting for the master MIB because the new file extent in secondary storage needs to be initialized with fill characters for all virgin pages.
HLIO	The percentage of all stops due to processes blocking (stopped) because the HLIO is aborting the I/O.
TIO	The percentage of all stops due to processes blocking (stopped) because Terminal I/O (TIO) fast write in DTS is waiting for a reply message from the device manager or buffer management.
Mem Mgr post	The percentage of all stops due to processes blocking (stopped) which are waiting for I/O completion when explicitly posting pages to disc.
Signal timer	The percentage of all stops due to processes blocking (stopped) for a delay or timer on a standard signal port.
CPU preempt	The percentage of all stops due to preemption by a higher priority process due to process awakening (IPC wait other than disc I/O completion).
Disc I/O preempt	The percentage of all stops due preemption by a higher-priority process due to disc I/O completion. This includes page fault, post, and prefetch.
Priority preempt	The percentage of all stops due to preemption by a higher priority process due to priority boosting or dropping.
SQL lock	The percentage of all stops due to processes blocking (stopped) which are waiting to acquire an SQL lock. This lock is required for user data (a tuple, a page or a relation).
SQL latch lev 1	The percentage of all stops due to processes blocking (stopped) for a level 1 latch. A latch is used to coordinate access to its run-time data structures. Each latch has a level associated with it and is used for deadlock prevention.
SQL latch lev 2	The percentage of all stops due to processes blocking (stopped) for a level 2 latch. A latch is used to coordinate access to its run-time data structures. Each latch has a level associated with it and is used for deadlock prevention.

Data Item	Description
SQL latch lev 3	The percentage of all stops due to processes blocking (stopped) for a level 3 latch. A latch is used to coordinate access to its run-time data structures. Each latch has a level associated with it and is used for deadlock prevention.
SQL latch lev 4	The percentage of all stops due to processes blocking (stopped) for a level 4 latch. A latch is used to coordinate access to its run-time data structures. Each latch has a level associated with it and is used for deadlock prevention.
SQL buffer	The percentage of all stops due to processes blocking (stopped) to change the state of a page in the SQL buffer. The buffer is used to hold a page (4K) of user data. The page can be in a number of states (for example being updated in transit-in, transit-out-of). When a process requests that a page be placed in a state that conflicts with its current state, the process blocks.
Long timer	The percentage of all stops due to processes pausing for two or more seconds.
Mem Mgr freeze	The percentage of all stops due to processes blocking (stopped) on freeze and corner cases other than page fault prefetch and freeze. This counter predominantly blocks on freeze.
Other	This category includes stop events that are not covered under any of the above-mentioned reasons. HP has not documented what these reasons are. Our experience shows that small numbers in these “Other” events occur relative to the others described above. This counter will usually be zero.

19

SOS TURBOIMAGE DATABASE MAIN

The TurboIMAGE Database Main screen (Figure 19.1) provides a comprehensive summary of performance data for databases located on the system. This includes accumulated data for all databases, for each database and for the database that is consuming the greatest amount of resources - the "Hog Database".



```
SOS/3000 G.03f(c) LPS  FRI, OCT  5, 2001, 12:49 PM   E: 00:05:50   I: 01:01
      Total Busy: 58.9%   High Pri: 24.4%   MemMgr:    .3%   Read Hit: 99%
                         Turbo Image Database Main
 #DB 10  #DS 10  ISCol% 94.95[96 ] HogID  508 Hog DB DB8.DAT.SHADTST
         Key Stats for All Databases           Key Stats for Hog Database
 CPU 24.16[10.36]% CPU/I 2.103[2.031]ms |CPU 2.526[.8791]% CPU/I 2.194[2.163]ms
 I/s 67.61[33.21]  Ela/I .0058[.0052]s  |I/s 6.775[7.658]  Ela/I .0060[.0048]s
                   Activity Against All Databases by Intrinsic
              Get   Update     Lock     Open    Begin  XBegin     Find    Ctrl
              Put   Delete   Unlock    Close      End    XEnd     Info Rollback
 CPU/I  1.4[1.5] 5.8[5.7] .92[.78] .< [90 ] .54[.56] .< [.< ] .< [.< ] .< [.< ]
        5.3[5.6] 5.0[5.0] .75[.76] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
 Ela/I  .< [.< ] .01[.01] .< [.< ] .< [.50] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
        .01[.01] .02[.01] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
 Int/s  11 [4.5] 5.9[2.2] 17 [13 ] .< [.07] 4.0[1.5] .< [.< ] .< [.< ] .< [.< ]
        5.6[2.2] 5.6[2.2] 17 [6.8] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
                            Activity per Database
 Database                  ID   CPU% Int/s Put/s Del/s Lock/s Get/s Upd/s Oth/s
 DB7.DAT.SHADTST          454 2.380 6.758 .5439 .5439  1.730 1.170 .6264 2.142
 DB8.DAT.SHADTST          508 2.526 6.775 .5604 .5769  1.730 1.186 .5769 2.142
 DB9.DAT.SHADTST          562 2.487 6.907 .5769 .5769  1.763 1.203 .6099 2.175
  TOTAL    10 LOGGED DATABASES.

Enter Command:_
```

Figure 19.1 *SOS TurboIMAGE Database Main screen*

To access this screen you have to press a shortcut key. This screen is available via shortcut from any other “SOS–TurboIMAGE” screens.

To access the TurboIMAGE Database Main screen from any SOS display screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen or type **J**.
2. From the Screen Selection Menu screen or at Enter Screen Code prompt, enter **I** (Turbo Image Database Main Screen). The TurboIMAGE Database Main screen will display. An example of the screen is shown in Figure 19.1.

Theory of Operation

This section provides a brief description of how the ImageStats feature is able to collect and display TurboIMAGE performance information.

Collecting Data

Any application that makes use of TurboIMAGE does so by calling TurboIMAGE intrinsics. SOS/3000 with ImageStats will, as an option, intercept all such calls for the purpose of taking statistics and reporting them. It does this by using a feature of MPE/iX called Procedure Exits. This feature enables SOS/3000 to execute functions, called handlers, both before and after the execution of each TurboIMAGE intrinsic. In this way the handlers can count the intrinsic calls, keep track of their success or failure, and measure the elapsed time and CPU time consumed.

The information obtained about intrinsic activity is stored by the handlers in an MPE file named ICOLL.PUB.LPS. This file is read and written using mapped file access, so it is very fast.

When SOS/3000 starts up with ImageStats enabled, it makes sure that the ICOLL.PUB.LPS file exists, and that the handlers are "armed" (enabled to be called when the intrinsics are called).

All of the handlers for all of the TurboIMAGE handlers must share access to the ICOLL.PUB.LPS file. A handler locks the file while it is being accessed. If another file tries to lock the file at the same time, it will be unable to do so, and it will not wait. In such a case, data will be lost. The percentage of intrinsic calls for which data was collected is displayed on the TurboImage Database Main screen as the data item **ISCol%**.

There is a mode wherein 100% of the data will be collected. However, this mode carries a somewhat greater risk to your system if there are program errors. Please contact Lund Performance Solutions for more information regarding this collection mode.

Displaying Data

In order to display data, SOS/3000 accesses the data collected by the handlers in ICOLL.PUB.LPS. It performs various computations on the data and then displays it on the ImageStats screens.

Stopping Data Collection

The handlers can tell whether the data they are collecting is being used; that is, they can tell whether there is any instance of SOS/3000 running that is using the data in ICOLL.PUB.LPS. If the data is not being used, they will quit collecting it. There will still be handler code that executes when an intrinsic is called, but it will do almost nothing. The handlers can be disabled altogether by running the program TIPEUTIL.PUB.LPS.

TurboIMAGE Database Main Screen Keys

Each of the TurboIMAGE Database Main Screen key is listed and explained in the following table.

Table 19.1 *TurboIMAGE Database Main Screen keys*

Key	Usage
Enter	Refresh screen
B	**Shortcut** to Turbo Image Database Detail Screen
E	Return to Main screen
F	Screen Freeze
J	Jump to new screen
L	Print Hardcopy
N	**Shortcut** to Turbo Image Process Detail Screen
S	Jump to SOS Screen Selection menu
X	Exit
Z	Zero Cumulative Totals
!	Execute Shell Commands
:	Execute Shell Commands
?	Help System
CTRL T	Toggle Timer Status

TurboIMAGE Database Main Screen Display Items

TurboIMAGE Database Main

The TurboIMAGE Database Main portion of the screen displays the following information.

Table 19.2 *SOS TurboIMAGE Database Main data items*

Data Item	Description
#DB	The number of accessed (logged) databases since the collection was started.
#DS	The number of accessed (logged) datasets since the collection was started.
ISCol %	The percentage of intrinsics for which data was successfully collected. See "Theory of Operation" on page 156.
Hog ID	The identification number of the database for which data access takes the greatest amount of resources.
Hog DB	The name of the database for which data access takes the greatest amount of resources.

Key Stats for All Databases

The Key Stats for All Databases portion of the screen displays the following information.

Table 19.3 *SOS Key Stats for All Databases data items*

Data Item	Description
CPU%	The percentage of utilized CPU time during the current interval used for DBI calls performed by all processes on any database.
CPU/I	The average CPU time during the current interval used per DBI call performed by all processes on any database (measured in milliseconds).
I/s	The average number of DBI calls per second performed by all processes on any database during the current interval.
Ela/I	The average completion time per DBI call performed by all processes on any database during the current interval.

Key Stats for Hog Database

The Key Stats for Hog Database portion of the TurboIMAGE Database Main screen displays the following information.

Table 19.4 *SOS Key Stats for Hog Database data items*

Data Item	Description
CPU%	The percentage of utilized CPU time during the current interval used for DBI calls performed by all processes on the hog database.
CPU/I	The average CPU time during the current interval used per DBI call performed by all processes on the hog database (measured in milliseconds).
I/s	The average number of DBI calls per second performed by all processes on the hog database during the current interval.
Ela/I	The average completion time per DBI call performed by the any processes on the hog database during the current interval.

Activity Against All Databases by Intrinsic

The Activity Against All Databases by Intrinsic portion of the screen displays the following information.

Table 19.5 *SOS Activity Against All Databases data items*

Data Item	Item for which Data is Displayed
Get	DBGET intrinsic calls
Put	DBPUT intrinsic calls
Update	DBUPDATE intrinsic calls
Delete	DBDELETE intrinsic calls
Lock	DBLOCK intrinsic calls
Unlock	DBUNLOCK intrinsic calls
Open	DBOPEN intrinsic calls
Close	DBCLOSE intrinsic calls
Begin	DBBEGIN intrinsic calls
End	DBEND intrinsic calls

Data Item	Item for which Data is Displayed
XBegin	DBXBEGIN intrinsic calls
XEnd	DBXEND intrinsic calls
Find	DBFIND intrinsic calls
Info	DBINFO intrinsic calls
Ctrl	DBCONTROL intrinsic calls
Rollback	DBXUNDO intrinsic calls

The counters and times for each of these data items are:

- **CPU/I** - The average CPU time during the current interval used per DBI call performed by all processes on all databases (measured in milliseconds).
- **Ela/I** - The average completion time per DBI call performed by the any processes on all databases during the current interval.
- **Int/s** - The average number of calls per second, calculated for DBI calls performed by all processes on any database—a separate count for each item.

Activity per Database

The Activity per Database portion of the TurboIMAGE Database Main screen contains performance data for each database accessed by any process on the system. The databases are indexed by their name; however, the user will have to use TIDBID to refer to them.

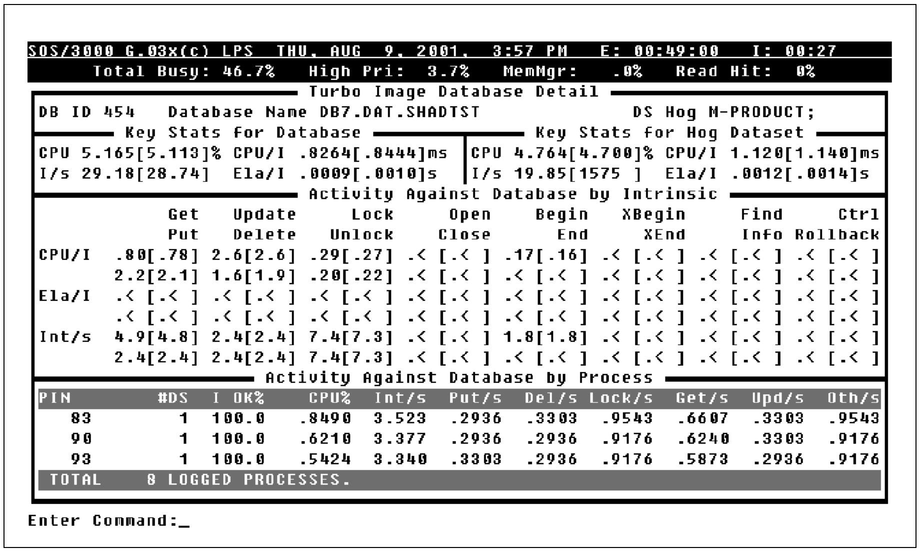
Table 19.6 *SOS Activity per Database data items*

Data Item	Description
Database	The database name.
ID	The database ID is the number uniquely assigned by SOS to the database. The user will have the option to use this ID instead of the database name in order to get to the database's detail screen.
CPU%	The percentage of utilized CPU time during the current interval used for DBI calls performed by all processes on the hog database.
Int/s	The average number of calls per second, calculated for DBI calls performed by all processes on any database—a separate count for each item.
Put/s	The average number of DBPUT intrinsic calls per second.

Data Item	Description
Del/s	The average number of DBDELETE intrinsic calls per second.
Lock/s	The average number of DBLOCK intrinsic calls per second.
Get/s	The average number of DBGET intrinsic calls per second.
Upd/s	The average number of DBUPDATE intrinsic calls per second.
Oth/s	The average number of other DBI calls.

SOS TURBOIMAGE DATABASE DETAIL

The TurboIMAGE Database Detail screen (Figure 20.1) provides performance data for a specific database; times and counts for all calls issued by all processes against the database. Because of the structure of a database, this screen also provides global performance data for all the datasets contained by the database.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:57 PM   E: 00:49:00   I: 00:27
      Total Busy: 46.7%   High Pri:  3.7%   MemMgr:   .0%   Read Hit:  0%
                      Turbo Image Database Detail
 DB ID 454   Database Name DB7.DAT.SHADTST              DS Hog M-PRODUCT;
        Key Stats for Database                Key Stats for Hog Dataset
 CPU 5.165[5.113]% CPU/I .8264[.8444]ms |CPU 4.764[4.700]% CPU/I 1.120[1.140]ms
 I/s 29.18[28.74]  Ela/I .0009[.0010]s  |I/s 19.85[1575 ]  Ela/I .0012[.0014]s
                      Activity Against Database by Intrinsic
                Get   Update     Lock     Open    Begin   XBegin     Find     Ctrl
                Put   Delete   Unlock    Close      End     XEnd     Info Rollback
 CPU/I   .80[.78] 2.6[2.6] .29[.27] .< [.< ] .17[.16] .< [.< ] .< [.< ] .< [.< ]
         2.2[2.1] 1.6[1.9] .20[.22] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
 Ela/I   .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
         .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
 Int/s   4.9[4.8] 2.4[2.4] 7.4[7.3] .< [.< ] 1.8[1.8] .< [.< ] .< [.< ] .< [.< ]
         2.4[2.4] 2.4[2.4] 7.4[7.3] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
                    Activity Against Database by Process
 PIN        #DS  I OK%    CPU%  Int/s  Put/s  Del/s Lock/s  Get/s  Upd/s  Oth/s
    83        1  100.0   .8490  3.523  .2936  .3303  .9543  .6607  .3303  .9543
    90        1  100.0   .6210  3.377  .2936  .2936  .9176  .6240  .3303  .9176
    93        1  100.0   .5424  3.340  .3303  .2936  .9176  .5873  .2936  .9176
  TOTAL     8 LOGGED PROCESSES.

Enter Command:_
```

Figure 20.1 *SOS TurboIMAGE Database Detail screen*

This screen is available from any other “SOS – TurboIMAGE” screen via shortcut key. From all other SOS screens the user can access this one via existing SOS Screen Selection menu.

To access the TurboIMAGE Database Detail screen from any SOS display screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen or type **J**.
2. From the Screen Selection Menu screen or at Enter Screen Code: prompt, enter **B** (Turbo Image Database Detail Screen).
3. You will be prompted for the TIDBID of the database in order to access this screen. Since you might not know the TIDBID assigned by SOS to a database, this may most probably

happen if you access the screen from within any other screen then Database Global Screen, the option to enter the TIDBID to be 0 (zero) is available. If the TIDBID is set to be 0, then you are prompted for the fully qualified database name in order to access the database detail screen. The TurboIMAGE Database Detail screen will display. An example of the screen is shown in Figure 20.1.

TurboIMAGE Database Detail Screen Keys

The TurboIMAGE Database Detail Screen keys are listed and explained in the following table.

Table 20.1 *TurboIMAGE Database Detail Screen keys*

Key	Usage
Enter	Refresh screen
B	**Shortcut** to Turbo Image Database Detail Screen
E	Return to Main screen
F	Screen Freeze
I	**Shortcut** to Turbo Image Database Main Screen
J	Jump to new screen
L	Print Hardcopy
N	**Shortcut** to Turbo Image Process Detail Screen
S	Jump to SOS Screen Selection menu
X	Exit
Z	Zero Cumulative Totals
!	Execute Shell Commands
:	Execute Shell Commands
?	Help System
CTRL T	Toggle Timer Status

TurboIMAGE Database Detail Screen Display Items

TurboIMAGE Database Detail

The TurboIMAGE Database Detail portion of the screen displays the data items listed in the next table.

Table 20.2 *SOS TurboIMAGE Database Detail data items*

Data Item	Description
DB ID	The database ID is the number uniquely assigned by SOS to the database.
Database Name	The name of the database for which the detailed information is displayed.
DS Hog	The database's dataset for which the data access takes the greatest amount of resources.

Key Stats for Database

The Key Stats for Database portion of the screen displays the data items listed in the next table.

Table 20.3 *SOS Key Stats for Database data items*

Data Item	Description
CPU%	The percentage of all CPU time during the current interval used for DBI calls performed by all processes on the database.
CPU/I	The average CPU time during the current interval used per DBI call performed by all processes on the database (measured in milliseconds).
I/s	The average number of DBI calls per second performed by all processes on the database during the current interval.
Ela/I	The average completion time per DBI call performed by the any processes on the database during the current interval.

Key Stats for Hog Dataset

The Key Stats for Hog Dataset portion of the TurboIMAGE Database Detail screen displays the data items listed in Table 20.4.

Table 20.4 *SOS Key Stats for Hog Dataset data items*

Data Item	Description
CPU%	The percentage of utilized CPU time during the current interval used for DBI calls performed by all processes on the hog dataset.
CPU/I	The average CPU time during the current interval used per DBI call performed by all processes on the hog dataset (measured in milliseconds).
I/s	The average number of DBI calls per second performed by all processes on the hog dataset during the current interval.
Ela/I	The average completion time per DBI call performed by the any processes on the hog dataset during the current interval.

NOTE If dataset performance data collection is turned off, the values for the items in this screen are replaced by dashed lines (---).

Activity Against Database by Intrinsic

The Activity Against Database by Intrinsic portion of the screen contains performance data for DBI calls performed by all processes on the database. This portion of the screen displays the following information.

Table 20.5 *SOS Activity Against Database by Intrinsic data items*

Data Item	Item for which Data is Displayed
Get	DBGET intrinsic calls
Put	DBPUT intrinsic calls
Update	DBUPDATE intrinsic calls
Delete	DBDELETE intrinsic calls
Lock	DBLOCK intrinsic calls
Unlock	DBUNLOCK intrinsic calls

Data Item	Item for which Data is Displayed
Open	DBOPEN intrinsic calls
Close	DBCLOSE intrinsic calls
Begin	DBBEGIN intrinsic calls
End	DBEND intrinsic calls
XBegin	DBXBEGIN intrinsic calls
XEnd	DBXEND intrinsic calls
Find	DBFIND intrinsic calls
Info	DBINFO intrinsic calls
Ctrl	DBCONTROL intrinsic calls
Rollback	DBXUNDO intrinsic calls

The counters and times for each of these data items are:

- **CPU/I** - The average CPU time during the current interval used per DBI call performed by all processes on all databases (measured in milliseconds).
- **Ela/I** - The average completion time per DBI call performed by the any processes on all databases during the current interval.
- **Int/s** - The average number of calls per second, calculated for DBI calls performed by all processes on any database—a separate count for each item.

Activity Against Database by Process

The Activity Against Database by Process portion of the screen contains performance data for all processes accessing the database for which the performance data is displayed. The entries in the list (processes) are indexed by their PIN.

Table 20.6 *SOS Activity Against Database by Process data items*

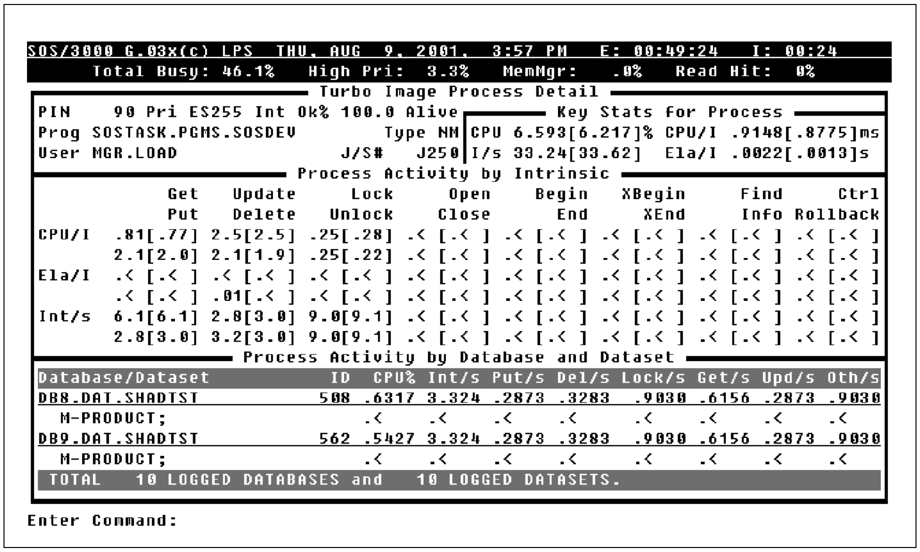
Data Item	Description
PIN	The process identification number.
#DS	The number of databases accessed (logged) since the collection was started or since the process was created - the nearest time is considered.

Data Item	Description
I OK%	The percentage of all DBI calls performed successfully by any process on any database. A successful call is defined in this context as an intrinsic call that returned 0 in the status parameter of the call.
CPU%	The percentage of all CPU time during the current interval used by the process for DBI calls.
Int/s	The average number of calls per second performed by the process on the database.
Put/s	The average number of DBPUT intrinsic calls performed by the process on the database per second.
Del/s	The average number of DBDELETE intrinsic calls per second.
Lock/s	The average number of DBLOCK intrinsic calls per second.
Get/s	The average number of DBGET intrinsic calls per second.
Upd/s	The average number of DBUPDATE intrinsic calls per second.
Oth/s	The average number of other DBI calls.

21

SOS TURBOIMAGE PROCESS DETAIL

The TurboIMAGE Process Detail screen (Figure 21.1) contains global information – regarding all databases and datasets accessed by the process and detailed information – regarding access of the process for a specific dataset and database.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:57 PM    E: 00:49:24    I: 00:24
      Total Busy: 46.1%   High Pri:  3.3%   MemMgr:   .0%   Read Hit:  0%
                           Turbo Image Process Detail
 PIN    90 Pri ES255 Int Ok% 100.0 Alive           Key Stats for Process
 Prog SOSTASK.PGMS.SOSDEV        Type NM CPU 6.593[6.217]% CPU/I .9148[.8775]ms
 User MGR.LOAD               J/S#   J250 I/s 33.24[33.62]  Ela/I .0022[.0013]s
                         Process Activity by Intrinsic
             Get   Update     Lock     Open    Begin   XBegin     Find     Ctrl
             Put   Delete   Unlock    Close      End     XEnd     Info Rollback
 CPU/I  .81[.77] 2.5[2.5] .25[.28] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
        2.1[2.0] 2.1[1.9] .25[.22] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
 Ela/I  .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
        .< [.< ] .01[.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
 Int/s  6.1[6.1] 2.8[3.0] 9.0[9.1] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
        2.8[3.0] 3.2[3.0] 9.0[9.1] .< [.< ] .< [.< ] .< [.< ] .< [.< ] .< [.< ]
                    Process Activity by Database and Dataset
 Database/Dataset           ID  CPU% Int/s Put/s Del/s Lock/s Get/s Upd/s Oth/s
 DB8.DAT.SHADTST           508 .6317 3.324 .2873 .3283  .9030 .6156 .2873 .9030
   M-PRODUCT;                  .<    .<    .<    .<     .<    .<    .<    .<
 DB9.DAT.SHADTST           562 .5427 3.324 .2873 .3283  .9030 .6156 .2873 .9030
   M-PRODUCT;                  .<    .<    .<    .<     .<    .<    .<    .<
  TOTAL    10 LOGGED DATABASES and    10 LOGGED DATASETS.

Enter Command:
```

Figure 21.1 *SOS TurboIMAGE Process Detail screen*

This screen is available through the shortcut key from any of the “SOS – TurboIMAGE” screens and through the screen selection menu to the rest of SOS screens.

To access the TurboIMAGE Process Detail screen from any SOS display screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen or type **J**.
2. From the Screen Selection Menu screen or at Enter Screen Code: prompt, enter **N** (Turbo Image Process Detail Screen).
3. At the secondary prompt, enter the PIN for the process that you need to see data for. The TurboIMAGE Process Detail screen will display. An example of the screen is shown in Figure 21.1.

TurboIMAGE Process Detail Screen Keys

Each of the TurboIMAGE Process Detail Screen key is listed and explained in the following table.

Table 21.1 *TurboIMAGE Process Detail Screen keys*

Key	Usage
Enter	Refresh screen
B	**Shortcut** to Turbo Image Database Detail Screen
E	Return to Main screen
F	Screen Freeze
H	Help System
I	**Shortcut** to Turbo Image Database Main Screen
J	Jump to new screen
L	Print Hardcopy
N	Refresh screen
S	Jump to SOS Screen Selection menu
X	Exit
Z	Zero Cumulative Totals
!	Execute Shell Commands
:	Execute Shell Commands
?	Help System
CTRL T	Toggle Timer Status

TurboIMAGE Process Detail Screen Display Items

TurboIMAGE Process Detail

The TurboIMAGE Process Detail portion of the screen contains data currently available in the current Process detail screen (like PIN, SESS, PRI, TYPE, PROG, and USER).

The one TurboIMAGE item displayed here is Int OK%, which is the number of successfully performed intrinsic calls issued by the process. A successful call is defined in this context as an intrinsic call that returned 0 in the status parameter of the call. The item is percentage of all intrinsic calls issued by the process on any database or dataset.

Key Stats for Process

The Key Stats for Process portion of the screen displays the data items listed in the next table.

Table 21.2 *SOS Key Stats for Process data items*

Data Item	Description
CPU%	The percentage of utilized CPU time during the current interval used by the process for DBI calls.
CPU/I	The average CPU time used per DBI call in the current interval, measured in milliseconds.
I/s	The average number of DBI calls per second performed by the process in the current interval.
Ela/I	The average completion time per DBI call performed by the process in the current interval.

Process Activity by Intrinsic

The Process Activity by Intrinsic portion of the screen displays the following information.

Table 21.3 *SOS Process Activity by Intrinsic data items*

Data Item	Item for which Data is Displayed
Get	DBGET intrinsic calls
Put	DBPUT intrinsic calls
Update	DBUPDATE intrinsic calls
Delete	DBDELETE intrinsic calls
Lock	DBLOCK intrinsic calls
Unlock	DBUNLOCK intrinsic calls
Open	DBOPEN intrinsic calls
Close	DBCLOSE intrinsic calls
Begin	DBBEGIN intrinsic calls
End	DBEND intrinsic calls

Data Item	Item for which Data is Displayed
XBegin	DBXBEGIN intrinsic calls
XEnd	DBXEND intrinsic calls
Find	DBFIND intrinsic calls
Info	DBINFO intrinsic calls
Ctrl	DBCONTROL intrinsic calls
Rollback	DBXUNDO intrinsic calls

The counters and times for each of these data items are:

- **CPU/I** - The average CPU time during the current interval used per DBI call performed by the current processes on all databases (measured in milliseconds).
- **Ela/I** - The average completion time per DBI call performed by the current process on all databases during the current interval.
- **Int/s** - The average number of calls per second, calculated for DBI calls performed by the current process on all database—a separate count for each item.

Process Activity by Database and Dataset

The Process Activity by Database and Dataset section contains performance data for databases and datasets accessed by the process. It is similar to the "Process Information" list in the Global Summary screen.

The look of the section depends of the amount of collected TurboIMAGE data. Dataset performance data is collected at user's request and it is an option (17) in the SOS Option Screen. This measure was taken as a result of increased resource usage that occurs when collecting all TurboIMAGE data. You are able to collect dataset performance data if necessary and you are able to prevent it from being collected if such data presents no interest for you and its collection is an unnecessary overload for the system. You must have SM or OP capabilities in order to change TurboIMAGE options in the SOS Main Options menu.

Depending on whether not dataset performance data is being collected, there are two ways to display this section.

The common features to both frame types are:

- The databases are indexed by their names, making them easy to find. The TIDBID is not placed to the left of the database name because it is used to refer the database and not as an index item. Within every database display block the datasets are indexed by their name.
- The database data is computed for the last collection time interval, presenting current data.

For each database there is a database display block that is made of lines containing data about the database and its datasets. The performance data displayed on each line is computed for the entire database or one of its datasets. The data displayed on the first line is per entire database and the following lines (contained by this database display block) contain data for each one of the database's logged datasets. The items displayed are described in the next table.

Table 21.4 *Process Activity by Database and Dataset data items*

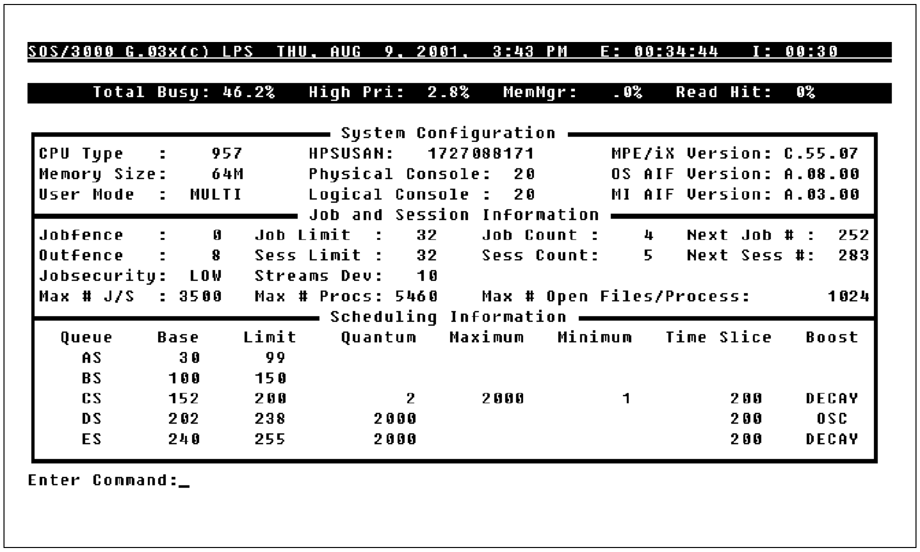
Data Item	Description
Database	The database name.
ID	The database ID is the number uniquely assigned by SOS to the database. The user will have the option to use this ID instead of the database name in order to get to the database's detail screen.
CPU%	The percentage of utilized CPU time during the current interval used for DBI calls performed by this process on the database.
Int/s	The average number of calls per second, calculated for DBI calls performed by this process on the database—a separate count for each item.
Put/s	The average number of DBPUT intrinsic calls per second.
Del/s	The average number of DBDELETE intrinsic calls per second.
Lock/s	The average number of DBLOCK intrinsic calls per second.
Get/s	The average number of DBGET intrinsic calls per second.
Upd/s	The average number of DBUPDATE intrinsic calls per second.
Oth/s	The average number of other DBI calls.

The differences between the two section types/looks:

- Dataset information is not being collected
  - The data presented on the dataset display lines contains counts and percentages computed per the entire time interval since collection was started – accumulated data.
  - The header of the frames is displayed on two different lines (for databases and datasets, because of the way that accumulated data is presented in SOS – that is enclosed in brackets.
  - The database lines are underlined.
- Dataset information is being collected:
  - The data presented on the dataset display lines contains counts and percentages computed per the last collection time interval – just like database performance data.

SOS SYSTEM CONFIGURATION

The System Configuration screen is provided as a means to show significant system configuration parameters.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:43 PM   E: 00:34:44   I: 00:30

      Total Busy: 46.2%   High Pri:  2.8%   MemMgr:   .0%   Read Hit:  0%

 ------------------------- System Configuration ------------------------
 CPU Type   :    957       HPSUSAN:   1727088171       MPE/iX Version: C.55.07
 Memory Size:    64M       Physical Console:  20       OS AIF Version: A.08.00
 User Mode  :  MULTI       Logical Console :  20       MI AIF Version: A.03.00
 ---------------------- Job and Session Information ---------------------
 Jobfence   :     0   Job Limit  :   32    Job Count :    4   Next Job # :  252
 Outfence   :     8   Sess Limit :   32    Sess Count:    5   Next Sess #:  283
 Jobsecurity:  LOW    Streams Dev:   10
 Max # J/S  : 3500    Max # Procs: 5460    Max # Open Files/Process:       1024
 ------------------------ Scheduling Information ------------------------
    Queue    Base    Limit    Quantum   Maximum   Minimum   Time Slice    Boost
      AS       30      99
      BS      100     150
      CS      152     200           2      2000         1          200    DECAY
      DS      202     238        2000                              200     OSC
      ES      240     255        2000                              200    DECAY

Enter Command:_
```

Figure 22.1 *SOS System Configuration screen*

To access the System Configuration screen from the global screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **J** (System Configuration Screen). The System Configuration screen will display. Figure 22.1 shows an example of the screen.

The screen is broken into the following sections:

- System Configuration
- Job and Session Information
- Scheduling Information

More System Configuration information is available through two additional screens that are accessed via function keys under the System Configuration screen:

- Globally Allowed Commands screen (Figure 22.1)
- System Log Events Enabled screen (Figure 22.1)

System Configuration Screen Keys

All of the System Configuration Screen keys are identical with the keys of the CPU Detail Screen. See "CPU Detail Screen Keys" on page 103 for details.

System Configuration Screen Display Items

The System Configuration screen displays data about the system configuration, jobs and sessions, and scheduling.

System Configuration

Each data item in the System Configuration portion of the System Configuration screen is described in Table 22.1.

Table 22.1 *SOS System Configuration data items*

Data Item	Description
CPU Type	The model of the computer system that runs the SOS/3000 Performance Advisor.
Memory Size	The amount of memory currently installed (megabytes).
User Mode	The current system operating mode. This option is either Single User or Multi-User.
HPSUSAN	This field represents the unique identifying number assigned to the CPU. This number is assigned by Hewlett-Packard for third-party vendors. This allows the vendors, including LPS, to tie their software to a particular CPU.
Physical Console	The logical device number to which the console device is attached.
Logical Console	The logical device number to which the console is currently assigned via the CONSOLE command.
MPE/iX Version	The version of MPE/iX currently running.

Data Item	Description
OS AIF Version	The version number of the Operating System Architected Interface that is currently installed.
MI AIF Version	The version number of the Measurement Interface Architected Interface that is currently installed.

Three messages can appear in the blank area of the System Configuration section. These messages are also in the Advice Section. They are described in the next table.

Table 22.2 *System Configuration Messages*

Message	Description
Disc Space Low	Disc space is too low to log processes on.
Out of Resources	Certain System resources are not available (tables, etc.)
Out of LDEVS	LDEV ports are not available.

Job and Session Information

Each data item in the Job and Session Information portion of the System Configuration screen is described in Table 22.3.

Table 22.3 *Job and Session Information data items*

Data Item	Description
Jobfence	The current setting of the MPE JOBFENCE.
Outfence	The current setting of the MPE OUTFENCE.
Jobsecurity	The current setting of the MPE JOBSECURITY keyword. The options are LOW or HIGH.
Max # J/S	The configured maximum number of combined jobs and sessions.
Job Limit	The current setting of the MPE LIMIT for batch jobs.
Sess Limit	The current setting of the MPE LIMIT for interactive sessions.
Streams Dev	The logical device number of system STREAMS device.
Max # Procs	The configured maximum number of concurrently running processes for the system.
Job Count	The current number of executing batch jobs.

Data Item	Description
Sess Count	The current number of interactive sessions.
Max # Open Files/Process	The configured maximum allowable number of open files process.
Next Job #	The number to be assigned to the next batch job.
Next Sess #	The number to be assigned to the next interactive session.

Scheduling Information

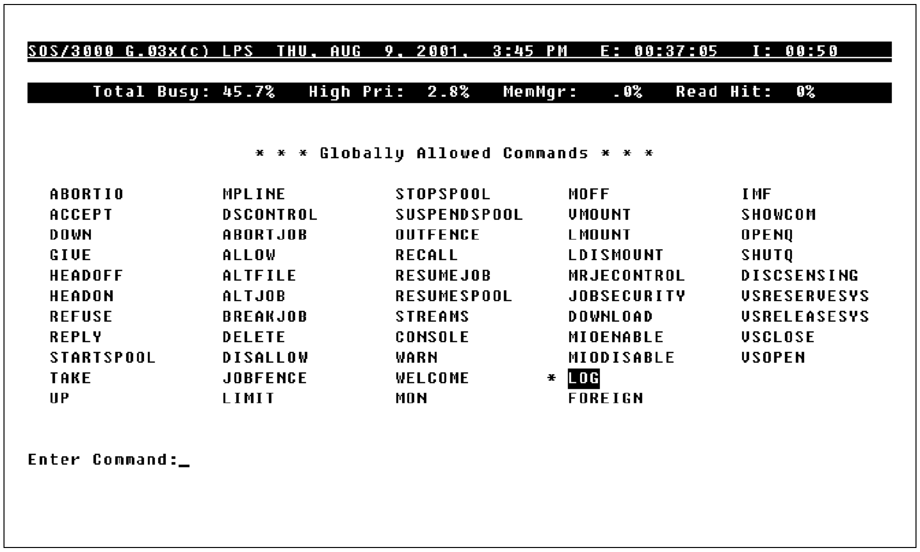
Each data item in the Scheduling Information portion of the System Configuration screen is described in Table 22.4.

Table 22.4 *Scheduling Information data items*

Data Item	Description
Queue Base AS, BS, CS, DS, ES	The base priority for the queue.
Queue Limit AS, BS, CS, DS, ES	The limit priority for the queue.
Quantum CS, DS, ES	The current queue quantum.
CS Quantum Max	The maximum allowable CS queue quantum.
CS Quantum Min	The minimum allowable CS queue quantum.
Time Slice CS, DS, ES	The amount of time allocated by the dispatcher for processes in queue before it recalculates its priority.
Boost - DECAY	If set, a process decays normally to the limit of the queue and returns to the base when the transaction is completed. DECAY is the default.
Boost - OSCILLATE	If set, a process is placed back to the base of the queue once its priority has decayed to the limit of the queue, even if it has not completed a dispatcher transaction.

Globally Allowed Commands Screen

This screen (Figure 22.2) shows all of the MPE commands that can potentially be globally allowed (i.e., allowed to all users). Access this display by pressing F4 - ALLOWED COMMANDS. Those commands within this list that have been highlighted in inverse with an "*" are currently globally allowed. (For a complete explanation of globally allowable commands, refer to the HP MPE/iX manuals.)

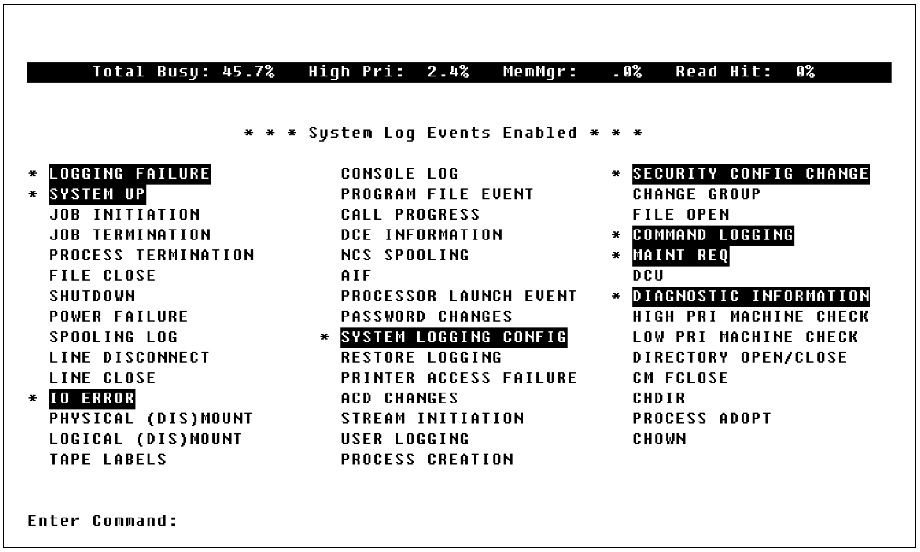


```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:45 PM   E: 00:37:05   I: 00:50

      Total Busy: 45.7%   High Pri:  2.8%   MemMgr:   .0%   Read Hit:  0%


                     * * * Globally Allowed Commands * * *

  ABORTIO         MPLINE          STOPSPOOL       MOFF            IMF
  ACCEPT          DSCONTROL       SUSPENDSPOOL    VMOUNT          SHOWCOM
  DOWN            ABORTJOB        OUTFENCE        LMOUNT          OPENQ
  GIVE            ALLOW           RECALL          LDISMOUNT       SHUTQ
  HEADOFF         ALTFILE         RESUMEJOB       MRJECONTROL     DISCSENSING
  HEADON          ALTJOB          RESUMESPOOL     JOBSECURITY     VSRESERVESYS
  REFUSE          BREAKJOB        STREAMS         DOWNLOAD        VSRELEASESYS
  REPLY           DELETE          CONSOLE         MIOENABLE       VSCLOSE
  STARTSPOOL      DISALLOW        WARN            MIODISABLE      VSOPEN
  TAKE            JOBFENCE        WELCOME       * LOG
  UP              LIMIT           MON             FOREIGN


Enter Command:_
```

Figure 22.2 *SOS Globally Allowed Commands screen*

System Log Events Enabled Screen

This screen (Figure 22.3) lists all of the MPE System Log Events that can potentially be enabled. Access this display by pressing F5 - SYS LOG EVENTS from either the System Configuration screen or the Globally Allowed Commands screen. Items highlighted in inverse with an "*" next to it are currently enabled. For a complete explanation of system logging and its associated events, refer to the appropriate MPE/iX manuals.



```
      Total Busy: 45.7%   High Pri:  2.4%   MemMgr:   .0%   Read Hit:  0%


                    * * * System Log Events Enabled * * *

* LOGGING FAILURE            CONSOLE LOG              * SECURITY CONFIG CHANGE
* SYSTEM UP                  PROGRAM FILE EVENT         CHANGE GROUP
  JOB INITIATION             CALL PROGRESS              FILE OPEN
  JOB TERMINATION            DCE INFORMATION          * COMMAND LOGGING
  PROCESS TERMINATION        NCS SPOOLING             * MAINT REQ
  FILE CLOSE                 AIF                        DCU
  SHUTDOWN                   PROCESSOR LAUNCH EVENT   * DIAGNOSTIC INFORMATION
  POWER FAILURE              PASSWORD CHANGES           HIGH PRI MACHINE CHECK
  SPOOLING LOG             * SYSTEM LOGGING CONFIG      LOW PRI MACHINE CHECK
  LINE DISCONNECT            RESTORE LOGGING            DIRECTORY OPEN/CLOSE
  LINE CLOSE                 PRINTER ACCESS FAILURE     CM FCLOSE
* IO ERROR                   ACD CHANGES                CHDIR
  PHYSICAL (DIS)MOUNT        STREAM INITIATION          PROCESS ADOPT
  LOGICAL (DIS)MOUNT         USER LOGGING               CHOWN
  TAPE LABELS                PROCESS CREATION


Enter Command:
```

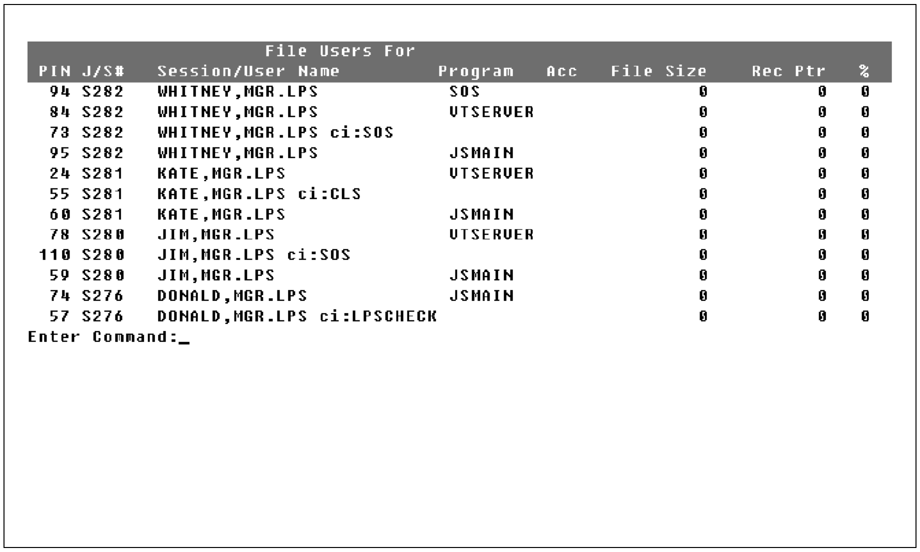
Figure 22.3 *SOS System Log Events Enabled screen*

23

SOS FILE USERS

To access the File Users Screen from the Global Summary screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen. You may also press F6 (FILE USERS) under the Utility Keys on the Process Detail Screen.
2. From the Screen Selection Menu screen, enter **F** (File Users Screen). You will be prompted for a valid filename. Do not use wildcards. After entering the filename, information similar to that in the Figure 23.1 will be displayed.



```
                      File Users For
 PIN J/S#   Session/User Name         Program   Acc   File Size    Rec Ptr   %
  94 S282   WHITNEY,MGR.LPS            SOS                    0          0   0
  84 S282   WHITNEY,MGR.LPS            VTSERVER               0          0   0
  73 S282   WHITNEY,MGR.LPS ci:SOS                            0          0   0
  95 S282   WHITNEY,MGR.LPS            JSMAIN                 0          0   0
  24 S281   KATE,MGR.LPS               VTSERVER               0          0   0
  55 S281   KATE,MGR.LPS ci:CLS                               0          0   0
  60 S281   KATE,MGR.LPS               JSMAIN                 0          0   0
  78 S280   JIM,MGR.LPS                VTSERVER               0          0   0
 110 S280   JIM,MGR.LPS ci:SOS                                0          0   0
  59 S280   JIM,MGR.LPS                JSMAIN                 0          0   0
  74 S276   DONALD,MGR.LPS             JSMAIN                 0          0   0
  57 S276   DONALD,MGR.LPS ci:LPSCHECK                        0          0   0
Enter Command:_
```

Figure 23.1 *SOS File Users screen*

File Users Screen Keys

Each of the File Users Screen key is listed and explained in the next table.

Table 23.1 *File Users Screen keys*

Key	Usage
Enter	Refresh screen
E	Return to Global Summary screen
F	Screen Freeze
J	Jump to new screen
H	Help System
L	Print Hardcopy
S	Jump to SOS Screen Selection menu
X	Exit
!	Execute Shell Commands
:	Execute Shell Commands
?	Help System
CTRL T	Toggle Timer Status

File Users Screen Display Items

The data items are described in Table 23.2.

Table 23.2 *SOS File Usage data items*

Data Item	Description
PIN	This number stands for the Process Identification Number (PIN). Each process is uniquely identified by its own PIN. The easiest way to locate processes is by knowing this number. A single job or session can have many processes associated with it.
J/S#	This is the job or session number associated with the particular process. If the process is a system type (not originating from a user job or session), **<sys>** will appear in this column.

Data Item	Description
Session/User Name	This is the logon sequence as initiated by the user or job minus the logon group. Once again, if the process was spawned by MPE/iX and not with a session or job then **<System Process>** will be shown here.
Program	This is the program executed by the user. Some system type program names will be uniquely identified, such as “Spooler.”
Acc	This is the code that represents how the file is being accessed by the process. **R** means read. **W** means write. **L** means lock.
File Size	This is the size of the file.
Rec Ptr	This is the current record number being accessed.
%	This is the number that will indicate how far a process has progressed through that file.

24

SOS FILE SPACE UTILIZATION

To access the File Space Utilization Screen from the Global Summary screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen. You may also type **J** at the Enter command: prompt of any SOS screen.
2. From the Screen Selection Menu screen, enter **U** (File Space Utilization Screen). The File Space Utilization Screen will display.

Transient disc space is disc space that is used to temporarily off-load main memory data. Effectively a transient space scheme is an inexpensive way to make main memory look bigger. The most active processes in main memory will have their data in memory, while less active processes' data will be temporarily sent out to transient disc space.

File Space Utilization Screen Keys

All of the File Space Utilization Screen keys are identical with the keys of the CPU Detail Screen. See "CPU Detail Screen Keys" on page 103 for details.

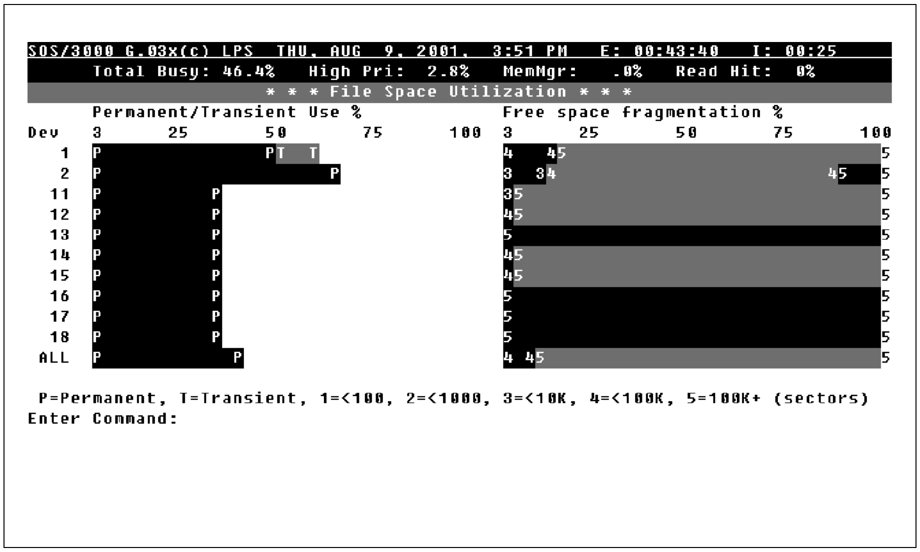
File Space Utilization Display Items

Examples of the File Space Utilization screen are provided in "Graphical Format" on page 186 and "Tabular Format" on page 188. These screen displays are especially helpful in tracking such things as disc space usage, virtual memory usage (transient space) and disc space fragmentation.

To toggle between a Graphic and Tabular display format press the **G** key or press the F4 function key (GRAPHIC DISPLAY/TABULAR DISPLAY).

Graphical Format

The graphic display shows key utilization and fragmentation statistics by disc drive and for all disc drives. The left side of the screen shows permanent and transient space utilization. The right side of the screen shows fragmentation by size category (i.e., blocks of less than 100 sector pieces, blocks of less than 1000 sectors, etc.). See Figure 24.1 for a sample display.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:51 PM   E: 00:43:40   I: 00:25
      Total Busy: 46.4%   High Pri:  2.8%   MemMgr:   .0%   Read Hit:  0%
                      * * * File Space Utilization * * *
      Permanent/Transient Use %             Free space fragmentation %
Dev   3      25       50       75      100  3      25       50       75      100
   1  P               PT  T                 4   45                             5
   2  P                     P               3  34                         45   5
  11  P          P                          35                                 5
  12  P          P                          45                                 5
  13  P          P                          5                                  5
  14  P          P                          45                                 5
  15  P          P                          45                                 5
  16  P          P                          5                                  5
  17  P          P                          5                                  5
  18  P          P                          5                                  5
 ALL  P            P                        4 45                               5

 P=Permanent, T=Transient, 1=<100, 2=<1000, 3=<10K, 4=<100K, 5=100K+ (sectors)
Enter Command:
```

Figure 24.1 *SOS File Space Utilization screen (graphical format)*

File Space Utilization (graphical format)

The File Space Utilization data items are described in the following table.

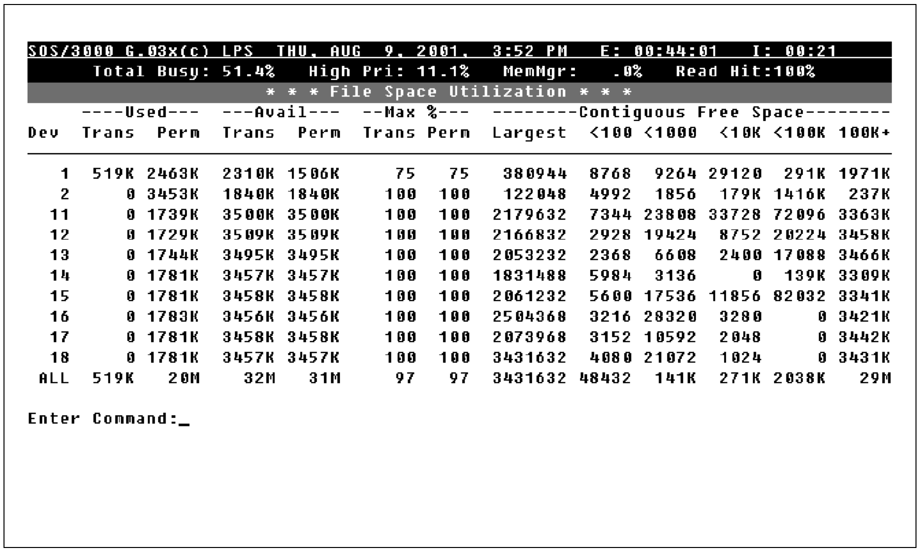
Table 24.1 *SOS File Space Utilization data items*

Data Item	Description
Dev	This is the disc drive number.
Permanent/Transient Use %	This is the amount of disc space being utilized by this disc for permanent space (delimited by the letter "P" on the bar graph) and transient space (delimited by the letter "T").

Data Item	Description
Free space fragmentation %	This is the amount of free space on each disc that is in non-continuous sectors. This mean that if information is saved on this disc and then must be retrieved from it, that information must be gathered from different areas on the disc, thus slowing response time. The bar graphs use the characters "1" through "5" as delimiters to indicate the following: **1** = The percentage of free space which is composed of chunks that are <100 sectors in size. **2** = The percentage of free space which is composed of chunks that are 100 to 999 sectors in size. **3** = The percentage of free space which is composed of chunks that are 1,000 to 9,999 sectors in size. **4** = The percentage of free space which is composed of chunks that are 10,000 to 99,999 sectors in size. **5** = The percentage of free space which is composed of chunks that are 100,000 or more sectors in size. ***Performance Tip*** The greater percentage of smaller numbers, the more fragmented is your free space.

Tabular Format

The tabular format shows more detailed information than the graphic format. Figure 24.2 is a sample of the File Space Utilization tabular screen.



```
SOS/3000 G.03x(c) LPS  THU, AUG  9, 2001,  3:52 PM   E: 00:44:01   I: 00:21
      Total Busy: 51.4%   High Pri: 11.1%   MemMgr:   .0%   Read Hit:100%
                      * * * File Space Utilization * * *
     ----Used---  ---Avail---  --Max %---  --------Contiguous Free Space--------
Dev  Trans  Perm  Trans  Perm  Trans Perm  Largest  <100 <1000  <10K <100K 100K+

   1  519K 2463K  2310K 1506K     75   75   380944  8768  9264 29120  291K 1971K
   2     0 3453K  1840K 1840K    100  100   122048  4992  1856  179K 1416K  237K
  11     0 1739K  3500K 3500K    100  100  2179632  7344 23808 33728 72096 3363K
  12     0 1729K  3509K 3509K    100  100  2166832  2928 19424  8752 20224 3458K
  13     0 1744K  3495K 3495K    100  100  2053232  2368  6608  2400 17088 3466K
  14     0 1781K  3457K 3457K    100  100  1831488  5984  3136     0  139K 3309K
  15     0 1781K  3458K 3458K    100  100  2061232  5600 17536 11856 82032 3341K
  16     0 1783K  3456K 3456K    100  100  2504368  3216 28320  3280     0 3421K
  17     0 1781K  3458K 3458K    100  100  2073968  3152 10592  2048     0 3442K
  18     0 1781K  3457K 3457K    100  100  3431632  4080 21072  1024     0 3431K
 ALL  519K   20M    32M   31M     97   97  3431632 48432  141K  271K 2038K   29M

Enter Command:_
```

Figure 24.2 *SOS File Space Utilization screen (tabular format)*

File Space Utilization (tabular format)

The following table contains a description of each component of the File Space Utilization tabular screen.

Table 24.2 *SOS File Space Utilization data items*

Data Item	Description
Dev	The disc drive number.
Used (Trans, Perm)	The amount of disc space being utilized by this disc for transient space and permanent space.
Avail (Trans, Perm)	The amount of free space on this disc for transient use and permanent use. Avail Trans is calculated by substracting Used Trans from Max Trans. Avail Perm is calculated by substracting Used Perm from Max Perm.

Data Item	Description
Max % (Trans, Perm)	The total percentage of available transient and permanent disc space for which your system is configured. ***Performance Tip*** It is important to have enough transient disc space configured on your system to prevent program aborts or delays (if insufficient space exists, applications will not run). An insufficient amount of main memory will cause the memory manager to swap out to disc, which will impact a transaction's response time.
Contiguous Free Space	The amount of free space on each disc that is in continuous sectors. **Largest** - The size (in sectors) of the largest contiguous chunk of free space on the given disc drive. **<100** - The number of sectors of free space which are composed of chunks that are <100 sectors in size. **<1000** - The number of sectors of free space which are composed of chunks that are 100 to 999 sectors in size. **<10K** - The number of sectors of the free space which are composed of chunks that are 1,000 to 9,999 sectors in size. **<100K** - The number of sectors of the free space which are composed of chunks that are 10,000 to 99,999 sectors in size. **100K+** - The number of sectors of the free space which are composed of chunks that are 100,000 or more sectors in size.

If you have a lot of free space in <100, you have disc fragmentation. Disc fragmentation, in theory, can contribute to disc I/O impedance. The graphic display of the Disc Space Utilization screen demonstrates Free Space fragmentation beautifully.

Keep in mind that this data is also logged in the SOS/3000 log files. To access this logged data refer to "SOSLOGX" on page 191. Also note that a list of extractable data items can be found in the Appendices.

25

SOSLOGX

The Historical Performance Data Extraction Utility

SOSLOGX is the historical data counterpart to SOS. It provides the means for reviewing performance data stored in the log files. The user interface is similar in many ways to SOS. The main difference is that the SOSLOGX screens do not display current samples of online performance data.

The primary functions of SOSLOGX are:

- To browse through the data recorded in your log files using a variety of screen reports. This is usually done to identify periods of system activity that may require further analysis.
- To prepare logged performance data from the log files for Performance Gallery Gold, a 32-bit, full-color graphical analysis and reporting application from Lund Performance Solutions.

The overall process can be broken down into the following three steps:

1. Collecting
2. Extracting
3. Downloading to a PC (optional)

Collecting

Collecting performance data is accomplished by running SOS/3000 in a batch mode. There are three standard jobstreams provided with SOS/3000 for this purpose (i.e., SOSMONJ, SOSJOB, SOSFULL). This three jobstreams are shown in detail in Appendix F, "Using SOS/3000 in a Batch Job" on page 299. For beginners waiting to get the logging process started immediately, simply stream SOSMONJ.PUB.LPS. This "collection" or "logging" process will create log files on the LPS account with the following file name convention: SLYYDDD, where "SL" stands for SOS/3000 Log, "YY" is current year, and "DDD" is the number of days into the current year (also known as the Julian date).

Extracting

Once you have accumulated one or more "SLxxxxx" files, you can access them using the SOSLOGX program.

With the SOSLOGX program you can perform the following regarding logged data:

- Interactively view trend information.
- Interactively zoom in on a given interval and determine what key processes were running at that time.
- Print selected reports.
- Export selected data to an ASCII file for downloading to a PC for further analysis.
- Exclude specific periods, days and dates from analysis.
- Determine averages based on user-definable criteria.

Getting Started

In order to access the logged performance data from the SOS/3000 global screen:

1. Type **S** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **L** (Log Trends Program (soslogx)).
3. SOSLOGX will check the log file catalog, if one exists. If one does not exist, it will be created containing basic information about all log files in the selected group and account as configured in the Log Trend Options.
4. Enter the following information as prompted:
   a. The start date of the initial sample using the format mm/dd/yy. If you do not provide a date, the program will retrieve the earliest sample date recorded by default. Press Enter.
   b. The start time using the format hh:mm. If you do not provide a start date, the program will retrieve the start time of the earliest sample data recorded, by default.

The first SOSLOGX data report, the CPU Utilization Trends screen, will display. Information about each SOSLOGX report is provided in “SOSLOGX Reports” on page 223.

The SOSLOGX commands and menus are described in “SOSLOGX Menus and Options” on page 203.

Command Line Switches

Use command line switches to modify the SOSLOGX configuration. Enter **soslogx -h** at the shell prompt. The functions of each command line switch is summarized in Table 25.1.

Table 25.1 *SOSLOGX command line switch functions.*

Switch	Function
/F	Specifies local configuration filename
/J	Forces job mode.
/K	Reads command information in keyword form (batch mode).
/G	Dumps SOSCHART commands to CHARTDMP file.
/N<filename>	Specifies system configuration filename.
/X	Enables process export file report.
/Z	Disables the "Are you sure you want to exit?" dialog.

Browsing SOSLOGX Reports

1. The first SOSLOGX report displayed is the CPU Utilization Trends report. Begin by scrolling through this report using the commands keys.
    - The commands shown in the SOSLOGX Main Commands screen are discussed in “SOSLOGX Menus and Options” on page 203.
    - Look for points within the data that show high CPU utilization percentages and/or high response time rates.
2. Compare the CPU data with information displayed in other SOSLOGX reports, which can be selected from the SOSLOGX Report Format Selection Menu.
    - The Report Format Selection Menu is explained in “The SOSLOGX Report Format Selection Menu” on page 205.
    - Each SOSLOGX report is described in “SOSLOGX Reports” on page 223.
3. The appearance of the reports displayed can be modified. Use the display options described in “The SOSLOGX Main Option Menu” on page 206.

Extracting Data in Batch

You can extract data with a batch job. This is the purpose of the job SOSLOGXJ. In “Cumulative Process Tracking” on page 200 you will find a sample SOSLOGXJ jobstream. This jobstream creates one report and one extract file. Add necessary job commands using this job as an example if you want more of either or both.

Exporting Data to ASCII Files

You can view data in a PC - or host - based graphics, statistical or spreadsheet program. Both global and process data can be exported. You can export data interactively or in a batch job (see "Extracting Data in Batch" on page 193). The process for exporting data is outlined as follows:

1. Determine what output file format you want and configure it as such in the export file configuration submenu in the options.
2. Select the appropriate report via the reports menu in the REPORT KEYS function key tree.
3. To indicate whether or not process information will be exported, select the option menu via the OPTIONS KEYS (F1) function key or by entering a **P** at the prompt.
4. Enter the appropriate output file starting date(s) and time(s) and ending date(s) and time(s) by selecting the PRINT REPORT function key in the LOG TRENDS main function key tree. Respond to the prompts as directed.
5. Transfer the ASCII data to the HOST- or PC-based analysis platform of your choice (for example, *Lotus 1-2-3*, *Excel*, *Quattro Pro*, *Harvard Graphics*, *Slide Write Plus*, or *Graphics Gallery*).

Using the Logging Facility

The SOS/3000 logging facility is the heart and soul of past performance trends analysis. To enable logging, answer "**Y**" to the "**Should logging be enabled?**" question in the SOS/3000 batch job SOSJOB.PUB.LPS. We recommend that you perform logging everyday. The easiest way to do this is to edit the SOSJOB jobstream to have a "**Duration of job in minutes**" of "**0**" and a re-stream of the SOSJOB just before the !EOJ. This automatically terminates a job at midnight. You can simplify the process further by adding a STREAM SOSJOB.PUB.LPS to the SYSSTART.PUB.SYS file. The overhead of this job depends on the collection interval and the size of the CPU. It usually takes less than 0.5% of the CPU.

When logging is enabled in batch, SOS/3000 will create one logical log file record for every interval. The default interval is 10 minutes. This number will be adequate in most cases. Some larger, more active shops may want to drop this to a five minute interval for finer granularity. The log file it produces will reside in the same Group and Account as the job logon specification. SOS/3000 log files are named in the following manner:

```
SLyyjjjs:
```

SL - SOS/3000 Log file.

yy- Current year, ‘01, ‘02, etc.

jjj- Julian day of the year

s- Sequence letter A-Z (up to 26 per day is possible)

It is also possible to have Cumulative Process Tracking. By enabling this feature via the appropriate line in the SOSJOB jobstream you can create a process log file. The naming convention for the process log file is similar to that of the global log file, except it begins with “**PR**” instead of “**SL**.” We will discuss Cumulative Process Tracking in greater detail later in this chapter.

Disc Space Utilization Formula for SOS Log Files

The approximate amount of disc space used in sectors by SOS/3000 log files is determined as follows:

```
(258 + (A * 70) + (B * 122) + (C * 52)) / 128
```

A - Number of user discs

B - Number of user workloads (plus up to three default workloads)

C - Maximum number of user processes logged.

Creating Custom Reports

The log reports generated by SOSLOGX are user-configurable.

The steps for creating a custom report are as follow:

1. Create the format file following the rules and syntax below.
2. Compile the format file into the REPRTDEF.REPORT.LPS file via the SOSRCOM program.
3. Reload the report, if necessary. This makes newly-compiled reports available in the current session.

There are several sample report formats in the SAMPLE.LPS group. These reports have been compiled into the REPRTDEF.REPORT.LPS file. Use these formats as examples in creating your own report format files.

The SOSRCOM report compiler uses the commands listed in the following table.

Table 25.2 *sosrcom report compiler commands*

Command	Description
ADD <file.group.acct>	Adds a new report.
DEL <report name>	Deletes a report.
DUMP <report name>	Dumps existing report internal information.
EXIT	Exits report compiler.
HELP	Displays the online help information.
LIST	Lists all reports in current reprtdef file.
UPDATE <file.group.acct>	Updates existing report.

Command	Description
REBUILD	Rebuild report configuration file.

SOSLOGX Report Configuration Rules

To create a report you must first run an EDITOR-type program. You can do this by Stand-alone or the Log Trends Utility keys. There are some rules to follow when creating custom report format files, although the entire process is essentially free-format. The logging process is keyword driven.

There are two types of keywords: *Extract-oriented* and *Format-oriented*. A list of logged data items available for extraction can be found in the Appendices. See "SOS/3000 Data Items" on page 287.

These keywords represent individually logged performance indicators such as TOT-BUSY% for total CPU busy. There are also items that represent several logged elements. For example, the DISC-IO-RATE and CPU%/GRP items can refer to multiple disc drives and application groups, respectively. Specifying DISC-IO-RATE:1 or CPU%/GRP:ALL will select for consideration disc I/O rates for LDEV 1 and a CPU utilization average for all application groups.

To extract information for separate elements (e.g., DISC-IO-RATE:1, DISC-IO-RATE:2, etc.), specify multiple lines in the format file (e.g., DISC-IO-RATE:1, DISC-IO-RATE:2, etc.).

To determine the application workload group number, refer to the main screen in SOS/3000 or count the workload group's position in the SOSWKDEF.PUB.LPS file. Remember that for disc I/O related items the logical device number of the disc drive follows the item name.

The second type of keywords available are formatting keywords. These keywords drive the format in which the extract keywords appear. See a sample format file in "SOSLOGX Report File Example" on page 199.

Delimiters

In all file specification lines, blanks and commas can be used interchangeably for delimiters. Blank lines can be inserted anywhere except in the text specifications associated with $HEAD and $TEXT lines.

Order of Items

Items must be specified in the following order:

1. TITLE, KEY, LENGTH, and LINES
2. HEAD specifications, if any
3. TEXT specifications, if any
4. ITEM and BAR specifications

Syntax of Specification Lines

The various specification lines are formatted using the following syntax.

$TITLE "<report name>"

Required. This line specifies the name of the report.

$KEY "<line 1>," "<line 2>," <keycode>

Required. This line specifies the function key used to select this report format (when function keys are available).

- <line 1> is the first function key label line.
- <line 2> is the second function key label line.
- <keycode> is the two-digit code that specifies which function key should be used. The first digit specifies the keyset. The second digit identifies a function key with that keyset (1-5). This field is optional. If not entered, the default is the first available function key.

$LENGTH <length>

Optional. This line specifies the maximum report line length. The <length> value cannot exceed 132. The default is 80.

$LINES <lines>

Optional. This line specifies the number of lines required for each log report. The default value for <lines> is the number of lines specified for $TEXT. If there is no $TEXT specification, the default is 1 (one).

$HEAD <start>

...text lines...

$END

Optional. This line specifies the report heading text lines. <start> specifies the column in which the specified text starts. The default is 1 (one).

This is used to facilitate entry of long hardcopy report lines with 80-character screen editors. The number of heading lines is defined by the first $HEAD specification encountered—subsequent $HEAD specifications may not exceed this number of lines.

$TEXT <start>

...text lines...

$END

Optional. These lines specify the fixed text label lines to appear in the log report. <start> specifies the column in which specified text starts. The restrictions for $HEAD also apply to $TEXT.

$DEFINE <identifier> <expression>

Optional. This line associates as an identifier with a string or numeric expression value. The identifiers can be used as item qualifiers in the next section.

- <identifier> is any string sequence up to 32 characters, starting with an alphabetical character.
- <expression> is one of the following:
  - A decimal, hexadecimal, or octal constant.
  - A sequence of up to 4 numerical constants, separated by periods.
  - A string of consecutive, non-blank characters, starting with a non-numeric character.
  - A quoted string, using either double or single quotation marks.

<item-name>[:<qualifier>]<row> <col> <length> <label>

This line specifies on item display.

- <item-name> is the name of the item. Global block items cannot have an item qualifier. All other items must have one.
- <qualifier> is a value that identifies which block in a multiple-block-type item is requested. This can be:
  - The word "Total" (the case must match).
  - A decimal, hexadecimal, or octal constant.
  - An identifier defined in a previous $DEFINE statement.
- <row> is the row in which the item should be displayed.
- <col> is the column in which the item should be displayed.
- <length> is the width of the field displayed.
- <label> is the unique text string (optional). It is not used by the log reporting program, but will be used by the report editor.

$BAR <row>,<col>,<length>,<label>,<item-name>,"<code>"

$END <scale>

This set of lines specifies a horizontal bar chart display, in which:

- <row> is the row in which the bar should be displayed.
- <col> is the column in which the bar should be displayed.
- <length> is the length of the bar chart displayed.
- <label> is a unique text string (optional). This is not used by the log reporting program, but will be used by the report editor.
- <item_name> is the name of the item to display. Disc and workload group items must be qualified. If multiple items are specified, they must all contain the same number of decimal places. This is generally not a problem, because only similar items will be combined in one bar graph, and similar items will all have the same number of decimal places.
- <code> is a single character to be used to represent this item in the bar graph. This can be blank.
- <scale> is the scaling factor. In other words, the total cumulative item value which completely fills the bar chart. It can contain as many decimal places as the specified items.

SOSLOGX Report File Example

An example of SOSLOGX report is provided here, for your convenience.

```
$TITLE "CPU Utilization Bar chart"
$KEY  "  CPU   "," TRENDS  ", 11
$HEAD
  *   *   *   CPU Utilization Trends   *   *   *
-------------    %CPU  Utilization   ----------------
Idle Resp
Time 0  10  20  30  40  50  60  70  80  90  100  Time
Time
$END
TIME 1, 1, 5

$BAR 1, 7, 60
AS-PROCESS%,     "A"
```

```
BS-PROCESS%,     "B"

CS-PROCESS%,     "C"

DS-PROCESS%,     "D"

ES-PROCESS%,     "E"

MEM-MANAGER%, "M"

DISPATCHER%,     "O"

OVERHEAD%,       "O"

PAUSE%,          "P"


$END


IDLE%      1, 69, 5


RESP-TIME  1, 75, 5
```

Printing Reports

The process of printing reports is outlined as follows:

1. Select the appropriate report via the reports menu in the REPORT KEYS function key tree.
2. Select, via the OPTIONS KEYS dialog, whether process information should be printed.
3. Perform any data breaks or exclusions.
4. Select the PRINT REPORT function key at the LOG TRENDS main function key tree and respond to the questions as directed with the desired starting and ending dates and times.

The report will then be directed to a spoolfile named LOGLIST. If you want to redirect the output of the Log Trends report printing function, issue a file equation using LOGLIST at the formal file designator.

Cumulative Process Tracking

Cumulative Process Tracking allows you to obtain reports on global program utilization. The basis for these reports is the Process Log file. The Process Log file is created in batch when the "**Should cumulative process tracking be enabled?**" question is answered with a **Y** (Yes). The name conventions for the Process Log file are the same as for the SOS/3000 Global Log file, except that instead of an "**SL**" the process log files have "**PR**" at the beginning.

The Process Log files contain extensive information regarding the execution of individual processes. The jobstream SOSPRANJ extracts and accumulates this process information on a program-by-program basis.

Following is a sample of SOSPRANJ job.

```
!JOB SOSPRANJ,MGR.LPS,PUB
!COMMENT
!run sospranl.logfiles.lps
standard  report type
01/01/00  beginning date
12/31/00  ending date
@.@.@     program specs to report, terminated by blank line

Y         sort by workload
1         sort key
80        cumulative cutoff percent
!COMMENT
!eoj
!RUN SOSPRANL.LOGFILES.LPS
```

26

SOSLOGX MENUS AND OPTIONS

The SOSLOGX Main Screen Function Keys

The function keys, the search keys and the utility keys under the Log Trends function are described in the next tables.

Table 26.1 *SOSLOGX Main Screen function keys*

Key	Description
F1 - OPTIONS	Displays the SOSLOGX Main Option Menu.
F2 - PRINT REPORT	Prints selected dates and times for the displayed report to the line printer.
F3 - EXPORT REPORT	Exports data from selected dates and times to ASCII files.
F5 - UTILITY KEYS	Displays various utility keys (discussed in Table 26.2).
F6 - REPORT KEYS	Displays a menu of available reports.
F7 - SEARCH KEYS	Displays search keys (discussed in Table 26.3)
F8 - MAIN SCREEN	Returns to SOS/3000 main screen.

Table 26.2 *UTILITY KEYS*

Utility Key	Description
F1 - MPE/iX COMMAND	Allows you to execute commands via an MPE command interface.
F2 - CREATE REPORTS	Executes the editor of your choice, configured in the SOSEDIT.PUB.LPS file.

Utility Key	Description
F5 - FORECAST ANALYSIS	Creates a data file for user with Forecast Capacity Planner. See the Forecast Capacity Planner quick start tutorial.
F6 - REPORT CARD	See "SOSLOGX Report Card" on page 237.
F7 - PERFORM GALLERY	Creates a data file for user with Performance Gallery Gold. See the Performance Gallery Gold manual.
F8 - MAIN KEYS	Returns to the Log Trends main function keys.

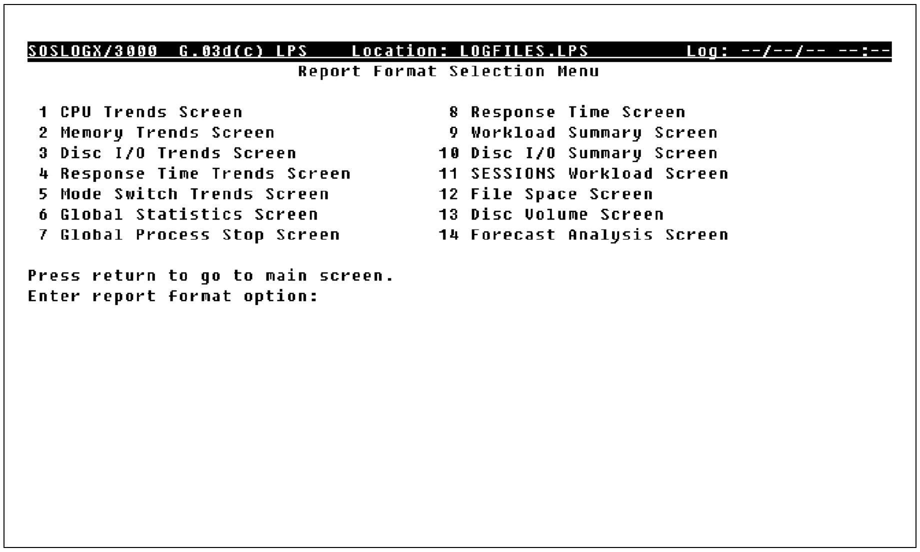
Table 26.3 *SEARCH KEYS*

Search Key	Description
F1 - SCROLL AHEAD	Displays the next page of data.
F2 - SCROLL BACK	Displays the previous page of data.
F3 - SKIP AHEAD	Produces a prompt for the number of samples to skip. After entering a valid number, that number of samples will be bypassed in a forward direction. The data displayed will be from that point forward.
F4 - SKIP BACK	Performs like the SKIP AHEAD. When a valid number is entered, that number of samples will be skipped backward. The data displayed will then be from that point.
F5 - SELECT TIME	Prompts for a time at which you want to begin examining data.
F6 - LIST LOGFILES	Displays all available SOS/3000 log files in the currently selected group and account.
F7 - REPORT KEYS	Displays the Report Selection menu.
F8 - MAIN KEYS	Returns to the main Log Trends (SOSLOGX) keys.

The SOSLOGX Report Format Selection Menu

A report is defined as a screen display format. It is also used to determine data for exportation, printing and graphing. There are a variety of reports available within the Log Trends function. There are two main types of reports: a *Standard report* and an *Export report*. The Standard report is used to perform regular reporting. It includes headings, text and data. The Export report is used to extract logged data into an ASCII format for exportation. The format of the Export report output is configurable via the SOSLOGX Main Options. In either case, the reports are used to present data on a terminal display. You can create your own report formats (see “Creating Custom Reports” on page 195).

Reports are selected from the reports menu and are available via the REPORT KEYS. The Reports menu is similar to Figure 26.1.



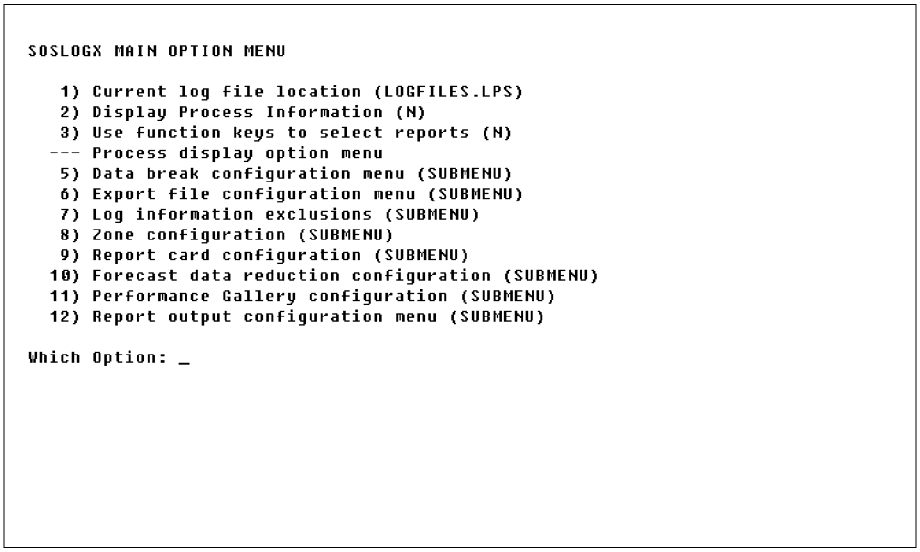
```
SOSLOGX/3000  G.03d(c) LPS     Location: LOGFILES.LPS          Log: --/--/-- --:--
                         Report Format Selection Menu

 1 CPU Trends Screen                      8 Response Time Screen
 2 Memory Trends Screen                   9 Workload Summary Screen
 3 Disc I/O Trends Screen                10 Disc I/O Summary Screen
 4 Response Time Trends Screen           11 SESSIONS Workload Screen
 5 Mode Switch Trends Screen             12 File Space Screen
 6 Global Statistics Screen              13 Disc Volume Screen
 7 Global Process Stop Screen            14 Forecast Analysis Screen

Press return to go to main screen.
Enter report format option:
```

Figure 26.1 *SOSLOGX Report Format Selection Menu screen*

To view one of the reports listed in the Report Format Selection Menu, type the report’s corresponding command key at the command prompt. The reports are described in detail in “SOSLOGX Reports” on page 223.

The SOSLOGX Main Option Menu

By pressing the OPTIONS function key you can alter various characteristics of the program and data. These options will allow you to tailor past performance data to your specifications. If you want to perform averaging, you can manipulate export data characteristics or date and time exclusions to do so.



```
SOSLOGX MAIN OPTION MENU

   1) Current log file location (LOGFILES.LPS)
   2) Display Process Information (N)
   3) Use function keys to select reports (N)
  --- Process display option menu
   5) Data break configuration menu (SUBMENU)
   6) Export file configuration menu (SUBMENU)
   7) Log information exclusions (SUBMENU)
   8) Zone configuration (SUBMENU)
   9) Report card configuration (SUBMENU)
  10) Forecast data reduction configuration (SUBMENU)
  11) Performance Gallery configuration (SUBMENU)
  12) Report output configuration menu (SUBMENU)

Which Option: _
```

Figure 26.2 *SOSLOGX Main Option menu*

Main Options

To enable an option:

1. Type the option command key from the SOSLOGX Main Option menu and press Enter.
2. Enter a new parameter at the secondary command prompt. Press Enter.
3. Press Enter again to exit the SOSLOGX Main Option menu.
4. At the Should these options be saved permanently? prompt:
   - Press Enter to return to the SOSLOGX program without saving the options permanently.
   - Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each option is described to assist you.

Current log file location

The current location of the SL log file is shown in parentheses. To load a different log file:

1. From the SOSLOGX Main Option menu, type the command key (option 1) for the Current log file location option. Press Enter.
2. At the secondary prompt, select the group and account in which the desired log file will reside by entering: **GROUP.ACCOUNT**. Press the Enter key.

   Normal MPE security applies here. To remove a location, enter a caret ("^") or a blank.

Display Process Information

This option allows you to display processes that were logged via SOS/3000 batch collection. See “Using SOS/3000 in a Batch Job” on page 299, to find how to enable batch collection. If you indicate to SOS/3000 that you want processes to be logged, those qualifying processes will appear at each time interval just under the current global data sample on the screen.

To include/exclude Process Information in the global report:

1. From the SOSLOGX Main Option menu, type **2** for the Display Process Information option. Press the Enter key.
2. At the secondary prompt, type **Y** (Yes) to enable the option, or **N** (No) to disable the option. Press Enter.

Use function keys to select reports

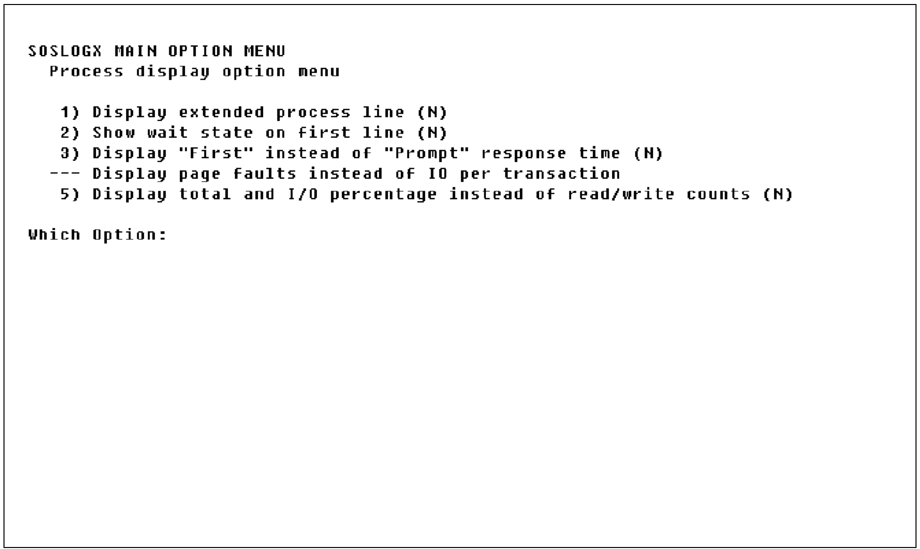
The function keys, when available, are displayed in the bottom portion of the soslogx screens. By default, they are not used to select soslogx reports. To enable/disable the function keys to select reports:

1. From the SOSLOGX Main Option menu, type **3** for the Use function keys to select reports option. Press Enter.
2. At the secondary prompt, type **Y** (Yes) to enable the option, or **N** (No) to disable the option. Press Enter.

Process display option menu (SUBMENU)

This option is only available if option 2 - Display Process Information is set to **Y**. To view the Process display option submenu, type **4** for the Process display option. Press Enter.

This option will display the following submenu:



```
SOSLOGX MAIN OPTION MENU
  Process display option menu

   1) Display extended process line (N)
   2) Show wait state on first line (N)
   3) Display "First" instead of "Prompt" response time (N)
  --- Display page faults instead of IO per transaction
   5) Display total and I/O percentage instead of read/write counts (N)

Which Option:
```

Figure 26.3 *SOSLOGX Process display option submenu*

The Process display options are listed and described in the next table.

Table 26.4 *SOSLOGX Process display options*

Option	Default	Description
Display extended process line	N	By default, the extended process line is not displayed. To display extended process line, enter **Y** (Yes).
Show wait state on first line	N	By default, the current wait state is not displayed on the first line of the process information. To show wait state on the first line, enter **Y** (Yes). The "Display Total I/O instead of Read/Write counts" option will be unavailable if wait states are displayed.
Display "First" instead of "Prompt" response time	N	By default, you can view the Prompt response time of a process. To display First response time, enter Y (Yes).

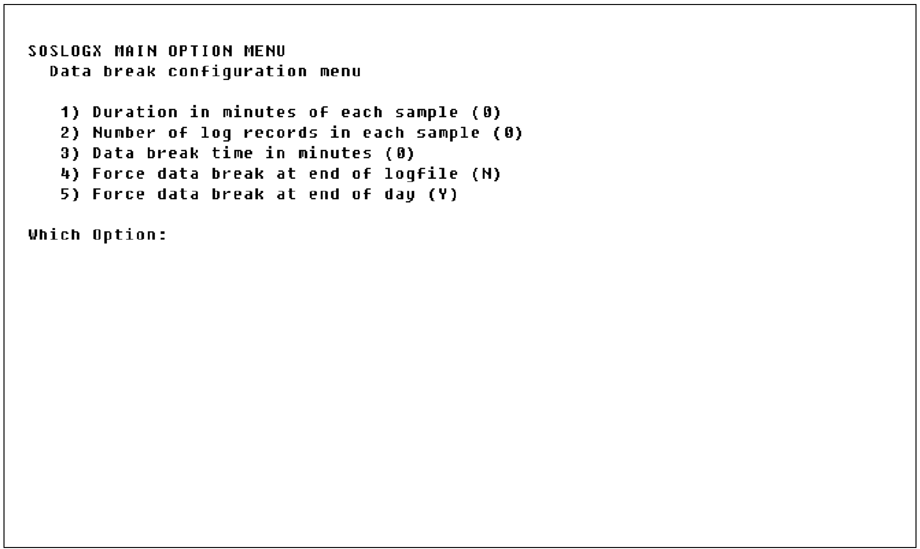
Option	Default	Description
Display page faults instead of IO per transaction	N	This option is only available if "Display extended process line" is set to **Y** (Yes). By default, the page fault memory statistic is not displayed on the extended process display. In order to display page faults, enter **Y** (Yes).
Display total and I/O percentage instead of read/write counts	N	By default, SOS/3000 will display the number of logical reads and writes to disc. To display total I/O and the percentage of all I/Os for which the processes are responsible, enter **Y** (Yes).

Press Enter after making your selection to return to the SOSLOGX Main Options menu.

Data break configuration menu (SUBMENU)

To view the Data break configuration submenu, type **5** for the Data break configuration menu option. Press Enter.

This option will display the following data break options:



```
SOSLOGX MAIN OPTION MENU
  Data break configuration menu

   1) Duration in minutes of each sample (0)
   2) Number of log records in each sample (0)
   3) Data break time in minutes (0)
   4) Force data break at end of logfile (N)
   5) Force data break at end of day (Y)

Which Option:
```

Figure 26.4 *SOSLOGX Data break configuration submenu*

These options combine to provide you with the ability to determine groupings and granularity of data.

The Data break configuration options are listed and described in Table 26.5.

Table 26.5 *SOSLOGX Data break configuration options*

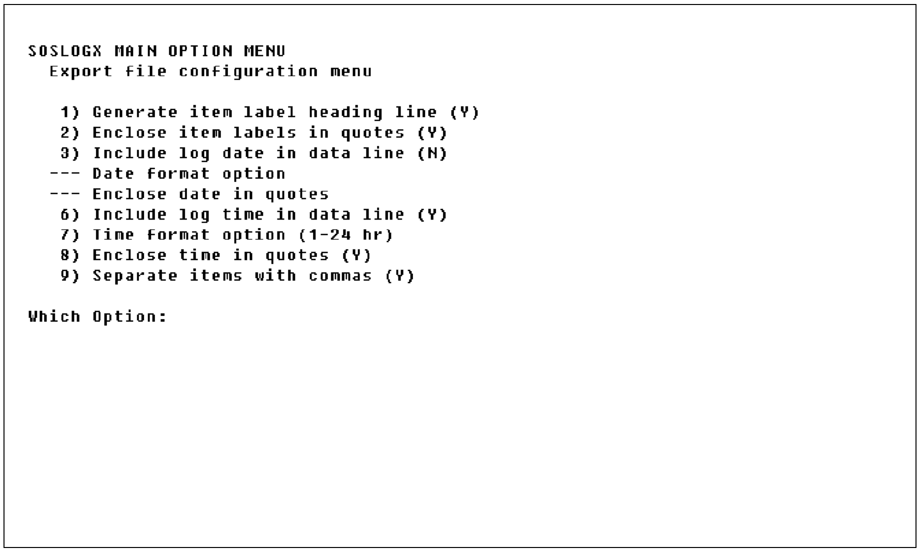
Option	Default	Description
Duration in minutes of each sample	0	This option allows you to report hourly averages of data collected in 10 minutes intervals. To do this, type "**60**" in this field.
Number of log records in each sample	0	This option allows you to do the same things as the previous one, except it groups by interval instead of by time. The values returned from LOG TRENDS represent averages not time slices.
Data break time in minutes	30	The data break will appear as a separating line between the last interval of the log file and the first interval of the next log file.
Force data break at end of logfile	N	By default, the boundary between data files is transparent, or "invisible", to the user. To force a break between data files on the report screen, enter **Y** (Yes).
Force data break at end of day	Y	By default, there is a break after the last data record for each day. To remove this break, enter **N** (No).

Press Enter after making your selection to return to the SOSLOGX Main Options menu.

Export file configuration menu (SUBMENU)

To view the Export file configuration submenu, type the command key for the Export file configuration menu option from the SOSLOGX Main Option menu (option 6).

This option will display the following export file configuration options:



```
SOSLOGX MAIN OPTION MENU
  Export file configuration menu

   1) Generate item label heading line (Y)
   2) Enclose item labels in quotes (Y)
   3) Include log date in data line (N)
  --- Date format option
  --- Enclose date in quotes
   6) Include log time in data line (Y)
   7) Time format option (1-24 hr)
   8) Enclose time in quotes (Y)
   9) Separate items with commas (Y)

Which Option:
```

Figure 26.5 *SOSLOGX Export file configuration submenu*

These combined items provide an extensive control over the format of data extracted into ASCII files.

The Export file configuration options are listed and described in the next table.

Table 26.6 *SOSLOGX Export file configuration options*

Option	Default	Description
Generate item label heading line	Y	The item label heading line is provided by default. To eliminate the heading line, choose **N** (No).
Enclose item labels in quotes	Y	The data item labels are enclosed in quotation marks (" "). To eliminate the quotation marks, choose **N** (No).
Include log date in data line	N	To include the log date in the data line, enter **Y** (Yes). The two subsequent options will be activated.

Option	Default	Description
Date format option	1-mm/dd/yy	This option is only available if option 3 is set to **Y**. To change the format of the log date, enter the corresponding number: 1=mm/dd/yy 2=mmddyy 3=dd mmm yy 4=dd.mm.yy
Enclose date in quotes	Y	The log date will be enclosed in quotation marks, by default. To remove the quotation marks, enter **N** (No).
Include log time in data line	Y	The log time will be included in the data line. To eliminate this information from the data line, enter **N** (No).
Time format option	1=24 hr	The time format options are: 1=24 hr 2=AM/PM
Enclose time in quotes	Y	The log time will be enclosed in quotation marks, by default. To remove the quotation marks, enter **N** (No).
Separate items with commas	Y	By default, the data items in the export file are comma-delimited. To send the data without commas, enter **N** (No).

Press Enter after making your selection to return to the SOSLOGX Main Options menu.

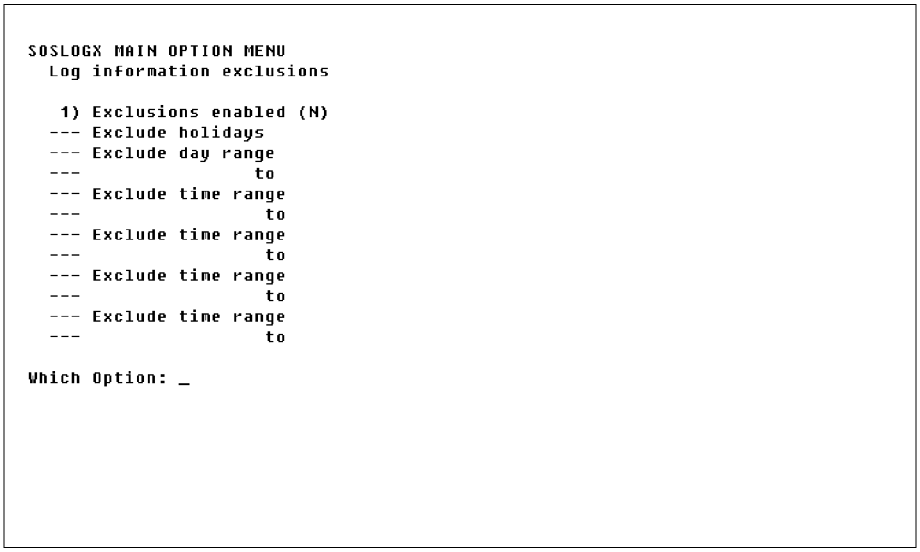
Log information exclusions (SUBMENU)

The Log information exclusions submenu contains options that can be set to exclude specific day and time ranges from the data display. The excluded data will not actually be removed from the SL file, but it will not appear in the soslogx reports.

The Log information exclusions options enable the user to exclude performance data collected during days or periods of low and or unusual activity that could skew analysis of the system's general performance.

NOTE Do not exclude log information when preparing data for export to the Forecast Capacity Planner and Performance Gallery Gold applications. Ensure the default settings are enabled.

To view the Log information exclusions submenu, type the command key for the Log information exclusions option (option 7) from the SOSLOGX Main Options menu (see Figure 26.6).



```
SOSLOGX MAIN OPTION MENU
  Log information exclusions

   1) Exclusions enabled (N)
  --- Exclude holidays
  --- Exclude day range
  ---                to
  --- Exclude time range
  ---                 to
  --- Exclude time range
  ---                 to
  --- Exclude time range
  ---                 to
  --- Exclude time range
  ---                 to

Which Option: _
```

Figure 26.6 *SOSLOGX Log information exclusions submenu*

The Log information exclusions options are listed and described in the next table.

Table 26.7 *SOSLOGX Log information exclusion options*

Option	Default	Description
Exclusions enabled	N	By default, exclusions are disabled. To set and enable one or more exclusions, type **Y** (Yes) and press Enter - the subsequent options will be activated.
Exclude holidays	N	To exclude holidays (as defined in the HOLIDAYS.PUB.LPS file), type **Y** (Yes) and press Enter. For information about the HOLIDAYS.PUB.LPS file, see “HOLIDAYS File” on page 50.

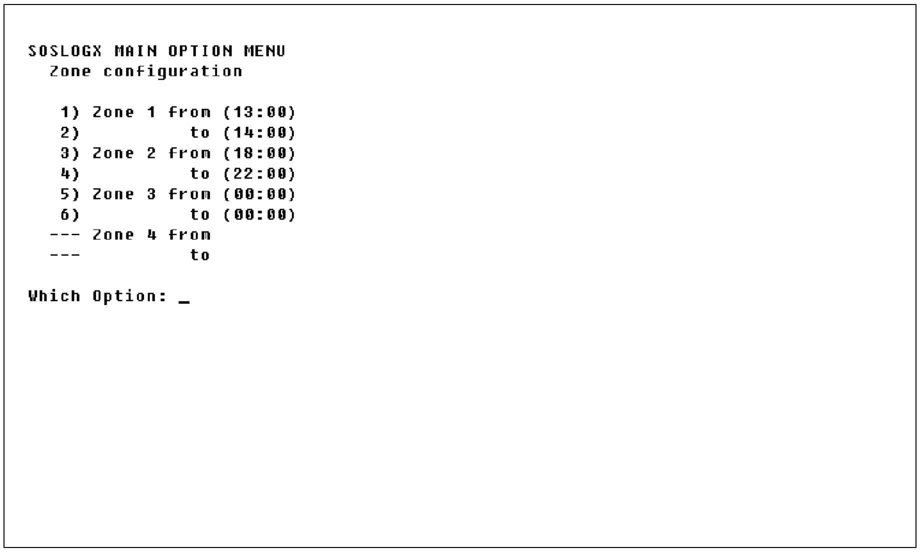
Option	Default	Description
Exclude day range	0=None	To exclude a range of days, type the corresponding number of the first day in the range of days. For example: 0=None (exclude no days) 1=Sunday 2=Monday 3=Tuesday 4=Wednesday 5=Thursday 6=Friday 7=Saturday
to	0=None	Type the corresponding number of the last day in the excluded day range.
Exclude time range	00:00	To exclude a specific range of time, type the start of this range in hours and minutes (hh:mm).
to	00:00	Type the end of the excluded time range (hh:mm).

Additional time ranges can be excluded. The progression of options allows up to four different time ranges to be excluded from each day or day range. For example, to report data for normal business hours only (Monday through Friday, 8:00 AM to 5:00 PM, no holidays), you would exclude data from weekends, holidays, the early morning hours, and the night-time hours.

Press Enter after making your selection to return to the SOSLOGX Main Options menu.

Zone configuration (SUBMENU)

One of the abilities provided by Log Trends is the ability to report performance information by zone. To access this submenu, choose option 8 from the SOSLOG Main Options menu. This feature is more thoroughly documented in “Report by zone (option 13)” on page 250. The following is provided for completeness:

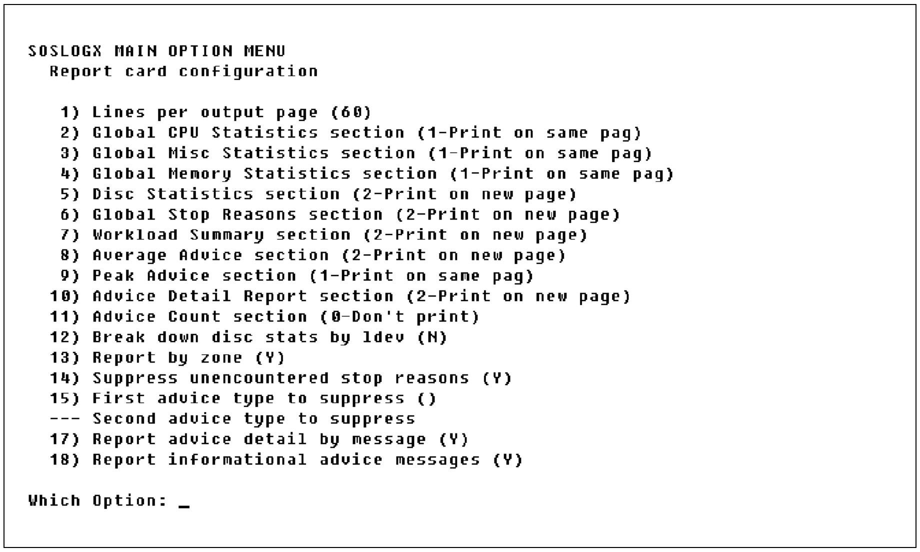


```
SOSLOGX MAIN OPTION MENU
  Zone configuration

   1) Zone 1 from (13:00)
   2)          to (14:00)
   3) Zone 2 from (18:00)
   4)          to (22:00)
   5) Zone 3 from (00:00)
   6)          to (00:00)
  --- Zone 4 from
  ---          to

Which Option: _
```

Figure 26.7 *SOSLOGX Zone configuration submenu*

Report card configuration (SUBMENU)

To view the Report card configuration submenu, type the command key (option 9) for Report card configuration option. Press the Enter key. For detailed information on this submenu, see "SOSLOGX Report Card" on page 237.



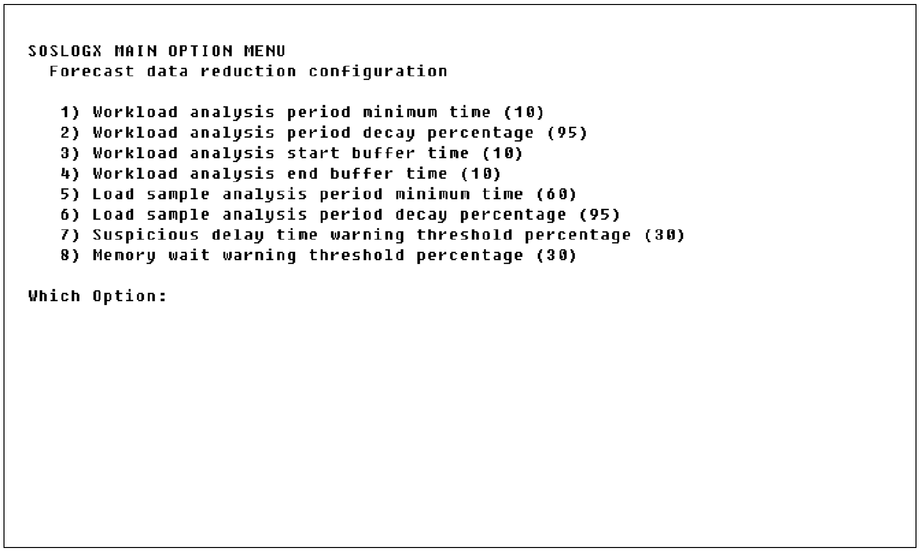
```
SOSLOGX MAIN OPTION MENU
  Report card configuration

   1) Lines per output page (60)
   2) Global CPU Statistics section (1-Print on same pag)
   3) Global Misc Statistics section (1-Print on same pag)
   4) Global Memory Statistics section (1-Print on same pag)
   5) Disc Statistics section (2-Print on new page)
   6) Global Stop Reasons section (2-Print on new page)
   7) Workload Summary section (2-Print on new page)
   8) Average Advice section (2-Print on new page)
   9) Peak Advice section (1-Print on same pag)
  10) Advice Detail Report section (2-Print on new page)
  11) Advice Count section (0-Don't print)
  12) Break down disc stats by ldev (N)
  13) Report by zone (Y)
  14) Suppress unencountered stop reasons (Y)
  15) First advice type to suppress ()
  --- Second advice type to suppress
  17) Report advice detail by message (Y)
  18) Report informational advice messages (Y)

Which Option: _
```

Figure 26.8 *SOSLOGX Report card configuration submenu*

NOTE Options 10 and 12 are available only for owners of *Forecast Capacity Planner*.

Forecast data reduction configuration (SUBMENU)

If you are licensed to use Forecast Capacity Planner, the Forecast data reduction configuration option is available from the SOSLOGX Main Options menu. Use this menu to set parameters for the Forecast export file. Access this submenu by typing 10 and pressing Enter.



```
SOSLOGX MAIN OPTION MENU
  Forecast data reduction configuration

    1) Workload analysis period minimum time (10)
    2) Workload analysis period decay percentage (95)
    3) Workload analysis start buffer time (10)
    4) Workload analysis end buffer time (10)
    5) Load sample analysis period minimum time (60)
    6) Load sample analysis period decay percentage (95)
    7) Suspicious delay time warning threshold percentage (30)
    8) Memory wait warning threshold percentage (30)

Which Option:
```

Figure 26.9 *SOSLOGX Forecast data reduction configuration submenu*

Each Forecast data reduction parameter is described in the next table.

Table 26.8 *SOSLOGX Forecast data reduction configuration options*

Option	Default	Description
Workload analysis period minimum time	10	Enter the minimum workload analysis period in minutes. These are periods when a specific workload is the primary if not only active workload that are used to calibrate workload physical disc I/O and overhead CPU utilization.

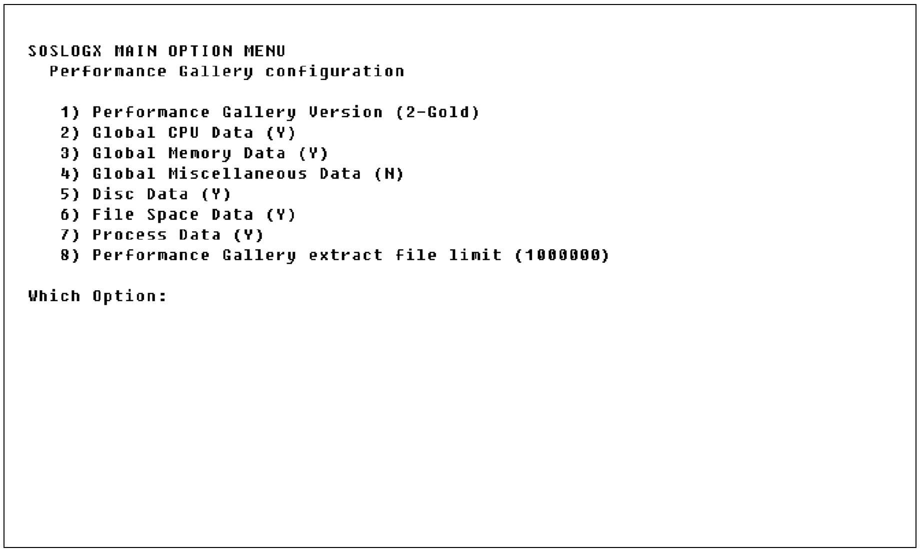
Option	Default	Description
Workload analysis period decay percentage	95	Enter a decay percentage to be used to determine the workload analysis period. These are periods when a specific workload is the primary, if not only, active workload that are used to calibrate workload physical disc I/O and CPU overhead utilization. The decay percentage is a measure of how far the workload's percentage of total logical disc I/O requests must decay from it's maximum value before marking the boundaries of the analysis period.
Workload analysis start buffer time	10	Buffer time in minutes which must be retained between the time a workload activity starts up and the beginning of the workload analysis period. This time buffer protects the workload calibration process from atypical workload demands involved in starting up the workload application.
Workload analysis end buffer time	10	Buffer time in minutes which must be retained between the end of a workload analysis period and the time all activity in that workload ceases. This time buffer protects the workload calibration process from atypical workload demands involved in shutting down the workload application.
Load sample analysis period minimum time	60	Enter the minimum sample load analysis period in minutes. These are periods of high system load that will be used to define the a computer model representing the current system load.
Load sample analysis period decay percentage	95	Enter a decay percentage to be used to determine the sample load analysis period. These are periods of high system load that will be used to define the a computer model representing the current system load. The decay percentage is a measure of how far the CPU utilization must decay from its maximum value before marking the boundaries of the analysis period.

Option	Default	Description
Suspicious delay time warning threshold percentage	30	If a workload spends a significant percentage of time waiting for resources other than disc I/O or the CPU, it may not be possible to forecast the effects of changes on it. Enter a percentage of "suspicious" delay time to allow without giving a warning message.
Memory wait warning threshold percentage	30	If a workload spends a significant percentage of time waiting for resources other than disc I/O or the CPU, it may not be possible to forecast the effects of changes on it. Enter a percentage of "suspicious" delay time to allow without giving a warning message.

Press Enter after making your selection to return to the SOSLOGX Main Options menu.

Performance Gallery configuration (SUBMENU)

To view the Performance Gallery configuration submenu, type the command key (option 11) for the Performance Gallery configuration option from the SOSLOGX Main Options menu. This option is only available for owners of Performance Gallery Gold.



```
SOSLOGX MAIN OPTION MENU
  Performance Gallery configuration

   1) Performance Gallery Version (2-Gold)
   2) Global CPU Data (Y)
   3) Global Memory Data (Y)
   4) Global Miscellaneous Data (N)
   5) Disc Data (Y)
   6) File Space Data (Y)
   7) Process Data (Y)
   8) Performance Gallery extract file limit (1000000)

Which Option:
```

Figure 26.10 *SOSLOGX Performance Gallery configuration submenu*

The Performance Gallery configuration options are listed and described in Table 26.9.

Table 26.9 *SOSLOGX Performance Gallery configuration options*

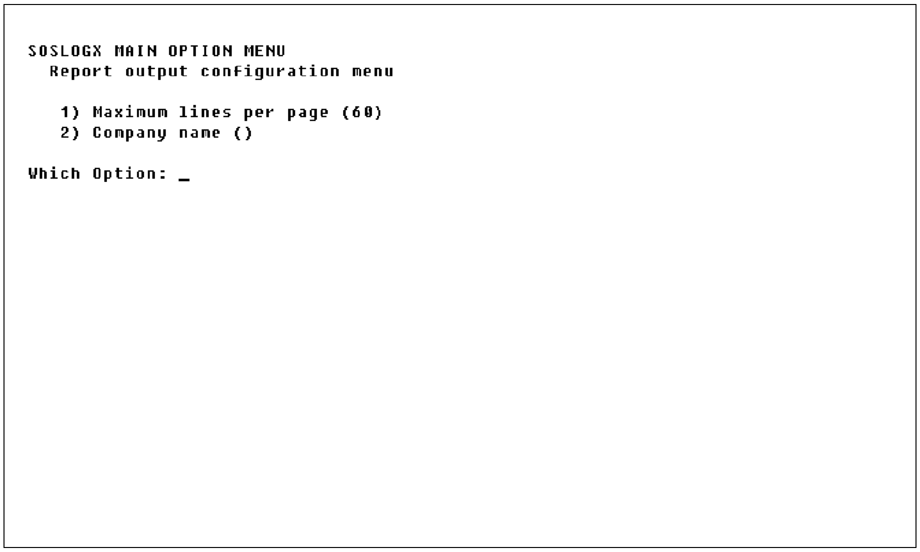
Option	Default	Description
Performance Gallery Version	1-Original	By default, the Performance Gallery version is 1 - Original. Your choices are: • 1 - Original • 2 - Gold
Global CPU Data	Y	By default, the global CPU data in the collection will be displayed. To eliminate CPU data from the report file, enter **N** (No).
Global Memory Data	Y	By default, the global memory data will be displayed. To eliminate this data from the report file, enter **N**.
Global Miscellaneous Data	Y	By default, the global miscellaneous data will be displayed. To eliminate this data from the report file, enter **N**.
Disc Data	Y	By default, disc data will be displayed. To eliminate this data from the report file, enter **N**.
File Space Data	Y	By default, file space data will be displayed. To eliminate this data from the report file, enter **N**.
Process Data	N	By default, process data will not be displayed. To include this data from the report file, enter **Y**.
Performance Gallery extract file limit	1000000	By default, the Performance Gallery extract file limit is 1,000,000 MB.

Press Enter after making your selection to return to the SOSLOGX Main Options menu.

Report output configuration menu (SUBMENU)

This option allows you to control the number of lines per page that you wish to configure for the SOSLOGX printed output.

To display the Report output configuration submenu, type the corresponding command key (12) from the SOSLOGX Main Options menu.



```
SOSLOGX MAIN OPTION MENU
  Report output configuration menu

   1) Maximum lines per page (60)
   2) Company name ()

Which Option: _
```

Figure 26.11 *SOSLOGX Report output configuration submenu*

The Report output configuration options are listed and described in the next table.

Table 26.10 *SOSLOGX Report output configuration options*

Option	Default	Description
Maximum lines per page	60	By default, SOSLOGX reports contain up to 60 lines of information per page. To increase or decrease the maximum threshold type a new maximum threshold. Press Enter.
Company Name		By default, the company name is not included in the SOSLOGX reports. Type a company name, system name, or another headline (up to 43 alpha-numeric characters). Press Enter.

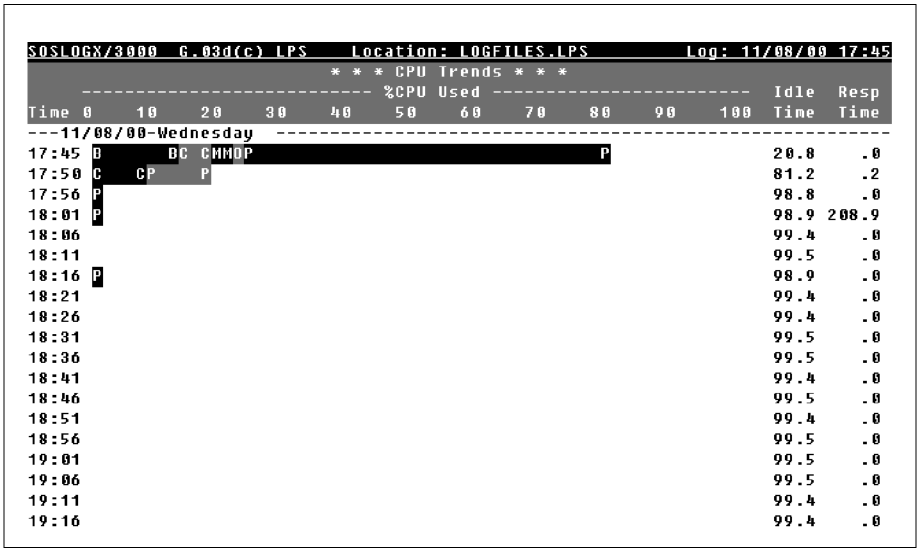
27

SOSLOGX REPORTS

To access SOSLOGX Trends Screens, press **F6 - REPORT KEYS**. The Report Format Selection Menu will appear. SOSLOGX trend screens are very similar to those found in SOS. See “SOS Current Resource Trends” on page 89 for more details. These screens will look quite different from the figures presented in this chapter if Option 2 - Display process information is set to **Y** in the SOSLOGX Main Options menu.

SOSLOGX CPU Trends Screen

The CPU Trends screen in SOSLOGX displays general CPU statistics in graphical format. To access this screen select option 1 from the Report Format Selection Menu.



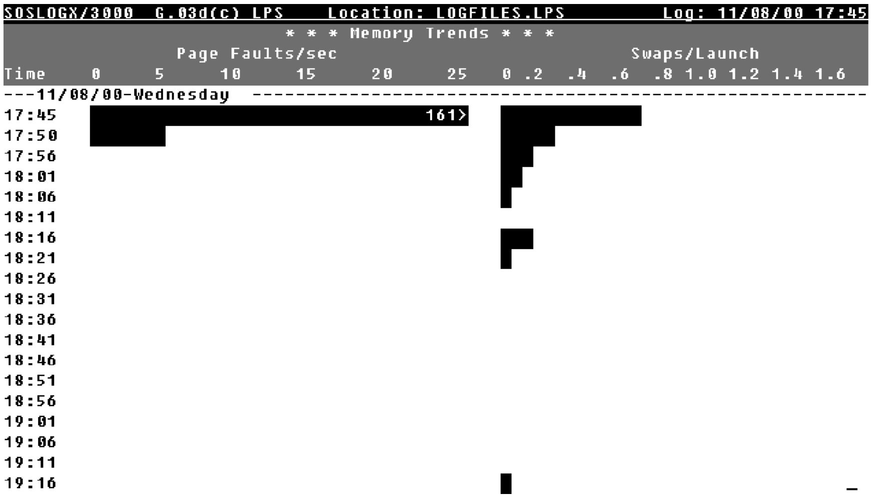
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
                            * * * CPU Trends * * *
     --------------------------- %CPU Used ------------------------  Idle  Resp
Time 0    10    20    30    40    50    60    70    80    90    100  Time  Time
---11/08/00-Wednesday  ---------------------------------------------------------
17:45 B      BC CMMOP                                P               20.8    .0
17:50 C   CP    P                                                    81.2    .2
17:56 P                                                              98.8    .0
18:01 P                                                              98.9 208.9
18:06                                                                99.4    .0
18:11                                                                99.5    .0
18:16 P                                                              98.9    .0
18:21                                                                99.4    .0
18:26                                                                99.4    .0
18:31                                                                99.5    .0
18:36                                                                99.5    .0
18:41                                                                99.4    .0
18:46                                                                99.5    .0
18:51                                                                99.4    .0
18:56                                                                99.5    .0
19:01                                                                99.5    .0
19:06                                                                99.5    .0
19:11                                                                99.4    .0
19:16                                                                99.4    .0
```

Figure 27.1 *SOSLOGX CPU Trends screen*

For information about the SOSLOGX CPU Utilization Bar chart data, please refer to “CPU Trends Screen” on page 91.

SOSLOGX Memory Trends Screen

The Memory Trends screen in SOSLOGX displays memory performance statistics in a graphical format. To access this screen select option 2 from the Report Format Selection Menu.



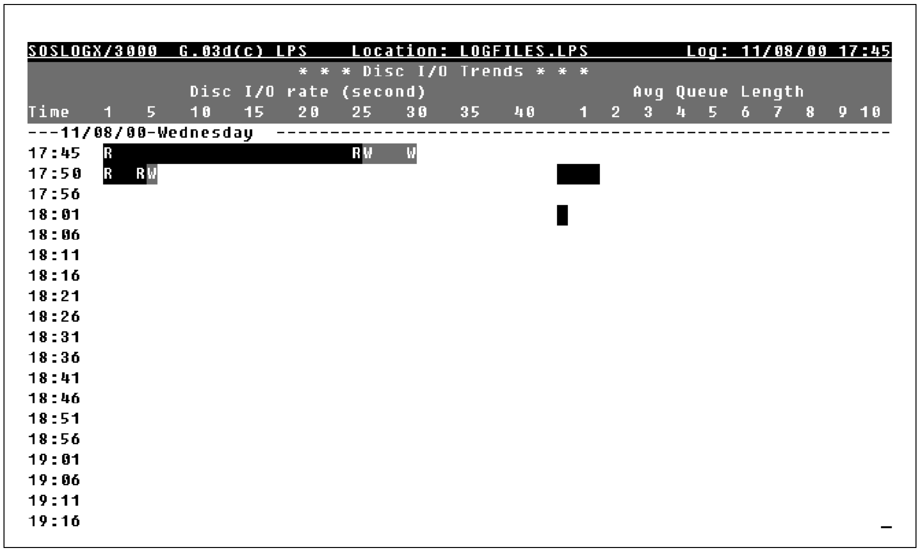
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
                          * * * Memory Trends * * *
                Page Faults/sec                          Swaps/Launch
Time     0     5      10      15      20      25    0 .2  .4  .6  .8 1.0 1.2 1.4 1.6
---11/08/00-Wednesday  ---------------------------------------------------------
17:45                                  161>
17:50
17:56
18:01
18:06
18:11
18:16
18:21
18:26
18:31
18:36
18:41
18:46
18:51
18:56
19:01
19:06
19:11
19:16                                                                               _
```

Figure 27.2 *SOSLOGX Memory Trends screen*

For information about the data in the SOSLOGX Memory Utilization Bar chart, refer to “Main Memory Trends Screen” on page 94.

SOSLOGX Disc I/O Trends Screen

The Disc I/O Trends screen in SOSLOGX displays disc performance data in graphical format. To access this screen select option 3 from the Report Format Selection Menu.



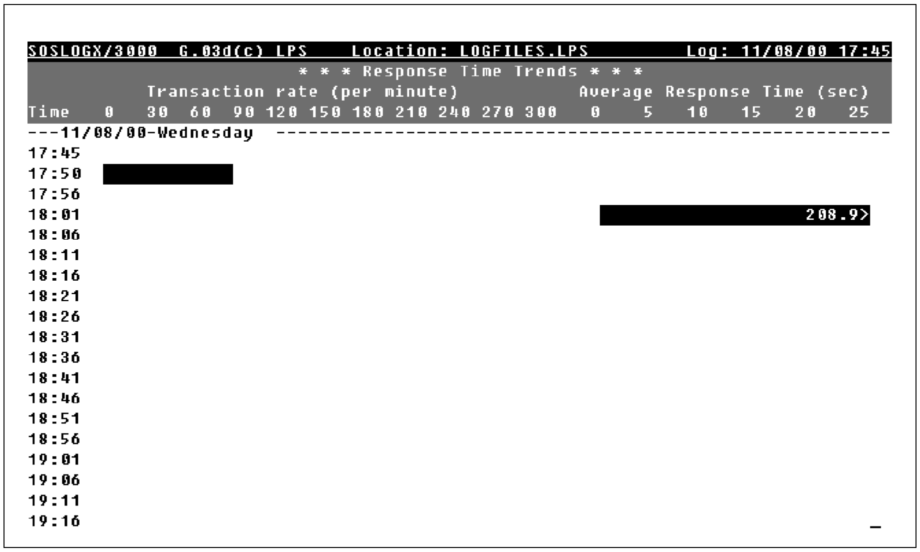
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
                         * * * Disc I/O Trends * * *
               Disc I/O rate (second)                   Avg Queue Length
Time   1   5   10   15   20   25   30   35   40     1  2  3  4  5  6  7  8  9 10
---11/08/00-Wednesday  ---------------------------------------------------------
17:45  R                      RW   W
17:50  R  RW
17:56
18:01
18:06
18:11
18:16
18:21
18:26
18:31
18:36
18:41
18:46
18:51
18:56
19:01
19:06
19:11
19:16
```

Figure 27.3 *SOSLOGX Disc I/O Trends screen*

For information about the data in the SOSLOGX Disc I/O Trends screen, refer to “Disc I/O Utilization Trends Screen” on page 95.

SOSLOGX Response Time Trends Screen

The Response Time Trends screen in SOSLOGX displays the transaction rate (per minute) and the average response time (seconds) recorded. To access this screen select option 4 from the Report Format Selection Menu.



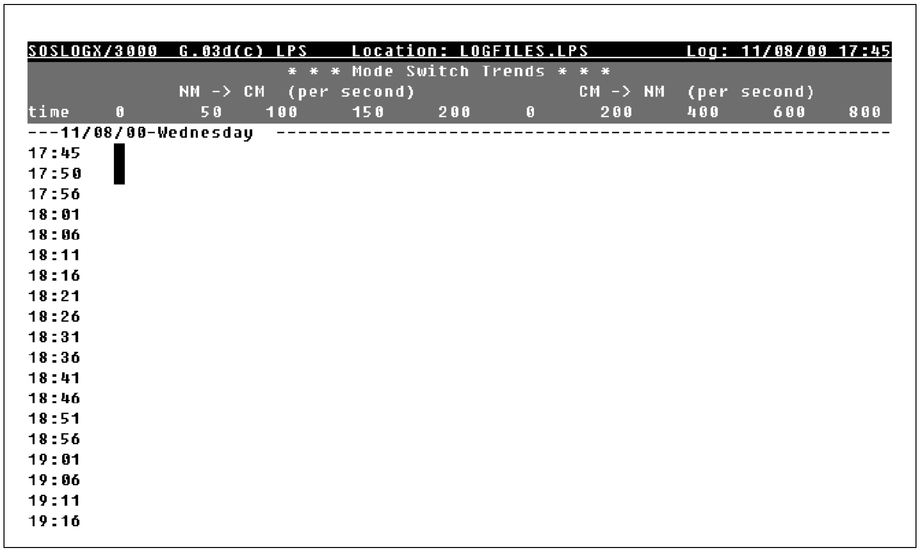
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
                         * * * Response Time Trends * * *
           Transaction rate (per minute)           Average Response Time (sec)
Time    0    30  60   90 120 150 180 210 240 270 300   0    5    10   15   20   25
---11/08/00-Wednesday  ---------------------------------------------------------
17:45
17:50
17:56
18:01                                                                   208.9>
18:06
18:11
18:16
18:21
18:26
18:31
18:36
18:41
18:46
18:51
18:56
19:01
19:06
19:11
19:16                                                                         _
```

Figure 27.4 *SOSLOGX Response Time Trends screen*

For information about the data presented in the SOSLOGX Response Time Trends screen, refer to "Response and Transaction Trends Screen" on page 96.

SOSLOGX Mode Switch Trends Screen

The Mode Switch Trends screen in SOSLOGX displays both the number of native mode to compatibility mode switches and the number of compatibility mode to native mode switches, performed per second. To access this screen select option 5 from the Report Format Selection Menu.



```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
                        * * * Mode Switch Trends * * *
              NM -> CM  (per second)               CM -> NM  (per second)
time    0       50    100     150     200     0      200     400     600    800
---11/08/00-Wednesday  ---------------------------------------------------------
17:45   █
17:50   █
17:56
18:01
18:06
18:11
18:16
18:21
18:26
18:31
18:36
18:41
18:46
18:51
18:56
19:01
19:06
19:11
19:16
```

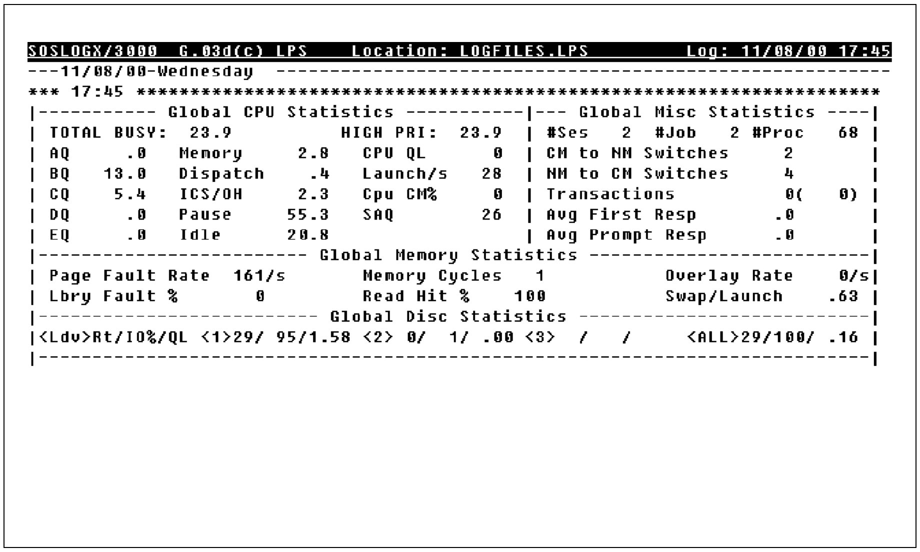
Figure 27.5 *SOSLOGX Mode Switch Trends screen*

For information about the data presented in the SOSLOGX Mode Switch Trends screen, refer to “Mode Switch Trends Screen” on page 97.

SOSLOGX Global Summary Screen

The Global Statistics screen in SOSLOGX displays system-wide performance data, similar to the Global Screen in SOS:

- Global CPU statistics
- Global Misc statistics
- Global Memory statistics
- Global Disc statistics
- Process Information
- System Performance Advice messages



```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS          Log: 11/08/00 17:45
---11/08/00-Wednesday  ----------------------------------------------------------
*** 17:45 **********************************************************************
|----------- Global CPU Statistics -----------|--- Global Misc Statistics ----|
| TOTAL BUSY:  23.9           HIGH PRI:  23.9  | #Ses    2  #Job    2 #Proc   68 |
| AQ      .0   Memory      2.8   CPU QL      0 | CM to NM Switches     2        |
| BQ    13.0   Dispatch     .4   Launch/s   28 | NM to CM Switches     4        |
| CQ     5.4   ICS/OH      2.3   Cpu CM%     0 | Transactions          0(    0) |
| DQ      .0   Pause      55.3   SAQ        26 | Avg First Resp       .0        |
| EQ      .0   Idle       20.8                 | Avg Prompt Resp      .0        |
|------------------------- Global Memory Statistics --------------------------|
| Page Fault Rate  161/s       Memory Cycles   1           Overlay Rate    0/s|
| Lbry Fault %       0         Read Hit %    100           Swap/Launch    .63 |
|-------------------------- Global Disc Statistics --------------------------|
|<Ldv>Rt/IO%/QL <1>29/ 95/1.58 <2> 0/  1/ .00 <3>  /   /     <ALL>29/100/ .16 |
|-----------------------------------------------------------------------------|
```

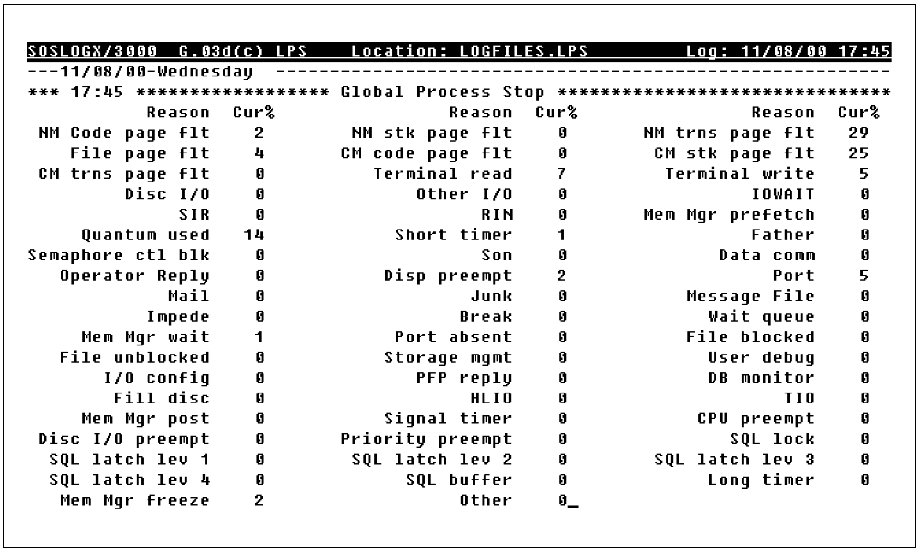
Figure 27.6 *SOSLOGX Global Statistics screen*

To access this screen select option 6 from the Report Format Selection Menu.

For information about the data displayed in the SOSLOGX Global Statistics screen, please refer to "SOS Global Summary" on page 55.

SOSLOGX Global Process Stop Screen

The Global Process Stop screen in SOSLOGX provides information that helps to determine why processes are hitting brick walls, similar to the Global Stop in SOS. To access this screen select option 7 from the Report Format Selection Menu.



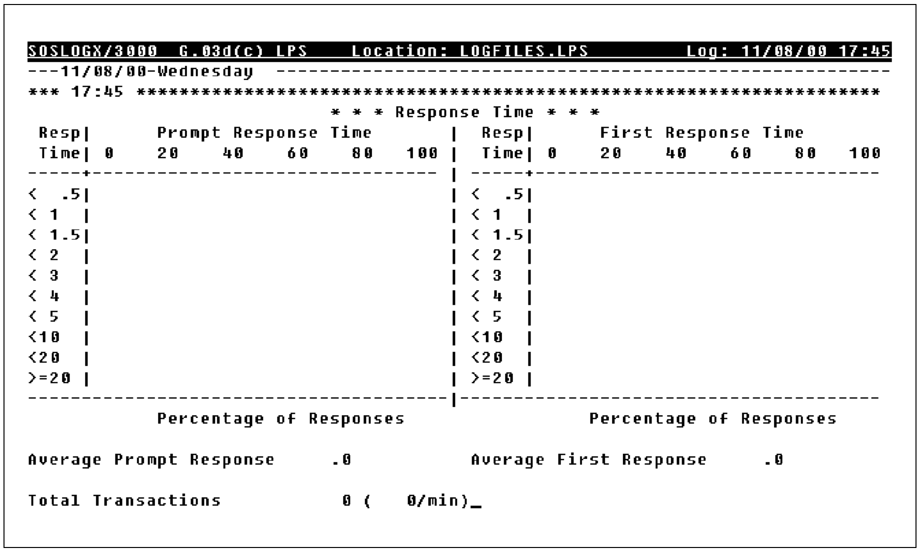
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 ****************** Global Process Stop *******************************
           Reason  Cur%                Reason  Cur%                Reason  Cur%
 NM Code page flt    2        NM stk page flt    0       NM trns page flt   29
    File page flt    4       CM code page flt    0        CM stk page flt   25
 CM trns page flt    0          Terminal read    7         Terminal write    5
         Disc I/O    0              Other I/O    0                 IOWAIT    0
              SIR    0                    RIN    0       Mem Mgr prefetch    0
     Quantum used   14            Short timer    1                 Father    0
Semaphore ctl blk    0                    Son    0              Data comm    0
   Operator Reply    0           Disp preempt    2                   Port    5
             Mail    0                   Junk    0           Message File    0
           Impede    0                  Break    0             Wait queue    0
     Mem Mgr wait    1            Port absent    0           File blocked    0
   File unblocked    0           Storage mgmt    0             User debug    0
       I/O config    0              PFP reply    0             DB monitor    0
        Fill disc    0                   HLIO    0                    TIO    0
     Mem Mgr post    0           Signal timer    0            CPU preempt    0
 Disc I/O preempt    0       Priority preempt    0               SQL lock    0
  SQL latch lev 1    0        SQL latch lev 2    0        SQL latch lev 3    0
  SQL latch lev 4    0             SQL buffer    0             Long timer    0
   Mem Mgr freeze    2                  Other    0_
```

Figure 27.7 *SOSLOGX Global Process Stop screen*

For information about the data displayed in the SOSLOGX Global Process Stop screen please refer to “Global Process Stop Data Items” on page 148.

SOSLOGX Response Time Detail Screen

The Response Time screen in SOSLOGX displays both Prompt Response Time and First Response Time recorded. To access this screen select option 8 from the Report Format Selection Menu.



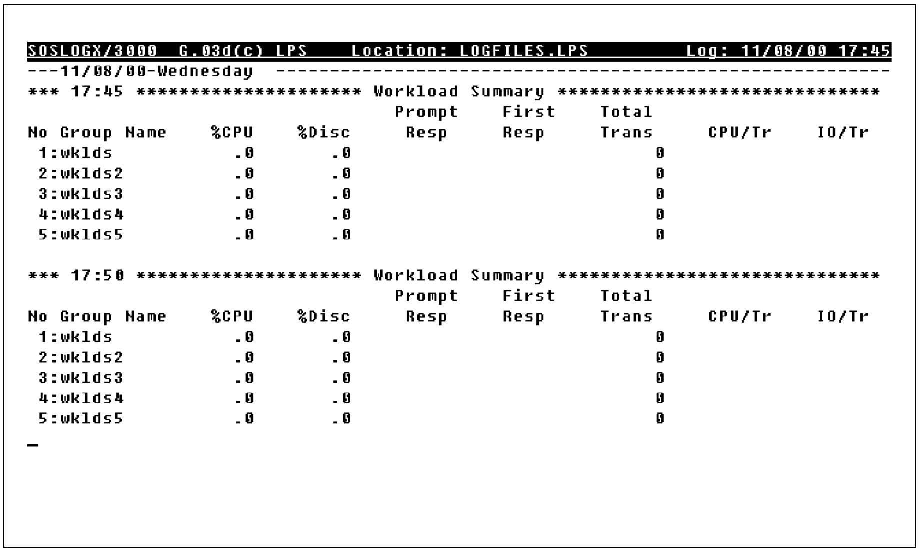
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS        Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 *********************************************************************
                            * * * Response Time * * *
 Resp|      Prompt Response Time          |  Resp|      First Response Time
 Time| 0    20    40    60    80    100 |  Time| 0    20    40    60    80    100
-----+--------------------------------  | -----+--------------------------------
<  .5|                                  | <  .5|
< 1  |                                  | < 1  |
< 1.5|                                  | < 1.5|
< 2  |                                  | < 2  |
< 3  |                                  | < 3  |
< 4  |                                  | < 4  |
< 5  |                                  | < 5  |
<10  |                                  | <10  |
<20  |                                  | <20  |
>=20 |                                  | >=20 |
---------------------------------------|----------------------------------------
            Percentage of Responses                 Percentage of Responses

Average Prompt Response     .0           Average First Response     .0

Total Transactions           0 (    0/min)_
```

Figure 27.8 *SOSLOGX Response Time screen*

For information about SOSLOGX response time data, refer to "SOS Response Time Detail" on page 99. Process details can be displayed here if option 2 in the SOSLOGX Main Options menu is set to **Y**.

SOSLOGX Workload Summary Screen

The Workload Summary screen in SOSLOGX displays workload statistics. To access this screen select option 9 from the Report Format Selection Menu.



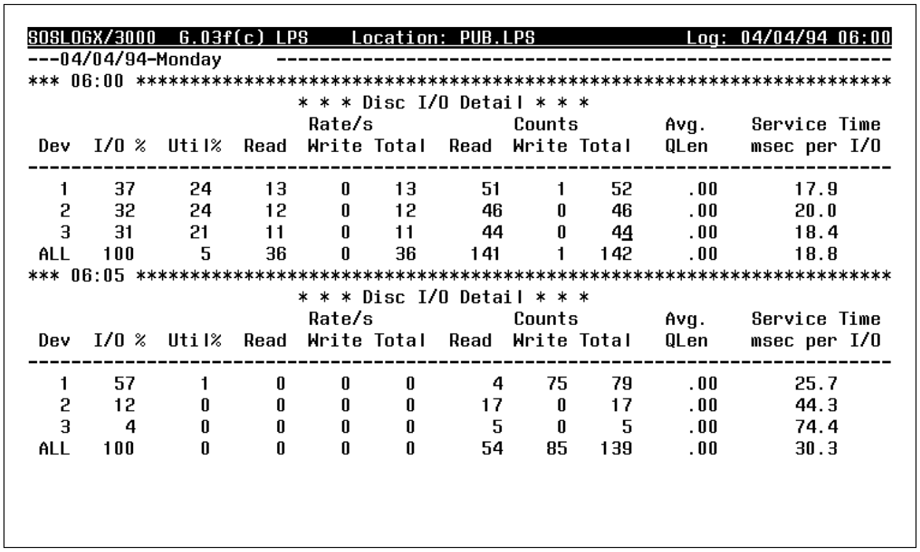
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS        Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 ********************* Workload Summary ******************************
                                  Prompt    First    Total
No Group Name    %CPU    %Disc     Resp      Resp     Trans      CPU/Tr     IO/Tr
 1:wklds           .0       .0                            0
 2:wklds2          .0       .0                            0
 3:wklds3          .0       .0                            0
 4:wklds4          .0       .0                            0
 5:wklds5          .0       .0                            0

*** 17:50 ********************* Workload Summary ******************************
                                  Prompt    First    Total
No Group Name    %CPU    %Disc     Resp      Resp     Trans      CPU/Tr     IO/Tr
 1:wklds           .0       .0                            0
 2:wklds2          .0       .0                            0
 3:wklds3          .0       .0                            0
 4:wklds4          .0       .0                            0
 5:wklds5          .0       .0                            0
_
```

Figure 27.9 *SOSLOGX Workload Summary screen*

For information about the SOSLOGX Workload Summary statistics, refer to “Process Summary by Application Workloads” on page 81.

SOSLOGX Disc I/O Detail Screen

The Disc I/O Detail screen in SOSLOGX provides a summary of performance data for all discs on the system. To access this screen select option 10 from the Report Format Selection Menu.



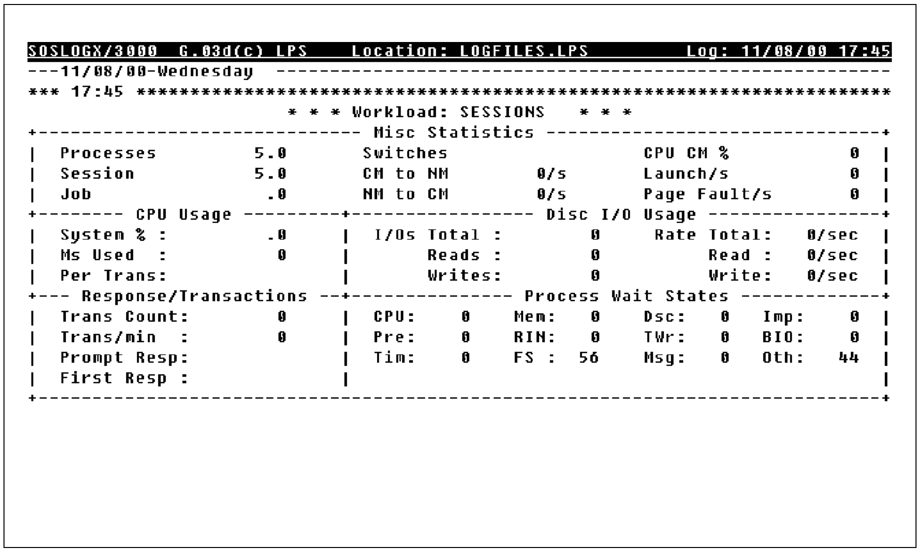
```
SOSLOGX/3000  G.03f(c) LPS    Location: PUB.LPS              Log: 04/04/94 06:00
---04/04/94-Monday     ---------------------------------------------------------
*** 06:00 **********************************************************************
                         * * * Disc I/O Detail * * *
                          Rate/s             Counts        Avg.    Service Time
 Dev  I/O %  Util%  Read  Write Total  Read  Write Total   QLen    msec per I/O
--------------------------------------------------------------------------------
   1    37     24     13     0    13      51     1    52     .00       17.9
   2    32     24     12     0    12      46     0    46     .00       20.0
   3    31     21     11     0    11      44     0    44     .00       18.4
 ALL   100      5     36     0    36     141     1   142     .00       18.8
*** 06:05 **********************************************************************
                         * * * Disc I/O Detail * * *
                          Rate/s             Counts        Avg.    Service Time
 Dev  I/O %  Util%  Read  Write Total  Read  Write Total   QLen    msec per I/O
--------------------------------------------------------------------------------
   1    57      1      0     0     0       4    75    79     .00       25.7
   2    12      0      0     0     0      17     0    17     .00       44.3
   3     4      0      0     0     0       5     0     5     .00       74.4
 ALL   100      0      0     0     0      54    85   139     .00       30.3
```

Figure 27.10 *SOSLOGX Disc I/O Summary screen*

For information about the data presented in the SOSLOGX Disc I/O Summary screen, refer to "Disc I/O Detail Screen Display Items" on page 107.

SOSLOGX SESSIONS Workload Screen

The SESSIONS Workload screen in SOSLOGX displays detailed information about SESSIONS workload. To access this screen select option 11 from the Report Format Selection Menu.



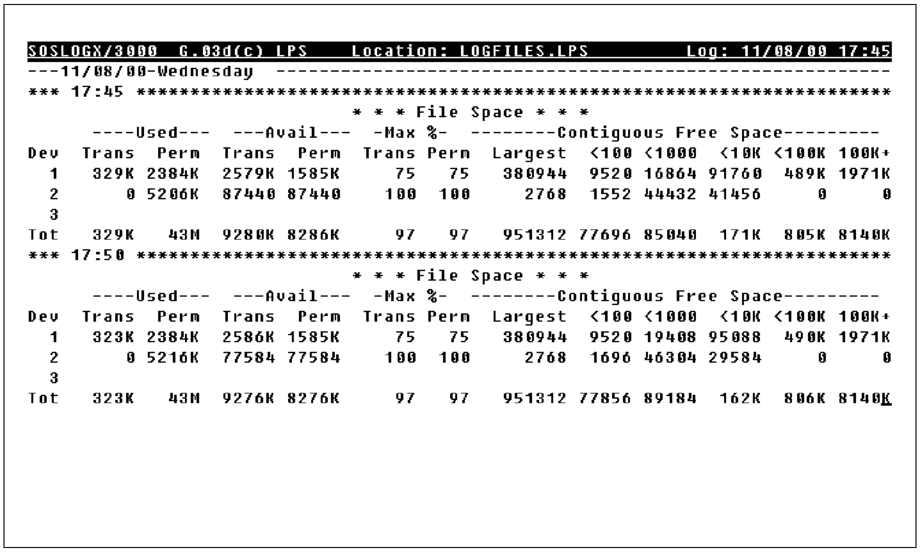
```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 **********************************************************************
                        * * * Workload: SESSIONS   * * *
+------------------------------ Misc Statistics -------------------------------+
|  Processes         5.0       Switches                  CPU CM %           0  |
|  Session           5.0       CM to NM        0/s       Launch/s           0  |
|  Job                .0       NM to CM        0/s       Page Fault/s       0  |
+-------- CPU Usage ---------+----------------- Disc I/O Usage ----------------+
|  System % :         .0     |  I/Os Total :        0     Rate Total:   0/sec  |
|  Ms Used  :          0     |       Reads :        0          Read :   0/sec  |
|  Per Trans:                |       Writes:        0          Write:   0/sec  |
+--- Response/Transactions --+--------------- Process Wait States -------------+
|  Trans Count:        0     |  CPU:    0    Mem:   0    Dsc:   0   Imp:    0  |
|  Trans/min  :        0     |  Pre:    0    RIN:   0    TWr:   0   BIO:    0  |
|  Prompt Resp:              |  Tim:    0    FS :  56    Msg:   0   Oth:   44  |
|  First Resp :              |                                                 |
+------------------------------------------------------------------------------+
```

Figure 27.11 *SOSLOGX SESSIONS Workload Detail report*

For information about the data contained in this report, see “Workload Detail Screen Display Items” on page 137.

SOSLOGX File Space Utilization Screen

The File Space screen in SOSLOGX displays key utilization and fragmentation statistics by disc drive and for all disc drives. To access this screen select option 12 from the Report Format Selection Menu.



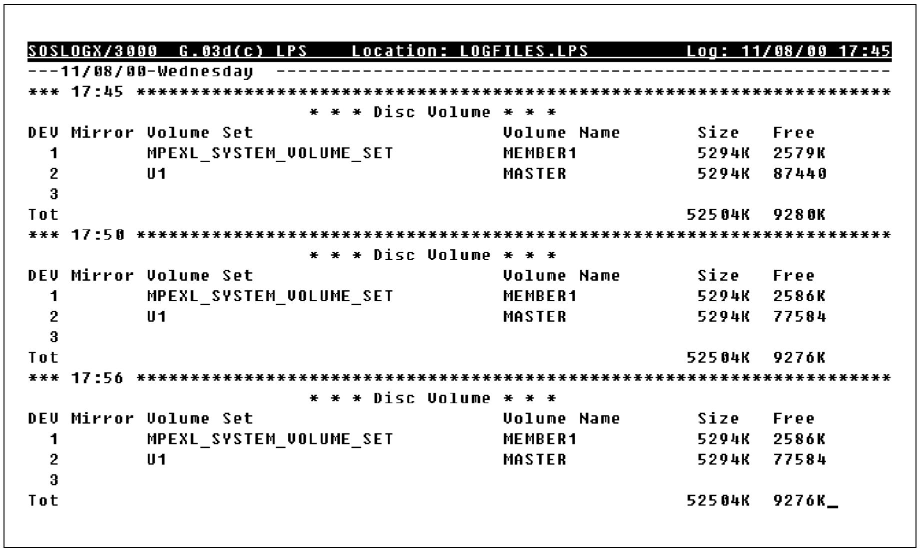
```
SOSLOGX/3000  G.03d(c) LPS     Location: LOGFILES.LPS         Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 **********************************************************************
                              * * * File Space * * *
      ----Used---  ---Avail---  -Max %-  --------Contiguous Free Space---------
Dev  Trans  Perm  Trans  Perm  Trans Perm  Largest  <100 <1000  <10K <100K 100K+
  1   329K 2384K  2579K 1585K     75   75   380944  9520 16864 91760  489K 1971K
  2      0 5206K  87440 87440    100  100     2768  1552 44432 41456     0     0
  3
Tot   329K   43M  9280K 8286K     97   97   951312 77696 85040  171K  805K 8140K
*** 17:50 **********************************************************************
                              * * * File Space * * *
      ----Used---  ---Avail---  -Max %-  --------Contiguous Free Space---------
Dev  Trans  Perm  Trans  Perm  Trans Perm  Largest  <100 <1000  <10K <100K 100K+
  1   323K 2384K  2586K 1585K     75   75   380944  9520 19408 95088  490K 1971K
  2      0 5216K  77584 77584    100  100     2768  1696 46304 29584     0     0
  3
Tot   323K   43M  9276K 8276K     97   97   951312 77856 89184  162K  806K 8140K
```

Figure 27.12 *SOSLOGX File Space screen*

For information about the data contained in this report, see "SOS File Space Utilization data items" on page 188.

SOSLOGX Disc Volume Screen

If the discs on the system are partitioned into volume sets, the Disc Volume screen in SOSLOGX will display this information. To access this screen select option 13 from the Report Format Selection Menu.



```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 **********************************************************************
                          * * * Disc Volume * * *
DEV Mirror Volume Set                         Volume Name       Size   Free
  1        MPEXL_SYSTEM_VOLUME_SET            MEMBER1           5294K  2579K
  2        U1                                 MASTER            5294K  87440
  3
Tot                                                            52504K  9280K
*** 17:50 **********************************************************************
                          * * * Disc Volume * * *
DEV Mirror Volume Set                         Volume Name       Size   Free
  1        MPEXL_SYSTEM_VOLUME_SET            MEMBER1           5294K  2586K
  2        U1                                 MASTER            5294K  77584
  3
Tot                                                            52504K  9276K
*** 17:56 **********************************************************************
                          * * * Disc Volume * * *
DEV Mirror Volume Set                         Volume Name       Size   Free
  1        MPEXL_SYSTEM_VOLUME_SET            MEMBER1           5294K  2586K
  2        U1                                 MASTER            5294K  77584
  3
Tot                                                            52504K  9276K_
```

Figure 27.13 *SOSLOGX Disc Volume screen*

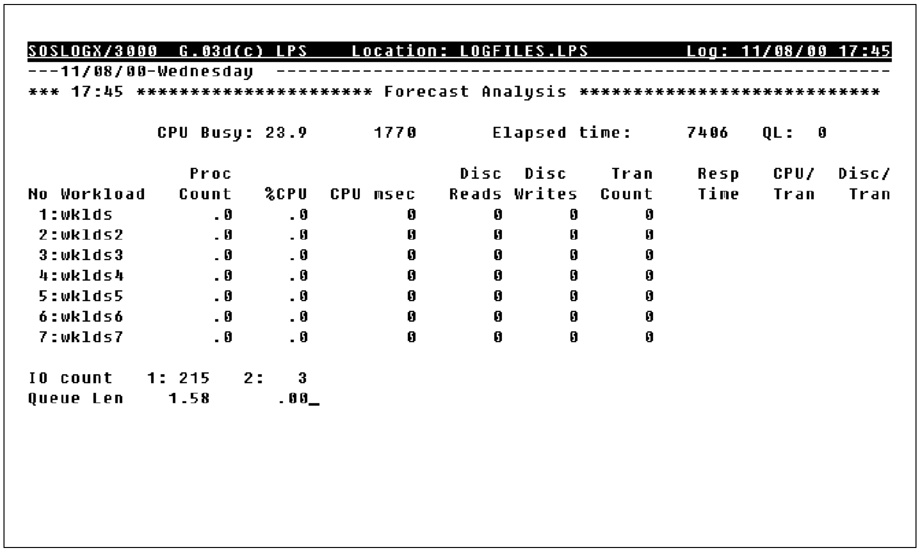
The data items in the SOSLOGX Disc Volume Information are described in Table 27.1.

Table 27.1 *SOSLOGX Disc Volume screen data items*

Data Item	Description
DEV	The logical device number of the disc.
Mirror	If the disc is being mirrored, the number of the mirror disc will appear here.
Volume Set	The name of the volume set the disc has been partitioned into.
Volume Name	The name of the disc. This will usually be Master or Member#.
Size	The physical size in kb (kilobytes) of the disk.
Free	The amount of space not being used during the current interval.

SOSLOGX Forecast Analysis Screen

The Forecast Analysis screen in SOSLOGX displays information utilized in the Forecast Capacity Planner program from LUND. This screen is only available to owners of Forecast. Access this screen by choosing option 14 in the Report Format Selection Menu.



```
SOSLOGX/3000  G.03d(c) LPS    Location: LOGFILES.LPS         Log: 11/08/00 17:45
---11/08/00-Wednesday  ---------------------------------------------------------
*** 17:45 ********************** Forecast Analysis ****************************

            CPU Busy: 23.9      1770       Elapsed time:     7406   QL:  0

               Proc                     Disc  Disc    Tran    Resp   CPU/  Disc/
No Workload   Count   %CPU  CPU msec   Reads Writes  Count    Time   Tran   Tran
 1:wklds          .0    .0         0       0      0      0
 2:wklds2         .0    .0         0       0      0      0
 3:wklds3         .0    .0         0       0      0      0
 4:wklds4         .0    .0         0       0      0      0
 5:wklds5         .0    .0         0       0      0      0
 6:wklds6         .0    .0         0       0      0      0
 7:wklds7         .0    .0         0       0      0      0

IO count   1: 215   2:   3
Queue Len    1.58      .00_
```

Figure 27.14 *SOSLOGX Forecast Analysis report*

For more information on data items found in this screen, see the *Forecast Capacity Planner User’s Guide*.

28

SOSLOGX REPORT CARD

The Report Card Screen

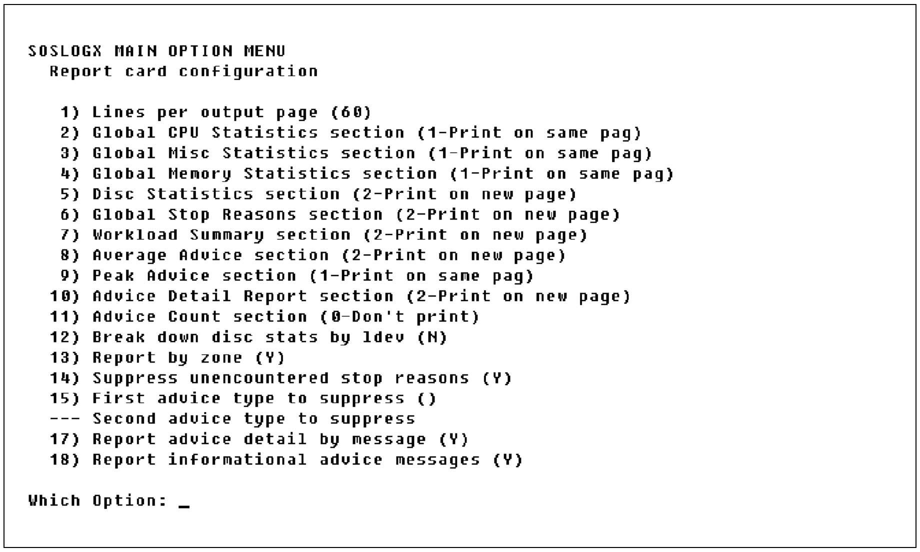
The Report Card is a standard SOS/3000 report that shows logged SOS/3000 performance data that is summarized in a concise fashion that is suitable for management. There are 18 different options that can be mixed and matched as desired to create a customized report best suited to your needs.

The initial set-up of the Report Card is very simple. It requires you to select options in the Report Card configuration submenu. That submenu is accessible in two ways:

- While you are in SOS/3000:
  a Press SCREEN MENU (F7) function key;
  b Press **L** for LOG TRENDS PROGRAM;
  c Press OPTIONS (F1) function key.
  d Type 9 to chose Report card configuration (SUBMENU). Press Enter.
- From an MPE prompt:
  a Run SOSLOGX.PUB.LPS and press the OPTIONS (F1) function key.
  b Type 9 to chose Report card configuration (SUBMENU). Press Enter.

Then you will see a Report Card Configuration Menu as is shown in Figure 28.1.

Each of the Report Card Configuration Options is designed for ease of use and flexibility so that you may tailor the reports specifically for your system.



```
SOSLOGX MAIN OPTION MENU
  Report card configuration

   1) Lines per output page (60)
   2) Global CPU Statistics section (1-Print on same pag)
   3) Global Misc Statistics section (1-Print on same pag)
   4) Global Memory Statistics section (1-Print on same pag)
   5) Disc Statistics section (2-Print on new page)
   6) Global Stop Reasons section (2-Print on new page)
   7) Workload Summary section (2-Print on new page)
   8) Average Advice section (2-Print on new page)
   9) Peak Advice section (1-Print on same pag)
  10) Advice Detail Report section (2-Print on new page)
  11) Advice Count section (0-Don't print)
  12) Break down disc stats by ldev (N)
  13) Report by zone (Y)
  14) Suppress unencountered stop reasons (Y)
  15) First advice type to suppress ()
  --- Second advice type to suppress
  17) Report advice detail by message (Y)
  18) Report informational advice messages (Y)

Which Option: _
```

Figure 28.1 *SOSLOGX Report Card configuration submenu*

Report Card Configuration Options

Lines per output page (option 1)

This option allows you to configure the output of your reports to your line printer. Enter the number of lines here that your printer prints per page. The default value is 60 lines per page.

Global CPU Statistics section (option 2)

Your choices are:

- 0 - Don't print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. To view this report, see "Viewing the Report Card" on page 251. The mean, standard deviation, high value and low value for each of the statistics will be listed (see Figure 28.2).

```
07/16/01                      SOS/3000 Report Card                        Page 1

Item                     Mean           SD            High            Low


*** Global CPU Statistics ***

Total busy               86.2          8.07           98.9            68.7
AQ CPU%                   1.5          1.37            2.9              .0
BQ CPU%                   9.5          3.06           16.3             4.4
CQ CPU%                  26.0          5.68           38.2            19.4
DQ CPU%                  35.9         12.85           58.8            18.2
EQ CPU%                    .0           .00             .0              .0

Memory Manager%           5.1          1.70            7.9             2.7
Dispatcher%                .1           .04             .2              .1
ISC/OH%                    .9          1.83            4.6              .0
Pause for Disc I/O%      12.9          7.97           31.3             1.1
Idle%                      .9          1.83            4.6              .0

CPU Queue Length            3            .5              4               2
Launches/sec               70          11.4             88              52
CPU CM%                    26           7.5             40              16
SAQ                       200            .0            200             200
```

Figure 28.2 *Report Card: Sample Global CPU Statistics Report*

Global Misc Statistics section (option 3)

Your choices are:

- 0 - Don’t print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page than the Global CPU Statistics Report. To view this report, see “Viewing the Report Card” on page 251. The mean, standard deviation, high value and low value for each of the statistics will be listed (see Figure 28.3).

```
07/16/01                         SOS/3000 Report Card                      Page 2

Item                      Mean        SD        Conf.       High        Low


*** Global Miscellaneous Statistics ***
Session                   102         1.9       5           105         99
Jobs                      15          .6        5           16          14
Processes                 629         9.8       5           655         621
CM to NM Switches/sec     483         433.8     5           1553        225
NM to CM Switches/sec     30          11.3      5           56          19
Transactions/minute       498         249.8     5           1012        320
First Response            .1          .03       5           .2          .1
Prompt Response           .3          .08       5           .4          .2
```

Figure 28.3 *Report Card: Sample Global Miscellaneous Statistics Report*

Global Memory Statistics section (option 4)

Your choices are:

- 0 - Don't print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a new page. To view this report, see “Viewing the Report Card” on page 251. The mean, standard deviation, high value and low value for each of the statistics will be listed (see Figure 28.4 on page 241.)

```
07/16/01                        SOS/3000 Report Card                        Page 3

Item                  Mean        SD        Conf.       High        Low


*** Global Memory Statistics ***

Page Faults/sec        14         4.4         5          23          6

Library Fault %         2         1.6         5           5          1

Memory Cycles           1          .6         5           2          0

Read Hit %             94         3.6         5          99         87

Overlay Rate            6         5.8         5          18          1

Swaps/Launch          .35        .074         5         .51        .27
```

Figure 28.4 *Report Card: Sample Global Memory Statistics Report*

Disc Statistics section (option 5)

Your choices are:

- 0 - Don’t print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a new page. To view this report, see “Viewing the Report Card” on page 251. The mean, standard deviation, high value and low value for each of the statistics will be listed (see Figure 28.5 on page 242.)

This option works with menu option:

12) Break down disc stats by ldev (Y)

The default for this option is **Y** (Yes). If you choose to change this to **N** (No), only a Total Global Disc Statistics Report will print.

Notice that each device will be followed by a report on that device and then at the end a Total Global Disc Statistics summing all of the disc drives will print. For this sample we have labeled the device as "n" (some integer).

```
07/16/01                      SOS/3000 Report Card                 Page 4

Item                          Mean      SD       Conf.    High      Low


*** Global Disc Statistics ***

Disc Reads/Sec                3         .8       5        4         2

Disc Writes/Sec               3         .8       0        4         2

Disc IO/Sec                   6         1.3      5        8         4

Disc Request Queue Length     1.92      .901     5        3.36      .61

Percent of Total Disc I/O     14        3.4      5        22        11

Total I/O                     1701      388.5    5        2472      1233
```

Figure 28.5 *Report Card: Sample Global (All) Disc Statistics Report*

Stop Reasons section (option 6)

Your choices are:

- 0 - Don't print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page. To view this report, see “Viewing the Report Card” on page 251. The mean, standard deviation, high value and low value for each of the statistics will be listed (see Figure 28.6 on page 243).

Remember, Stop Reasons are the reasons that a process loses the CPU as determined by the MPE dispatcher. This will report the Stop Reasons encountered during the interval on which you are reporting. It is possible to list all Stop Reasons encountered or not by choosing option:

14) Suppress unencountered stop reasons (N)

```
07/16/01                        SOS/3000 Report Card                     Page 5

Item                          Mean       SD        Conf.      High       Low


*** Stop Reasons ***
Terminal Read Stop %           12        3.9        5          19         8
Terminal Write Stop %           0         .3        5           1         0
Other I/I Stop %                1         .7        5           3         1
IOWAIT Stop %                   1         .0        5           1         1
Suspend on Father Stop %        0         .3        5           1         0
Suspend on Son Stop %           1         .3        5           2         1
Port Stop %                    11        4.2        5          19         7
Junk Stop %                     1         .3        5           2         1
Fill Disk Stop %                1         .7        5           2         0
CPU Preempt Stop %             13        2.6        5          18         9
```

Figure 28.6 *Report Card: Sample Stop Reasons Report*

Workload Summary section (option 7)

Your choices are:

- 0 - Don’t print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page. To view this report, see “Viewing the Report Card” on page 251. The mean, standard deviation, high value and low value for each of the statistics will be listed (see Figure 28.7 on page 244).

A report will print for each workload that you have defined in your workload definition file, SOSWKDEF (see “Defining Workloads” on page 282). If no workloads have been defined then only three workloads will be reported. These three are the default workloads of JOBS, SESSIONS, and SYSPROCS (system processes).

If you have changed your workload definition file (SOSWKDEF) during the period you are including within your report, Report Card will break your report into time slices for every change to the workload definition file. In each of these sections an informational message will be printed noting that multiple workloads have been detected. This ensures that the data is reliable because averaging data that was not created with the same criteria is like mixing apples and oranges.

For this sample we have displayed the "Sessions" workload summary.

```
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Item                                   Mean         SD         Conf.        High        Low


*** Sessions Workload Summary ***
CPU Percentage                         19.3         4.82        5           31.4        14.5
Total Disk I/O %                       40.8         6.02        5           49.5        31.0
Average Prompt Response Time           .3           .05         5           .3          .2
Total Transactions                     1328         180.7       5           1665        1085
CPU Time per Transaction               46           16.6        5           89          30
Disc I/O per Transaction               4            1.0         5           5           2
Average First Response Time            .1           .03         5           .2          .1
CPU Time in msecs                      588830       148370.4    5           965530      449680
CPU CM Time in msecs                   136880       42720.3     5           196350      74080
Disc Read Count                        3931         844.8       5           5709        2883
Disc Write Count                       843          295.1       5           1263        455
```

Figure 28.7 *Report Card: Sample Workload Summary Report*

Average Advice section (option 8)

Your choices are:

- 0 - Don't print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will average the information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page. These are the informational or excessive messages that occurred during the average of all performance indicators, in other words, it is a representative time performance report of your system (see Figure 28.8 on page 245).

The Mean Interval Advice messages are a useful indicator of what the average performance hindrances might be for your system.

There is also an option not to report certain messages. For example, if you are not interested in reporting the MODERATE messages choose option:

15) First advice type to suppress (3) (See this menu option for more details).

Your choices are:

- 1 - EXCESSIVE advice messages
- 2 - HEAVY advice messages
- 3 - MODERATE advice messages

```
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*** Mean Interval Advice ***

Comp. Mode to Native Mode Switch rate during this interval was EXCESSIVE      <GE03>

Disc I/O indicator #1 (CPU Pause Disc) reveals a HEAVY I/O Bottleneck         <DE01>

Memory indicator #2 (CPU Memory) reveals a MODERATE memory load               <ME02>

Memory indicator #4 (Page Fault Rate) reveals a MODERATE memory load          <ME04>
```

Figure 28.8 *Report Card: Sample Mean Interval Advice Report*

Peak Advice section (option 9)

Your choices are:

- 0 - Don’t print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print and it will select the highest or worst measurement information for the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page. Peak Advice Messages are the informational or excessive messages that occured during the highest or worst measurement of all the performance indicators. In other words, it is a snapshot of when your HP 3000 resources are being stressed the most (see Figure 28.9 on page 246).

The Peak Interval Advice messages are a useful indicator of what happens to your HP 3000 during high resource utilization periods.

There is also an option not to report certain messages. For example if you are not interested in reporting the MODERATE messages choose option:

15) First advice type to suppress (3) (See this menu option for more details).

Your choices are:

- 1 - EXCESSIVE advice messages
- 2 - HEAVY advice messages
- 3 - MODERATE advice messages

```
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*** Peak Interval Advice ***

CPU consumption due to system overhead during this interval was MODERATE          <GE01>

Native Mode to Comp. Mode Switch rate during this interval was MODERATE           <GE02>

Disc I/O indicator #1 (CPU Pause Disc) reveals an EXCESSIVE I/O Bottleneck        <DE01>

Memory indicator #2 (CPU Memory) reveals a MODERATE memory load                   <ME02>

Memory indicator #3 (Swap/Launch) reveals a MODERATE memory load                  <ME03>

Memory indicator #4 (Page Fault Rate) reveals a MODERATE memory load              <ME04>
```

Figure 28.9 *Report Card: Sample Peak Interval Advice Report*

Advice Detail Report section (option 10)

Your choices are:

- 0 - Don't print
- 1 - Print on same page
- 2 - Print on new page

This option works with submenu options 15-18.

If you choose either 1 or 2, this report will print all informational messages that occurred during the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page. A sample report will appear displaying all Advice Detail Messages (see Figure 28.10 on page 247).

We advise you that you choose a very short time interval for your REPORT CARD if you choose to print this option, otherwise you will probably be printing reams of paper.

This option is very useful if you have a specific time interval in mind that you want to investigate. For example, if you notice that a batch job was very slow at a certain time you can list the informational messages to investigate the cause.

There is also an option not to report certain messages. For example if you are not interested in reporting the MODERATE messages choose option:

> **15) First advice type to suppress (3)** (See this menu option for more details).

Your choices are:

- 1 - EXCESSIVE advice messages
- 2 - HEAVY advice messages
- 3 - MODERATE advice messages

You also have the option of ordering your advice detail by message if you choose submenu option:

> **18) Report informational advice messages (N) or (Y)** (See this menu option for more details).

Another option is to report informational advice messages not just exceptional messages. Choose submenu option:

> **18) Report informational advice messages (N) or (Y)** (See this menu option for more details).

```
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                              SOS/3000 Report Card


*** Advice Detail Report ***


Disc I/O indicator #1 (CPU Pause Disc) reveals a MODERATE I/O Bottleneck      <DE01>
    07/16/01 06:30 AM   07/16/01 06:35 AM   07/16/01 06:45 AM   07/16/01 06:55 AM
    07/16/01 07:00 AM   07/16/01 07:20 AM   07/16/01 08:20 AM   07/16/01 08:50 AM
    07/16/01 08:55 AM   07/16/01 09:20 AM   07/16/01 10:30 AM   07/16/01 11:25 AM
    07/16/01 11:55 AM   07/16/01 01:20 PM   07/16/01 02:40 PM   07/16/01 02:55 PM
    07/16/01 03:15 PM   07/16/01 04:50 PM   07/16/01 04:55 PM   07/16/01 05:25 PM
Disc I/O indicator #1 (CPU Pause Disc) reveals a HEAVY I/O Bottleneck         <DE01>
    07/16/01 06:20 AM   07/16/01 06:50 AM   07/16/01 08:10 AM   07/16/01 08:30 AM
    07/16/01 10:10 AM   07/16/01 11:30 AM   07/16/01 02:20 PM   07/16/01 02:45 PM
    07/16/01 03:35 PM   07/16/01 04:20 PM   07/16/01 04:45 PM
Disc I/O indicator #1 (CPU Pause Disc) reveals an EXCESSIVE I/O Bottleneck    <DE01>
    07/16/01 07:45 AM   07/16/01 09:15 AM   07/16/01 09:20 AM   07/16/01 09:40 AM
    07/16/01 10:20 AM   07/16/01 10:25 AM   07/16/01 01:25 PM   07/16/01 01:40 PM
    07/16/01 02:50 PM   07/16/01 03:05 PM   07/16/01 04:00 PM   07/16/01 04:10 PM
    07/16/01 04:25 PM   07/16/01 05:00 PM   07/16/01 05:05 PM   07/16/01 05:10 PM
    07/16/01 05:15 PM
```

Figure 28.10 *Report Card: Sample Advice Detail Report*

Advice Count section (option 11)

Your choices are:

- 0 - Don't print
- 1 - Print on same page
- 2 - Print on new page

If you choose either 1 or 2, this report will print a count of all informational messages that occurred during the time frame that you choose when you are in REPORT CARD. When you choose "**2 - Print on new page**", then this report option will print on a different page. A sample report will appear displaying the count on all advice messages (see Figure 28.11 on page 249).

This option is very useful to indicate which informational messages occur most often. An example of this is if you see the message "**Disc I/O indicator #1 (CPU Pause Disc) reveals an EXCESSIVE I/O Bottleneck**" with a count of 300 and you only have 300 samples, you should investigate this to determine if you truly have a resource problem or an application problem.

There is also an option not to report certain messages. For example, if you are not interested in reporting the MODERATE messages choose option:

15) First advice type to suppress (3) (See this menu option for more details).

Your choices are:

- 1 - EXCESSIVE advice messages
- 2 - HEAVY advice messages
- 3 - MODERATE advice messages

```
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*** Advice Counts Report ***

Disc I/O indicator #1 (CPU Pause Disc) reveals a MODERATE I/O Bottleneck               <DE01>

Count:                                22

Disc I/O indicator #1 (CPU Pause Disc) reveals a HEAVY I/O Bottleneck                  <DE01>

Count:                                18

Disc I/O indicator #1 (CPU Pause Disc) reveals an EXCESSIVE I/O Bottleneck             <DE01>

Count:                                22

Native Mode to Comp. Mode Switch rate during this interval was MODERATE                <GE02>

Count:                                73

Native Mode to Comp. Mode Switch rate during this interval was HEAVY                   <GE02>

Count:                                19

Native Mode to Comp. Mode Switch rate during this interval was EXCESSIVE               <GE02>
```

```
Count:                           5
Comp. Mode to Native Mode Switch rate during this interval was MODERATE        <GE03>
Count:                           10
Comp. Mode to Native Mode Switch rate during this interval was HEAVY           <GE03>
Count:                           10
Comp. Mode to Native Mode Switch rate during this interval was EXCESSIVE       <GE03>
Count:                           115
Global average response time during this interval was MODERATE                 <GE04>
Count:                           3
Global average response time during this interval was HEAVY                    <GE04>
Count:                           1
Global average response time during this interval was EXCESSIVE                <GE04>
Count:                           1
Memory indicator #3 (Swap/Launch) reveals a MODERATE memory load               <ME03>
Count:                           24
Memory indicator #3 (Swap/Launch) reveals a HEAVY memory load                  <ME03>
Count:                           7
Memory indicator #4 (Page Fault Rate) reveals a MODERATE memory load           <ME04>
Count:                           24
Memory indicator #4 (Page Fault Rate) reveals a HEAVY memory load              <ME04>
Count:                           50
Memory indicator #4 (Page Fault Rate) reveals an EXCESSIVE memory load         <ME04>
Count:                           28
```

Figure 28.11 *Report Card: Sample Advice Count Report*

Break down disc stats by ldev (option 12)

This option (option 12) works with menu option:

5) Disc Statistics section

If option 5 is set to print and option 12 is set to the default of **Y** (Yes) is used, then each and every LDEV will be followed by a report on that device and then at the end a Total Global Disc Statistics summing all of the disc drives will print.

If you choose to change this to **N** (No) only a Total Global Disc Statistics Report will print, summing the average disc statistics.

Report by zone (option 13)

Zones or shifts are originally defined in the Data Break Configuration submenu (see “Data break configuration menu (SUBMENU)” on page 209). The default is to accept the zones as you have previously defined them and then each zone is reported individually but summed in the global statistics reports.

If you choose to ignore the zones that you have defined (change this option to **N** (No)), then the entire time period you specify will be examined as a whole and averaged together.

This option is very useful if you have specified zones that indicate different usage/utilization of your HP 3000. An example of this is to "zone" the heavy interactive use from the heavy batch processing use. Are the interactive users heavy from 9 am to 3 pm? Is this different from the batch job runs?

Suppress unencountered stop reasons (option 14)

The default value for this option (14) is **Y** (Yes). This option works with menu option:

6) Global Stop Reasons section

Remember, Stop Reasons are reasons that a process loses the CPU as determined by the MPE dispatcher. This will report the Stop Reasons encountered during the interval that you are reporting on.

If you would like a listing of all the possible Stop Reasons, whether or not they were encountered, change the value for this option to **N** (No).

First advice type to suppress (option 15)

This menu option works with all Advice menu options (options 8-11).

Your choices are:

- 1 - EXCESSIVE advice messages
- 2 - HEAVY advice messages
- 3 - MODERATE advice messages

The default value for this option is blank. If you would like to exclude certain types of advice messages choose the associated number. If you choose a number then option "**16) Second advice type to suppress**" will become available for you to select.

Second advice type to suppress (option 16)

If you choose to exclude a type of Advice message then it will not appear on any of your reports. An example of this is if you choose to exclude the MODERATE and HEAVY messages from your reports because you were only interested in EXCESSIVE message. First you would choose menu option 15 and enter a **2** to exclude HEAVY advice messages. The resulting reports that you choose would not have HEAVY or MODERATE advice messages on your Advice Reports.

Notice that this menu option will not be available if you do not choose to print any Advice Reports.

This menu option is available if you have chosen to print at least one of the Advice Reports and you entered a valid value (1, 2 or 3) in option 15 - First advice type to suppress.

Report advice detail by message (option 17)

This option works in conjunction with submenu option 10 - Advice Detail Report section.

If you choose to print the Advice Detail then you have the option of ordering your detail report by advice message. you will see a detail report that uses the advice message as a header and then notes the time stamp when that message occurred. This is an easy way to scan your data for peak resource stress time periods. Perhaps segregating them as zones will work very well for your shop.

Report informational advice messages (option 18)

This option works in conjunction with submenu option 10 - Advice Detail Report section

If you choose to print the Advice Detail, then you have the option of suppressing or enabling the reporting of information messages as well as exceptional messages.

How to Run Report Card

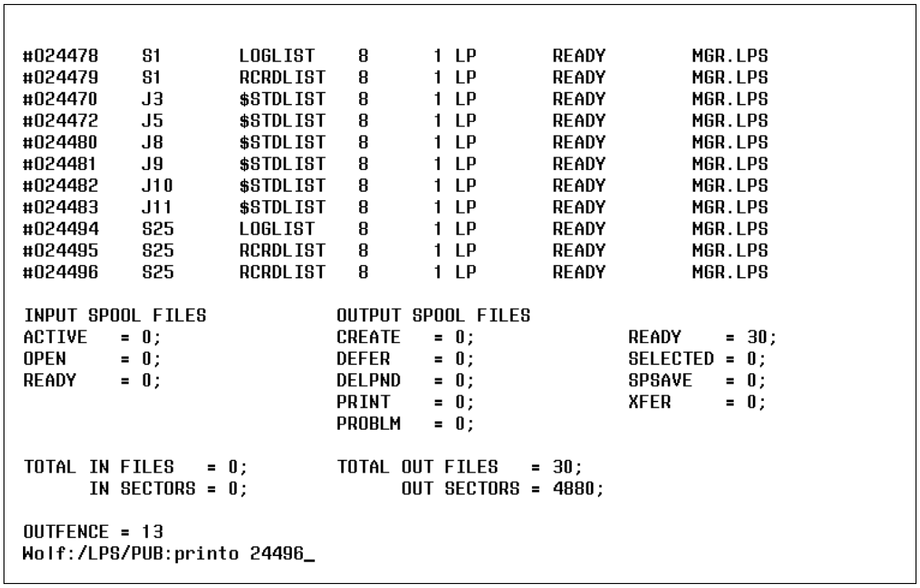
The way to access Report Card is to run SOSLOGX.PUB.LPS and press UTILITY KEYS (F5) and the REPORT CARD (F6) function key. You will then see a Report Card time prompt screen. Choose the dates and times you would like your reports to include.

Pressing the REPORT CARD function key will generate a Report Card. To view the report card, see "Viewing the Report Card."

Viewing the Report Card

To print the Report Card to your screen:

1. Exit SOSLOGX by pressing EXIT SOSLOGX (F8).
2. At the MPE prompt, type **listspf**.
3. Scan the list of spoolfiles. The last RCRDLIST file in the list is the most recent printout of the Report Card.
4. At the MPE prompt, type **printo,** then the number associated with the file, minus the number sign (#) and the zero (0). In Figure 28.12, the file is number 24496.



```
#024478    S1       LOGLIST    8      1 LP       READY        MGR.LPS
#024479    S1       RCRDLIST   8      1 LP       READY        MGR.LPS
#024470    J3       $STDLIST   8      1 LP       READY        MGR.LPS
#024472    J5       $STDLIST   8      1 LP       READY        MGR.LPS
#024480    J8       $STDLIST   8      1 LP       READY        MGR.LPS
#024481    J9       $STDLIST   8      1 LP       READY        MGR.LPS
#024482    J10      $STDLIST   8      1 LP       READY        MGR.LPS
#024483    J11      $STDLIST   8      1 LP       READY        MGR.LPS
#024494    S25      LOGLIST    8      1 LP       READY        MGR.LPS
#024495    S25      RCRDLIST   8      1 LP       READY        MGR.LPS
#024496    S25      RCRDLIST   8      1 LP       READY        MGR.LPS

INPUT SPOOL FILES            OUTPUT SPOOL FILES
ACTIVE   = 0;                CREATE   = 0;              READY    = 30;
OPEN     = 0;                DEFER    = 0;              SELECTED = 0;
READY    = 0;                DELPND   = 0;              SPSAVE   = 0;
                             PRINT    = 0;              XFER     = 0;
                             PROBLM   = 0;

TOTAL IN FILES   = 0;        TOTAL OUT FILES   = 30;
      IN SECTORS = 0;              OUT SECTORS = 4880;

OUTFENCE = 13
Wolf:/LPS/PUB:printo 24496_
```

Figure 28.12 *Sample listspf screen and printo command*

29

SCOPEUTIL FILE CONVERTER

Lund Performance Solutions has created a program, ScopeUtil, for the SOS/3000 Performance Advisor product. ScopeUtil takes Scope extract files as input and creates SL files as output.

- The SL files are the files that hold SOS/3000 historical data.
- Scope is a performance data collector sold by Hewlett-Packard.

By converting Scope data to SL files, ScopeUtil makes the data available to the historical reporting tools from LUND, including SOSLOGX (in SOS/3000) and Performance Gallery Gold.

What Is Converted

Scope and SOS/3000 do not collect the same data. Scope collects some items that SOS/3000 does not, and SOS/3000 collects some items that Scope does not. The purpose of ScopeUtil is to create SL files, which are SOS/3000 data files. Therefore, ScopeUtil calculates SOS/3000 data items from Scope data items. There are some SOS/3000 data items that are impossible to calculate because Scope does not provide adequate data. In such cases, the values for those data items are set to 0.

The file scopform.pub.lps contains formulas that express SOS/3000 data items in terms of Scope data items. ScopeUtil uses the formulas in this file to do its conversions. You may use this file for reference when you have questions about whether an SOS item is being supplied by ScopeUtil.

Here is a short extract from that file:

```
 ! Exact
QUEUE-LEN=
GLOB:CPUQUEUE;

! Not available from Scope export
! SAQ=

! Approximate, includes CM from user processes
CPU-CM%=
```

(100*SUM(PROC:CM_SECONDS))/GLOB:INTERVAL;

A line that begins with an exclamation point is a comment line. This example shows that the SOS data item, QUEUE-LEN, can be calculated exactly from Scope data, and in particular, it is the same as the Scope global data item, CPUQUEUE. The SOS data item, SAQ, is not available from Scope. It will therefore be set to 0 within the SL files. The SOS data item CPU-CM% is calculated from the Scope process data records.

Getting Started

The fastest way to start viewing your Scope data in Performance Gallery Gold is to use the scopallj.pub.lps job stream. In this section you will find instructions that should be sufficient to allow you to create an SL file and a Performance Gallery Gold extract file using that job. Additional detail is provided in the sections that follow.

1. Modify these two lines in the scopallj job stream:

   start <startdate> <starttime>

   stop <stopdate> <stoptime>

   These commands set the start and stop date/time's for the Scope extraction process. They determine the time range of data that will be created. There are comments within the job file to help you modify these commands appropriately.
2. Stream the stream file and wait for completion. If the job runs successfully, you will have a file called outfile.scope.lps, which is the extract file needed by Performance Gallery Gold.
3. Transfer outfile.scope.lps to your PC where Performance Gallery Gold is installed. Use a binary mode of transfer, and give the file an extension of ".pfg" on the PC.
4. Load the file in Performance Gallery Gold. See the *Performance Gallery Gold User's Guide*.

How ScopeUtil Works

The steps required to convert Scope data to SOS data are:

1. Create a Scope extract file.

   This extract file is the input to ScopeUtil. There is a job file, scopextj.pub.lps, supplied with ScopeUtil to create this file. Creating the file is also done by the first job in the file scopallj.pub.lps. These jobs create an extract file named perfextr.scope.lps. Using these jobs is discussed in greater detail in “Creating the Scope Extract File” on page 255.
2. Create an SL file from the Scope extract files.

   There is a job file, scoputj.pub.lps, supplied with ScopeUtil, to create the SL file from the extract file. Creating the SL file is also the first activity of the second job in the file scopallj.pub.lps. These jobs place the SL file in the group scope.lps. Using these jobs is discussed in greater detail in “Creating an SL File with ScopeUtil” on page 256.

After you perform these two steps, you have an SL file in the group scope.lps. Having an SL file allows you to display the data in SOSLOGX (program file soslogx.pub.lps), and to use SOSLOGX to create a Performance Gallery Gold extract file. SOSLOGX is a program that is part of the SOS/3000 product.

Typically one will want to display the data with Performance Gallery Gold. This requires two additional steps to prepare the data for use by Performance Gallery Gold:

3. Use SOSLOGX to create the Performance Gallery Gold extract file. This activity is part of the scopallj job. The Performance Gallery Gold extract file is given the name output.scope.lps (this name can be changed in scopallj). The extraction can also be done interactively within SOSLOGX. Refer to the *SOS/3000 Performance Advisor User Reference Manual* for details on performing this task.
4. Transfer the extract file to your PC where Performance Gallery Gold is installed. Use a binary mode of transfer, and give the file an extension of ".pfg" on the PC.

Creating the Scope Extract File

Before Scopeutil can convert your Scope performance data to an SOS SL data file, the Scope program named Extract must be used to convert the data to a Scope extract file, which holds the Scope data in an ASCII format.

The Scope extract job is scopextj.pub.lps. The first job in scopallj.pub.lps does the same thing as scopextj.pub.lps. The following comments apply to this part of scopallj also.

The job is set up to provide the information required by the ScopeUtil conversion program and, with a few exceptions noted here, should not be modified. You might want to make a copy of the job file in another location (group scope.lps for example) and modify the copy.

Here are acceptable modifications:

1. The job specifies that the Scope collection file is logglob.scope.sys. If this is not the case, this file name needs to be changed.
2. The job logs on as user manager.sys into the scope.sys group. This can be changed, but the user needs to have SM capability.
3. There are also two dates and times that *must* be supplied. These are the start and stop dates for the data to be extracted. The lines in which to supply them are:

   start <startdate> <starttime>

   stop <stopdate> <stoptime>

   The items in angular braces need to be replaced with dates and times. For example:

   start 3/1/00 9:00 am

   stop 3/5/00 12:00 pm
4. The Scope extract job writes the extracted data to file perfextr. scope.lps. This file name can be changed. However this file is input to the ScopeUtil conversion activity, so there must be

a corresponding change in whatever job performs that activity (scoputj or scopallj). See "Creating an SL File with ScopeUtil" on page 256.

5 The file equations in the job put a file limit of 100 megabytes on the extract output files. This could be made larger if necessary.

For more details on the operation of the Scope Extract program, consult your HP Scope manual, or the online help for the Extract program.

Creating an SL File with ScopeUtil

The ScopeUtil conversion job converts the extract file created by the Scope extract job into an SL file that SOSLOGX can read. SOSLOGX is the historical reporting program in SOS/3000.

The file scoputj.pub.lps contains a job to perform this conversion. The second job in scopallj.pub.lps also has a section that does the same thing as scoputj.pub.lps. The following comments apply to this part of scopallj, also.

The job reads the extract file created by the Scope extract job. It assumes the file is named perfextr.scope.lps. Altering options used by ScopeUtil can change this. This is discussed below.

The ScopeUtil conversion program creates an SL file in whatever group it is logged onto. The ScopeUtil conversion job logs on to the group scope.lps, so that is where it will place the SL file. This could be changed if you wish the file to be placed in a different location. Just change the logon specified in the :JOB statement.

Each run of the ScopeUtil conversion program will create one SL file. The name of the file will be SLYYDDDA, where the letters YY are replaced by a two-digit year, and DDD are replaced by a three-digit day of the year, a number between 1 and 366. The year and day used correspond to the earliest date that appears in the Scope extract file.

Please note that this behavior makes it difficult to handle ScopeUtil conversion of more than one set of Scope data from a single day. However it would be possible to accomplish such a task using renaming or file equations. The details will not be given here, since we believe that most people will not want to have multiple SL files per day. Talk to the support group at LPS if you need help with such a task.

Options are provided to the scoputil program in the ScopeUtil conversion job. Here is the section of the job stream in which that is done:

```
:scoputil.pub -o
ProcLog            = Y
ProcCPUThreshold   = .0
ProcOnlyActive     = Y
ProcLogSessions    = Y
ProcLogJobs        = Y
ProcLogSysprocs    = Y
```

```
ProcLogDead         = Y
ProcLogonFilter     = @.@
ProcSortOpt         = 4
ProcSortAscend      = Y
ProcLogLimit        = 10
ApplFile            = perfextr.scope
ConfFile            = perfextr.scope
DiscFile            = perfextr.scope
GlobFile            = perfextr.scope
ProcFile            = perfextr.scope
:eod
```

The name of each option being set appears to the left of the equal sign. The value for the option appears to the right of the equal sign. The options and appropriate values for them are discussed in “ScopeUtil Command-Line Parameters” on page 257.

Running the ScopeUtil Program

The ScopeUtil program that actually performs the file conversion is scoputil.pub.lps. Its activity is controlled by program options and command-line parameters.

The program options (or, simply, options) are similar to the options in other SOS/3000 programs such as SOS and SOSLOGX. The ScopeUtil program reads options from the file scopparm in the user's logon group. If the file does not exist, the ScopeUtil program uses default values.

If the ScopeUtil program is run using the -m command-line parameter, it will present the user with an options menu that can be used to set parameters for the current ScopeUtil run. It also allows the user to save the non-default parameter values into scopparm (in the logon group). Details of using the -m command-line parameter are in the next section.

ScopeUtil Command-Line Parameters

When the ScopeUtil program is run, command-line parameters may be specified. There are three command-line parameters: -l, -m and -o.

scoputil.pub -l

This parameter causes ScopeUtil to display a "#" for every record written to the SL file.

scoputil.pub -m

In a session, this parameter causes ScopeUtil to display the options menu and allows options to be set. This is what is initially displayed:

```
SCOPEUTIL MAIN OPTION MENU
1) Process logging configuration submenu (SUBMENU)
2) Import files configuration submenu (SUBMENU)
Which Option:
```

Selecting item 1 brings up the process logging configuration submenu, as follows:

```
SCOPEUTIL MAIN OPTION MENU
 Process logging configuration submenu
1) Log processes (Y)
2) CPU percentage required for process display (.0)
3) Log only active processes (Y)
4) Log session processes (Y)
5) Log job processes (Y)
6) Log system processes (Y)
7) Log processes which have died (Y)
8) Process logon filter (@.@)
9) Process sort option (4-CPU time)
10) Log processes sorted in ascending order (N)
11) Maximum number of processes to be logged per interval (10)
Which Option:
```

These options are discussed in further detail in “Process Logging Configuration Submenu” on page 259.

Selecting option 2 from the main menu brings up these options. These specify the names of the Scope extract files that Scopeutil should use as the source for its data.

```
SCOPEUTIL MAIN OPTION MENU
Import files configuration submenu
1) Application File (perfextr.scope)
2) Configuration File (perfextr.scope)
3) Disc File (perfextr.scope)
```

4) Global File (perfextr.scope)

5) Processes File (perfextr.scope)

Which Option:

In a job, the -m command-line parameter has no effect. See “scoputil.pub -o” on page 259 for instructions on how to run ScopeUtil in a job.

scoputil.pub -o

In a job, the -o parameter causes ScopeUtil to read the options from $stdin in a parameter=value format. You can see exactly how this is done in the jobs scoputj.pub.lps and scopallj.pub.lps.

In a session, the -o parameter has no effect. See “scoputil.pub -m” on page 258 for instructions on how to run ScopeUtil in a session.

scoputil.pub

When scoputil is run without command-line options, it proceeds to convert files according to the options in the scopparm file (in the logon group).

Process Logging Configuration Submenu

The following table shows the options available in the Process Logging Configuration Submenu.

Option Name	Prompt in Option Menu	Type	Description
ProcLog	Log processes	Y/N	If "**Y**", put process data in the log. If "**N**", don't.
ProcCPUThreshold	CPU percentage required for process display	Number, nn.n	CPU usage level that must be exceeded if ProcOnlyActive is "**Y**."
ProcOnlyActive	Log only active processes	Y/N	If "**Y**", only include process whose CPU usage in the most recent interval exceeds the ProcCPUThreshold.
ProcLogSessions	Log session processes	Y/N	If "**Y**", log session processes.
ProcLogJobs	Log job processes	Y/N	If "**Y**", log job processes.

Option Name	Prompt in Option Menu	Type	Description
ProcLogSysprocs	Log system processes	Y/N	If "**Y**", log system processes.
ProcLogDead	Log processes which have died	Y/N	(not used)
ProcLogonFilter	Process logon filter	String	Filter processes according to the logon filter. The default filter @.@ passes everything. This filter works the same as the logon filter described for SOS in the SOS/3000 Performance Advisor User Reference Manual.
ProcSortOpt	Process sort option	Integer	Sort processes according to the data item specified here.
ProcSortAscend	Log processes sorted in ascending order	Y/N	If "**Y**", sort ascending. If "**N**", sort descending.
ProcLogLimit	Maximum number of processes to be logged per interval	Y/N	The maximum number of processes to be logged each interval.

List of Files used by ScopeUtil

Scopeutil uses the files listed in the next table. All except scopparm are distributed on the production distribution tape.

Table 29.1 *ScopeUtil Files*

ScopeUtil File	Description
itemlist.pub.lps	This file is part of the SOS/3000 product. It describes the items and records that appear in the SL file.
psitems.pub.lps	This file describes the items and records of a process record in the SL file.

ScopeUtil File	Description
scopallj.pub.lps	The job stream that runs the Scope Extract program to create a Scope extract file, ScopeUtil to create an SL file, and SOSLOGX to create a Performance Gallery extract file.
scopextj.pub.lps	The job stream that runs the Scope Extract program to create a Scope extract file.
scopextl.pub.lps	The items that the Scope Extract program should extract for use by ScopeUtil. This file should only be modified by LPS.
scopform.pub.lps	The set of formulas that defines how ScopeUtil should create SOS data items for the SL files from Scope data items in the Scope extract files. This file should only be modified by LPS.
scopitem.pub.lps	The items that can appear in Scope extract files, and the column headings that should be used by the ScopeUtil executable to identify them.
scopparm.pub.lps	The scoputil program will write this file when it is run with the -m parameter and non-default options are specified.
scoputil.pub.lps	The Scopeutil executable that converts Scope extract files to an SL file.
scoputj.pub.lps	The job stream that runs the Scopeutil executable to convert Scope extract files to SL files.
totdiv.pub.lps	This file can be thought of as kind of an addendum to the scopform file. It just contains the items that are in totals subblocks within the SL file and need special treatment.

A

SOS/3000 PULSE POINTS

Pulse points are the indicators of performance displayed in the SOS Pulse Points screen. For information about Pulse point performance indicators, see “SOS Pulse Points” on page 85.

The following HP-3000 Pulse points performance ranges are generic for all HP e3000 systems—customizing them for your system is recommended. Please refer to the configuration instructions in “Pulse Points - SOSADVIC File” on page 46.

Table A.1 *SOS/3000 Pulse Points*

Performance Indicator	Performance Ranges		
	Normal	Problematic	Unacceptable
Processor Performance			
High Pri Busy (%) The summations of the AQ+BQ+CQ+Memory+Dispatch+ICS/OH. High Priority busy time is a good indicator of CPU saturation.	less than 50	50 to 85	greater than 85
CPU QL The average number of processes that required use of the CPU in order to continue processing during the last interval. This number is roughly equivalent to the number of processes appearing in the upper right hand column of the SHOWQ command, except that SOS/3000 provides a current and cumulative average.	less than 5	5 to 15	greater than 15

Performance Indicator	Performance Ranges		
	Normal	**Problematic**	**Unacceptable**
ICS/OH+Dispatch (%) The time the CPU spends dealing with external device activity and the time the CPU spends on dispatcher activity. Time handling disc I/O completions are included here. Interrupt Control Stack activity ICS requires service time by the CPU.	less than 10	10 to 15	greater than 15
CPU CM (%) The average number of time the CPU spends in Compatibility Mode program code.	less than 10	10 to 15	greater than 15
AQ+BQ The beginning letters (i.e., "A" and "B") signify the particular dispatch subqueue in which the process is executing. See “AL” on page 123 and “BL” on page 123 for more information.	less than 5	5 to 8	greater than 8
Memory Performance			
CPU MM % The amount of the total CPU capacity consumed by main memory page activity. This counter includes time spent on memory allocations for user processes that cannot acquire the CPU’s attention (launched) until necessary segments are present in memory.	less than 4	4 to 10	greater than 10

Performance Indicator	Performance Ranges		
	Normal	**Problematic**	**Unacceptable**
Page Fault Rate The current and cumulative number of times per second that memory page faulting occurs. A Page Fault is counted when a process needs a memory object (code or data) that is absent from main memory. The threshold between the various zones for this particular indicator do tend to vary with your CPU size. See the approximate ranges for this item in “Page Fault Rates” on page 71.	less than 10	10 to 25	greater than 25
Swaps/Launch The ratio of the number of swap-ins to the number of launches occurring for the current interval. This can also be a good indicator of memory pressure.	less than 0.4	0.4 to 0.8	greater than 0.8
Memory Cycles/Hour This is an activity of the memory manager. When there is a request for memory space, the memory manager begins to search memory where it last left off. The time it takes to cycle through all of main memory is referred to as a "clock cycle". This time is an important performance metric.	less than 10	10 to 25	greater than 25
Disc Performance			
Pause The percentage of time the CPU spends waiting for disc I/O’s to complete.	less than 5	5 to 15	greater than 15
Read Hit % The percentage of time that Disc Read requests were satisfied in main memory. A Read Hit percentage less than 95 could indicate a data locality problem or a shortage of memory.	greater than 95	95-85	less than 85

Performance Indicator	Performance Ranges		
	Normal	**Problematic**	**Unacceptable**
Average Q-Length The average length of the disc request queue for all disc devices when another disc I/O request arrives. An average queue length of one (1.0) or greater is not acceptable.	less than 0.5	0.5 to 1.0	greater than 1.0
Disc I/O Rate/Sec The number of disc I/O (reads and writes to disc) per second.	less than 10	10 to 25	greater than 25
Miscellaneous Performance			
CM to NM Switches The number and rate per second (nnn/s) of Compatibility Mode to Native Mode switches performed by the process.			greater than 200
NM to CM Switches The number and rate per second (nnn/s) of Native Mode to Compatibility Mode switches performed by the process.			greater than 75

B

PERFORMANCE ADVICE MESSAGE CATALOG

Each of the advice messages follow a similar format. Advice messages are displayed on a terminal screen or in STDLIST in the case of a batch job. Messages can be sent to the console and to individual sessions via the TELLOP and TELL commands, respectively. All selected advice messages will be sent to a list of users and/or the system console. The TELL function is implemented as follows:

```
TELLOP

TELL MANAGER.SYS

TELL MGR.FINANC

<GI01> The CPU was...
```

Simply list potential target users by placing TELL or TELLOP in the first part of the file. To select specific messages to be sent, place an exclamation point (!) before the item. To select specific exceeded threshold messages, place an exclamation before the threshold.

Global Advice Messages <GXnn>

Each of the global messages relate to the "big picture" on the system. They will primarily refer to CPU states, but other events will be included as well. Global messages will include Informational (I) and Excessive (E) messages. "E" messages may require immediate action and should always be heeded.

<GI01> Global System CPU Usage

This informational message is a summary of the total amount of work actively performed by the CPU during the current interval. This number will be the same as the Total Busy: value in the Global CPU Statistics (tabular) section. Therefore, the CPU Statistics section does not have to be enabled in order to view this statistic.

<GI02> Process CPU Usage by Subqueue

This reveals the amount of CPU capacity being consumed within each subqueue. Noting the difference in utilization between the CS subqueue and the DS/ES subqueues, as this denotes how much CPU time is spent on interactive vs. batch processing. If the A and B subqueues are receiving an abundance of CPU time, this may indicate that system processes (or user processes that have "queue jumped") are creating problems. Unless special applications require the use of the B subqueue, most processing will occur in the CS subqueue during primary shift hours, and the DS subqueue during off-shift hours. This value is also found in the Global CPU Statistics section of the Global screen.

<GE01> Global System CPU Overhead Usage

This is an excessive condition indicator. It will only appear when the CPU Overhead percentage exceeds certain thresholds. This value is the same as the ICS/OH value in the CPU Global Statistics portion of the Global tabular screen. The default thresholds and their associated messages are listed below.

> If CPU Overhead is greater than or equal to 10% and less than 12%:
>
> > CPU consumption due to system overhead during this interval was MODERATE
>
> If CPU Overhead is greater than or equal to 12% and less than 14%:
>
> > CPU consumption due to system overhead during this interval was HEAVY
>
> If CPU Overhead is greater than 14%:
>
> > CPU consumption due to system overhead during this interval was EXCESSIVE

As mentioned before, this statistic represents time spent by the CPU handling interrupt activity from DTCs and disc drives. Pressing RETURN (or ENTER) to get and MPE prompt is one such interrupt. Handling disc I/O completions are another.

The Advice section provides a message to help narrow down the cause(s) of high overhead utilization. Excessive terminal or disc I/O by a single (or multiple) process(es) can induce elevated overhead values and can affect response times significantly. This indicator is worth watching. If this number reaches as high as 30%, it is possible that a device (perhaps a modem or multiplexing device) is malfunctioning and is sending an inordinate number of interrupts to the system.

<GE02> Native Mode to Compatibility Mode Switch Rate

If this type of mode switching becomes excessive, the Advice section will display the appropriate message. Elevated mode switches can drain the CPU, forcing other processes to take longer to complete. This is especially true for NM to CM switches (see "CPU CM%" on page 65). These categories and the associated messages are listed below.

> If the NM to CM switch rate is greater than or equal to 50 per second but less than 100:
>
> > Native Mode to Comp. Mode Switch rate during this interval was MODERATE
>
> If the NM to CM switch rate is greater than or equal to 100 per second but less than 200:
>
> > Native Mode to Comp. Mode Switch rate during this interval was HEAVY
>
> If the NM to CM switch rate is greater than 200 per second:
>
> > Native Mode to Comp. Mode Switch rate during this interval was EXCESSIVE

Refer to the Process Detail screen to find which processes are performing excessive switches.

<GE03> Compatibility Mode to Native Mode Switch Rate

If this type of mode switching becomes excessive, the Advice section will display the appropriate message. While CM to NM switches are less CPU-intensive than NM to CM switches, they still put an extra load on the CPU which can affect completion times for other processes. These categories and the associated messages are listed below.

If the CM to NM switch rate is greater than or equal to 100 per second but less than 200:

Comp. Mode to Native Mode Switch rate during this interval was MODERATE

If the CM to NM switch rate is greater than or equal to 200 per second but less than 300:

Comp. Mode to Native Mode Switch rate during this interval was HEAVY

If the CM to NM switch rate is greater than 300 per second:

Comp. Mode to Native Mode Switch rate during this interval was EXCESSIVE

<GE04> Global Average Response Times

This message appears when average prompt response times exceed various thresholds on the system. These categories and the associated messages are listed below.

If response time is greater than or equal to 10 seconds but less than 15:

Global average response time during this interval was MODERATE

If response time is greater than or equal to 15 seconds but less than 20:

Global average response time during this interval was HEAVY

If response time is greater than 20 seconds:

Global average response time during this interval was EXCESSIVE

<GE05> CPU Queue Length

This message appears when the CPU queue length exceed certain thresholds. Excessive CPU requests indicate that the CPU is not adequate for the amount of processing requested of it, or that too many jobs are being allowed to run concurrently. These categories and the associated messages are listed below.

If the CPU queue length is greater than or equal to 5 but less than 10:

CPU queue length indicates a MODERATE CPU bottleneck

If the CPU queue length is greater than or equal to 10 but less than 15:

CPU queue length indicates a HEAVY CPU bottleneck

If the CPU queue length is greater than 15:

CPU queue length indicates an EXCESSIVE CPU bottleneck

<GE06> Logon Failure Due to Shortage of Resources

This message appears when a logon fails because of a shortage of resources (CPU, disc, etc.). Excessive logon failures indicate that resources may be inadequate due to program hangs or database locks.

<GE07> Logon Failure Due to Shortage of Output Devices

This message appears when a logon fails because output devices are excessively involved. Excessive output requests can overload the CPU and contribute to poor performance.

<GE08> Logon Failure Due to Shortage of Disc Space

This message appears when a logon fails because disc space is lacking. When this occurs, programs usually abort or fail. Disc space must be freed up to improve performance.

Disc Advice Messages <DXnn>

<DE01> CPU Wait for Disc

This message appears when the CPU pause for disc I/O value exceeds certain thresholds. Excessive disc I/O indicates a possible shortage of memory or data locality issues. These categories and the associated messages are listed below.

If the CPU wait for disc value is greater than or equal to 5 but less than 10:

Disc I/O indicator #1 (CPU Pause Disc) reveals a MODERATE I/O bottleneck

If the CPU wait for disc value is greater than or equal to 10 but less than 15:

Disc I/O indicator #1 (CPU Pause Disc) reveals a HEAVY I/O bottleneck

If the CPU wait for disc value is greater than 15:

Disc I/O indicator #1 (CPU Pause Disc) reveals an EXCESSIVE I/O bottleneck

Memory Advice Messages <MXnn>

These messages are prefixed with an M, but follow the same format as Global messages. The majority of these messages are EXCESSIVE in nature are presented when memory resources are being heavily burdened. If HEAVY or EXCESSIVE messages are common on the system, it is very likely that the system does not have enough memory for the amount of processes required of it. CPU, disc, and response time indicators can all be adversely affected by a shortage of memory.

To alleviate the memory load, do one or more of the following:

- Reschedule or redesign memory hog processes.
- Add memory.
- Restrict the number of jobs that may start up at any one time.

- Reschedule batch processes to run after primary shift hours.

<ME02> CPU Busy on Memory Management

The amount of time the CPU spends dealing with memory paging activity is usually proportional to the amount of memory necessary. When the CPU spends more than a few percentage points of its time managing main memory, there may be a memory shortage. These categories and the associated messages are listed below.

If memory manager percentage is greater than or equal to 4% but less than or equal to 8%:

Main Memory indicator #2 (CPU Memory) reveals a MODERATE memory load

If memory manager percentage is greater than or equal to 9% but less than or equal to 12%:

Main Memory indicator #2 (CPU Memory) reveals a HEAVY memory load

If memory manager percentage is greater than 12%:

Main Memory indicator #2 (CPU Memory) reveals an EXCESSIVE memory load

<ME03> The Ratio of Memory Swaps to Process Launches

Each time a process is granted the CPU's attention, the dispatcher has to decide whether or not all the necessary data for that process are present in main memory. If all the data are not present, the memory manager has to perform a disc I/O. One swap per 10 launches is a ratio od 0.10 swaps per launch. As this ration escalates, the system works harder to satisfy memory requests, without actually performing more productive work. Consequently, response times can increase, especially if this ration reaches around 0.5 or higher. These categories and the associated messages are listed below.

If swaps to launch ratio is greater than or equal to 0.4 but less than 0.6:

Memory indicator #3 (Swap/Launch) reveals a MODERATE memory load

If swaps to launch ratio is greater than or equal to 0.6 but less than 0.8:

Memory indicator #3 (Swap/Launch) reveals a HEAVY memory load

If swaps to launch ratio is greater than 0.8:

Memory indicator #3 (Swap/Launch) reveals an EXCESSIVE memory load

<ME04> The Page Fault Rate

This value represents the number of times per second that memory page faulting occurred. A page fault is counted when a process needs a memory object (code or data) that is absent from main memory. Any consistent value of more than 25 page faults per second is indicative of a possible memory bottleneck.

Note, however, that the page fault rate depends on the size of the system. See Table 9.6 on page 71 for a breakdown of these rates. the value of 25 is used as a benchmark.

The page fault categories and the associated messages are listed below.

If the page faults per second rate is greater than or equal to 10 but less than 15:

Memory indicator #4 (Page Fault Rate) reveals a MODERATE memory load

If the page faults per second rate is greater than or equal to 15 but less than 20:

Memory indicator #4 (Page Fault Rate) reveals a MODERATE memory load

If the page faults per second rate is greater than 20:

Memory indicator #4 (Page Fault Rate) reveals an EXCESSIVE memory load

Process Advice Messages <PInn>

Process Advice messages are prefixed with a P because they describe various conditions relating to individual process activity. Many times, a global problem is induced by one or two "problem" processes. It is especially critical to pay attention to the high resource usage process messages (identifying the "Hog" process).

<GI02> Process CPU Usage by Subqueue

See "<GI02> Process CPU Usage by Subqueue" on page 267.

<PI02> The Hog Process of the Current Interval

The Hog process is simply the highest CPU-user for the current interval. There will always be an advice message indicating which process this is, even if the Hog is only using a tiny portion of the CPU. If, however, the Hog is consistently using vast amounts of CPU resource, you can drill down into this process by pressing the HOG PROC ZOOM function key. This one process may be affecting the performance of all other processes on the system.

<PI03> The High Disc I/O Usage Process

This message identifies the job or session that generated the highest number of combined reads and writes to disc during the current interval. If an extremely high number of disc I/Os are being performed by a particular process, it is also likely using a large portion of the CPU, which has to service the I/O. This message can indicate a number of issues at work. It may be that one or more TurboIMAGE datasets that were accessed by that process are experiencing data locality issues. This is an excellent method for finding application or data file inefficiencies.

<PI04> The High Terminal I/O Process

This message identifies the user session during the current interval that generates the highest number terminal reads. Refer to the "Global Misc Statistics (tabular format)" on page 66 for more information on terminal I/O specifics. The high terminal I/O user will indicate one of three possibilities:

- The user is holding the RETURN/ENTER key down.
- The application is inefficient.
- The application is efficient, but demanding. Some character mode applications generate terminal reads excessively.

If this process fall into one of the Application Workload groups that has been previously defined as having a certain amount of terminal reads per user transaction, then the number reported will reflect the approximate user transactions.

C

SOS/3000 WAIT STATES

Overview

SOS/3000 wait states information is displayed in the following SOS screens:

- In the extended process line of the Process Information portion in the global screen.
- In the Process Wait States portion of the Process Detail screen.
- In the Workload Wait States portion of the Workload Detail screen.

Wait State Description

The wait state codes defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

Wait:Cur

These states are defined in the next table.

Table 3.1 *Current Wait States*

Wait State	Description
BIO	Waiting for non-disc I/O to complete.
CPU	Currently active in the CPU resource.
Dead	This process has terminated and will not show next interval. Its last will and testament (statistics) are shown.
Disc	Waiting for Disc I/O to complete.
FS	Waiting for activation by its father or son process.
Imp	Waiting due to some resource being unavailable. An example is database locks, lack of system table entries, etc.

Wait State	Description
Mem	Waiting for a segment(s) to be brought into memory.
Msg	Waiting for message file I/O, port sendmail or port receivemail.
Pre	This process has been preempted by a higher priority process.
RIN	Waiting for a RIN to become available.
Time	Waiting for a timer.
Trd	Waiting for a terminal read to complete.
TWr	Waiting for a terminal write to complete.
Othr	Waiting for a miscellaneous condition to complete.

Wait:{CP ME DI IM PR RI TR IO TI FS MS OT}

These states are defined in Table 3.2.

Table 3.2 *Wait States*

Wait State	Description
CP	This wait state is the percentage of the process' response time due to servicing by the CPU. That is, it takes time away from the CPU to perform the commands of processes. ***Performance Tip*** For processes that are computation intensive, you will usually see a high number in this category. It is possible that a process exhibiting close to 100% here is in a looping state, especially if the program has not completed as desired.

Wait State	Description
ME	This wait state is the percentage of the process' response time that is due to time spent waiting for missing memory segments to return to main memory. When a process tries to continue to run but cannot because of missing necessary memory segments, that process is blocked. Memory fault stop time is counted in this category. ***Performance Tip*** There may be numbers greater than 10% in this category for systems that do not have an adequate amount of main memory to support current demands. Systems exhibiting severe memory shortage will show most user processes, which need even modest amounts of memory, as high memory wait percentages in this bucket. If only a few processes typically report values greater than or equal to 20% to 30%, you should look at their individual memory requirements. It is possible that a particular application is gorging itself on memory space. A re-design of that program might be warranted. Remember, when dealing with process brick walls (in this case absent memory segments), small percentages are desirable. Less than 10% in this wait state is preferable.
DI	This wait state is the percentage of the process' response time due to waiting for missing data to be brought into main memory from disc. An I/O brick wall occurs when a process wants to continue running, but cannot because necessary user-requested data is missing from disc. Since a process literally stopped and the CPU is taken away when a physical disc access is performed, it is absolutely necessary to minimize this percentage. ***Performance Tip*** If you notice that the CPU Pause time (Global Screen) is rising above 10-15% most of the time, you will usually find that one or more processes are spending a moderate-to-high percentage of their processing time waiting for disc I/O's to complete. If a process is consistently waiting more than 20-30% of its time on disc I/O servicing, then we should find out why. There are a number of reasons why I/O bottlenecking can take place. Some of the more common culprits are: • TurboIMAGE master and detail set inefficiencies. • Inefficient pre-fetching operation (lack of CPU, memory, poor I/O locality). • Too many I/O demanding processes running at once, etc. Please refer to the Disc I/O and TurboIMAGE chapters in the book *Taming The HP 3000* for more problem/solution information in this area.

Wait State	Description
IM	This wait state is the percentage of the process' response time due to being impeded by various lock and latch control mechanisms. This category includes many stop reasons. An impede occurs when a process tries to gain access to a software table or control structure and cannot because other processes arrived first. TurboIMAGE access is one of the most common sources of impedes. When a process wants to gain entry to a particular dataset and another process has that set locked via the DBLOCK intrinsic, then the waiting process is counted as having been impeded. It must wait until the prior process is finished with its current operation before it can continue. Also, any file may have only one disc request outstanding. That is, in order for a process to access even a simple MPE/iX flat file, it must first gain control of that file's control block. This access is not by the FLOCK intrinsic as is the case in the RIN wait state bucket. Rather, only one user (regardless of programmatic locking) can gain access at a time. Other sources of impedes include unavailable system table entries, terminal buffers, etc. ***Performance Tip*** The interpretation of impedes can be difficult because there are potentially many causes and inter-relationships between processes and resources. First of all, it is best to determine the overall global impede rate. This is done by looking at the Impede value on the Global Process Stop Reasons screen. If the Global Impede percentage is consistently high then it is important to look at individual processes that show high impede percentages as a part of their processing time. Processes that access the same database in applications where poor locking strategies are implemented tend to spend a very large percentage of their time being impeded. It is not uncommon to see values in excess of 60% for these processes in the impeded wait state. A large percentage may point to poor locking or simply a great deal of competition for a particular file.

Wait State	Description
PR	This wait state is the percentage of the process' response time due to preemption by other processes. A preemption occurs when a process is forced to give up use of the CPU because a higher priority process is ready to execute. ***Performance Tip*** If both interactive and batch processes are running, batch processes (those in lower queues) will receive a higher number of preemptions than processes running in the interactive queue. If interactive users are spending a large percentage of their response time being preempted it is possible that there is not enough CPU horsepower to go around. Either backing off on demand or increasing the supply are your recourses. You may try doling out the CPU resource by means of the TUNE command or a program to accomplish this. The basic strategy is to give less CPU attention to those who can stand it, and provide more to those who really need it.
RI	This wait state is the percentage of time the process is waiting for a RIN.
TW	This wait state is the percentage of time the process is waiting for terminal writes to complete. Since terminal output is usually buffered, this will only accumulate time if the system runs out of terminal buffers or if the program is blocking on terminal output.
IO	This wait state is the percentage of time the process is waiting for non-disc I/O to complete (e.g., tape drive activity). Datacomm overhead is accumulated in this bucket as well.
TI	This wait state is the percentage of time the process is waiting for a programmatic timer (such as the PAUSE intrinsic) to complete.
FS	This wait state is the percentage of time the process is waiting on a father and/or son wait.
MS	This wait state is the percentage of time the process is waiting on a message file, port, or sendmail/receivemail wait.
OT	This wait state is the percentage of time the process is waiting on other events not covered by the above definitions.

D

WORKLOAD GROUPS

The ability to track resource usage and other statistics on the basis of user-defined application workloads is one of the most powerful features of SOS/3000. Without workload definitions and descriptions for a system, it is nearly impossible to perform adequate capacity planning. Also, workloads have different service requirements. The more a workload demands of a resource, the more utilized that resource will be. This in turn, affects not only processes associated with that workload, but other workloads as well.

Understanding Workloads

An application workload is a group of individual users and programs or even a department within your company. You might think of an application workload as a virtual application, one that does not exist as a single program or user, but as an aggregate of programs and users on your system. A workload can be as simple as one user running one program or as complex as many users running many programs. Usually, workloads consist of users and programs that perform like tasks.

For example, let's say that your finance department has the following financial functions under its umbrella:

```
Accounts payable          (programs = AP002.PROG.FINANCE)

Accounts receivable       (programs = AR001.PROG.FINANCE)
```

Let's also say that the following users who operate the accounting department will be included no matter what programs they run. These folks might use an editor program in order to create a simple job stream for an accounting function. They might run a query program to perform ad hoc reporting. These users are therefore included in the finance workload although they do not always run the above-mentioned programs.

They log on as:

```
COLLEEN,MGR.FINANCE

LAYNE,MGR.FINANCE

BILL,MGR.FINANCE
```

Another category of users we may include is upper management. A few high-level managers periodically inquire via their terminal into various on-line reports. These managers log on as:

```
JIM,MGR.BOSS
```

```
MELISSA,MGR.BOSS
```

So, to answer our question: "**What is a workload?**" consider the following for our FINANCE application:

- Any user running various AP and AR programs.
- A restricted number of users logging onto the FINANCE account.
- Certain managers logging onto the BOSS account.

Now that we have described and defined our FINANCE application workload, let's ask the next question: "**What percentage of CPU, disc requests, etc., is the FINANCE workload as an aggregate unit consuming as compared to other workloads on my system?**" This is an example of the type of question that many system managers and management personnel ask. SOS/3000 has the ability to track workloads at a terminal, in a batch job, and in a log file so you can download ASCII data into spreadsheets and graphics programs for further analysis.

Defining Workloads

SOS/3000 comes with three pre-defined workloads:

JOBS - all batch jobstreams

SESSION - all on-line terminal sessions

SYSPROCS - all system processes

Additional workloads can be defined by the user in the SOSWKDEF.PUB.LPS file. Use your favorite editor to create the SOSWKDEF file (QUAD.UTIL.LPS is included free of charge on our distribution tape).

The basic format of SOSWKDEF requires the following three items for each workload defined:

1. Name of workload (up to 12 characters)
2. Type of workload (Job, Session or Both)
3. User specifications. A list of one or more of the following:

USER=(MPE logon User and Account for desired sessions)

PROG=(MPE fully-qualified program file name)

Following is a sample SOSWKDEF file:

```
ACCOUNTREC                       !NAME of group (max 10 characters)
JOB                               !GROUP TYPE (JOB/SESSION/BOTH)
USER=@.ACCTNG,AR                  !USER SPECIFICATIONS
                                 !At least 1 blank line (required)
ACCOUNTPAY                        !NAME
SESSION                           !GROUP TYPE (JOB/SESSION/BOTH)
USER=@.ACCTNG,AP                  !Specification
                                 !At least 1 blank line (required)
GL                                !NAME
JOB                               !GROUP TYPE
USER=@.ACCTNG,GL                  !Specification
LDEV=20-45                        !Only ports 20-45 included

ORDERS
SESSION
USER=@.OE

SALES
SESSION
USER=@.SALES

COMPILING                          !Let's track the programmers
JOB                                !Catch job compiles
PROG=REACTOR.PUB.@                 !Any users on the entire system
PROG=SPL.PUB.SYS                  !running either of these programs
```

Figure 4.1 *Sample SOSWKDEF File*

SOSWKDEF File Configuration Rules

1. A workload **NAME** is *required*. It may be up to 12 characters.
2. A workload **TYPE** specification is *required* to indicate which types of processes to include or exclude from the workload definition. This ensures that you can create two workloads for processes that run both interactively and in batch. For example, two FINANCE workloads: Batch and Session.
   - A group *TYPE* of "**JOB**" will only include batch jobs.
   - A group *TYPE* of "**SESSION**" will only include interactive processes.
   - A group *TYPE* of "**BOTH**" will include jobs and sessions, but not system processes.
3. It is *required* that workloads be separated by at least one or more *blank lines* within a definition file. Comments may be included on any line by preceding them with an exclamation mark ("**!**") character.
4. Either a user or a program specification is *REQUIRED*. They must be entered one per line and consist of any of the following three types:

   A program specification must contain a program, group and account:

   ```
   PROG=PROGRAM.GROUP.ACCOUNT
   ```

   A user specification must contain a user and account, the session name and logon group are optional:

   ```
   USER=SESSIONS,USER.ACCOUNT,GROUP
   ```

   The MPE logical device number or range of device numbers:

   ```
   LDEV=nnn or LDEV=nnn-nnn
   ```

You may use an "@" sign for any of the criteria; it functions as a wild card just as it does within normal MPE rules (partial or full).

5. Ldev specifications means that you can capture activity on a terminal-by-terminal basis or even within a range of terminals. Use this option with caution!
6. There is virtually no limit to the number of USER, PROGRAM and LDEV specifications allowed for each workload.
7. Three workloads provided by default: JOBS, SESSION and SYSPROCS. Processes not falling into one of your defined workloads will fall into one of these. All processes will be assigned to one, and only one, workload group.
8. The NAME and TYPE specification lines are required. All other lines are optional. *Important*: In order to be considered a part of a workload group, a process must satisfy the PROG specification and the USER specification and the LDEV specification if all three are present. If one or more program specification line is included, a program has to satisfy only one of the program specifications to be included in the group. If no program specifications are entered, all process programs are considered to be in the group (unless the process is somehow disqualified by either USER or LDEV specification). The USER and LDEV specifications are resolved the same way.

For example, the following lines are entered into SOSWKDEF to define the workload called “WORKTEST:”

```
WORKTEST                       !Workload name

SESSION                        !Only terminals

PROG=@.PUB.MFG

PROG=MONEND.PUB.QTR

USER=JANE,MGR.MFG

USER=@.@.QTR

LDEV=50-60

LDEV=120
```

For a process to be included in the WORKTEST workload it has to satisfy just one PROG specification and one USER specification and one LDEV specification. Each is considered to be an “*OR*” condition. For example, a program INVEN01.PUB.MFG run by MGR.QTR at LDEV 56 would be counted in this workload.

9 Command Interpreter processes can be selected by specifying the program file name CI(PROG=CI). Spooler processes can be selected by specifying the program file name of “SP” (PROG=SP). All other system processes can be identified by name. When selecting any of these system type processes the program group and account must be specified as “@.”

   Note: If you want to strip out Command Interpreters from the catch-all SESSIONS workload you must create a separate workload with the program name CI to have the response times for SESSION reflect what the users actually experience.

10 A process can belong to only one workload group. If it fits the criteria for two or more groups, it will be assigned to the first one in the file it qualifies for.

Keep in mind that you can also log workload information and utilize the logging facility to prepare ASCII data files to download to a PC or data may be exported into **PERFORMANCE GALLERY** from LPS.

E

SOS/3000 DATA ITEMS

The following is the contents of the ITEMLIST file. All possible data items monitored by SOS Performance Advisor are listed in this file.

This information is provided as a reference to the user—please do not modify the itemlist file in any way. Data items may be added, modified, or deleted by Lund Performance Solutions periodically and without notice to users**.**

```
!###########################################################################
!###########################################################################
!################                WARNING!               ####################
!################  CUSTOMERS: DO NOT MODIFY THIS FILE!  ####################
!###########################################################################
!###########################################################################
!XL
!
! File Structure:
!
! Column 1
!     Item Name (used by SOSLOGX reports and other functions)
!               (17 character MAX)
! Column 2
!     Block Number (Must be in sorted order from 0 to n)
!     NOTE: The following block numbers are considered singular log blocks
!        0,6,7,8,10,12,14,15
!
! Column 3
!     Offset in 16 bit words (Must be in sorted order with no holes or overlaps)
! Column 4
!     Type of variable  (1 = short,    (16 bits,signed)
!                        2 = long,     (32 bits,signed)
!                        4 = longint,  (64 bits,signed)
!                       -1 = ushort,   (16 bits,unsigned)
!                       -2 = uint,     (32 bits,unsigned)
!                       -4 = ulongint, (64 bits,unsigned)
!                        0 = string)
! Column 5
!     Total display length in characters (including dec pt and dec places)
!          (Should never be greater than 11 for non-string types!)
! Column 6
!     Implied decimal places
! Column 7
!     flags   - = none,
!             a = accumulate data (instead of average)
!             l = peak values are low
!             0 = treat 0% like 100%
!             n=no interval value
!             r=pulse point disc rates
! Column 8
!     Comments
!
TOT-BUSY%         0  0  -1   5  1 -    Total CPU busy%
AS-PROCESS%       0  1  -1   5  1 -    AS queue process%
BS-PROCESS%       0  2  -1   5  1 -    BS queue process%
CS-PROCESS%       0  3  -1   5  1 -    CS queue process%
DS-PROCESS%       0  4  -1   5  1 -    DS queue process%
ES-PROCESS%       0  5  -1   5  1 -    ES queue process%
MEM-MANAGER%      0  6  -1   5  1 -    Memory manager%
```

```
DISPATCHER%       0  7  -1  5  1 -    Dispatcher%
OVERHEAD%         0  8  -1  5  1 -    Overhead%
IDLE%             0  9  -1  5  1 -    Idle%
PAUSE%            0 10  -1  5  1 -    Disc Wait%
QUEUE-LEN         0 11  -1  3  0 -    Ready queue length
SAQ               0 12   2  4  0 -    SAQ value
CPU-CM%           0 14  -1  3  0 -    CPU Compatibility mode %
SWAPS/LAUNCH      0 15  -1  4  2 -    Swaps/Launch ratio
MEM-CYCLES        0 16  -1  4  0 a    Memory Cycles
*UNUSED*          0 17  -1  0  0 -    *** Unused ***
LAUNCH-RATE       0 18  -1  3  0 -    Launch Rate
PAGE-FAULT/S      0 19  -1  3  0 -    Page faults/second
LIBRARY-FAULT%    0 20  -1  3  0 -    % of library page faults
SESSIONS          0 21  -1  3  0 -    # Sessions
JOBS              0 22  -1  3  0 -    # Jobs
PROCESSES         0 23  -1  3  0 -    # Processes
N/C-SWITCHES      0 24  -1  3  0 -    NM to CM Switches/sec
C/N-SWITCHES      0 25  -1  3  0 -    CM to NM Switches/sec
TERM-READS        0 26  -1  5  0 a    Number of terminal reads
TERM-READS/MIN    0 27  -1  4  0 -    Number of terminal reads/minute
PREEMPTS/SEC      0 28  -1  2  0 -    Number of preempts/second
IMPEDES/SEC       0 29  -1  2  0 -    Number of impedes/second
SIR-RIN/SEC       0 30  -1  2  0 -    Number of SIR/RIN locks/second
RESP-TIME         0 31  -1  5  1 -    Overall prompt response time
OVER-CAND/SEC     0 32  -1  3  0 -    Overlay candidates/sec
PRE-FETCH/SEC     0 33  -1  3  0 -    Prefetches/sec
POSTS/SEC         0 34  -1  3  0 -    Number of memory posts/sec
FIRST-RESP-TIME 0 35  -1  5  1 -   Overall first response time
PROMPT-RESP-P5% 0 36  -1  5  1 -   Prompt response <.5 percentage
PROMPT-RESP-1%    0 37  -1  5  1 -   Prompt response <1 percentage
```

```
PROMPT-RESP-1P5% 0 38  -1  5  1 -   Prompt response <1.5 percentage
PROMPT-RESP-2%   0 39  -1  5  1 -   Prompt response <2 percentage
PROMPT-RESP-3%   0 40  -1  5  1 -   Prompt response <3 percentage
PROMPT-RESP-4%   0 41  -1  5  1 -   Prompt response <4 percentage
PROMPT-RESP-5%   0 42  -1  5  1 -   Prompt response <5 percentage
PROMPT-RESP-10%  0 43  -1  5  1 -   Prompt response <10 percentage
PROMPT-RESP-20%  0 44  -1  5  1 -   Prompt response <20 percentage
PROMPT-RESP-OVR% 0 45  -1  5  1 -   Prompt response >20 percentage
FIRST-RESP-P5%   0 46  -1  5  1 -   First response <.5 percentage
FIRST-RESP-1%    0 47  -1  5  1 -   First response <1 percentage
FIRST-RESP-1P5%  0 48  -1  5  1 -   First response <1.5 percentage
FIRST-RESP-2%    0 49  -1  5  1 -   First response <2 percentage
FIRST-RESP-3%    0 50  -1  5  1 -   First response <3 percentage
FIRST-RESP-4%    0 51  -1  5  1 -   First response <4 percentage
FIRST-RESP-5%    0 52  -1  5  1 -   First response <5 percentage
FIRST-RESP-10%   0 53  -1  5  1 -   First response <10 percentage
FIRST-RESP-20%   0 54  -1  5  1 -   First response <20 percentage
FIRST-RESP-OVR%  0 55  -1  5  1 -   First response >20 percentage
STOP-NMCOD-PFLT  0 56  -1  3  0 -   NM code page fault stop %
STOP-NMSTK-PFLT  0 57  -1  3  0 -   NM stack page fault stop %
STOP-NMTRN-PFLT  0 58  -1  3  0 -   NM transient page fault stop %
STOP-FILE-PFLT   0 59  -1  3  0 -   File object page fault stop %
STOP-CMCOD-PFLT  0 60  -1  3  0 -   CM code page fault stop %
STOP-CMSTK-PFLT  0 61  -1  3  0 -   CM stack page fault stop %
STOP-CMTRN-PFLT  0 62  -1  3  0 -   CM transient page fault stop %
STOP-TERM-READ   0 63  -1  3  0 -   Terminal read stop %
STOP-TERM-WRITE  0 64  -1  3  0 -   Terminal write stop %
STOP-DISC-IO     0 65  -1  3  0 -   Terminal disc I/O stop %
STOP-OTHER-IO    0 66  -1  3  0 -   Terminal disc I/O stop %
STOP-IOWAIT      0 67  -1  3  0 -   IOWAIT stop %
```

```
STOP-SIR         0 68  -1  3  0 -   SIR stop %
STOP-RIN         0 69  -1  3  0 -   RIN stop %
STOP-MM-PREFET   0 70  -1  3  0 -   Memory manager prefetch stop %
STOP-QUANT-USED  0 71  -1  3  0 -   Quantum expiration stop %
STOP-SHORT-TIME  0 72  -1  3  0 -   Short timer stop %
STOP-FATHER      0 73  -1  3  0 -   Suspend on father stop %
STOP-SEM-CT-BLK  0 74  -1  3  0 -   Semaphore control block stop %
STOP-SON         0 75  -1  3  0 -   Suspend on son stop %
STOP-DATA-COMM   0 76  -1  3  0 -   Data communications stop %
STOP-OPER-REPLY  0 77  -1  3  0 -   Operator reply stop %
STOP-DISP-PRMPT  0 78  -1  3  0 -   Dispatcher preempt stop %
STOP-PORT        0 79  -1  3  0 -   Port stop %
STOP-MAIL        0 80  -1  3  0 -   Mail stop %
STOP-JUNK        0 81  -1  3  0 -   Junk stop %
STOP-MSG-FILE    0 82  -1  3  0 -   Message file stop %
STOP-IMPEDE      0 83  -1  3  0 -   Impede stop %
STOP-BREAK       0 84  -1  3  0 -   Break stop %
STOP-WAIT-QUEUE  0 85  -1  3  0 -   Wait queue stop %
STOP-MM-WAIT     0 86  -1  3  0 -   Memory manager wait stop %
STOP-PORT-ABS    0 87  -1  3  0 -   Port absent stop %
STOP-FILE-BLK    0 88  -1  3  0 -   File blocked stop %
STOP-FILE-UNBLK  0 89  -1  3  0 -   File unblocked stop %
STOP-STOR-MGMNT  0 90  -1  3  0 -   Storage management stop %
STOP-USER-DEBUG  0 91  -1  3  0 -   User debug stop %
STOP-IO-CONFIG   0 92  -1  3  0 -   I/O configuration stop %
STOP-PFP-REPLY   0 93  -1  3  0 -   PFP reply stop %
STOP-DB-MONITOR  0 94  -1  3  0 -   Data base monitor stop %
STOP-FILL-DISC   0 95  -1  3  0 -   Fill disc stop %
STOP-HLIO        0 96  -1  3  0 -   HLIO stop %
STOP-TIO         0 97  -1  3  0 -   TIO stop %
```

```
STOP-MM-POST      0 98  -1  3  0 -   Memory manager post stop %
STOP-SIG-TIMER    0 99  -1  3  0 -   Signal timer stop %
STOP-CPU-PR       0 100 -1  3  0 -   CPU preempt stop %
STOP-DSC-IO-PR    0 101 -1  3  0 -   Disc I/O preempt stop %
STOP-PRI-PR       0 102 -1  3  0 -   Priority preempt stop %
STOP-SQL-LOCK     0 103 -1  3  0 -   SQL lock stop %
STOP-SQL-LAT1     0 104 -1  3  0 -   SQL level 1 latch stop %
STOP-SQL-LAT2     0 105 -1  3  0 -   SQL level 2 latch stop %
STOP-SQL-LAT3     0 106 -1  3  0 -   SQL level 3 latch stop %
STOP-SQL-LAT4     0 107 -1  3  0 -   SQL level 4 latch stop %
STOP-SQL-BUFF     0 108 -1  3  0 -   SQL buffer stop %
STOP-LONG-TIME    0 109 -1  3  0 -   Long timer stop %
STOP-MM-FREEZE    0 110 -1  3  0 -   Memory manager freeze stop %
STOP-OTHER        0 111 -1  3  0 -   Other stop %
ALERT-RESOURCE    0 112 -1  3  0 a   Out of source alert
ALERT-LDEV        0 113 -1  3  0 a   Out of ldevs alert
ALERT-DISC        0 114 -1  3  0 a   Low on disc space alert
READ-HIT%         0 115 -1  3  0 -   Disc read hit %
TOTAL-CPU-TIME    0 116  2  9  0 a   Total CPU time in msecs
ELAPSED-TIME      0 118  2  9  0 a   Elapsed time in msecs
HIGH-PRI-BUSY%    0 120  2  9  0 -   High Priority CPU busy %
FILLER            0 121 -1  5  0 -   Unused filler
PFLT-TRANS-CNT    0 122  2  9  0 -   Page Fault Transient object cnt
PFLT-PERM-CNT     0 124  2  9  0 -   Page Fault Permanent object cnt
PFLT-NMSTK-CNT    0 126  2  9  0 -   Page Fault NM stack object cnt
PFLT-CMSTK-CNT    0 128  2  9  0 -   Page Fault CM stack object cnt
PFLT-NMCODE-CNT   0 130  2  9  0 -   Page Fault NM code object cnt
PFLT-CMCODE-CNT   0 132  2  9  0 -   Page Fault CM code object cnt
PFLT-CMDATA-CNT   0 134  2  9  0 -   Page Fault CM data object cnt
PFLT-FILEOBJ-CNT  0 136  2  9  0 -   Page Fault File object cnt
```

PFLT-NMSYS-CNT	0	138	2	9	0	-	Page Fault NM Sys lib object cnt
PFLT-CMSYS-CNT	0	140	2	9	0	-	Page Fault CM Sys lib object cnt
PFET-TRANS-CNT	0	142	2	9	0	-	Prefetch Transient object cnt
PFET-PERM-CNT	0	144	2	9	0	-	Prefetch Permanent object cnt
PFET-NMSTK-CNT	0	146	2	9	0	-	Prefetch NM stack object cnt
PFET-CMSTK-CNT	0	148	2	9	0	-	Prefetch CM stack object cnt
PFET-NMCODE-CNT	0	150	2	9	0	-	Prefetch NM code object cnt
PFET-CMCODE-CNT	0	152	2	9	0	-	Prefetch CM code object cnt
PFET-CMDATA-CNT	0	154	2	9	0	-	Prefetch CM data object cnt
PFET-FILEOBJ-CNT	0	156	2	9	0	-	Prefetch File object cnt
PFET-NMSYS-CNT	0	158	2	9	0	-	Prefetch NM Sys lib object cnt
PFET-CMSYS-CNT	0	160	2	9	0	-	Prefetch CM Sys lib object cnt
POST-TRANS-CNT	0	162	2	9	0	-	Post Transient object cnt
POST-PERM-CNT	0	164	2	9	0	-	Post Permanent object cnt
POST-NMSTK-CNT	0	166	2	9	0	-	Post NM stack object cnt
POST-CMSTK-CNT	0	168	2	9	0	-	Post CM stack object cnt
POST-NMCODE-CNT	0	170	2	9	0	-	Post NM code object cnt
POST-CMCODE-CNT	0	172	2	9	0	-	Post CM code object cnt
POST-CMDATA-CNT	0	174	2	9	0	-	Post CM data object cnt
POST-FILEOBJ-CNT	0	176	2	9	0	-	Post File object cnt
POST-NMSYS-CNT	0	178	2	9	0	-	Post NM Sys lib object cnt
POST-CMSYS-CNT	0	180	2	9	0	-	Post CM Sys lib object cnt
MKOC-TRANS-CNT	0	182	2	9	0	-	ROC Transient object cnt
MKOC-PERM-CNT	0	184	2	9	0	-	ROC Permanent object cnt
MKOC-NMSTK-CNT	0	186	2	9	0	-	ROC NM stack object cnt
MKOC-CMSTK-CNT	0	188	2	9	0	-	ROC CM stack object cnt
MKOC-NMCODE-CNT	0	180	2	9	0	-	ROC NM code object cnt
MKOC-CMCODE-CNT	0	192	2	9	0	-	ROC CM code object cnt
MKOC-CMDATA-CNT	0	194	2	9	0	-	ROC CM data object cnt
MKOC-FILEOBJ-CNT	0	196	2	9	0	-	ROC File object cnt

```
MKOC-NMSYS-CNT    0 198  2  9  0 -   ROC NM Sys lib object cnt
MKOC-CMSYS-CNT    0 200  2  9  0 -   ROC CM Sys lib object cnt

DISC-LDEV         1  0  -1  3  0 -   Disc Ldev
DISC-READ-RATE    1  1  -1  3  0 r   Disc Reads/sec
DISC-WRITE-RATE   1  2  -1  3  0 r   Disc Writes/sec
DISC-IO-RATE      1  3  -1  3  0 r   Disc I/O/sec
DISC-QUEUE-LEN    1  4  -1  5  2 -   Disc request queue length
DISC-IO%          1  5  -1  3  0 -   Percent of total disc I/O
DISC-IO-CNT       1  6  -1  5  0 a   Total I/O
DISC-UTIL%        1  7  -1  3  0 -   Disc utilization percent
DISC-TOT-SERVICE  1  8   2  5  0 a   Total service time in msecs
DISC-QLEN-0       1 10  -1  5  0 a   Times queue length was 0
DISC-QLEN-1       1 11  -1  5  0 a   Times queue length was 1
DISC-QLEN-2       1 12  -1  5  0 a   Times queue length was 2
DISC-QLEN-3-4     1 13  -1  5  0 a   Times queue length was 3-4
DISC-QLEN-5-8     1 14  -1  5  0 a   Times queue length was 5-8
DISC-QLEN-9-16    1 15  -1  5  0 a   Times queue length was 9-16
DISC-QLEN-17-32   1 16  -1  5  0 a   Times queue length was 17-32
DISC-QLEN-OVR-32  1 17  -1  5  0 a   Times queue length was over 32
DISC-SERV-TIME    1 18  -1  4  1 -   Average request service time
DISC-READ-CNT     1 19  -1  5  0 a   Total Reads
DISC-WRITE-CNT    1 20  -1  5  0 a   Total Writes

DISC-LDEV2       1 1000 -1  3  0 -   Disc Ldev

GROUP             2  0  -1  3  0 -   Workload group number
CPU%/GRP          2  1  -1  5  1 -   CPU %
DISC%/GRP         2  2  -1  5  1 -   Disc I/O %
RESP-TIME/GRP     2  3  -1  5  1 -   Average prompt response time
```

```
TRANSACT/GRP      2  4  -1  5  0 a   Total transaction
CPU/TRAN/GRP      2  5  -1  5  0 -   CPU per transaction
DISC/TRAN/GRP     2  6  -1  5  0 -   Disc I/O per transaction
FIRST-RESP/GRP    2  7  -1  5  1 -   Average first response time
CPU/GRP           2  8   2  9  0 a   CPU time in msecs
CM-CPU/GRP        2 10   2  9  0 a   CPU CM time in msecs
DISC-READ/GRP     2 12  -1  5  0 a   Disc read count
DISC-WRITE/GRP    2 13  -1  5  0 a   Disc write count
TOT-RESP/GRP      2 14   2  9  0 a   Total base response time in msecs
TYPE-MASK/GRP     2 16  -1  1  0 a   Job/Session/System process mask
QUEUE/GRP         2 17  -1  1  0 a   Priority queue limits (unprintable)
PROC-COUNT/GRP    2 18  -1  6  1 -   Active process count
BASE-RESP/GRP     2 19  -1  5  1 a   Base response time
LIVE-TIME/GRP     2 20   2  9  0 a   Total process live time in msecs
ABSENT-TIME/GRP   2 22   2  9  0 a   Total process absent time in msecs
TERM-RD-TIME/GRP 2 24   2  9  0 a   Total process term read time in msecs
TERM-WR-TIME/GRP 2 26   2  9  0 a  Total process term write time in ms.
DISC-TIME/GRP     2 28   2  9  0 a   Total process disc I/O time in msecs
IMPEDED-TIME/GRP  2 30   2  9  0 a   Total process impeded time in msecs
PREEMPT-TIME/GRP  2 32   2  9  0 a  Total process preempted time in msecs
RIN-TIME/GRP      2 34   2  9  0 a   Total process RIN wait time in msecs
IO/TIME/GRP      2 36   2  9  0 a   Total process other I/O time in msecs
TIMER-TIME/GRP   2 38   2  9  0 a  Total process timer wait time in msecs
FATH-SON-TIME/GRP 2 40  2  9  0 a   Total proc father/son wait time in ms


MSG-TIME/GRP     2 42   2  9  0 a  Total process msg file wait time in ms


OTHER-TIME/GRP   2 44   2  9  0 a  Total process other wait time in msecs
SESS-PROC-CNT/GRP 2 46 -1  5  1 -   Average session process count
JOB-PROC-CNT/GRP 2 47  -1  5  1 -   Average job process count
```

```
CM CPU%/GRP       2 48   -1  5  1 -   CPU CM percentage
SW-TO-CM/GRP      2 49   -1  3  0 -   Switches from NM to CM/sec
SW-TO-NM/GRP      2 50   -1  3  0 -   Switches from CM to NM/sec
PAGE-FAULTS/GRP   2 51   -1  3  0 -   Page faults/sec
CPU-BUSY%/GRP     2 52   -1  3  0 -   Total process CPU busy percent
ABSENT-WT%/GRP    2 53   -1  3  0 -   Total process absent percent
DISC-WT%/GRP      2 54   -1  3  0 -   Total process disc I/O percent
IMPEDED-WT%/GRP   2 55   -1  3  0 -   Total process impeded percent
PREEMPT-WT%/GRP   2 56   -1  3  0 -   Total process preempt percent
RIN-WT%/GRP       2 57   -1  3  0 -   Total process RIN wait percent
TERM-WR-WT%/GRP   2 58   -1  3  0 -   Total process term write percent
IO-WT%/GRP        2 59   -1  3  0 -   Total process other I/O percent
TIMER-WT%/GRP     2 60   -1  3  0 -   Total process timer wait percent
FATH-SON-WT%/GRP  2 61   -1  3  0 -  Total process father/son wait percent
MSG-WT%/GRP       2 62   -1  3  0 -   Total process msg file wait percent
OTHER-WT%/GRP     2 63   -1  3  0 -   Total process other wait percent
LAUNCH-RATE/GRP   2 64   -1  4  0 -   Launch rate per sec
DISC-IO/GRP       2 65   -1  5  0 a   Disc I/O count
WRITE-RATE/GRP    2 66   -1  4  0 -   Disc write rate
IO-RATE/GRP       2 68   -1  4  0 -   Disc I/O rate
TRAN-RATE/GRP     2 69   -1  4  0 -   Transaction rate

GROUP2          2 1000 -1  3  0 -   Workload group number
GROUP-NAME      2 1001  0 12  0 -   Workload name

FSPC-DEV         5  0  -1  3  0 -   Disc Ldev
FSPC-MIRROR-DEV  5  1  -1  3  0 -   Mirrored disc ldev
FSPC-MAX-TRANS%  5  2  -1  3  0 -   Maximum transient space allocation
FSPC-MAX-PERM%   5  3  -1  3  0 -   Maximum permanent space allocation
FSPC-VOL-SET     5  4   0 32  0 -   Volume set name
```

```
FSPC-VOL-NAME    5  20  0 16  0 -   Volume name
FSPC-SZ          5  28  4 11  0 -   Total disc capacity
FSPC-MAX-TRANS   5  32  4 11 -2 -   Maximum transient space
FSPC-MAX-PERM    5  36  4 11 -2 -   Maximum permanent space
FSPC-TRANS-USED  5  40  4 11 -2 -   Amount of transient space used
FSPC-PERM-USED   5  44  4 11 -2 -   Amount of permanent space used
FSPC-AVAIL-TRANS 5  48  4 11 -2 -   Available transient space
FSPC-AVAIL-PERM  5  52  4 11 -2 -   Available permanent space
FSPC-TOT-FREE    5  56  4 11 -2 -   Total free space
FSPC-LARGEST-FREE 5 60  4 11 -2 -   Largest free space
FSPC-FREE-9      5  64  4 11 -2 -   Free space <= 9 sectors
FSPC-FREE-99     5  68  4 11 -2 -   Free space <= 99 sectors
FSPC-FREE-999    5  72  4 11 -2 -   Free space <= 999 sectors
FSPC-FREE-9999   5  76  4 11 -2 -   Free space <= 9999 sectors
FSPC-FREE-99999  5  80  4 11 -2 -   Free space <= 99999 sectors
FSPC-FREE-OVER   5  84  4 11 -2 -   Free space over 99999 sectors
FSPC-BLOCK-9     5  88  2  6 -2 -   Block space <= 9 sectors
FSPC-BLOCK-99    5  90  2  6 -2 -   Block space <= 99 sectors
FSPC-BLOCK-999   5  92  2  6 -2 -   Block space <= 999 sectors
FSPC-BLOCK-9999  5  94  2  6 -2 -   Block space <= 9999 sectors
FSPC-BLOCK-99999 5  96  2  6 -2 -   Block space <= 99999 sectors
FSPC-BLOCK-OVER  5  98  2  6 -2 -   Block space over 99999 sectors

CPU-COUNT       6 1000  -1  2 0 -   CPU processor count


CPU-MODEL      15 1000   0  8 0 -   CPU model name


SUSAN-NUM      31 1000   2 10 0 -   System Susan Number
```

F

USING SOS/3000 IN A BATCH JOB

Another useful feature of SOS/3000 is its batch job capability. There are three standard batch jobs included in the PUB.LPS group/account named SOSMONJ, SOSJOB, and SOSFULL. In each of these jobstreams you will see a lengthy set of control record lines immediately following the "**:run SOS.PUB.LPS**" line. These options are described in “SOS Main Option Menu” on page 17. To change any of the options, modify the characters in the left hand column.

The following is a sample of SOSMONJ.

```
:job sosmonj,mgr.lps,logfiles


:comment ********************************************************

:comment *** This job will provide continuous SOS monitoring

:comment *** by streaming itself and logging off every night at

:comment *** midnight.

:comment ********************************************************


:comment  This job is intended for use with SOS version F.04a or later.

:comment  Versions of this job that were supplied with earlier versions

:comment  of SOS may no longer work and should not be used.

:comment

:comment  Similarly, this job may be invalidated by future SOS releases.

:comment

:comment  Please refer to the release notes of each version for further

:comment  information.


:tellop *** SOS/3000 Batch Job Collection is Starting! ***


:comment  Refer to the comments in the soslogxj job for information about

:comment  providing input to sos.
```

```
:setdump
:run sos.pub
Y           : Should batch output be suppressed
300         : SOS sample interval
Y           : Display Key Indicators of Performance
Y           : Display advice
Y           : Display informational advice messages
2           : Global display option
Y           : Display global memory statistics
Y           : Display global disc statistics
Y           : Collect process/workload Information
Y           : Display process information
Y           : Display workload information
Y           : Display only active workloads
0.0         : CPU percentage required for display
Your Company Name
N           : Display extended process line
N           : Display 132 column process line
N           : Show Wait State on first process line
N           : Display first instead of full response time
Y           : Display page fault rate instead of IO/Transaction
N           : Display total I/O percent instead of R/W counts
Y           : Display only active processes
0.0         : CPU percentage required for display
Y           : Display session processes
Y           : Display job processes
Y           : Display system processes
Y           : Display command interpreter processes
Y           : Display dead processes which have died
@.@         : Process logon filter
4           : Process sort option
N           : Sort processes in ascending order
```

```
0           : Process display limit
Y           : Display CPU pulse points
N           : Display Memory pulse points
N           : Display Disc I/O pulse points
N           : Display misc pulse points
Y           : Should logging be enabled?
Y           : Should disc space utilization info be logged
10          : Process log limit
Y           : Should process tracking be enabled
N           : Should Memory detail information be displayed
N           : Should Global Stop information be displayed
N           : Should Disc I/O summary information be displayed
N           : Should Tape drive I/O detail information be displayed
N           : Should system printer I/O detail information be displayed
N           : Should serial printer I/O detail information be displayed
Y           : Should device detail info be limited to active devices
N           : Should terminal response detail information be displayed
N           : Should system transaction manager detail information be
displayed
N           : Should user transaction manager detail information be
displayed
0           : Enter duration of job in minutes
:eod

:stream sosmonj.pub

:tellop *** SOS/3000 Batch Job Collection is Finished! ***

:eoj
```

The following is a sample of Batch Job.

```
:job sosjob,mgr.lps,logfiles

:comment *****************************************************
```

```
:comment *** This job will run for 8 hours at a 5-minute interval
:comment *** between reports and will display:
:comment ***  processes which have used some CPU
:comment ***  global, disc, and performance advice
:comment *** You may change the run and interval time (see below)
:comment ****************************************************

:comment  This job is intended for use with SOS version F.04a or later.
:comment  Versions of this job that were supplied with earlier versions
:comment  of SOS may no longer work and should not be used.
:comment
:comment  Similarly, this job may be invalidated by future SOS releases.
:comment
:comment  Please refer to the release notes of each version for further
:comment  information.

:tellop *** SOS/3000 Batch Job Collection is Starting! ***

:comment  Refer to the comments in the soslogxj job for information about
:comment  providing input to sos.

:setdump
:run sos.pub
Y            : Should batch output be suppressed
300          : SOS sample interval
Y            : Display Key Indicators of Performance
Y            : Display advice
Y            : Display informational advice messages
2            : Global display option
Y            : Display global memory statistics
Y            : Display global disc statistics
Y            : Collect process/workload Information
Y            : Display process information
```

```
Y           : Display workload information
Y           : Display only active workloads
0.0         : CPU percentage required for display
Your Company Name
N           : Display extended process line
N           : Display 132 column process line
N           : Show Wait State on first process line
N           : Display first instead of full response time
Y           : Display page fault rate instead of IO/Transaction
N           : Display total I/O percent instead of R/W counts
Y           : Display only active processes
0.0         : CPU percentage required for display
Y           : Display session processes
Y           : Display job processes
Y           : Display system processes
Y           : Display command interpreter processes
Y           : Display dead processes which have died
@.@         : Process logon filter
4           : Process sort option
N           : Sort processes in ascending order
0           : Process display limit
Y           : Display CPU pulse points
N           : Display Memory pulse points
N           : Display Disc I/O pulse points
N           : Display misc pulse points
Y           : Should logging be enabled?
Y           : Should disc space utilization info be logged
10          : Process log limit
Y           : Should process tracking be enabled
N           : Should Memory detail information be displayed
N           : Should Global Stop information be displayed
N           : Should Disc I/O summary information be displayed
```

```
N           : Should Tape drive I/O detail information be displayed

N           : Should system printer I/O detail information be displayed

N           : Should serial printer I/O detail information be displayed

Y           : Should device detail info be limited to active devices

N           : Should terminal response detail information be displayed

N           : Should system transaction manager detail information be
displayed

N           : Should user transaction manager detail information be
displayed

480         : Enter duration of job in minutes

:eod


:tellop *** SOS/3000 Batch Job Collection is Finished! ***


:eoj
```

With few exceptions, the batch output is virtually identical to that of the interactive screen. The job duration states how long the collection will take place before the job ends peacefully. If you specify a "**0**" (zero) at the "**Enter duration of job in minutes**" question, the job will run until 12:00 midnight. At this time it will send the output report, $STDLIST, to the spooler. For your convenience, we have supplied a job called SOSMONJ. This job already has the re-stream command in it and will automatically stream SOSMONJ.PUB.LPS. This ensures a perpetual run of the program especially if you have logging enabled. We highly recommend this so you will have a log file for each day. You may also include a STREAM of SOSJOB in your SYSSTART file.

At any time an SOS/3000 job may be prematurely aborted and you will still receive reports to that point. We suggest that you have different jobs that provide the types of options you want enabled. For example, you might have one job (SOSJADV) for an advice-only collection and another for only processes that use more than 5% of the CPU, etc.

If you want detailed disc I/O data to be displayed, enter a **Y** (Yes) after the question "**Should disc I/O detail information be displayed?**" This will cause a page of disc I/O data to be generated after each standard SOS/3000 logfiles. Refer to the "Disc Space Utilization Formula for SOS Log Files" on page 195 to calculate the disc space utilization of logfiles.

The log file size is automatically the EOF unless you abort the batch job. If you abort a batch job it will take a pre-allocated log file space of 20000. Then if you restart the batch job the prior log file will automatically be converted to EOF, thus cleaning up disc space.

The following is a sample of SOSFULL jobstream.

```
:job sosfull,mgr.lps,logfiles; outclass=lp,1


:comment ****************************************************
```

```
:comment *** This job will provide continuous SOS monitoring
:comment *** by streaming itself and logging off every night at
:comment *** midnight.
:comment *** It provides full reporting to $stdlist.
:comment ********************************************************

:comment  This job is intended for use with SOS version F.04a or later.
:comment  Versions of this job that were supplied with earlier versions
:comment  of SOS may no longer work and should not be used.
:comment
:comment  Similarly, this job may be invalidated by future SOS releases.
:comment
:comment  Please refer to the release notes of each version for further
:comment  information.

:tellop *** SOS/3000 Batch Job Collection is Starting: ***

:comment  Refer to the comments in the soslogxj job for information about
:comment  providing input to sos.

:setdump
:run sos.pub
Y            : Should batch output be suppressed
300          : SOS sample interval
Y            : Display Key Indicators of Performance
Y            : Display advice
Y            : Display informational advice messages
2            : Global display option
Y            : Display global memory statistics
Y            : Display global disc statistics
Y            : Collect process/workload Information
Y            : Display process information
Y            : Display workload information
```

```
Y           : Display only active workloads
0.0         : CPU percentage required for display
Your Company Name
N           : Display extended process line
N           : Display 132 column process line
N           : Show Wait State on first process line
N           : Display first instead of full response time
Y           : Display page fault rate instead of IO/Transaction
N           : Display total I/O percent instead of R/W counts
Y           : Display only active processes
0.0         : CPU percentage required for display
Y           : Display session processes
Y           : Display job processes
Y           : Display system processes
Y           : Display command interpreter processes
Y           : Display dead processes which have died
@.@         : Process logon filter
4           : Process sort option
N           : Sort processes in ascending order
0           : Process display limit
Y           : Display CPU pulse points
N           : Display Memory pulse points
N           : Display Disc I/O pulse points
N           : Display misc pulse points
Y           : Should logging be enabled?
Y           : Should disc space utilization info be logged
10          : Process log limit
Y           : Should process tracking be enabled
N           : Should Memory detail information be displayed
N           : Should Global Stop information be displayed
N           : Should Disc I/O summary information be displayed
N           : Should Tape drive I/O detail information be displayed
```

```
N           : Should system printer I/O detail information be displayed

N           : Should serial printer I/O detail information be displayed

Y           : Should device detail info be limited to active devices

N           : Should terminal response detail information be displayed

N           : Should system transaction manager detail information be
displayed

N           : Should user transaction manager detail information be
displayed

0           : Enter duration of job in minutes

:eod


:stream sosfull.pub


:tellop *** SOS/3000 Batch Job Collection is Finished! ***


:eoj
```

G

ALTERING PROCESS PRIORITIES-"Q-JUMPING"

The SOS/3000 Q-Jump feature allows a user with OP or SM capability to alter the priority and/or scheduling queue of a live, running process. This is often helpful as a tactical mechanism to either favor or penalize certain processes. The MPE TUNE command is helpful from a strategic and global standpoint. Often there is a single renegade process that can be sent to the E subqueue to free the CPU for other processes.

Using the Q-Jump Feature

In order to change the priority or queue of a process go to UTILITY KEYS (F6) and select F3 - QUEUE JUMP. The following will appear:

Enter Process Identification Number of process to reschedule:

You must then select the PIN number of the process whose priority you want to alter. After entering the desired PIN the following statement will appear:

Process ppp current priority is X

or

Process ppp current priority is Lnnn

ppp	The PIN number.
X	A letter representing the current scheduling queue in which the process is running (A, B, C, D, or E).
L	A linear priority has been assigned
nnn	The current absolute of the process (0-225) if an absolute priority has been selected.

The following question will appear:

What should its new priority be?

The new queue priority can be entered in the general form “**qcddd**”, where:

q	is the priority queue (B, C, D, or E) which defaults to B if not entered. SM capability is required to place processes in the B queue or to alter the priority of a process which is in the B queue.
c	is an optional qualifier which specifies the process behavior within the queue (L for linear and S for circular). If "**c**" is not qualified, the defaults are L for the B queue and S for C, D, and E queues. A circular (S) queue priority will be adjusted by the MPE queue dispatcher according to how you have tuned your system (i.e., OSCILLATE or DECAY). A linear (L) queue priority will keep a process at a fixed priority. "S" may not be specified for the B queue.
ddd	is an optional number MPE priority. It can only be specified for linear (L) queues. It must be within the scheduling queue's base and limit priority as defined by the TUNE command, or in the range 100-150 for the BL queue. If not entered, 150 is the default for the B queue. The default for the other scheduling queues (C, D, and E) is their base priority.

Examples

B130	B linear queue, priority 130
D or DS	D circular queue
CL152	C linear queue, priority 152

After you have selected either a queue letter or linear priority the following confirmation will be shown:

Confirm process ppp priority change from Xnnn to Ymmm (N)?

If you want to execute the priority change, answer **Y** (Yes) otherwise press **N** (No) or hit C/R for the default **N**. If you reply **Y** then SOS/3000 will let you know that the priority was successfully changed.

GLOSSARY OF TERMS

CPU Terms

The CPU terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

capture ratio

A ratio of time a CPU spent in user mode to system/kernel mode. The capture ratio value is calculated:

Capture Ratio = (User + Real + Nice + NNice) / (Sys + Intr + C SW + Trap + Vflt)

A capture ratio value equal to one or greater indicates the system is spending more than half its time on useful system work. A value of less than one means the system is spending more than half its time on overhead.

context switch

A context switch occurs when a process relinquishes a CPU.

context switch time

The amount of time a CPU spends managing context switches.

high priority time (high pri time)

The amount of time a CPU spends executing high priority processes. A high priority process is any process (excluding batch processes) that does not have a positive nice value. Generally, high priority processes are all interactive and system processes.

idle time

The amount of time a CPU has nothing to do.

interrupt

Interrupt s occur when a high priority event must have control of a CPU. The current running process is forced to temporarily suspend execution while the interrupt is processed. The most well known interrupt is a disc I/O completion interrupt.

interrupt CPU time

The amount of time a CPU spends processing interrupts.

negative nice time (nnice time)

The amount of time a CPU spends in user mode for a process that has a nice level of 0-19. Refer to the **nice** man page for more information.

nice time

The amount of time a CPU spends in user mode for a process that has a nice level of 21-40. Refer to the **nice** man page for more information.

real time

The amount of time a CPU spends in in user mode for "real time" priority processes.

system time

The amount of time a CPU spends in kernel mode which does not fall under interrupt, trap, and memory times.

trap

Similar to an interrupt. The difference is that the process currently running on a CPU causes the trap. Interrupts are not caused by the process that is interrupted.

trap time

The amount of time a CPU spends processing traps.

user time

The amount of time a CPU spends in user mode (excluding nice, negative nice, and real times).

Memory Terms

The memory terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

activation

An activation occurs when a process is reactivated from a deactivation. See “deactivation” on page 313.

buffer cache

A pool of buffers in memory with the purpose of maintaining data in memory to avoid disc access.

buffer cache headers

The headers associated with each set of data within the buffer cache.

buffer cache hit

A buffer cache hit occurs when data is found in the buffer cache as opposed to disc. Read hit percentages lower than 90 can indicate the need for a larger buffer cache. Write hit percentage lower than 65 also indicates the potential need to increase the buffer cache size.

deactivation

A deactivation occurs when a process is removed from the list of runable processes because of memory or CPU contention. It will not be scheduled until it is CPU and/or memory contention subsides. Deactivations indicate CPU and/or memory bottlenecks.

desfree

The lower bound for paging. When free memory drops below desfree, paging begins.

dynamic buffer cache (DBC)

The buffer cache is configured in a manner that allows the kernel to dynamically change the buffer cache size. The buffer cache grows as a result of page faults. It shrinks as the vhand process finds unused pages.

fixed size buffer cache

The "fixed size buffer cache" means the size is fixed and will not change without a reconfiguration and recompilation of the kernel.

lotsfree

The upper bound for paging. Once paging has begun, it will continue until free memory is larger than lotsfree.

major page fault

Page faults that require disc access.

minfree

The threshold at which the system considers itself "out of memory". At this point, the system will start swapping processes.

minor page fault

Page faults that are satisfied in memory; for example, via page reclaims.

page fault

Page faults occur when a page is not found in the buffer cache; the pages are satisfied in memory and disc.

page in

A page in is a page fault that requires disc access.

page out

A page out occurs when the amount of memory required is greater than the amount available. Data within the page is written to disc and the page is made available for use. Excessive page outs indicates a memory bottleneck.

page reclaim

A page reclaim occurs when a requested page exists on the free list. A page reclaim results in a page fault being satisfied in memory.

page scan

A page scan occurs when the vhand process searches through used pages for candidates to page out. Excessive page scanning can be an indicator of a memory bottleneck.

unlockable memory

The amount of memory that cannot be locked. Physical memory that may be locked is called "lockable memory". Locked memory holds frequently-accessed programs or data structures, such as the operating system code. Lockable memory is never more than 3/4 of the available memory. Allowing too much locked memory could lead to a system deadlock. Unlockable memory is used for swapping pages but lockable memory cannot be used for swapping pages.

VM I/O

A physical disc I/O that is a result of virtual memory management.

Disc Terms

The disc terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

logical I/O

An I/O that is satisfied in memory or disc.

physical I/O

An I/O that requires disc access. Physical I/Os include User, Sys, VM, and RAW.

raw I/O

A disc I/O that bypasses the buffer cache.

service time

The amount of time an I/O request takes to be serviced once it begins to be processed by the disc (removed from the disc queue), excluding wait time.

system I/O

A disc I/O that is the result of system overhead in managing files (i.e., super-block reads/writes).

user I/O

A disc I/O that is a result of user file reads/writes.

virtual memory I/O

A disc I/O that is a result of virtual memory management.

wait time

The amount of time an I/O request waits in the disc queue before being serviced. Excessive wait times indicate a disc bottleneck.

Network Terms

The network terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

collision

A network collisions occurs when the system sends a packet at the same time as another system. When collisions occur, the system dispatching them waits a random amount of time to retransmit the packet. Excessive collision percentages indicate a network bottleneck.

Process Terms

The process terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

priority

The CPU scheduling priority of the process. High priority numbers indicate low priority status, and vice versa.

think time

The amount of time a process is waiting for user input.

timeslice

The maximum amount of time one process is allowed to run before the scheduler searches for other higher priority processes. The process may give up the CPU sooner if it enters kernel mode.

wait state

Identifies a resource that a process is waiting (blocked) on.

Wait State Codes

The wait state codes defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

CACH/CA

Waiting for a cache operation (such as a getblk or genewbuf) to complete. This can include buffered I/Os to disc.

CPU/RN

Actually running on CPU.

Disc/DI

Waiting for a disc driver to complete a disc I/O.

GRAF/GR

Waiting for a graphics card or a framebuf semaphore operation to complete.

INOD/IN

Waiting for a system inode to be updated or become available.

IO/IO

Waiting for any I/O other than LAN or terminal to complete.

IPC/IP

Waiting for an interprocess communication call to complete.

LAN/LN

Waiting for I/O over LAN to complete.

MSG/MG

Waiting for a message operation to complete.

NFS/NF

Waiting for a Network File System request (such as a read, write or control) to complete.

PIPE/PI

Waiting for a pipe communication to complete.

PRE/PR

Waiting in the CPU run queue.

RPC/RP

Waiting for a remote procedure call to complete.

SEM/SE

Waiting for a SysV semaphore operation to complete.

SHM/SH

Waiting for a shared memory operation to complete.

SLEP/SL

Waiting for a sleep or wait call to expire.

SOCK/SO

Waiting for a socket operation (such as a connect or a send) to complete.

STRM/ST

Waiting for a stream operation to complete.

SYS/SY

Waiting for a general kernel resource (such as audit, security or page control) to become available.

TTY/TY

Waiting for a terminal I/O to complete.

VM/VM

Waiting for a memory resource to become available.

OTHR/OT

Waiting for other event not covered by the above definitions to complete.

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