
1 Preface

1.1 Brief description of the SM2 monitoring system

The SM2 monitoring system provides the user with statistics on the performance of the DP system and on resource utilization.

It consists of the following components:

- the SM2 monitoring program
- the SM2U1 utility routine
- the SM2R1 analysis routine

The SM2 monitoring program collects statistical data and outputs it either to a terminal and/or to a file. The first option is ideally suited for real-time (online) monitoring. If the data is output to file, the stored data can be analyzed (offline) at a later time.

The SM2U1 utility routine manages the SM2 output files and is occasionally used as a file conversion leader for the SM2R1 analysis routine.

The SM2R1 utility routine manages the statistical data registered by SM2 and written to a system-global SM2 output file.

The following products are also available and can be used to edit and display SM2 monitored data:

- The SM2R1-PC analysis routine is used to graphically display the monitored data on a PC.
- The SM2ONLINE-PC monitoring program is used to simultaneously monitor and display monitored data from several BS2000/OSD computers on a PC.
- The SM2-PA analysis routine is used for user-specific SM2 output files.

1.2 Target group

This manual is intended for system users who need information on the current system workload. It will be of particular interest to computer center and systems support staff who wish to assess the performance of their configuration and isolate bottleneck areas by means of long-term monitoring.

1.3 Summary of contents

This is Volume 1 of a set of two manuals and describes the SM2 monitoring program.

Volume 2 describes the SM2U1 conversion routine and the SM2R1 analysis routine, and gives an overview of the other analysis routines. These routines allow you to carry out performance analyses in BS2000.

Volume 1: "Administration and Operation"

Chapter 1, *Preface*,

specifies the target group of the manual and provides pointers on how to use it.

Chapter 2, *The SM2 monitoring program*,

describes the monitoring program and gives a overview of the terminology used. This chapter provides an introduction to system monitoring and optimization, and provides suggestions on how to carry out performance monitoring with SM2.

Chapter 3, *SM2 monitoring programs*,

describes the SM2 monitoring programs and measurement data.

Chapter 4, *SM2 operation*,

describes SM2 operation and statements for real-time and background monitoring. The statements are presented in two sections: an administration section and an evaluation section. The first section describes the statements for the SM2 administrator for controlling the monitoring process and outputting the monitored data to the SM2 output file. The second section describes the statements available to nonprivileged SM2 users for selecting and controlling reports.

Chapter 5, *SM2 screen outputs*,

describes the individual output forms (SM2 reports) for monitored data and the SM2 information screens.

Chapter 6, *Notes on SM2 operation*,

contains important information to be taken into account when using the monitoring system.

Chapter 7, *Variables reports*,
contains a table detailing variables and report groups.

Chapter 8, *Messages*,
lists all the program messages, together with an explanation and the action to be taken in each case.

Chapter 9, *Installation*,
describes how to install SM2.

Chapter 10, *Appendix*,
contains descriptions of the SDF syntax and overviews of the SM2 statements.

At the back of the manual, you will find a glossary, lists of abbreviations, figures and tables, and related publications, and an index.

Volume 2: "Analysis and Display of SM2 Monitored Data"

Chapter 1, *Preface*,
specifies the target group of the manual and provides pointers on how to use it.

Chapter 2, *SM2U1 utility routine*,
describes the functions and operation of the SM2U1 conversion routine.

Chapter 3, *SM2R1 analysis routine*,
describes the functions and operation of the SM2R1 analysis routine and the records of the SM2R1 transfer file.

Chapter 4, *Other analysis routines*,
provides a short description of other analysis routines for SM2 monitored data which may be ordered.

Chapter 5, *Variables reports*,
contains tables detailing variables, report groups, report names and reports on monitored variables (with information on the variables in question).

Chapter 6, *SM2 program interfaces*,
presents the C interfaces SM2GMS and SM2GDAT and the assembly language interface PFMON.

Chapter 7, *Appendix*,
contains descriptions of the SDF syntax and the data structures for C.

At the back of the manual, you will find a glossary, lists of abbreviations, figures and tables, and related publications, and an index.

1.4 Changes made since the last version of the manual

SM2 Version 13.0A (June 1999) incorporates the following major changes as compared to the previous version (V12.0A, December 1996):

SM2

- New monitoring programs
 - BCAM-CONNECTION
This monitoring program is used to record monitored data for defined connections.
 - DISK-FILE
This monitoring program is used to record inputs and outputs for selected disks.
 - HSMS
This monitoring program is used to record monitored data on the migration and retrieval of files.
- Changes to the monitoring programs
 - CHANNEL-IO
Monitored data is also output in the CHANNEL report and at the SM2GDAT interface.
 - DISK
The number of possible devices has been increased to 256.
 - FILE
File-specific access times are also output.
 - PFA
Monitored data from SYMMETRIX controllers that do not comply with the PFA concept is also recorded.
 - SERVICETIME
The number of possible devices has been increased to 256.
 - TASK
The number of devices that can be monitored has been increased to 64.

- New reports
 - BCAM CONNECTION
Outputs information on data that has been received/sent and on bucket-specific times.
 - DISK FILE
Outputs files showing the inputs and outputs per second for the monitored disk devices.
 - SYMMETRIX CONTROLLER
Outputs monitored data on the use of SYMMETRIX controllers.
 - SYMMETRIX DEVICE
Outputs monitored data on the use of the individual devices of a SYMMETRIX controller.
- Modified report output for the CHANNEL, DAB, DAB CACHE, FILE, GS, ISAM, PFA CONTROLLER and VM2000 reports
- New administrator statements
 - ADD-BCAM-CONNECTION-SET
Specifies the connection set for the new BCAM-CONNECTION monitoring program.
 - REMOVE-BCAM-CONNECTION-SET
Specifies the connection set to be excluded from the monitoring process for the new BCAM-CONNECTION monitoring program.
 - SET-BCAM-CONNECTION-PARAMETER
Specifies the global monitoring parameters for the BCAM-CONNECTION monitoring program.
 - SET-DISK-FILE-PARAMETER
Defines the disk devices which are to be monitored by the new DISK-FILE monitoring program.
- Modified and enhanced administrator statements
 - SET-CHANNEL-IO-PARAMETER
Three-digit hexadecimal numbers can be specified for the CHANNELS operand.
 - SET-DISK-PARAMETER
The DEVICES operand has been extended to accept 256 device names.

- SET/MODIFY-COSMOS-PARAMETER
The new MEASUREMENT-TIME operand can be used to specify the duration of the monitoring process.
In the TSN operand, up to 16 TSNs can be specified.
In the TSN, USER-ID, JOB-NAME and CATEGORY operands, the last character may be an asterisk (*).
- SET-SERVICETIME-PARAMETER
The DEVICES operand has been extended to accept 256 device names.
- SET-TASK-PARAMETER
The DEVICES operand has been extended to accept 64 device names.
- SHOW-ACTIVE/DEFINED-PARAMETER
The TYPE operand has been extended to include the new monitoring programs BCAM-CONNECTION and DISK-FILE.
- START/STOP/CHANGE-MEASUREMENT-PROGRAM
The TYPE operand has been extended to include the new monitoring programs BCAM-CONNECTION, DISK-FILE and HSMS.
- New, enhanced and obsolete user statements
 - The SELECT-SYMMETRIX-CONTROLLER user statement (select the SYMMETRIX controller for the SYMMETRIX-DEVICE report) has been included in the manual for the first time.
 - The REPORT user statement has been extended to include the values BCAM, DISK_FILE (DFILE) and SYMMETRIX (SYM).
 - The CHANNEL user statement is now obsolete, since the CHANNEL report can now output follow-up screens.
- SM2 program interface
In the SM2GDAT macro, the variable 'unsigned long buffer_flags' is now incompatible. The BCAM-CONNCTION, CHANNEL-IO, DISK-FILE and HSMS data buffers are now available.
- Changes to the SM2 output file
In SM2 output files with freely selectable file characteristics, the block length must be 16.
- Dynamic IO reconfiguration
SM2 recognizes a dynamic IO reconfiguration and, if necessary, automatically changes the number of objects being monitored. This is described in a new section in chapter 2.
- The constraints on SR2000 have been incorporated. For further information, please refer to section 5.8 of the manual "OSD-SVP V2.0 User Interfaces on Systems with RISC Architecture" [20].

SM2U1

- Extended statement: SELECT-MEASUREMENT-GROUPS
The statement has been extended to include
 - the new monitoring programs BCAM-CONNECTION, DISK-FILE and HSMS
 - the new report groups SYMMETRIX-CONTROLLER and SYMMETRIX-DEVICE.

SM2R1

- New statement: PRINT-HSMS-STATISTICS
Data from the HSMS monitoring program is displayed in the form of tables.
- Enhanced statement: PRINT-REPORTS
The statement has been extended to include the report groups BCAM-CONNECTION, SYMMETRIX-CONTROLLER and SYMMETRIX-DEVICE.
The report groups CPU, DAB, DEVICE and FILE have been extended.
The operand REPORT-LIST=CHANNEL has been modified to take account of the maximum channel number of 511.
- Extended statement: PRINT-DISK-STATISTICS
The DEVICES operand has been extended to accept 256 device names.
- Modified statement: PRINT-TASK-STATISTICS
The output has been modified to include a software and hardware operating time.
- The calculation of average values has been modified.

Manual structure

The manual has been divided into two volumes. The individual chapters have been revised and some sections reformatted. All screens have been replaced.

1.5 Notational conventions

All statements for controlling monitoring operations (SM2 administration statements) and the statement interfaces of the SM2U1 and SM2R1 utilities are fully supported by the SDF statement syntax. ISP statements are no longer available.

The SM2 functions for selecting and controlling screen output can only be addressed via ISP.

For a description of the SDF syntax, see the appendix.

1.6 README file

Information on any functional changes and additions to the current version of the product described in this manual can be found in the product-specific README file. You will find the README file on your BS2000 system under the file name `SYSRME.SM2.130.E`.

Ask your systems support staff for the user ID under which the README file is located. You can view the README file by using the `/SHOW-FILE` command or an editor, and you can print it out on a standard printer by means of the following command:

```
/PRINT-DOCUMENT SYSRME.SM2.130.E, LINE-SPACING=*BY-EBCDIC-CONTROL
```

2 The SM2 monitoring program

2.1 Overview

SM2 is a shareable program that runs under BS2000. It provides the user with information on the status and performance of the system, making it possible to improve the performance of both the system and its applications. The mode and scope of monitored data acquisition in SM2 can be controlled using commands and statements.

SM2 generates a number of system tasks which are responsible for collecting data and writing it to the SM2 output files.

SM2 consists of privileged and nonprivileged components. Figure 1 shows the exchange of information between the various SM2 tasks.

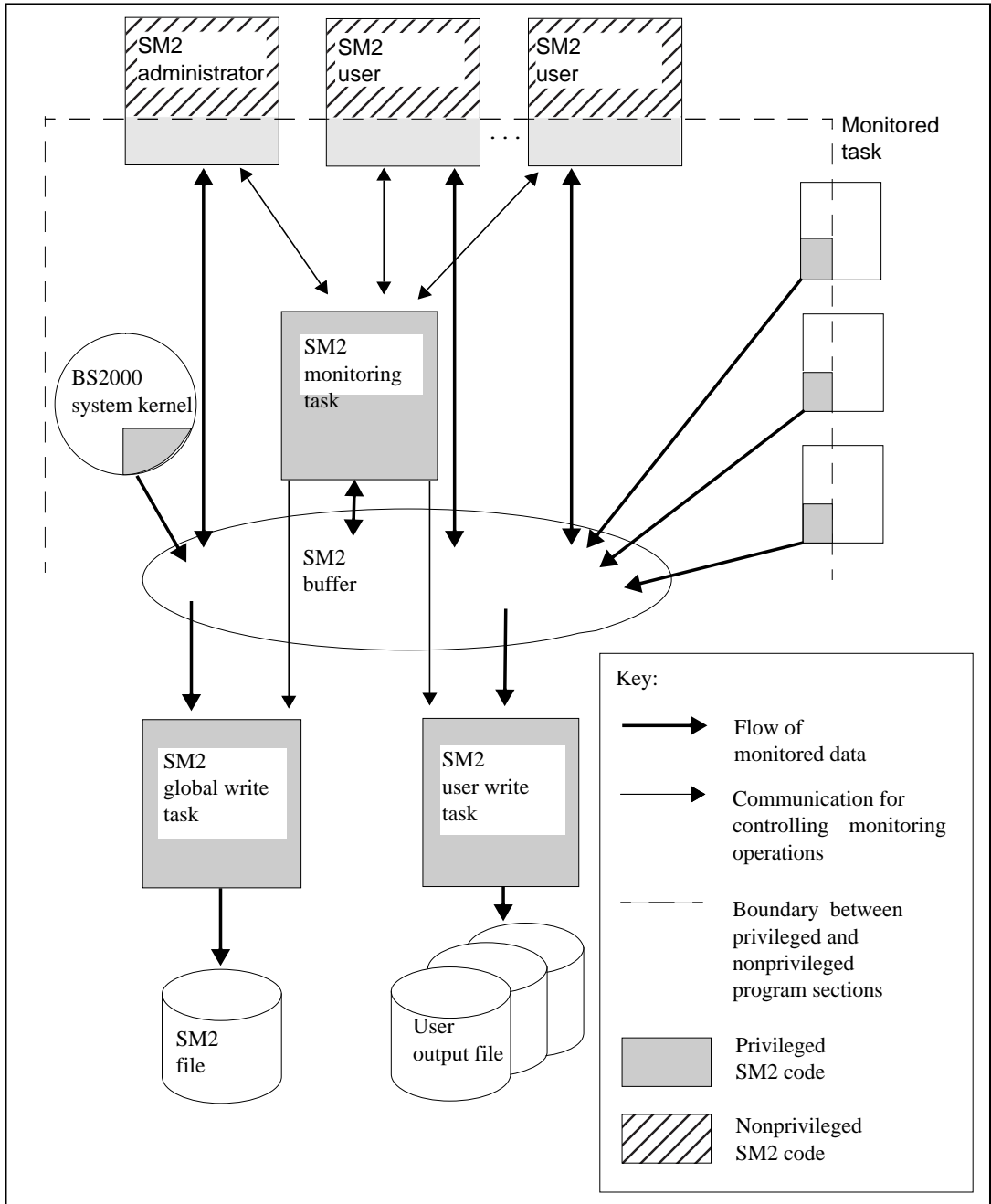


Figure 1: SM2 configuration

2.2 SM2 operating modes

SM2 offers three operating modes:

1. Real-time monitoring (information output to a data display terminal)
2. Background monitoring (information output to a file for subsequent analysis)
3. User-specific task monitoring

The operating modes can be used simultaneously.

When mode 1 is used, SM2 periodically outputs monitored data in the form of reports on the data terminal. The color version of the 9752 Data Display Terminal is supported. This data refers to the latest monitoring cycle (e.g. 150 seconds) and can be used as snapshots for assessing the current system status. Only selected SM2 monitored data is output in this mode.

When mode 2 is used, the collected data is output in the form records to a file, the SM2 output file. This data can be analyzed later using SM2 products. This mode allows for selective use of the SM2 operands and is equally suitable for long-term monitoring with a low system load and for brief special-purpose monitoring with a correspondingly higher system load.

When mode 3 is used, the nonprivileged user (using the START-TASK-MEASUREMENT command) can register tasks under his/her own ID for monitoring by SM2. In addition to the task-specific monitored data, a command counter and SVC task statistics can be requested. In the case of user-specific task monitoring, all information is written to user-specific SM2 output files.

2.3 Users

Privileged users

Privileged SM2 users are users who have been assigned the system privilege SW-MONITOR-ADMINISTRATION. These fall into the following categories: "primary" administrators, "secondary" administrators and other privileged users.

Entry of an administration statement gives the first privileged SM2 user the status of SM2 primary administrator. This user retains this status until he/she terminates his/her program or switches over to online analysis using the CALL-EVALUATION-PART statement. The SM2 primary administrator has all privileges, and there can only be one primary administrator at any one time.

The primary administrator is the only person who is authorized to admit other (secondary) administrators (MODIFY-ADMINISTRATOR-ADMISSION statement) and to permit nonprivileged users to run monitoring programs (MODIFY-USER-ADMISSION).

With the exception of the MODIFY-ADMISSION statements, the secondary administrators have the same rights as the primary administrator.

All administrators can:

- create and close the SM2 output file
- set monitoring parameters
- activate or deactivate optional monitoring runs.

In addition to these privileges, the SM2 administrators can also use all statements of a nonprivileged user. All other privileged users are only offered the SHOW functions and the SELECT-HOSTS statement in the administration section.

Notes

SM2 cannot prevent the various administrators from carrying out operations which conflict with one another. It is only possible to make sensible use of the system if the different administrators agree on a common course of action.

Modification of the variables to be monitored and functions which can be added may influence the real-time monitoring of other SM2 users. Modification of the monitoring cycle applies to all SM2 users.

Nonprivileged users

All users who call the SM2 routine from a user ID without the system privilege SW-MONITOR-ADMINISTRATION are categorized as nonprivileged users. These users are only authorized to use the statements for controlling output during real-time monitoring.

2.4 Table of authorizations

The following table indicates which users are permitted to carry out which functions and under what circumstances.

Function (group)	Sys. priv. SWMONADM			Priv. usr	User
	Pr. adm	Sec. adm	Other		
Start/stop functions					
Start SM2 monitor	y	n	n	n	n
Terminate SM2 monitor	5	5	5	5	5
Administration functions					
MODIFY-ADMINISTRATOR-ADMISSION	y	n	n	n	n
MODIFY-USER-ADMISSION	y	n	n	n	n
MODIFY-MEASUREMENT-PERIODS	y	y	n	n	n
OPEN-/CLOSE-LOG-FILE	y	y	n	n	n
ADD/REMOVE measurement object	y	y	n	n	n
SET/MOD measurement PARAMETER def.	y	7	n	n	n
INITIATE-COSMOS	y	n	n	n	n
START-/CHANGE-/STOP-MEASUREMENT-PROGRAM	y	7	n	n	n
SHOW statements	y	y	y	n	n
CALL-EVALUATION-PART	y	y	y	n	n
SELECT-HOSTS	y	y	y	n	n
Analysis functions					
OUTPUT / START DEVICE	y	y	y	y	y
SELECT-DAB / -PCA / -PERIODIC-TASK / -PFA/ -UTM / -SYMMETRIX	y	y	y	y	y
STATUS	y	y	y	y	y
REPORT	y	y	y	1	1
RESTART	y	y	y	1	1
FILE	6	6	6	2	n
START-/CHANGE-/STOP-ISAM-STATISTICS	6	6	6	2	n
SHOW-USER-MEASURED-OBJECTS	4	4	4	4	4
CALL-ADMINISTRATION-PART	y	y	y	n	n
BS2000 commands					
START-/STOP-TASK-MEASUREMENT	6	6	6	2	n
Other SM2 features					
Monitor foreign files	3	3	n	n	n
Monitor foreign ISAM pools	3	3	n	n	n
Monitor foreign tasks	6	6	6	n	n
Monitor SVCs/PCounter	6	6	6	6	6

Table 1: Authorization table

Key

Pr. adm:	Primary administrator
Sec. adm:	Secondary administrator
Other:	Other privileged user
Priv. user:	Users permitted to execute a monitoring program as specified by MODIFY-USER-ADMISSION
User:	Users not permitted to execute a monitoring program
y:	Yes
n:	No
1:	Yes, but some reports are reserved for privileged users
2:	Yes if the corresponding monitoring process is permitted for the caller
3:	Yes, but only for the corresponding privileged monitoring program
4:	Yes, but only for objects registered by this user
5:	System privilege SUBSYSTEM-MANAGEMENT required; SM2 privileges are irrelevant
6:	Yes, provided that "Priv. user" is also active
7:	Yes, except for the COSMOS monitoring program

2.5 Activating a monitoring task

When SM2 is called for the first time during a session, the SM2 monitoring task is activated. This is an internal task which collects the monitored data, edits it, and stores it in a central buffer. From this buffer, the data is transferred to the various SM2 user tasks or to the SM2 output file for output. If different offline and online periods are selected, the monitored data is written to two central buffer stores.

The precise time at which the SM2 monitoring task was initiated and the online or offline period selected is given in the SM2 MEASUREMENT STATUS under SM2 GATHERING TASK CREATED AT, ONLINE PERIOD, OFFLINE PERIOD.

2.6 Acquisition of monitored data

SM2 records a wide range of monitored data and outputs it to either a screen and/or a file. The data is collected at regular intervals, called monitoring cycles. Some of the monitoring tasks are carried out by default, while others are carried out by special monitoring programs which can be activated as and when required.

The monitored data is then processed and displayed internally by SM2 or by independent SM2 monitoring and analysis routines.

There are three methods of collecting data:

- Based on the monitoring cycle

Most of the monitored data (e.g. the CPU load) is collected at the end of each monitoring cycle. The current count (or time stamp) is taken from the SM2 or system tables, and the difference between this value and the value at the end of the last monitoring cycle is calculated.

The same procedure is used to calculate the intermediate values for the methods described below at the end of the monitoring cycle (except for the monitoring programs DISK and TASK).

A monitoring cycle can be set to between 10 seconds and 1 hour.

- Based on the sampling cycle

Because the status is constantly changing, it may not be appropriate to wait until the end of the monitoring cycle to query some monitored data (e.g. device utilization). When acquiring this type of monitored data, it is recommended that the monitoring cycle be broken down into several sampling cycles. At the end of each sampling cycle, the current monitored variable is obtained. Then, at the end of each monitoring cycle, the mean value across all sampling cycles is computed.

A sampling cycle can be set between 200 milliseconds and 10 seconds.

- Event-driven

Some monitored data (e.g. the distribution of disk operation times) is determined by monitoring events within the system. When an event occurs, such as the start of an input/output operation, an SM2 routine is activated which collects the event-specific data. This data is then used to calculate the monitored variables.

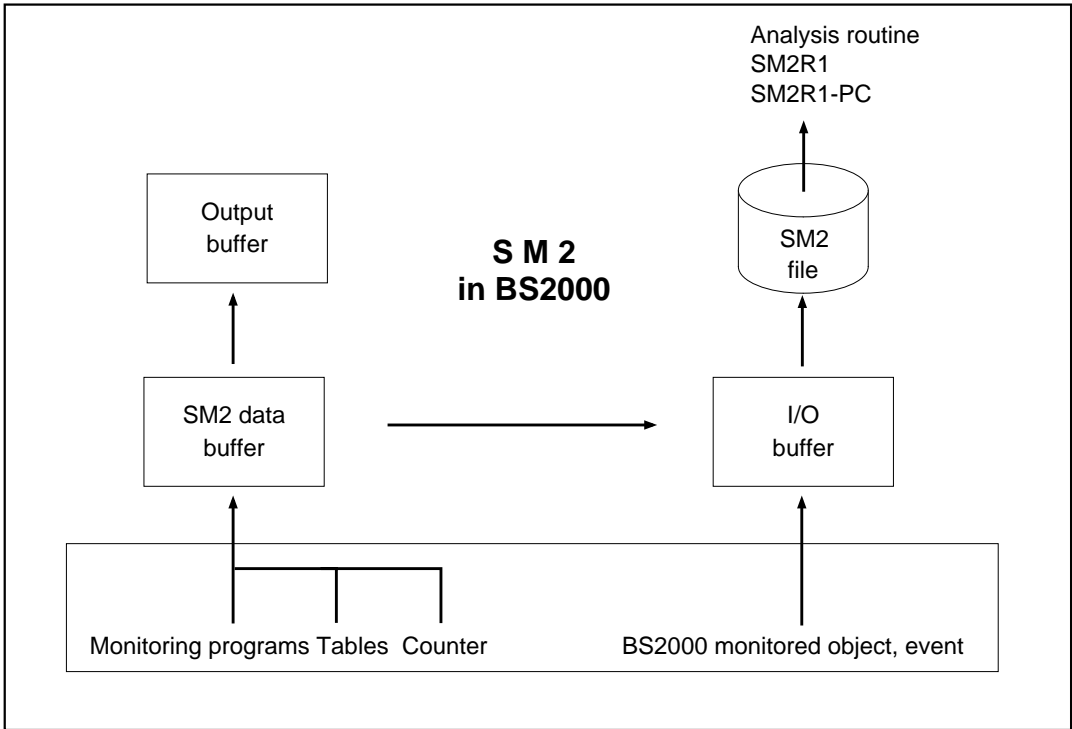


Figure 2: Collecting monitored data

2.7 Monitoring cycle

As mentioned above, SM2 collects data at regular intervals known as monitoring cycles (except for the monitoring programs DISK and TASK). At the end of each monitoring cycle, the processed data is written to the data buffer and to the SM2 output file, if one is available. The length of the monitoring cycle is preset at 150 seconds when the subsystem is started. The SM2 administrator can change this setting using the OFFLINE-PERIOD operand of the MODIFY-MEASUREMENT-PERIODS statement. The value is entered under OFFLINE PERIOD in SM2 MEASUREMENT STATUS .

Online monitoring cycle

The online cycle also defines a monitoring cycle in which the monitored data for online analysis is collected and written to another buffer. The online cycle is deactivated by default. It can be modified using the ONLINE-PERIOD parameter in the MODIFY-MEASUREMENT-PERIODS statement. When the online cycle is deactivated, the ONLINE-PERIOD corresponds to the OFFLINE-PERIOD. The CYCLE column in each report shows the online value currently set. In addition, the value under the ONLINE-PERIOD column is entered in SM2 MEASUREMENT STATUS.

The online cycle should only be activated if the delay at the terminal is too great when carrying out online monitoring. This may happen if a long monitoring cycle is set for output to an SM2 output file. Please note that by activating the online cycle, you also increase the workload on the system.

Sampling cycle

For monitored-data acquisition based on random sampling, SM2 subdivides the monitoring cycle into a large number of small, regular time slots called sampling cycles. The monitoring task is activated at the specified interval for data collection. At the end of each sampling cycle, snapshots are taken for some variables. From the large number of snapshots, a mean value is computed for each monitoring cycle.

The accuracy of the computed value thus depends on the length of the sampling cycle:

The shorter the sampling cycle, the greater the number of snapshots that can be taken during the monitoring cycle. The SM2 workload on the system, however, increases simultaneously.

The sampling cycle is preset to 800 milliseconds when the subsystem is started.

The SM2 administrator can change this value in the SAMPLING-PERIOD operand of the MODIFY-MEASUREMENT-PERIODS statement. The SAMPLING PERIOD column in the SM2 MEASUREMENT STATUS indicates the current setting, while the SAMPLES column in the individual reports contains the number of samples taken during the latest monitoring cycle.

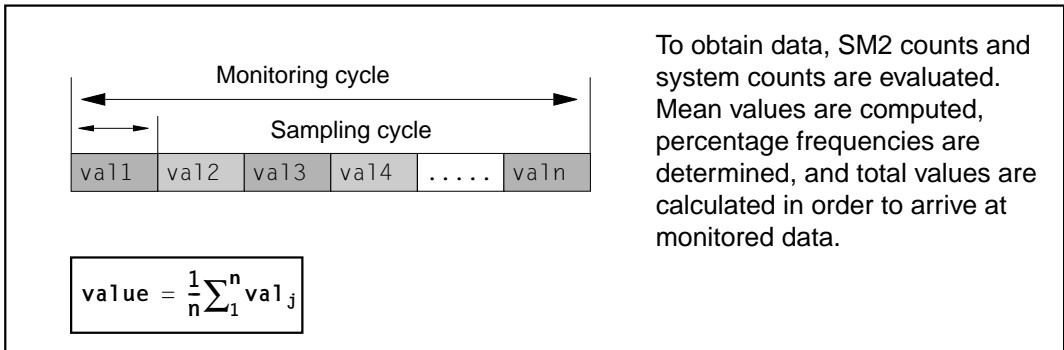


Figure 3: Relationship between the sampling cycle and the monitoring cycle

2.8 Outputting and saving monitored data

At the end of a monitoring cycle, the monitored data is summarized into groups which have similar content, extended by the SM2 monitoring task to include additional information (time stamp, host, ...), and then written to a central SM2 data buffer.

If a user has activated online monitoring, the monitored data is transferred from the central data buffer to the buffer of the user task. Note that sensitive data is transferred to privileged users only. The monitored data is then processed and output in the address space of the user task.

For background monitoring, the SM2 administrator can open an SM2 output file. At the end of a monitoring cycle, the monitored data is grouped into data records and written to the SM2 output file. The information in the SM2 output file can be used for subsequent problem and trend analyses. Special analysis routines are provided for this purpose.

Methods used for compressed output of monitored data

1. Mean values

SM2 adds up the sampled values at the end of each sampling cycle and computes a mean value for each monitoring cycle (e.g. the number of tasks) as follows:

$$\text{Average} = \frac{\text{Sum of sampled values}}{\text{Number of samples}}$$

2. Percentage frequency

At the end of each sampling cycle, SM2 records the occurrence of specific events or conditions and computes the percentage frequency of events (conditions) in relation to the total number of samples (e.g. channel utilization) as follows:

$$\text{Frequency} = \frac{\text{Sum of occurrences}}{\text{Number of samples}} * 100 \%$$

3. Ascending system counters and SM2 counters

The activity during the monitoring cycle can be determined by calculating the differences between values gathered at the beginning and the end of the monitoring cycle (e.g. idle time).

4. Computation

SM2 computes some data from monitored data, e.g. the summation values for all categories.

Uninterruptible clock resetting

SM2 works internally with UTC time. During the switch from daylight saving time to winter time and vice versa, SM2 can continue to work without interruption.

2.9 SM2 monitored variables

The table below shows the main monitored variables of SM2.

A table showing the links between the monitored variables and monitoring programs, ONLINE reports, and SM2R1 report groups can be found in chapter “Variables reports” on page 361.

Monitored variable	Description
Cache	
Access statistics and hit rates for DAB caches	Number of read/write accesses to DAB cache areas per second and the percentage frequency of read/write accesses to DAB subareas without disk access.
Access statistics for ISAM pools	Number of ISAM accesses per second to pages in the ISAM pool and directly to disk, as well as the number of ISAM accesses with a delay per second. Size of the ISAM pool, reserved pages and fixed pages in PAM pages.
Access statistics and hit rates for hiperfiles (PFA)	Number of read/write accesses to PCA or DAB cache areas per second, and their percentage share of the total number of read/write accesses. Number of failed attempts to use the cache per second.
Access statistics and hit rates for SYMMETRIX controllers	Number of read/write accesses to SYMMETRIX controllers and devices. Proportion of read/write accesses handled successfully by the cache.
Access statistics and hit rates for controllers with cache (PCA)	Number of read/write accesses and their percentage share of the total number of read/write accesses for PCA controllers, cache areas, and devices.
CPU	
CPU utilization	Time during which the processor is in one of the following statuses: TU, TPR, SIH, IDLE or STOP. In SR2000 systems, /390 time will also be output.
Number of system calls	Number of SVC calls in TU/TPR per second, and the sum of all SVC calls per second.
Files	
Catalog access statistics	Number of read/write accesses to catalog entries/JV entries of files per second, as well as average access times in milli-seconds.

Table 2: SM2 monitored variables

Monitored variable	Description
Files (continued)	
File access statistics	Number of PAM-WAIT, PAM-CHECK-READ, PAM-WRITE operations and input/output operations per second for one file. Distribution of input/output operations to files for selected disks.
File access times	Average access time in milliseconds for each input/output.
IOs	
Number of input/output operations	Number of input/output operations per second.
Number of paging input/output operations	
Channel utilization and channel transmission rates	Number of input/output operations or transferred PAM blocks per channel.
Device utilization and transmission rates	Device utilization in % without/because of paging activities.
Length of device queues	Number of input/output requests addressed to a device.
Duration of input/output operations	Hardware operating time between SDV command and channel interruption for input/output operations of a specific device, measured in milliseconds.
Access distribution to cylinders/PAM blocks of disks	Cylinder number/PAM block addressed for input/output operation.
Number of input/output operations	Number of input/output operations per second.
Communication	
Response times	Average time in seconds between the receipt of a message on the system and the sending of a response to the application.
Transaction times	Average time in seconds between input and the last output.
Thinking time	Time between an output and the resulting subsequent input.
Wait time	Average wait time for incoming messages before being processed by the application.
Transaction rate	Number of transactions per second.
Length of transaction message	Average length in bytes of input/output messages for selected connection sets.
Number of input/output operations of network devices	Number of read/write accesses per second, and the number of bytes transferred.
Network transmission rate	Transmission rate for all TCP/IP connections; data transfer information for specific connections.

Table 2: SM2 monitored variables

Monitored variable	Description
Memory	
Main memory utilization	Number of 4-KB pages in main memory.
Utilization of paging area	Number of pageable 4-KB pages on the devices.
Utilization of virtual address space	Number of class 1 through class 4 pages in the virtual address space.
Page fault rate	Number of page fault interrupts per second.
Access statistics for global storage	Number of read/write accesses to global storage per second and the number of bytes transferred per second.
Subsystem	
PCS data	Service rate of the affected categories in %, job delays and SERVICE RATEs per second.
UTM response times and transaction rates	Number of dialog and asynchronous transactions per second and the average time in seconds taken for the transaction.
Number and duration of send jobs via MSCF	Number of send jobs per second, as well as average total and wait times.
POSIX data	File accesses, message accesses, semaphore activities, buffer utilization and all types of system accesses per second.
Lock requests to the DLM	Number of enqueue, convert, dequeue and information lock requests per second, as well as the number of lock allocations and releases per second.
Data on synchronization functions in HIPLEX (NSM)	
HSMS data	Data on the migration of files to the background level and the retrieval of files to the processing level.
Task	
Number of tasks	Number of BATCH, DIALOG, TP and system tasks.
Length of task queues	Number of tasks in a category.
Dwell times in task queues	Dwell times in task queues per category.
Frequency of task activation and deactivation	
Task-specific utilization of resources	Service units per second, percentage CPU utilization, input/output operations per second, used pages in 4-KB pages, paging read per second.
Utilization and queues for task locks	Percentage utilization of a task lock and the number of tasks in the task lock queue.

Table 2: SM2 monitored variables

Monitored variable	Description
VM2000	
Hypervisor activities	Percentage active and idle times of the system.
Guest system activities	Planned and measured CPU utilization as a percentage.

Table 2: SM2 monitored variables

2.10 Analyzing monitored data

There are several tools on various different platforms which can be used to process and display monitored data.

SM2-ONLINE (BS2000/OSD)

SM2-ONLINE is a component of the SM2 monitoring program. At the end of each monitoring cycle, it outputs monitored data in the form of reports. For further information, please refer to chapter "SM2 screen output" on page 201ff.

SM2R1 (BS2000/OSD)

SM2R1 is a component of SM2 and analyzes the SM2 output file. SM2R1 outputs statistics in tabular form and time series in chart form to a file which is ready to print. For further information, please refer to the chapter "SM2R1 analysis routine" in Volume 2 of the SM2 manual [21].

SM2R1-PC (Microsoft Windows)

The SM2R-PC routine can be purchased separately, and is a development of SM2R1. It makes use of the graphical options offered by a PC when displaying monitored data. SM2 output files from various BS2000/OSD computers can be analyzed in a single analysis run. The result data can be displayed in tabular form and can be edited graphically. Charts can be copied into the clipboard and transferred to any Windows application that can access the clipboard. For further information, please refer to the chapter "Additional utility routines" in Volume 2 of the SM2 manual [21].

SM2ONLINE-PC (Microsoft Windows)

The SM2ONLINE-PC utility can be purchased separately and is used to simultaneously display and monitor SM2 data from several BS2000/OSD computers online. The monitored data is supplied in the form of charts which are updated at the end of every monitoring cycle. Each monitored variable can be subjected to threshold monitoring. Alarms signalling threshold violations can be both audible and visual. For further information, please refer to the chapter "Additional utility routines" in Volume 2 of the SM2 manual [21].

SM2-PA (BS2000/OSD)

The SM2-PA routine can be purchased separately and is used to analyze user-specific SM2 output files from user task monitoring operations. The result data is displayed in the form of statistics and offers information on task resource utilization and/or the performance of user programs. For further information, please refer to the chapter "Additional utility routines" in Volume 2 of the SM2 manual [21] and the manual "SM2-PA" [8].

2.11 Performance expectations of the user

When assessing the performance of a DP system, the user is generally interested in:

- the time it takes for the system to respond to requests,
- how many requests the system can handle within a given period of time, and
- what resources are used.

The performance level of the hardware (e.g. the number of instructions processed per second) and of the operating system (e.g. task management efficiency) are generally of secondary interest.

Interactive mode criteria

A distinction is made between inquiry-and-transaction mode and timesharing mode:

In **inquiry-and-transaction mode**, the terminal users can communicate only with programs which are specific to a given application. Normally, a large number of users interact with a relatively small number of application programs.

In **interactive (or timesharing) mode**, the terminal users enter their own application programs for interactively processing a given task. The application programs are generally controlled by system programs for creating, testing and updating files and programs.

In both inquiry-and-transaction mode and timesharing mode, the unit of DP operation is a transaction.

The transaction time is the delay between the arrival of the input at the host and the output of the acknowledgment. The DP system can output several responses with different response times for a single transaction. If resources are not released when a transaction is completed but are reserved for the next transaction, the transaction is known as a multi-step transaction.

The sum of single-step and multi-step transactions required for handling one application is called an operation.

The characteristic criteria for describing performance expectations are:

- Transaction rate
Sum of all successfully completed transactions per unit of time
- Response time
Time required for processing by the DP system
- Number of simultaneously active users.

The monitored values for these characteristics are determined in SM2 by the monitoring program BCAM-CONNECTION (page 35), RESPONSETIME (page 45) and UTM (page 53).

Batch processing criteria

In batch processing, the unit of DP processing is a job.

- Throughput rate
Number of successfully processed jobs per unit of time
- Dwell time
Time required for processing a job

For the individual user, a satisfactory performance (short response time, short dwell time) is obtained if the required resources are available when they are requested. This requirement can easily be met if utilization of the requested resources (in particular of the input/output devices) is kept to a minimum.

The DP system performance, on the other hand, is characterized by the transaction and throughput rates, where maximum utilization of the resources is desirable for economic reasons.

These contradictory performance requirements relating to resource utilization can be fulfilled only by carefully planning the workload and the associated resource requirements.

2.12 Using SM2 for system monitoring

Depending on the mode of monitored-data acquisition (frequency, scope), we must consider two different applications:

- Trend monitoring (= long-term monitoring) for obtaining data for system capacity planning
- Bottleneck analysis for locating and eliminating performance problems

Trend monitoring

The utilization data of the following resources is required in order to carry out long-term system capacity planning:

- CPUs
- channels
- devices
- main memory

Additional monitoring routines need not be activated.

It is advisable to use the following settings for monitoring periods:

Sampling cycle (SAMPLING-PERIOD):	1000 milliseconds
Monitoring cycle (OFFLINE-PERIOD):	5 minutes
Analysis subinterval	1 hour

The monitoring period should cover the entire period from SYSTEM READY through to SHUTDOWN. If output of the online screen report takes too long during the session, you can shorten the online monitoring cycle.

Monitoring times are set using the MODIFY-MEASUREMENT-PERIODS statement.

It is a good idea to create a new SM2 output file every day (OPEN-LOG-FILE / CLOSE-LOG-FILE statements). The SM2U1 routine can be used to combine (and split) daily SM2 output files to create one large file, known as the master SM2 output file. The daily SM2 output files must be added to the master SM2 output file in chronological order.

Bottleneck analysis

Before monitoring is started, you must clarify any performance problems, i.e. performance expectations that are not satisfied. The following problems may exist:

- System-oriented performance problems
These arise if the system throughput rate is unsatisfactory, and are indicated by a low transaction rate and/or throughput rate. The most likely cause is the overloading of one or more resources.
- User-oriented performance problems
These occur due to long delays when handling specific load requirements.

The following monitored variables should be used to analyze bottlenecks. SM2 also allows for more extensive analysis through addition monitoring programs.

These monitored variables and monitoring programs make it easier to locate overloaded resources:

Monitored variable	Monitoring program
Number of tasks in the system queues and at devices	Monitored by default
Number of input/output operations per device	Monitored by default
Working set per category	Monitored by default
CPU utilization and number of input/output operations per category	SYSSTAT
Number of input/output operations and volume of data transferred per channel	CHANNEL-IO
Access to catalog entries	CMS
Number of transactions	RESPONSETIME, BCAM-CONNECTION, and UTM

Table 3: Monitoring programs used to locate overloaded resources

The following settings are recommended for monitoring times (MODIFY-MEASUREMENT-PERIODS statement):

Sampling cycle (SAMPLING PERIOD):	400 milliseconds
Monitoring cycle (OFFLINE-PERIOD):	60 seconds
Analysis subinterval:	1 - 5 minutes
Monitoring period:	0.5 - 5 hours

Monitoring must be carried out during peak load periods.

Due to the shorter monitoring cycle and the activated monitoring programs, bottleneck analysis produces a large volume of data compared to trend monitoring. The volume of data corresponds to the number of objects monitored and the number of events (DISK monitoring program). The resulting SM2 output file may be very large.

Because of the volume of data generated, it does not make sense to copy all data record types into the master SM2 output file. SM2U1 can be used to suppress certain data records when updating the master SM2 output file.

To investigate delays when handling special load requirements, you will need further information in addition to the system utilization data described above. To begin with, the monitoring program PERIODIC-TASK or TASK can be used to select a task. The DISK-FILE monitoring program can be used for overloaded disks to determine the files accessed most frequently. It is not possible to list general guidelines for the additional selection of monitoring programs. For further information, please refer to the “Performance Handbook” [5].

2.13 Basic procedure for ensuring efficient DP system usage

To minimize performance analysis problems, the following procedure should be adhered to:

- Define the performance expectations (see page 25).
- Check the extent to which performance expectations are satisfied once productive operation has begun. This involves carrying out a “basis” test.
- If some performance expectations are not satisfied, check whether these are system-oriented or user-oriented.
- Check for errors in the system setup.
- Carry out a bottleneck analysis (see the section “Automatic performance analysis” in the chapter “SM2R1 analysis routine” and the description of the START-AUTOMATIC-ANALYSIS statement in Volume 2 of the SM2 manual [21]).
Concentrate on those bottlenecks whose elimination promises the greatest performance improvement.
- After eliminating the detected bottlenecks, repeat the bottleneck analysis. Many bottlenecks remain hidden until after some kind of intervention.
- Monitor the system at regular intervals (see page 27) to detect saturation symptoms in the main resources (due to increasing loads) and to avoid critical system conditions.

The procedure is described in detail in the “Performance Handbook” [5], which also explains how to interpret the results.

2.14 SM2 in computer networks

SM2 provides functions for the central online monitoring and control of monitored-data acquisition in a computer network.

The monitored data is independently recorded on each host in the network by a local SM2 monitoring program, and is exchanged between the hosts via a LAN. In this way, the online reports of all hosts can be output on any computer in the network.

There are also reports which output the combined monitored data of the various hosts.

All control statements for the acquisition of monitored data (changing monitoring cycles, switching monitoring programs, etc.) can be entered on any host for all computers in the network.

The SM2 functions for monitored-data acquisition in a network are also available in a HIPLEX network.

Prerequisites for using SM2 in computer networks

1. An MSCF connection of type CCS (Closely Coupled System) must exist between all hosts in the network.
For further information on this connection type, refer to the "HIPLEX MSCF" manual [4].
2. The SM2 functions for monitored-data acquisition in a network can only be used for those computers in the network which run the same version of SM2.
3. SM2 must be started once on all computers in the network (e.g. with START-SM2) or at least loaded via the DSSM command /START-SUBSYSTEM
SUBSYSTEM-NAME=SM2.

Selecting hosts with SM2

The privileged statement SELECT-HOSTS (see page 110) selects the computers to which all subsequently entered SM2 statements are to be sent. This statement always applies to the user who issues it. Following the END statement and a restart, the default value applies again, i.e. SM2 statements are only executed on the local host.

The SHOW-SELECTED-HOSTS statement (see page 140) provides information on the selected hosts. This includes the time of the last monitored variable queried.

Users in a computer network

SM2 distinguishes between privileged users ("primary" and "secondary" administrators and other privileged users) and nonprivileged users. This also applies in a computer network.

It does not distinguish between the rights of local and remote users.

Users can have different rights on different hosts, depending on their privileges and the rights they have already been assigned. In particular, the primary administrator of a host can come from a different host. These primary administrators can be identified on the MEASUREMENT STATUS screen by the additional output of the host name.

The set of administration statements available may be restricted according to the rights of the user. As a result, the set of permitted statements may vary from one host to the next. Prohibited statements are rejected by the relevant hosts. If several hosts are selected, the statements of the first specified host are displayed in the user dialog.

Screen output

The screens containing the local data of a particular host are output in succession. These are followed by the screens of the next host, and so on. The system name in the top left-hand corner of the screen indicates which host to which the screen belongs.

Before the local screens of the individual hosts, screens showing combined data from the whole network can be output (GLOBAL, NSM and SHARED-PVS reports):

- The GLOBAL report provides an overview of the utilization of all hosts in the network.
- The NSM report outputs data of the NSM subsystem for all hosts in the network.
- The SHARED-PVS report shows the access to shared disk devices.

These reports only cover the hosts which have been previously selected by means of the SELECT-HOSTS statement.

Standard SM2 output file

The standard SM2 output file is created on every host on the home pubset. To enable the SM2 output files of the various hosts to be distinguished later on, the file name also includes the system name.

Restrictions for the computer network

1. The BS2000 /START-TASK-MEASUREMENT command can only be used on the local host.
2. Scroll commands
 - Scrolling backward with “-” or “-R” is not supported across host boundaries; i.e. you cannot scroll back from the first report of one host to the last report of the previous host.
 - You can only change to the first report of the previous host using the scroll command “-N” (node) (see page 152).
 - You can only access the reports containing combined monitored data using “-N” while scrolling backward.
 - The scroll command “--” always displays the first selected report.
3. The monitored values of the individual hosts are only output together if the time also corresponds. The system clocks on all hosts should be synchronized as far as possible and the same monitoring cycle must be set in SM2.

If no valid or new file exists, the following outputs are possible:

- SHOW-SELECTED-HOSTS statement
In the LAST BUFFER column, RSLT NOT VALID is output for the last monitored variable queried instead of the time.
- GLOBAL and NSM reports
In the column for the monitored variables, “***” is output.
- SHARED PVS report
The message “SOME DATA MISSED” is output.
- Local reports
For local reports, the message “NO DATA FROM xyz” is output.

Dynamic IO reconfiguration

SM2 recognizes a dynamic IO reconfiguration and, if need be, automatically modifies the range of objects monitored. The monitoring programs CHANNEL-IO, SERVICETIME, SYSSTAT, TASK and NET-DEVICE and the monitoring process for CHANNEL/DEVICE are terminated internally and then restarted. As a result, monitored variables cannot be supplied for the most recent monitoring cycle.

Monitoring program definitions with wildcards *ALL, *DISK or *TAPE are re-interpreted.

3 SM2 monitoring programs

3.1 Overview

SM2 offers a range of optional monitoring programs that record additional data. A distinction is drawn between privileged monitoring programs, which only an SM2 administrator can start and stop, and monitoring programs for user-specific monitored objects, for which the permission of the SM2 primary administrator is required (see the MODIFY-USER-ADMISSION statement, page 98).

The monitoring programs are started and stopped by means of START-MEASUREMENT-PROGRAM and STOP-MEASUREMENT-PROGRAM. For some monitoring programs, monitoring parameters must be defined with the SET-<programname>-PARAMETER statement and/or the objects to be monitored must be selected with ADD-... and REMOVE-... before the program is started.

The data supplied by the monitoring programs is output on screen and/or to the SM2 output file. To start monitoring programs that output their data exclusively to the SM2 output file, an SM2 output file must be open. All other monitoring programs also write their data to the SM2 output file when it is open. In the case of screen output with some monitoring programs, it is possible to use a SELECT-... statement to select additional, object-specific online reports.

The following table indicates the monitoring programs:

- for which parameters must be defined or the objects to be monitored must be selected
- that output their data exclusively to the SM2 output file
- that output data in an online report on the screen
- that output data in an online report only to privileged users
- for which additional, object-specific reports can be selected.

Restriction

The monitoring programs GS and GSVOL cannot be used with SR2000 as certain hardware and system requirements are not met.

Monitoring programs	Parameter/ monitored object definition	Output exclu- sively to file	Online output		
			Name of the online report	Only privileged users	Selection of addi- tional re- ports
BCAM-CONNECTION	x		BCAM CONNECTION		
CHANNEL-IO	x		CHANNEL		
CMS			CMS		
COSMOS	x	x (1)			
DAB			DAB		x
DISK	x	x			
DISK-FILE	x		DISK FILE		
DLM			DLM		
FILE	x		FILE	x	
GS			GS		
GSVOL			GSVOL		
HSMS					
ISAM	x		ISAM	x	
MSCF			MSCF		
NET-DEVICE			NET DEVICE		
NSM			NSM		
PCA			PCA		x
PERIODIC-TASK	x		PERIODIC TASK		
PFA			PFA, SYMMETRIX		x
POSIX			POSIX		
RESPONSETIME	x		RESPONSETIME		
SERVICETIME	x	x			
SVC			SVC		
SYSSTAT	x		CATEGORY		
TASK	x	x			
TCP-IP			TCP/IP		
TLM			TLM		
UTM			UTM		x
VM			VM2000		
USER FILE			FILE		
USER ISAM			ISAM		
USER TASK		x (2)			

Table 4: Overview of the SM2 monitoring programs

(1) COSMOS outputs data to a separate SM2 output file (see the description of COSMOS).

(2) Output is to a user-specific SM2 output file.

3.2 Privileged SM2 monitoring programs

BCAM-CONNECTION

Monitored data on connection sets

The BCAM-CONNECTION monitoring program supplies monitored data for connections that are combined in connection sets. It provides monitored variables for DCAM applications (with NEA names) and socket applications (with port numbers) only. Information is recorded on INWAIT, REACT, INPROC and OUTPROC times.

- The INWAIT time is defined as the time between the display of a BCAM message at an application and the retrieval of this message by the application.
- The REACT time is defined as the time between an application's send call and the receive call which immediately precedes it. If the send and receive calls are logically linked, then the REACT time can be seen as the time it takes for the application to respond. In dialog-oriented applications, each input is normally followed by the appropriate output.
- The INPROC time is defined as the time between the arrival of a message at BCAM and the retrieval of this message by the application. The INPROC time includes the INWAIT time.
- The OUTPROC time is defined as the time between a send call and the transfer of the last byte of a message to the network. Data transfer to the network may also be delayed by the receiving party.

In addition, statistics are recorded on incoming and outgoing data (jobs, the volume of data, packets, etc.).

The SM2 administrator can use the SET-BCAM-CONNECTION-PARAMETER and ADD-BCAM-CONNECTION-SET statements to define global and connection-specific monitoring parameters respectively.

The SET-BCAM-CONNECTION-PARAMETER statement must be entered before the first ADD-BCAM-CONNECTION-SET statement.

Global parameters

Time statistics are recorded bucket-specifically. The BUCKET parameters consist of a list of the maximum INWAIT, REACT, INPROC and OUTPROC times, arranged in order of magnitude. The ranges defined in these lists apply to all connection sets defined in the ADD-BCAM-CONNECTION-SET statement.

<integer 1 .. 99999> is an integer which defines a limit value. The number of limit values in this list implicitly determines the number of ranges. This may vary from list to list, but four limit values is the maximum.

The last value in the list of ranges specifies the overflow limit. All monitored variables that exceed this limit are included under the last range. The bucket parameters in BCAM can be specified by both SM2 and other applications. It is also possible to disable monitored data acquisition entirely.

The SET-BCAM-CONNECTION-PARAMETER statement contains the *UNCHANGED operand value. This causes SM2 to leave the bucket parameters set in BCAM as they are, and to adopt these values for its own monitoring program definition.

If the SET-BCAM-CONNECTION-PARAMETER statement is used to define alternative bucket parameters, then these will also be set in BCAM when you start the monitoring program. If you modify the bucket parameters in BCAM during the monitoring process, the new parameters will also apply to SM2.

If monitore- data acquisition is disabled in BCAM during monitoring, SM2 will reenale it using the parameters defined in SM2.

Connection-specific parameters

A connection is defined by an NEA name or a port number, the type of connection, and the host name. A connection set is understood as a number of connections defined by specifying these objects.

The objects may be specified using

- a fully qualified name (name),
- a partially qualified name (name*), or
- or an unqualified name (*ANY, *LOCAL, *REMOTE, *BOTH).

Using an unqualified name may lead to fluctuations in the number of connections in a connection set during monitoring. The BCAM-CONNECTION screen shows the number of connections of the connection set which are currently being monitored. A connection set is defined by specifying a list of up to 16 name definitions. You can specify either NEA application names or port numbers, but not both.

You must also specify the type of connection:

- *LOCAL Only connections within the host
- *REMOTE Only remote connections
- *BOTH All connections

Another distinguishing feature used to select connections is the names of the hosts between which the connection exists. It is possible to define up to 32 connection sets.

*Examples of monitoring program definitions**Example 1*

```
SET-BCAM-CONNECTION-PARAMETER
    INWAIT-BUCKETS = *UNCHANGED,
    REACT-BUCKETS  = *UNCHANGED,
    INPROC-BUCKETS = *UNCHANGED,
    OUTPROC-BUCKETS = *UNCHANGED

ADD-BCAM-CONNECTION-SET
    SET-NAME = setname1,
    CONNECTION-SELECTION = *BY-NEA-NAME (
        CONNECTION-NAME = *SPECIFIED (
            LOCAL-APPLICATION = $DIALOG,
            PARTNER-APPLICATION = *ANY)),
    CONNECTION-TYPE = *REMOTE,
    HOST-SELECTION = *SPECIFIED (
        LOCAL-HOST-NAME = *LOCAL,
        PARTNER-HOST-NAME = hostname1)

START-MEASUREMENT-PROGRAM TYPE = *BCAM-CONNECTION
```

In these statements, the monitoring parameters set in BCAM are transferred. A connection set is defined which records all connections with the name type NEA and the local application name \$DIALOG. The connections are remote and lead to the specified hosts.

Example 2

```

REMOVE-BCAM-CONNECTION-SET SET-NAME = *ALL
SET-BCAM-CONNECTION-PARAMETER
ADD-BCAM-CONNECTION-SET
    SET-NAME = setname2,
    CONNECTION-SELECTION = *BY-PORT-NUMBER(
        PORT-NUMBER = *SPECIFIED (
            LOCAL-PORT-NUMBER = 5000,
            PARTNER-PORT-NUMBER = *ANY)),
    CONNECTION-TYPE = *BOTH,
    HOST-SELECTION = *SPECIFIED (
        LOCAL-HOST-NAME = *LOCAL,
        PARTNER-HOST-NAME = hostname2)
CHANGE-MEASUREMENT-PROGRAM TYPE = *BCAM-CONNECTION

```

These statements end the current monitoring process and restart it using new parameters. The bucket parameters are set to their default values. A connection set is defined which records all connections with the local port number 5000 and which lead to the specified host.

CHANNEL-IO

Monitored data on the channel load

The CHANNEL-IO monitoring program provides precise information on the channel load. For each channel to be monitored, it returns the number of I/O operations for PAM block transfer, byte transfer, and without data transfer (NODATA). In addition, it indicates the volume of data transferred for PAM block and byte transfer in PAM blocks.

CMS

Monitored data on the catalog management system

The CMS monitoring program provides information on the performance of the catalog management system. It outputs monitored variables for each catalog and for all private disks.

COSMOS

Monitored data on the system for bottleneck analysis

COSMOS is an event-driven monitoring program for recording detailed system data that is required particularly for bottleneck analyses of OLTP applications. It collects monitored data for all tasks, for task groups (which can be selected by user ID, category, or job name), or for individual tasks. Because of the high volume of very detailed monitored data involved, COSMOS should only be used for short-term monitoring. Intimate knowledge of the internal workings of the system is required to interpret the monitored data.

COSMOS is an SM2 add-on product and only available on special release. A detailed description is supplied with the product.

DAB

Monitored data on DAB activities

SM2 outputs highly detailed information on DAB activity in all DAB cache areas. Intensive use of DAB in parallel may result in a large volume of data traffic in SM2.

DISK

Monitored data on disk access

The monitoring program for disk statistics permits fine analysis of the frequency with which the cylinders or blocks of a disk are accessed, and of the duration of I/O operations. SM2R1 provides analyses of the records supplied by SM2. These analyses, combined with a knowledge of how files are mapped to cylinder/block areas, make it possible to optimize the mean access time for disk I/O operations.

Monitored variables

The following information is recorded for each completed disk access to a selected disk device:

- mnemonic device name
- cylinder/block number addressed when I/O is started (at the time of the SDV or START-SUBCHANNEL command)
- duration of hardware I/O (time between the initiation of I/O using the SDV or START-SUBCHANNEL command) until termination of I/O (as the result of a channel interrupt)
- I/O identifier specifying read, write or other I/O operations

The monitored data recorded is then written only to an SM2 output file, from which it can be analyzed by SM2R1 (PRINT-DISK-STATISTICS statement).

Due to the large amount of data generated and the resulting high load on the CPU, this monitoring program should be used for short monitoring operations only (between half an hour and one hour), and only on a small number of disk devices.

Note

The only access values recorded are ones where an I/O chain begins with a search command (SEEK). This is usually the case for most access attempts, with the exception of the following instances:

1. When formatting disks (VOLIN)
2. When accessing the VOL1 label

DISK-FILE

Monitored data on file access for selected disks

This monitoring program provides information on physical access to files on a selected disk, provided that access was by way of the I/O output system of privileged PAM (PPAM). This includes file access using the methods EAM (Evanescent Access Method), ISAM (Indexed Sequential Access Method), SAM (Sequential Access Method) and UPAM (User Primary Access Method).

In the case of multiprocessor systems, monitoring is restricted to I/O operations originating in the local system running SM2.

Note

Due to the extension of the I/O path, the monitoring program should only be used for short periods of time.

DLM

Monitored data on lock requests

The DLM (Distributed Lock Manager) monitoring program provides information on lock requests from TU, TPR and NSM.

FILE

Monitored data on file access for selected files

This monitoring program provides information on the number and average duration of file access, provided that access was by way of the I/O output system of privileged PAM (PPAM). This includes file access using the methods EAM (Evanescent Access Method) and ISAM (Indexed Sequential Access Method).

In addition, data is recorded for the access methods SAM (Sequential Access Method) and UPAM (User Primary Access Method), all disk access, and all access to magnetic tape files with standard blocks.

The FILE statistics also contain the access times for files. The monitored time covers the logical duration of I/O operations between start and end of a job from the point of view of the software. For asynchronous I/O operations, this time can be considerably greater than the hardware time.

In the case of multiprocessor systems, monitoring is restricted to I/O operations originating in the local system running SM2.

HSMS

Monitored data on file migration

This monitoring program supplies information on the migration of files to the background level and the retrieval of files to the processing level.

GS

Monitored data on access to global storage

This monitoring program provides information on read and write access to global storage (GS), categorized by partitions.

GSVOL

Monitored data on volumes in global storage

This monitoring program provides information on read and write access to volumes which are emulated on global storage.

ISAM

Monitored data on ISAM pools

When the BS2000 component NK-ISAM is installed, the monitoring program for ISAM pools provides information on the performance of the ISAM buffer management facility. ISAM buffer management is aimed at reducing the physical I/O operations involved in accessing ISAM files. Using the information recorded in this monitoring program, the access behavior of this ISAM pool can be optimized by modifying the parameters of an ISAM pool, as required (for more details on the ISAM access method, please refer to the "DMS Macros" manual [2]).

Users can issue the BS2000 command SHOW-ISAM-POOL-ATTRIBUTES to obtain information on the pool names.

MSCF

Monitored data on communication between hosts

The MSCF (Multiple System Control Facility) monitoring program provides information on communication between the local host and other hosts.

NET-DEVICE

Monitored data on network devices

This monitoring program provides information on access to and the transferred data of network devices (mainframe interface controllers).

NSM

Monitored data on HIPLEX MSCF®

The NSM (Node Serialization Manager) monitoring program provides information on the basic functions of a HIPLEX MSCF® network.

PCA

Monitored data on 3419/21 disk controllers under PCA

This monitoring program records monitored data on 3419/21 disk controllers managed by the PCA (Peripheral Cache Administrator) subsystem. It is used to record statistics on the ADM PFA cache areas (Administrator Controlled Performant File Access). The main purpose of the subsystem is to configure the cache integrated in the controller according to the particular needs of the user, achieving a higher I/O throughput rate or shorter I/O times. The monitored values recorded by the PCA monitoring program serve to evaluate the efficiency of the cache configuration and to provide pointers on how to improve the utilization of the cache.

Unlike other SM2 monitoring programs, these statistics are not processor-oriented, rather they relate globally to a particular controller. This fact should be taken into account particularly when interpreting monitored data. For example, high hit or miss rates for a disk device supported by the cache do not necessarily imply that these were triggered by the host running SM2. Also, this does not mean that the disk device listed was ever addressed by the SM2 host via the controller, or that the device has even been generated on this host. This information about the particular configuration should be obtained before SM2 is put to practical use, in other words before selecting controllers or caches, with the aid of PCA subsystem SHOW commands.

PERIODIC-TASK

Monitored data on tasks

This monitoring program records the most important utilization data for all tasks. Each user can himself/herself use the SELECT-PERIODIC-TASK-PARAMETER statement to specify the sort criterion and the output information for online output. The privileged statement SET-PERIODIC-TASK-PARAMETER is used to specify the tasks whose data is to be written to the SM2 output file. This prevents the SM2 output file from becoming too large. Nonprivileged users receive information only on those tasks that are under their user ID.

PFA

Monitored data on caches under User PFA

User PFA (User Controlled Performant File Access) allows users to assign performance attributes to files, thus converting them into hiperfiles (High Performance Files). The idea behind hiperfiles is that file access is accelerated by buffering the file in a high-speed cache in order to avoid the slow disk input/output operations. The following cache media are used for hiperfiles: main memory (MM), global storage (GS), 3419/21, 3860 and SYMMETRIX cache controllers, and SSDs (solid state disks). Depending on the cache medium, the caches are administered by DAB (main memory, ES, GS), by PCA (disk controllers with cache, CTL), or by the hardware itself (SYMMETRIX).

The PFA monitoring program records monitored data on all user PFA caches. This data may overlap with that contained in the PCA, DAB and SYMMETRIX reports.

Note

The PFA monitoring program also records information on SYMMETRIX controllers which are not used in accordance with the PFA concept. This information is output to the SYMMETRIX reports (see page 302ff) and applies globally to the SYMMETRIX controller. In other words, the data output is not host-oriented.

The data in PFA reports refers to the PFA cache and is likewise not host-oriented. Only SYMMETRIX reports should be taken into account for SYMMETRIX controllers. With the introduction of SYMMETRIX reports, it no longer makes sense to configure PFA pubsets in SYMMETRIX controllers.

POSIX

Monitored data on POSIX

This monitoring program provides information on the POSIX subsystem. This information corresponds to the options and output data of the SINIX command “sar”.

RESPONSETIME

Monitored data on the BCAM pool

The RESPONSETIME monitoring program records information on response times, think times, transactions times, and wait times in the BCAM pool. It supplies useful monitored data for dialog-oriented DCAM applications only (with NEA names).

The **response time** is understood to mean the time between the receipt of a message by the host and the sending of a response to the partner application.

SM2 makes a distinction between two kinds of response time:

Definition 1 The time between an input (receipt of a message) and the next output (sending of a message) via the same connection .

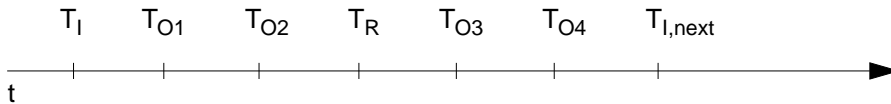
Definition 2 The time between an input and the next output or all follow-up outputs sent before a further input.

The SM2 administrator can choose between these two definitions (using the SET-RESPONSETIME-PARAMETER or MODIFY-RESPONSETIME-PARAMETER statement).

The **think time** is understood to mean the time taken between output and the next (subsequent) input. The **transaction time** is understood to mean the total time elapsed between an input and the final output. The **wait time** is understood to mean the time between entry of a message in the BCAM pool and retrieval of the message from this pool.

For simplicity, **interaction** is the term used as an overall definition covering the wait, response, think, transaction times.

Example: Calculating the time values



T_I Input time stamp

T_O Output time stamp

T_R Time stamp of the current receive action in the BCAM application

$RT_1 = T_{O1} - T_I$ Response time (definition 1)

$RT_2 = T_{O2} - T_{O1}, T_{O3} - T_{O2}, T_{O4} - T_{O3}$ Response time (definition 2)

$TrT = T_{O4} - T_I$ Transaction time

$ThT = T_{I,next} - T_{O4}$ Think time

$WT = T_R - T_I$ Wait time

The outputs at times $T_{O1,2}$ cannot refer to the input at time T_I because the latter was not retrieved until time T_R .

The outputs at times $T_{O3,4}$ can (but need not) refer to the input at time T_I .

Because the monitoring is performed in the BCAM transport system, no definite statement can be made about the logical (application-specific) connection between the individual inputs and outputs.

With dialog-oriented applications, each input is generally followed by the associated output, so the correct response times can be established.

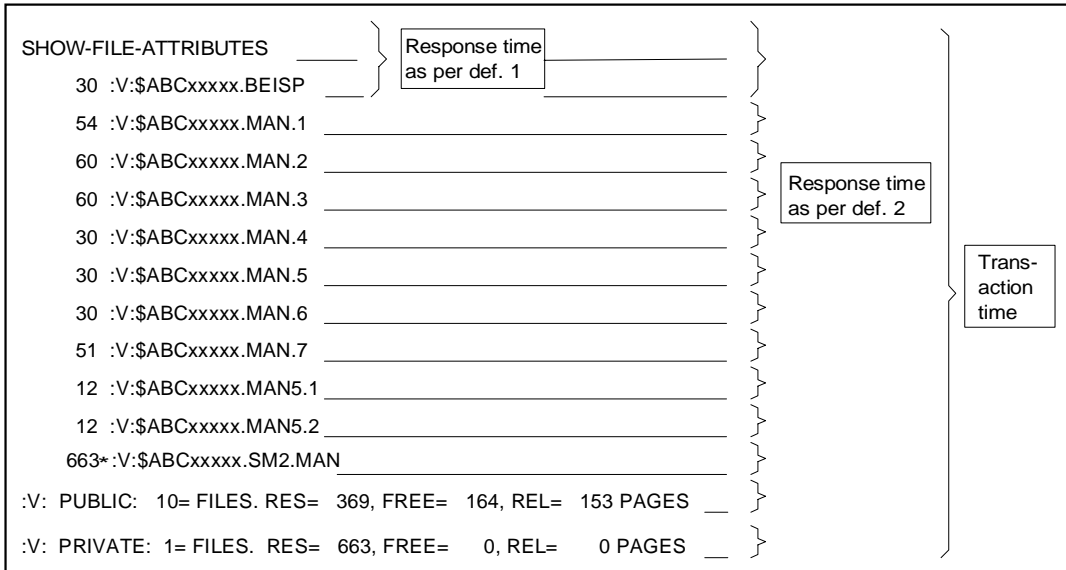
SM2 interprets each message from a partner application to a BCAM application as an input and each message from a BCAM application to a partner application as an output. No distinction is made as to whether the communications partner of the BCAM application is a data display terminal or an application in a partner system.

In order to restrict monitoring to individual connections, SM2 employs the BCAM application name. SM2 assumes that the transmitter or receiver (data display terminal) has been uniquely assigned to a specific application name.

There are some special applications for which this application name has not been defined. Specific response time measurement by SM2 is not suitable for such cases, but the corresponding values are recorded in the total.

Wait times within the communications host and data transfer times cannot be taken into consideration.

Example: Responses to a /SHOW-FILE-ATTRIBUTES command



The SM2 administrator can use the SET- or MODIFY-RESPONSETIME-PARAMETER statement and the ADD-CONNECTION-SET statement to define global and connection-specific monitoring parameters respectively.

Global parameters

If response times are recorded for specific categories (SCOPE=*CATEGORY), the calculation of means values per category only involves values which are below the maximum corresponding bucket value. If no bucket-specific analysis is required, only one value is required to determine the overflow limit. If more than one bucket has been defined, values below this limit are ignored as being irrelevant, and the category assignment valid at the end of interaction remains applicable

Using the parameter CONNECTION-NUMBER=<integer 1..8187>, the maximum number of connections to be monitored is defined. Once this number is reached, response time monitoring continues, in which case SM2 will react to any unrecorded interaction in the following manner:

- The message "NOTE: CONNECTION NUMBER TOO LOW" will be issued in the SM2 output report. Each of the RESPONSETIME screens (see description of the RESPONSETIME report) will show the same message. The message is output only if no interactions were recorded during the monitoring cycle in question.
- An indication to this effect will be given in the SM2 response record at the end of this monitoring cycle.
- With SM2R1, the message SOME INTERACTIONS MISSED will be issued at the end of the analysis. This message is output only if no interactions were recorded during the analysis period in question.

The BUCKET parameters consists of a list of the maximum response, think, transaction and wait times, arranged in order of magnitude. The ranges defined in the specified lists apply to all connection sets specified in the ADD-CONNECTION-SET statement.

<integer 1 .. 99999> is an integer which defines the limit value. The number of limit values in this list implicitly determines the number of ranges. This may vary from list to list, but five limit values is the maximum. The last value in the list of ranges specifies the overflow limit. All monitored variables that exceed this limit value are included under the last value, but are not included in the calculation of mean values given in the RESPONSETIME report.

Connection-specific parameters

The SM2 administrator can monitor the response time both globally, i.e. for all possible connections, and for specific individual connections, connection groups, or connection sets.

A connection is uniquely defined in the local the host by specifying the following objects:

- the name of an application
- the name of a partner
- the host name of the partner
- the type of connection

A connection group is understood as number of connections which are defined by specifying the objects listed above. The objects may be specified using a fully qualified name (name), a partially qualified name (name*), or an unqualified name (*ALL). For example, (\$DIALOG,*ALL,*ALL) defines a connection group which includes the \$DIALOG application.

A connection set is understood as a combination of connection groups. It is defined by specifying a list of up to five connection groups.

For example, ((\$DIALOG,*ALL,*ALL),(UTM1,*ALL,*ALL)) defines a connection set which combines two connection groups with the \$DIALOG and UTM1 applications.

This monitoring program supplies statistics for each connection set. In addition, the set of all connections is monitored on an ongoing basis. When selecting which connections are to be monitored, the SM2 administrator can define up to 15 connection sets. (*ALL,*ALL,*ALL) is always set automatically as the additional connection set. Furthermore, the SM2 administrator must specify whether the selected connections are to be monitored or excluded from monitoring using the *BY-CONNECTION or *EXCEPT-CONNECTION operand of the ADD-CONNECTION-SET statement. With *EXCEPT-CONNECTION, all connections except for those in the specified connection groups are monitored.

The SM2 administrator can also specify the type of the connection. If *LOCAL is specified, connections within the host are taken into account. This makes it possible to record the response times for individual applications, even if it would normally appear to the system that everything is running under the OMNIS carrier application.

Each defined connection set can consist of a maximum of five connection groups. The total number of connection groups which can be defined is, in turn, limited to 15 at most.

Examples of the RESPONSETIME monitoring program

Example 1

```
SET-RESPONSETIME-PARAMETER
ADD-CONNECTION-SET SET-NAME=setname1,SET-DEFINITION=*BY-CONNECTION,
  CONNECTION-SET=((utm1,*ALL,*ALL),(utm2,*ALL,*ALL),(utm3,t1,pr1))
ADD-CONNECTION-SET SET-NAME=setname2,SET-DEFINITION=*BY-CONNECTION,
  CONNECTION-SET=(utm3,*ALL,*ALL),CONNECTION-TYPE=*BOTH,
ADD-CONNECTION-SET SET-NAME=setname3,SET-DEFINITION=*EXCEPT-CONNECTION,
  CONNECTION-SET=((*ALL,termx*,*ALL),(omnis,*ALL,*ALL))
ADD-CONNECTION-SET SET-NAME=setname4,SET-DEFINITION=*EXCEPT-CONNECTION,
  CONNECTION-SET=((utm1,*ALL,*ALL),(omnis,*ALL,*ALL),(apl1,t1,pr1))
START-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME
```

The above statements are used to explicitly define four connection sets: the first by specifying a list of three connection groups. These three connection groups are taken as a whole. The second connection set takes account of local and remote connections. All the other connection sets only take account of remote connections (≙ default setting). The third connection set defines all connections which are neither part of the OMNIS application nor belong to a partner whose name begins with "termx". The fourth connection set combines all connections which belong to neither the UTM1 or OMNIS application nor to the explicit connection (apl1,t1,pr1).

Example 2

```
REMOVE-CONNECTION-SET SET-NAME=*ALL
MODIFY-RESPONSETIME-PARAMETER DEFINITION=*2
ADD-CONNECTION-SET SET-NAME=setname,SET-DEFINITION=*EXCEPT-CONNECTION,
CONNECTION-SET=( $OMNIS,*ALL,*ALL)
CHANGE-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME
```

The above statements terminate the RESPONSETIME monitoring program (apart from *GLOBAL) and restart it, monitoring all connections with the exception of the \$OMNIS application. In addition, the response time as defined in definition 2 is monitored. All other monitoring parameters from the response time monitoring process just terminated are retained.

Example 3

```
SET-RESPONSETIME-PARAMETER CONNECTION-NUMBER=100,RESPONSETIME-BUCKETS=
(50,100,200),THINKTIME-BUCKETS=(50,100,150,200,250)
START-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME
```

The SET-RESPONSETIME-PARAMETER statement is used to automatically define a connection set with the name *GLOBAL; all connections in this set are monitored (CONNECTION(*ALL,*ALL,*ALL)). In addition, here the number of connections is limited to 100. Three limits (50,100,200) are set for the response time, and five limits (50,100,150,200,250) for the think time. The transaction time and the wait time in the BCAM pool are set to their default values.

SERVICETIME**Monitored data on the service time**

This monitoring program is used to carry out detailed monitoring of the service times of individual devices. This applies, in particular, to systems using DCS (Dynamic Channel Subsystem). For systems which do not have DCS, the service time is split up into the device queue time and the remaining service time.

For systems with DCS, a more precise picture of the remaining service time can be obtained. Information is output on the time from Start Subchannel to Start IO (function pending time), the device queue time (further subdivided into the device connect time and the device disconnect time), and the remaining service time (see definition in the glossary). DCS does not support the detailed monitoring of devices on byte multiplexer channels. For these devices, SM2 outputs the same monitored data as for systems which do not have DCS.

In the case of systems with an incomplete DCS, SM2 outputs the same monitored data as for systems which do not have DCS.

The monitored values are only output to the SM2 output file.

In the case of processors with DCS in which there are several guest systems running under VM2000, the SERVICETIME monitoring program can only be started by one of these guest systems. Any attempts to start this function from a second guest system will be accepted without an error message, but no DCS-specific monitored data will be returned. In general, when using SHARED-DEVICES under VM2000, DCS-specific data will not be delivered by any of the guest systems (see the "VM2000" manual [9]).

Note for SR2000

Information on device disconnect times cannot be supplied for devices connected to a bus.

SVC

Monitored data on SVC calls

This monitoring program records all the SVC calls in the system.

The monitored data returned will be of interest only to performance specialists, since detailed knowledge of the internal workings of the system is required to interpret it.

SYSSTAT

Global system and category-specific monitored data

This SM2 function provides information on important global system or category-specific variables. The most important aspect of these variables is that they can be obtained using event-driven methods. These monitored values make it possible to assign values which are otherwise global by default (CPU, I/O) to individual categories, i.e. the category-related share of the load can be determined. For precise determination of category dilation, the SET-SYSSTAT-PARAMETER statement is required to include all devices in the monitoring process. The queue statistics are automatically activated when the monitoring program is started. The monitored data is written to the SM2 output file; some of the values are displayed on screen in the CATEGORY report.

TASK

Task-specific monitored data

The purpose of this function is to provide task-specific variables, from which the resource requirements of individual tasks can be determined.

This data can be used for the following purposes:

- to determine which tasks most frequently use specific resources
- to optimize operation by relocating loads
- as input data for simulation models or analytic calculations.

SM2 writes this data to the SM2 output file, from which subsequent analysis is possible. As with SM2 reports, data cannot be output during the monitoring process.

When defining the monitoring program, the tasks to be monitored must be specified. Both user tasks and system tasks can be monitored.

SM2 can monitor both current tasks already executing or further tasks created in the course of monitoring operations.

Monitoring information can be written to the SM2 output file at two points in time:

1. At task termination time, if the task is terminated during monitoring.
2. At monitoring termination time, if the task is still executing when the monitoring program is terminated.

If the devices to be monitored are defined in the DEVICES operand of the SET-TASK-PARAMETER statement, the number and service time of I/O operations for these devices are output for each task according to whether they are hardware- or software-related. Due to the time and effort involved in gathering this monitored data, this monitoring program should only be used for brief periods of time (e.g. one hour) or for a small number of tasks. For each task, it is possible to monitor up to 64 devices.

TCP-IP

Monitored data on TCP/IP connections

This monitoring program provides information on TCP/IP connections.

TLM

Monitored data on locks

The TLM (TASK LOCK MANAGER) monitoring program records monitored data on locks managed by the Task Lock Manager. The occupation and average queue length of each lock are determined.

The monitored data returned will be of interest only to performance specialists, since detailed knowledge of the internal workings of the system is required to interpret it.

UTM

Monitored data on UTM applications

The UTM monitoring program records application-specific monitored data and outputs it to the screen or to the SM2 output file. It can only generate monitored data if the following conditions have been fulfilled:

- the UTM-SM2 subsystem is started
- the UTM applications are delivering data
- BS2000 Accounting is started (only for DB-specific user values).

For UTM versions < V5.0, the UTM-SM2 subsystem must be started manually before the respective UTM application begins to deliver data.

As of UTM V5.0, the UTM-SM2 subsystem is started automatically.

The UTM application must be ready to deliver data to SM2.

In the KDCDEF run (operand MAX SM2=ON / OFF / NO), it is possible to influence the transfer of monitored data.

- SM2=OFF (default setting)
No monitored data is delivered.
If you use the UTM administration interface with KDCAPPL and SM2=ON, the transfer of monitored data can be activated subsequently for each UTM application.
- SM2=ON
Data is delivered.
Additional administration is not required.
- SM2=NO
No data is delivered. It is not possible to start the transfer of data subsequently.

The settings for the transfer of monitored data are active only if the UTM-SM2 subsystem has already been started (only applicable for UTM versions < V5.0).

DB-specific utilization figures (UDS and SESAM only) are only supplied if the following conditions are met:

- BS2000 Accounting is active.
- The UTM accounting record UTMA is switched on (using the BS2000 command `MODIFY-ACCOUNTING-PARAMETERS SET-RECORD-TYPE=UTMA`).
- UTM Accounting is switched on (using the KDCAPPL statement, parameter `ACC=ON`).
- Monitored-data acquisition is enabled in SESAM (using the statement `ACC,TP=ON,CPU`).

More information on this subject can be found in the manual “UTM - Generating and Administering Applications” [10].

VM

CPU shares of virtual machines

SM2 records the share of CPU time required by the various virtual machines of a VM2000 system. The monitoring program supplies information for all virtual machines on the VM1 monitoring system only. On all other VMs, only the values for the local VM are output. In NATIVE mode, a message is output every time an attempt is made to start this monitoring program.

3.3 Nonprivileged SM2 monitoring programs

The following instructions must be heeded when using nonprivileged monitoring programs. You should also refer to the descriptions of the corresponding privileged monitoring programs for a better understanding of monitoring-program-specific features and variants.

FILE

Monitored data on file access

With this monitoring program, a user can only include files in the monitoring process if the SM2 primary administrator has permitted the monitoring of file access values. This permission can be granted either to all users or to users with certain IDs. In this case, the SM2 MEASUREMENT STATUS screen will have the entry FILE in the line entitled USER MEASUREMENTS ALLOWED.

Each authorized user can include and exclude files which are set up under his own ID. It is also possible to include files which do not exist. Privileged users are not treated differently from normal users.

The FILE statistics also contain the access times for files. The monitored time covers the logical duration of I/O operations between start and end of a job from the point of view of the software. For asynchronous I/O operations, this time can be considerably greater than the hardware time.

Any monitored files are excluded from the monitoring process once SM2 is terminated.

All together, up to 16 files can be monitored by this monitoring program; no values for these files are written to the SM2 output file.

ISAM

Monitored data on ISAM pools

With this monitoring program, a user can only include ISAM pools in the monitoring process if the SM2 primary administrator has permitted ISAM pool monitoring. This permission can be granted either to all users or to users with certain IDs. In this case, the SM2 MEASUREMENT STATUS screen will have the entry ISAM in the line entitled USER MEASUREMENTS ALLOWED.

Each authorized user can include or exclude global ISAM pools and all task-specific or user-specific ISAM pools which have been created or are being created under his user ID.

SM2 does not check whether an ISAM pool exists when a user tries to include it; in other words an ISAM pool can be included in the monitoring process even before it has been created. If an ISAM pool which has been included does not exist during the monitoring cycle, all its monitored data will be listed with blanks. Since the total number of ISAM pools that can be monitored by SM2 for nonprivileged users is limited to 16, care must be taken not to unnecessarily include too many non-existent ISAM pools in the monitoring operations.

No values are written to the SM2 output file for ISAM pools monitored with the aid of this monitoring program.

TASK

Task-specific monitored data

A user can start this monitoring program only if the primary SM2 administrator has permitted user-specific task monitoring. This permission can be granted either to all users or to users with certain IDs. In this case, the SM2 MEASUREMENT STATUS screen will contain the entry TASK in the line entitled USER MEASUREMENTS ALLOWED.

With the /START-TASK-MEASUREMENT command, the user is then given the option of including tasks under his/her own ID for monitoring by SM2. This task information is stored in a user-specific SM2 output file and it can then be analyzed using the SM2-PA analysis routine (see the "SM2-PA" manual [8]).

4 SM2 operation

4.1 Starting and terminating SM2

4.1.1 Starting the program

SM2 is called with the following BS2000 command :

START-SM2

Format

START-SM2
<pre>VERSION = *STD / <product-version mandatory-man-corr> / <product-version mandatory-man-without-corr> / <product-version without-man-corr> ,MONJV = *NONE / <filename 1..54 without-gen-vers> ,CPU-LIMIT = *JOB-REST / <integer 1..32767></pre>

Operands

VERSION =

Specifies the version of SM2 to be called.

VERSION = *STD

The current version is called.

VERSION = <product-version>

The specified version is called.

MONJV =

Specifies the name of the job variable to be monitored in the SM2 run. The job variable must already be cataloged.

MONJV = *NONE

No job variable is specified.

MONJV = <filename 1..54 without-gen-vers>

Specifies the name of a job variable already cataloged.

CPU-LIMIT =

Specifies the CPU time required for the SM2 run. In interactive mode, the user is notified by the system if this time is exceeded. In batch mode, the SM2 run is terminated.

CPU-LIMIT = *JOB-REST

There is no limit on the CPU time available to the program.

CPU-LIMIT = <integer 1..32767>

Specifies the CPU time required for the SM2 run.

4.1.2 Terminating the program

SM2 is terminated using the END statement.

- The automatic output mode is terminated with the BREAK function. The END statement is entered after returning to program mode (using /INFORM-PROGRAM).
- In controlled mode, END can be entered instead of an output control character just like any other output statement.

SM2 acknowledges program termination with the message

```
SM2 TERMINATED NORMALLY.
```

Note

Monitored data acquisition is never terminated by the END statement. Termination of the SM2 subsystem is only possible by explicitly issuing the command /STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2.

4.2 Overview of SM2 operation

After the program load message, SM2 prompts you to enter statements.

Each caller (privileged or nonprivileged user, see section “Users” on page 12) is initially taken to the analysis subinterval of SM2. Here the user can do the following:

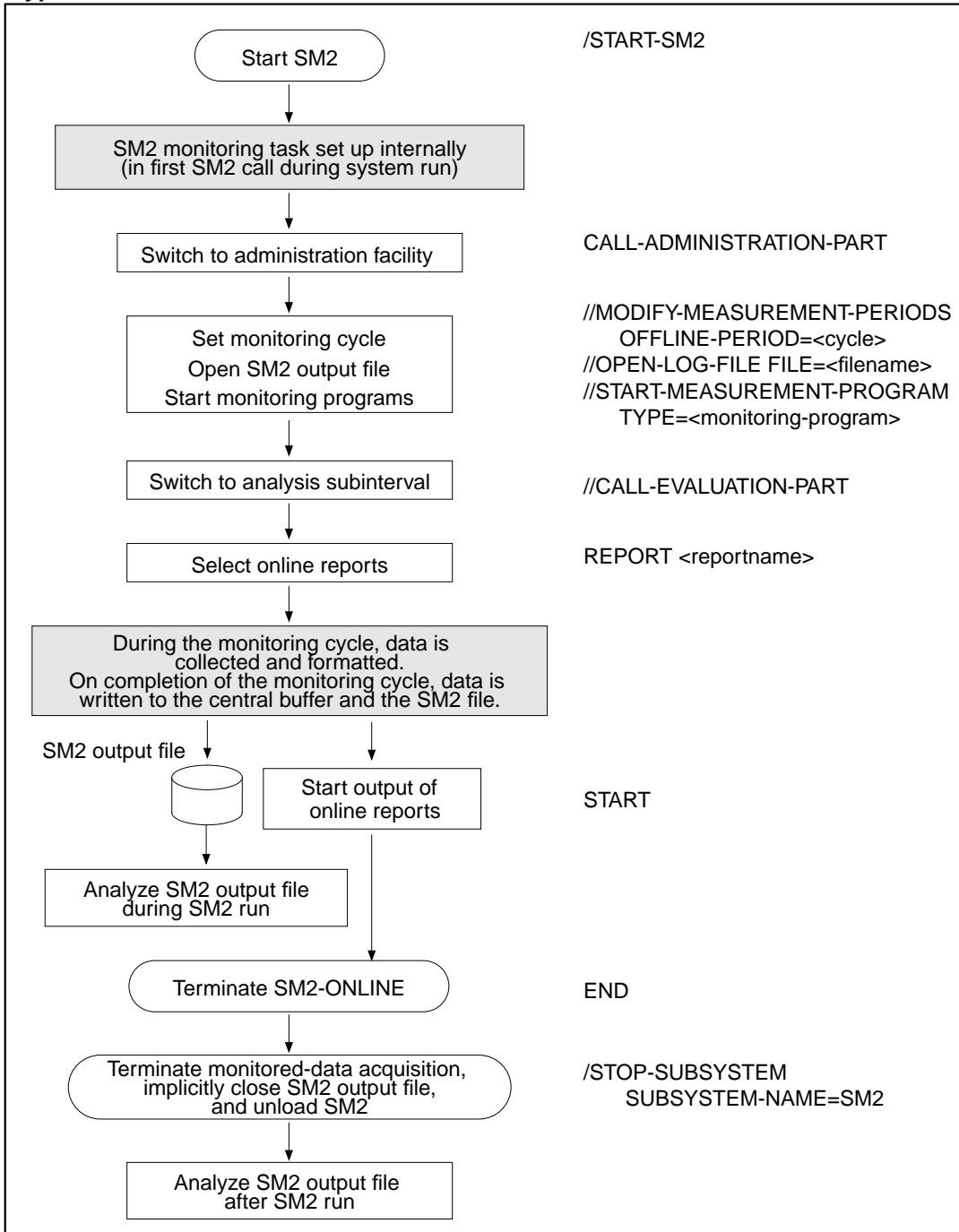
- select monitored data for output on-screen
- control screen output
- output information on the monitoring process

In addition, the privileged user (SM2 call with the system privilege SW-MONITOR-ADMINISTRATION) also has the option of using the CALL-ADMINISTRATION-PART statement to change to the administration facility. Here the SM2 administrator can perform the following administration tasks:

- define monitoring parameters
- activate/deactivate optional monitoring runs
- set up the SM2 output file
- assign privileges for nonprivileged users
- output information on the monitoring process
- specify a host for SM2 statements and reports (only applies for privileged users themselves)

In order to be able to issue the statements used to control real-time monitoring, the privileged user must switch into the analysis subinterval (using the CALL-EVALUATION-PART statement). In doing so, the privileged user defines his/her status as an SM2 administrator.

Typical SM2 run



4.3 Statements for SM2 administrators

These statements are used by SM2 administrators to control data acquisition by SM2. The statements for assigning authorizations to nonprivileged users and for admitting other SM2 administrators are only available to the SM2 primary administrator

Statements for switching between the analysis subinterval and the administration facility

Statement	Function
CALL-ADMINISTRATION-PART	Switch from the analysis subinterval to the administration facility
CALL-EVALUATION-PART	Switch from the administration facility to the analysis subinterval

Statements for defining monitoring programs

Some monitoring programs require you to specify which objects are to be monitored and with what parameters. The ADD, REMOVE, SET and MODIFY statements are provided for this purpose.

The ADD statements each define an object to be monitored by a particular monitoring program. The REMOVE statements can be used to exclude a set of monitored objects, defined with the aid of ADD statements, from the monitoring process. The SET statements define a list of objects to be monitored or the monitoring parameters. The MODIFY statements can be used to modify the default values. The objects to be monitored or the monitoring parameters defined using the statements listed above can be output using the SHOW-DEFINED-PARAMETER statement. Monitoring of the defined objects does not begin until the monitoring programs are started (using the START-MEASUREMENT-PROGRAM statement) or restarted (using CHANGE-MEASUREMENT-PROGRAM). The monitoring program definitions become active and can be output using the SHOW-ACTIVE-PARAMETER statement.

Statement	Function
ADD-BCAM-CONNECTION-SET	Add a connection set for BCAM-CONNECTION monitoring
ADD-CONNECTION-SET	Add a connection set (applications and partner systems) for RESPONSETIME monitoring
ADD-COSMOS-EVENT	Define events for monitored-data acquisition
ADD-FILE	Define a file to be monitored
ADD-ISAM-POOL	Define an ISAM pool to be monitored
MODIFY-COSMOS-PARAMETER	Modify the parameters for COSMOS monitoring
MODIFY-RESPONSETIME- PARAMETER	Modify the parameters for RESPONSETIME monitoring
REMOVE-BCAM-CONNECTION-SET	Exclude a connection set from BCAM-CONNECTION monitoring
REMOVE-CONNECTION-SET	Exclude a connection set from RESPONSETIME monitoring
REMOVE-COSMOS-EVENT	Remove events from the COSMOS monitoring parameters
REMOVE-FILE	Remove file(s) from the FILE monitoring parameters
REMOVE-ISAM-POOL	Remove ISAM pool(s) from the ISAM monitoring parameters
SET-BCAM-CONNECTION-PARAMETER	Define BCAM-CONNECTION monitoring parameters
SET-CHANNEL-IO-PARAMETER	Define CHANNEL-IO monitoring parameters
SET-COSMOS-PARAMETER	Define COSMOS monitoring parameters
SET-DISK-PARAMETER	Define DISK monitoring parameters
SET-DISK-FILE-PARAMETER	Define DISK-FILE monitoring parameters
SET-PERIODIC-TASK-PARAMETER	Define PERIODIC-TASK monitoring parameters
SET-RESPONSETIME-PARAMETER	Define RESPONSETIME monitoring parameters
SET-SERVICETIME-PARAMETER	Define SERVICETIME monitoring parameters
SET-SYSSSTAT-PARAMETER	Define SYSSSTAT monitoring parameters
SET-TASK-PARAMETER	Define TASK monitoring parameters

Statements for preparing, starting, and stopping monitoring programs

Once you have defined the objects to be monitored, the monitoring program run can be started. Certain preparations are recommended for the COSMOS monitoring program to ensure that it starts quickly and without errors. After defining new monitored objects/monitoring parameters, the monitoring program run must be stopped and then started again in order to actually add the newly defined objects and parameters to the monitoring program. The INITIATE, START, CHANGE and STOP statements are used for this purpose.

Statement	Function
INITIATE-COSMOS	Prepare the COSMOS monitoring program
START-MEASUREMENT-PROGRAM	Start the monitoring program run
CHANGE-MEASUREMENT-PROGRAM	Stop the current monitoring program run and restart it with new monitored objects/monitoring parameters
STOP-MEASUREMENT-PROGRAM	Terminate the monitoring program run

The START statement is used to start the monitoring programs. The CHANGE statement is required following the redefinition of monitored objects/monitoring parameters of the monitoring program run in order to add the new objects/parameters to the monitoring program. The monitoring program run is stopped and then started with the new monitored objects/monitoring parameters. The STOP statement terminates the specified monitoring programs.

The START, CHANGE and STOP statements merely interrupt the current monitoring cycle.

Statements for opening and closing the SM2 output file and controlling monitored-data acquisition

In addition to the output of reports on the screen, monitored data can be continuously written to file. Creating the SM2 output file (OPEN-LOG-FILE) and closing it (CLOSE-LOG-FILE) is a privilege reserved for SM2 administrators. The OPEN-LOG-FILE statement can be used to modify the predefined SM2 file attributes.

The MODIFY-MEASUREMENT-PERIODS statement can be used to modify the monitoring cycles for background monitoring (collecting and writing monitored data to the SM2 output file), and to modify the screen output and the sampling cycle.

Statement	Function
OPEN-LOG-FILE	Open the SM2 output file
CLOSE-LOG-FILE	Close the SM2 output file
MODIFY-MEASUREMENT-PERIODS	Modify the SM2 monitoring cycle

Statements for assigning privileges

At the beginning of the program, the nonprivileged user is not allowed to monitor tasks, files or ISAM pools. But by using the MODIFY-USER-ADMISSION statement, the primary SM2 administrator can grant or withdraw permission for all BS2000 users to monitor tasks under their own ID, files and ISAM pools. The MODIFY-ADMINISTRATOR-ADMISSION statement allows the primary SM2 administrator to admit additional (secondary) administrators.

Statement	Function
MODIFY-USER-ADMISSION	Define authorizations for nonprivileged users
MODIFY-ADMINISTRATOR-ADMISSION	Admit additional SM2 administrators

Statements for outputting information

The SHOW statements provide information on the monitoring status, the objects, and the monitoring parameters for selected monitoring programs, as well as on the status of the SM2 system tasks.

Statement	Function
SHOW-MEASUREMENT-STATUS	Output the monitoring status
SHOW-DEFINED-PARAMETER	Output defined monitoring parameters
SHOW-ACTIVE-PARAMETER	Output active monitoring parameters
SHOW-USER-MEASURED-OBJECTS	Output monitored objects and associated users
SHOW-SM2-STATUS	Output the status of SM2 system tasks
SHOW-SELECTED-HOSTS	Output selected hosts

Statement for specifying hosts for administration statements and screen outputs

This statement is used to specify the hosts to which the SM2 administration statements apply and for which the screens are to be output.

Statement	Function
SELECT-HOSTS	Define hosts for SM2 statements and screen output

Statement for terminating the SM2 program

The END statement is used to terminate the SM2 session. However, monitoring operations which have already been initiated are not affected, i.e. they continue to run.

Statement	Function
END	Terminate the SM2 run

The following sections describe the statements for SM2 administrators in alphabetical order.

Notes

In all statements which allow you to use wildcard syntax, only the character * is supported as the last character. All other constructs possible in SDF are rejected with a error message.

The internal program name for syntax validation in SM2 statements in EDT is SM2130.

ADD-BCAM-CONNECTION-SET

Add connection set for BCAM-CONNECTION monitoring

Function

This statement is used to define a connection set which is to be added to the BCAM-CONNECTION monitoring program definition.

The following features must be specified:

- the type of connection with local and partner (connection) names
- the names of the local and partner systems
- an indication of whether the connections are local or remote

It is possible to define up to 32 connection sets.

This statement must be preceded by a SET-BCAM-CONNECTION-PARAMETER statement.

Format

ADD-BCAM-CONNECTION-SET
<pre> SET-NAME = <alphanum-name 1..16> ,CONNECTION-SELECTION = *BY-NEA-NAME(...) / *BY-PORT-NUMBER(...) *BY-NEA-NAME(...) CONNECTION-NAME = list-poss(16): *SPECIFIED(...) *SPECIFIED(...) LOCAL-APPLICATION = *ANY / <alphanum-name 1..8 with wild> ,PARTNER-APPLICATION = *ANY / <alphanum-name 1..8 with wild> *BY-PORT-NUMBER(...) PORT-NUMBER = list-poss(16): *SPECIFIED(...) *SPECIFIED(...) LOCAL-PORT-NUMBER = *ANY / <integer 1..65535> ,PARTNER-PORT-NUMBER = *ANY / <integer 1..65535> ,CONNECTION-TYPE = *REMOTE / *LOCAL / *BOTH ,HOST-SELECTION = *ANY / *SPECIFIED(...) *SPECIFIED(...) LOCAL-HOST-NAME = *LOCAL / <alphanum-name 1..8 with-wild> ,PARTNER-HOST-NAME = *ANY / <alphanum-name 1..8 with-wild> </pre>

Operands

SET-NAME = <alphanum-name 1..16>

Defines a name for the selected connection set.

CONNECTION-SELECTION =

Defines the type of connection set to be monitored.

CONNECTION-SELECTION = *BY-NEA-NAME(...)

Defines a selection of connections in accordance with the application name.

CONNECTION-NAME = list-poss(16): *SPECIFIED(...)

LOCAL-APPLICATION = *ANY / <alphanum-name 1..8 with wild>

*ANY: No special local application is selected.

<alphanum-name 1..8>: Specifies the name of the selected local application.

An asterisk (*) is also permitted as the last character in a wildcard specification.

,PARTNER-APPLICATION = *ANY / <alphanum-name 1..8 with wild>

*ANY: No special partner application is selected.

<alphanum-name 1..8>: Specifies the name of the selected partner application.

An asterisk (*) is also permitted as the last character in a wildcard specification.

CONNECTION-SELECTION = *BY-PORT-NUMBER(...)

Defines a selection of connections in accordance with the port number.

PORT-NUMBER = list-poss(16): *SPECIFIED(...)

LOCAL-PORT-NUMBER = *ANY / <integer 1..65535>

*ANY: No special local transport address is selected.

<integer 1..65535>: Local transport address.

PARTNER-PORT-NUMBER = *ANY / <integer 1..65535>

*ANY: No special partner transport address is selected.

<integer 1..65535>: Partner transport address.

CONNECTION-TYPE =

Specifies the type of connection to be taken into consideration for the connection set.

CONNECTION-TYPE = *REMOTE

Only remote connections are taken into consideration.

CONNECTION-TYPE = *LOCAL

Only local connections are taken into consideration.

CONNECTION-TYPE = *BOTH

Both local and remote connections are taken into consideration.

HOST-SELECTION =

Defines the names of the hosts between which the connections to be monitored should exist.

HOST-SELECTION = *ANY

No special host name is selected.

HOST-SELECTION = *SPECIFIED(...)**LOCAL-HOST-NAME = *LOCAL / <alphanum-name 1..8 with-wild>**

*LOCAL: The local host name should be used.

<alphanum-name 1..8>: Specifies the name of the local host. With some connections, the local processor name may differ from the host name. An asterisk (*) is also permitted as the last character in a wildcard specification.

PARTNER-HOST-NAME = *ANY / <alphanum-name 1..8 with-wild>

*ANY: No special partner host should be assumed.

<alphanum-name 1..8>: Specifies the name of the partner host. An asterisk (*) is also permitted as the last character in a wildcard specification.

ADD-CONNECTION-SET

Add connection set for RESPONSETIME monitoring

Function

This statement is used to define a connection set which is to be added to the RESPONSETIME monitoring program definition. A connection set consists of one or more (as many as five) connection groups. The connection set can be either positively defined (i.e. all groups specified in this connection set are monitored) or negatively defined (i.e. all groups except those specified in the connection set are monitored). For each connection set, a freely selectable name must be assigned; the name is the one under which this set can be addressed in the REMOVE-CONNECTION-SET statement and also addressed by SM2R1 for analysis purposes. If a connection set is defined, it is also possible to specify whether remote, local or both types of connections are to be taken into account for the set. SM2 then passes the correct parameter value to BCAM-SM2. This value then applies to this connection set only.

This statement cannot be entered until after the SET-RESPONSETIME-PARAMETER statement has been entered. The SET-RESPONSETIME-PARAMETER statement automatically defines a connection set with the name *GLOBAL in which all connections are monitored (*CONNECTION (*ALL,*ALL,*ALL)). The value CONNECTION-TYPE=*REMOTE applies for this connection set and cannot be changed.

A total of 16 connection sets (*GLOBAL inclusions) may be defined with a total of 16 different connection groups ((*ALL,*ALL,*ALL) inclusion). If this number is exceeded, the statement will be rejected and a message to this effect issued. If an attempt is made to declare more than one set under one set name, the statement will be rejected and a message will be issued.

Format

ADD-CONNECTION-SET
<pre> SET-NAME = <alphanum-name 1..16> ,SET-DEFINITION = *BY-CONNECTION / *EXCEPT-CONNECTION ,CONNECTION-SET = list-poss(5): *CONNECTION(...) *CONNECTION(...) APPLICATION = *ALL / <alphanum-name 1..8 with-wild> ,PARTNER = *ALL / <alphanum-name 1..8 with-wild> ,PROCESSOR = *ALL / <alphanum-name 1..8 with-wild> ,CONNECTION-TYPE = *REMOTE / *LOCAL / *BOTH </pre>

Operands

SET-NAME = <alphanum-name 1..16>

Defines a name for the selected connection set.

SET-DEFINITION =

Defines the connection set to be monitored.

SET-DEFINITION = *BY-CONNECTION

All connection groups defined in the connection set are monitored.

SET-DEFINITION = *EXCEPT-CONNECTION

All connection groups except those defined in the connection set are monitored.

CONNECTION-SET = list-poss(5): *CONNECTION(...)

Defines a selection of up to five connection groups.

APPLICATION = *ALL / <alphanum-name 1..8 with-wild>

*ALL: No special application is selected.

<alphanum-name 1..8>: Specifies the name of the selected application. An asterisk (*) is also permitted as the last character in a wildcard specification.

PARTNER = *ALL / <alphanum-name 1..8 with-wild>

*ALL: No special partner is selected.

<alphanum-name 1..8>: Specifies the name of the selected partner. An asterisk (*) is also permitted as the last character in a wildcard specification.

PROCESSOR = *ALL / <alphanum-name 1..8 with-wild>

*ALL: No special partner processor is selected.

<alphanum-name 1..8>: Specifies the name of the partner processor which has been selected. An asterisk (*) is also permitted as the last character in a wildcard specification.

CONNECTION-TYPE =

Specifies the type of connection to be taken into consideration for the connection set.

CONNECTION-TYPE = *REMOTE

Only remote connections are taken into consideration.

CONNECTION-TYPE = *LOCAL

Only local connections are taken into consideration.

CONNECTION-TYPE = *BOTH

Both local and remote connections are taken into consideration.

Note

No application name is defined for applications that use the SOCKETS(BS2000) or ICMX(BS2000) interface. Connections of these applications cannot be selected in SM2 using the ADD-CONNECTION-SET statement. They are contained in the *GLOBAL connection set.

ADD-COSMOS-EVENT

Define events for monitored-data acquisition

Function

This statement is used to define events which are to be added to the COSMOS monitoring program definition.

Format

ADD-COSMOS-EVENT

```
EVENT-NAME = *STANDARD-EVENTS / list-poss(67): *STANDARD-EVENTS / *ACF / *BCAM / *BCPT /
*BLS / *BOUR / *CHTM / *CMD / *CMS / *DAB / *DCAM / *DLM / *EIA / *EIA2 / *EIA3 /
*FITC / *GSAC / *HAL / *IDLE / *INTR / *IONQ / *ISEV / *ISPL / *KAI / *LOCK / *MSG / *NSM / *PAGE /
*PAM / *PCCC / *PCTC / *PDEA / *PEND / *PIO / *PMIO / *PRGS / *PRGT / *PRTY / *RELM /
*REQM / *SDV / *SLOT / *SNAP / *STD1 / *STDI / *STDN / *SVC / *TGMA / *TGMP / *TGMT /
*TINF / *TLM / *TLT / *TSKI / *TSVC / *UTM / *VMCH / *VMH / *VMI / *VMLK / *VMPD /
*VMPR / *VMS / *VM2 / *WSCT / *XEIA
```

Operands

EVENT-NAME =

Specifies the name of the events to be recorded.

EVENT-NAME = *STANDARD-EVENTS

The following events are to be recorded by default: ACF, BLS, BOUR, CHTM, CMS, DAB, EIA2, EIA3, FITC, IDLE, INTR, IONQ, PAGE, PAM, PCCC, PCTC, PEND, PMIO, PRGS, PRGT, RELM, REQM, SDV, SVC, TSKI, TSVC, WSCT.

```
EVENT-NAME = list-poss(67): *STANDARD-EVENTS / *ACF / *BCAM / *BCPT /
*BLS / *BOUR / *CHTM / *CMD / *CMS / *DAB / *DCAM / *DLM / *EIA / *EIA2 / *EIA3 /
*FITC / *GSAC / *HAL / *IDLE / *INTR / *IONQ / *ISEV / *ISPL / *KAI / *LOCK / *MSG /
*NSM / *PAGE / *PAM / *PCCC / *PCTC / *PDEA / *PEND / *PIO / *PMIO / *PRGS /
*PRGT / *PRTY / *RELM / *REQM / *SDV / *SLOT / *SNAP / *STD1 / *STDI / *STDN /
*SVC / *TGMA / *TGMP / *TGMT / *TIC / *TINF / *TLM / *TLT / *TSKI / *TSVC / *UTM /
*VMCH / *VMH / *VMI / *VMLK / *VMPD / *VMPR / *VMS / *VM2 / *WSCT / *XEIA
```

The events specified in the list are to be recorded. The mandatory events CREA, DEST, INIT, LGON, MMRC, PTSK and STAT are always recorded.

ADD-FILE

Define file to be monitored

Function

This statement is used to define a file which is to be added to the FILE monitoring program definition. This monitoring program allows you to define up to 16 files for monitoring. If this number is exceeded, the statement is rejected and a corresponding message is issued.

Format

ADD-FILE
FILE-NAME = <filename 1..54>

Operands

FILE-NAME = <filename 1..54>

Name of the file whose access values are to be monitored. The file name must be specified as a fully qualified name.

ADD-ISAM-POOL

Define ISAM pool to be monitored

Function

This statement is used to define an ISAM pool which is to be added to the ISAM monitoring program definition. This monitoring program allows you to define up to 16 ISAM pools for monitoring. If this number is exceeded, the statement is rejected and a message is issued.

Format

ADD-ISAM-POOL
<pre> POOL-NAME = <alphanum-name 1..8> ,SCOPE = *HOST-SYSTEM / *TASK(...) / *USER(...) *TASK(...) TSN = <alphanum-name 1..4> *USER(...) USER-ID = <alphanum-name 1..8> ,CAT-ID = *HOME-PVS / <catid 1..4> </pre>

Operands

POOL-NAME = <alphanum-name 1..8>

Specifies the name of the ISAM pool to be monitored.

SCOPE =

Defines the type of ISAM pool.

SCOPE = *HOST-SYSTEM

The pool here is a global ISAM pool.

SCOPE = *TASK(...)

The pool here is a task-specific ISAM pool.

TSN = <alphanum-name 1..4>

Specifies the TSN of the task under which the task-specific ISAM pool was set up.

SCOPE = *USER(...)

The pool is a user-specific ISAM pool.

USER-ID = <alphanum-name 1..8>

Specifies the user ID under which the ISAM pool was set up. This must be specified without the "\$" sign.

CAT-ID =

Specifies the catalog ID of the public volume set to which the ISAM pool has been assigned. The user ID must be specified without the "\$" sign.

CAT-ID = *HOME-PVS

The ID here is the catalog ID of the home pubset.

CAT-ID = <cat-id 1..4>

Catalog ID of the public volume set to which the ISAM pool has been assigned.

CALL-ADMINISTRATION-PART

Switch from evaluation part to administration facility

Function

This statement is used to switch from the evaluation part to the administration facility, which provides an SDF statement interface.

To switch back to the analysis subinterval, use the CALL-EVALUATION-PART command.

Format

CALL-ADMINISTRATION-PART

CALL-EVALUATION-PART

Switch from administration facility to evaluation part

Function

This statement is used to switch from the administration facility to the evaluation part, i.e. after this statement is entered all statements required for online analysis can be entered. To switch back to SDF statement mode for administration purposes, use the CALL-ADMINISTRATION-PART command.

Format

CALL-EVALUATION-PART

CHANGE-MEASUREMENT-PROGRAM

Stop current monitoring program run and restart it with new monitored objects

Function

This statement is used to stop the current monitoring program run and restart it using newly defined monitored objects/monitoring parameters. The current monitoring cycle is interrupted.

Format

CHANGE-MEASUREMENT-PROGRAM
TYPE = list-poss(12): *BCAM-CONNECTION / *CHANNEL-IO / *COSMOS / *DISK / *DISK-FILE / *FILE / *ISAM / *PERIODIC-TASK / *RESPONSETIME / *SERVICETIME / *SYSSTAT / *TASK

Operands

TYPE =

Specifies the type of monitoring program (the descriptions below are in alphabetical order) to be restarted using the modified monitored objects/monitoring parameters.

TYPE = *BCAM-CONNECTION

The BCAM-CONNECTION monitoring program is restarted with new monitoring parameters or connection sets.

TYPE = *CHANNEL-IO

The CHANNEL-IO monitoring program is restarted with a new range of channels.

TYPE = *COSMOS

The COSMOS monitoring program is restarted with a new scope.

TYPE = *DISK

The DISK monitoring program is restarted with a new range of disks.

TYPE = *DISK-FILE

The DISK-FILE monitoring program is restarted with a new range of disks.

TYPE = *FILE

The FILE monitoring program is restarted with a new range of files.

TYPE = *ISAM

The ISAM monitoring program is restarted with a new range of ISAM pools.

TYPE = *PERIODIC-TASK

The PERIODIC-TASK monitoring program is restarted with a new range of tasks.

TYPE = *RESPONSETIME

The RESPONSETIME monitoring program is restarted with a new set of parameters or a new range of connection sets.

TYPE = *SERVICETIME

The SERVICETIME monitoring program is restarted with a new range of devices.

TYPE = *SYSSTAT

The SYSSTAT monitoring program is restarted with a new range of devices.

TYPE = *TASK

The TASK monitoring program is restarted with a new set of TSNs or a new range of devices.

Note

Even if errors are detected when processing the CHANGE statement before the monitoring programs are stopped, the monitoring programs continue to execute. If, after stopping the program, errors are detected when restarting the monitoring programs, the monitoring programs specified in the statement will still be stopped.

CLOSE-LOG-FILE

Close SM2 output file

Function

This statement is used to close an SM2 output file. The current monitoring cycle is interrupted.

Format

CLOSE-LOG-FILE

Note:

When the SM2 output file is closed, all monitoring programs are stopped and the monitored data is written exclusively to the SM2 output file (see table “Overview of the SM2 monitoring programs” on page 34).

END

Terminate SM2 run

Function

This statement is used to terminate SM2 administration. All current measurements are continued using the currently defined monitoring parameters. This is also the case if no further user is working with SM2. The only way to terminate SM2 along with the privileged system tasks is to issue the DSSM command `/STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2`.

Format

END

INITIATE-COSMOS

Prepare COSMOS monitoring program

Function

The COSMOS monitoring program is fully initiated (prepared), but no events are recorded yet - not even mandatory events. This statement is used to ensure to a large extent that the COSMOS monitoring program subsequently starts without errors and quickly (without mount messages).

Format

INITIATE-COSMOS

MODIFY-ADMINISTRATOR-ADMISSION

Admit additional SM2 administrators

Function

This statement is used by the SM2 primary administrator to admit additional secondary administrators.

Format

MODIFY-ADMINISTRATOR-ADMISSION
CONCURRENCY = * <u>NO</u> / *YES

Operands

CONCURRENCY =

Specifies whether additional SM2 administrators are to be admitted.

CONCURRENCY = *NO

No additional SM2 administrators are to be admitted.

CONCURRENCY = *YES

Additional administrators are admitted. These administrators are allowed to execute all SM2 statements with the exception of MODIFY-ADMINISTRATOR-ADMISSION and MODIFY-USER-ADMISSION.

MODIFY-COSMOS-PARAMETER

Modify parameters for COSMOS monitoring

Function

This statement is used to modify the COSMOS monitoring program definition. It is useful when the SHOW-DEFINED-PARAMETER statement finds parameters that have to be modified.

Format

(part 1 of 2)

MODIFY-COSMOS-PARAMETER

```
TITLE = *UNCHANGED / <c-string 1..80>
,BUFFER-SIZE = *UNCHANGED / <integer 1..7>
,NUMBER-OF-BUFFERS = *UNCHANGED / <integer 2..128>
,ADDITIONAL-INFO = *UNCHANGED / *NONE / list-poss(2): *CONFIGURATION / *VM2000(...)
    *VM2000(...)
        | FILE-NAME = <filename 1..54 without-gen-vers>
,OUTPUT = *UNCHANGED / *DISK(...) / *WRAP-AROUND(...) / *TAPE(...) / *STREAM-TAPE(...)
    *DISK(...)
        | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
    *WRAP-AROUND(...)
        | FILE-NAME = <filename 1..54 without-gen-vers>
    *TAPE(...)
        | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
    *STREAM-TAPE(...)
        | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
```

Continued →

```
,TASK-SELECTION = *UNCHANGED / *ALL / *SPECIFIED(...)
    *SPECIFIED(...)
        ,JOB-NAME = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
        ,CATEGORY = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..7 with-wild>
        ,USER-ID = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
        ,TSN = *NOT-SPECIFIED / list-poss(16): <alphanum-name 1..4 with-wild>
        ,TYPE = *NOT-SPECIFIED / list-poss(4): *SYSTEM / *DIALOG / *BATCH / *TP
,EVENT-SELECTION = *UNCHANGED / *ALL-BY-ADD-COSMOS-EVENT / *SPECIFIED(...)
    *SPECIFIED(...)
        EIA-INTERRUPT-CLASS = *UNCHANGED / *ANY / list-poss(5): *SVC / *PROGRAM /
            *MACHINE-CHECK / *IO / *EXTERNAL
        ,EIA-SVC-NUMBER = *UNCHANGED / *ANY / list-poss(8): <integer 1..255>
        ,IO-DEVICE = *UNCHANGED / *ANY / list-poss(8): <alphanum-name 2..4>
        ,DAB-CACHE-ID = *UNCHANGED / *ANY / list-poss(8): <alphanum-name 1..32>
        ,MEMORY-CLASS = *UNCHANGED / *ANY / list-poss(4): *3 / *4 / *5 / *6
        ,SLOT-MEMORY-CLASS = *UNCHANGED / *ANY / list-poss(4): *3 / *4 / *5 / *6
        ,PEND-CODE = *UNCHANGED / *ANY / list-poss(16): <integer 1..22>
        ,LOCK-ID = *UNCHANGED / *ANY / list-poss(4): <alphanum-name 1..2>
        ,TLT-DESCRIPTOR = *UNCHANGED / *ANY / list-poss(8): <alphanum-name 1..3>
        ,TSKI-SWITCH = *UNCHANGED / *ANY / *TASK
        ,TSVC-SVC-NUMBER = *UNCHANGED / *ANY / list-poss(8): <integer 1..255>
,UNLOAD = *UNCHANGED / *AT-MEASUREMENT-PROGRAM-STOP / *AT-SM2-STOP
,MEASUREMENT-TIME = *UNCHANGED / *NOT-SPECIFIED / <integer 1..60>
```

Operands

TITLE =

Specifies the title of the COSMOS monitoring process.

TITLE = *UNCHANGED

The currently specified title is not changed.

TITLE = <c-string 1..80>

The specified title is assigned.

BUFFER-SIZE =

Specifies the number of 4K pages per buffer.

BUFFER-SIZE = *UNCHANGED

The currently specified number of pages per buffer is not changed.

BUFFER-SIZE = <integer 1..7>

Buffers of the specified size (number of pages) are created.

NUMBER-OF-BUFFERS =

Specifies the number of buffers.

NUMBER-OF-BUFFERS = *UNCHANGED

The currently specified number of buffers is not changed.

NUMBER-OF-BUFFERS = <integer 2..128>

COSMOS creates the specified number of buffers for writing events.

ADDITIONAL-INFO =

Specifies additional data to be recorded.

ADDITIONAL-INFO = *UNCHANGED

The existing data specified for ADDITIONAL-INFO is not changed.

ADDITIONAL-INFO = *NONE

No additional data is recorded.

ADDITIONAL-INFO = *CONFIGURATION

The configuration at the start of monitoring is also recorded.

ADDITIONAL-INFO = *VM2000(...)

The VM2000 events are also recorded. For this purpose, they must be explicitly opened (ADD-COSMOS-EVENT statement).

FILE-NAME = <filename 1..54 without-gen-vers>

Specifies the name of the file to which the VM2000 events are written.

OUTPUT =

Specifies how the COSMOS output files are written.

OUTPUT = *UNCHANGED

The currently specified value for OUTPUT is not changed.

OUTPUT = *DISK(...)

The COSMOS monitoring data is written sequentially to the files on hard disk; i.e. there is a write task for each output file. If a monitoring data buffer is full, a write task is activated that writes the buffer to the corresponding file.

FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>

Specifies the file(s) to which the COSMOS monitored data is written.

OUTPUT = *WRAP-AROUND(...)

COSMOS monitored data is written to a file on disk. If the disk space allocated (PRIMARY-ALLOCATION) is insufficient, the file is overwritten from the top. The secondary allocation (SECONDARY-ALLOCATION) must be set to zero.

FILE-NAME = <filename 1..54 without-gen-vers>

Specifies the file to which COSMOS monitored data is written.

OUTPUT = *TAPE(...)

The COSMOS monitored data is written sequentially to the files on tape (works as described for OUTPUT=*DISK).

FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>

Specifies the file(s) to which COSMOS monitored data is written.

OUTPUT = *STREAM-TAPE(...)

The COSMOS output files are written in streaming mode. This reduces the chances of events not being recorded, because the files are written to the tape continuously without any repositioning of the tape.

FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>

Specifies the file(s) to which COSMOS monitored data is written.

TASK-SELECTION =

Specifies the tasks to be monitored.

TASK-SELECTION = *UNCHANGED

The current selection of tasks to be monitored is not changed.

TASK-SELECTION = *ALL

All tasks are monitored.

TASK-SELECTION = *SPECIFIED(...)

Specifies the tasks to be monitored by means of their TSN, user ID, job name, category or type.

JOB-NAME =

The tasks are selected by means of their job name. An asterisk (*) is also permitted as the last character in a wildcard specification.

JOB-NAME = *NOT-SPECIFIED

No tasks are selected by means of their job name.

JOB-NAME = list-poss(8): <alphanum-name 1..8 with-wild>

Specifies the job names of the tasks to be monitored.

CATEGORY =

The tasks are selected by means of their category. An asterisk (*) is also permitted as the last character in a wildcard specification.

CATEGORY = *NOT-SPECIFIED

No tasks are selected by means of their category.

CATEGORY = list-poss(8): <alphanum-name 1..7 with-wild>

Specifies the categories of the tasks to be monitored.

USER-ID =

The tasks are selected by means of their user ID.

USER-ID = *NOT-SPECIFIED

No tasks are selected by means of their user ID.

USER-ID = list-poss(8): <alphanum-name 1..8 with-wild>

Specifies the user IDs of the tasks to be monitored. These must be specified without the "\$" sign. An asterisk (*) is also permitted as the last character in a wildcard specification.

TSN =

The tasks are selected by means of their TSN. An asterisk (*) is also permitted as the last character in a wildcard specification.

TSN = *NOT-SPECIFIED

No tasks are selected by means of their TSN.

TSN = list-poss(16): <alphanum-name 1..4 with-wild>

Specifies the TSNs of the tasks to be monitored.

TYPE =

The tasks are selected by means of their type. An asterisk (*) is also permitted as the last character in a wildcard specification.

TYPE = *NOT-SPECIFIED

No tasks are selected by means of their type.

TYPE = *SYSTEM

All system tasks are to be monitored.

TYPE = *DIALOG

All interactive tasks are to be monitored.

TYPE = *BATCH

All batch tasks are to be monitored.

TYPE = *TP

All TP tasks are to be monitored.

EVENT-SELECTION =

Specifies the events to be recorded. Their recording is linked to specific conditions.

EVENT-SELECTION = *UNCHANGED

The existing values for EVENT-SELECTION are not changed.

EVENT-SELECTION = *ALL-BY-ADD-COSMOS-EVENT

All open events are recorded.

EVENT-SELECTION = *SPECIFIED(...)

Only those events that satisfy the specified conditions are recorded.

EIA-INTERRUPT-CLASS =

Controls the recording of EIA events on the basis of their interrupt class (IC).

EIA-INTERRUPT-CLASS = *UNCHANGED

The currently specified ICs are not changed.

EIA-INTERRUPT-CLASS = *ANY

The recording of EIA events is independent of their IC.

EIA-INTERRUPT-CLASS = list-poss(5): *SVC / *PROGRAM / *MACHINE-CHECK / *IO / *EXTERNAL

Only those EIA events with the specified IC are recorded.

EIA-SVC-NUMBER =

Controls the recording of EIA events on the basis of their SVC.

EIA-SVC-NUMBER = *UNCHANGED

The currently specified SVCs are not changed.

EIA-SVC-NUMBER = *ANY

The recording of EIA events is independent of their SVC.

EIA-SVC-NUMBER = list-poss(8): <integer 1..255>

Only those EIA events with the specified SVC(s) are recorded.

IO-DEVICE =

Controls the recording of SDV, CHTM, IONQ and PMIO events on the basis of their mnemonic device name.

IO-DEVICE = *UNCHANGED

The currently specified mnemonic device names are not changed.

IO-DEVICE = *ANY

The recording of SDV, CHTM, IONQ and PMIO events is independent of their mnemonic device name.

IO-DEVICE = list-poss(8): <alphanum-name 2..4>

Only those SDV, CHTM, IONQ and PMIO events with the specified mnemonic device names are recorded.

DAB-CACHE-ID =

Controls the recording of DAB events on the basis of their DAB cache IDs.

DAB-CACHE-ID = *UNCHANGED

The currently specified DAB cache IDs are not changed.

DAB-CACHE-ID = *ANY

The recording of DAB events is independent of their DAB cache IDs.

DAB-CACHE-ID = list-poss(8): <alphanum-name 1..32>

Only those DAB events with the specified DAB cache IDs are recorded.

MEMORY-CLASS =

Controls the recording of RELM and REQM events on the basis of their memory class.

MEMORY-CLASS = *UNCHANGED

The currently specified memory classes for RELM and REQM events are not changed.

MEMORY-CLASS = *ANY

The recording of RELM and REQM events is independent of their memory class.

MEMORY-CLASS = list-poss(4): *3 / *4 / *5 / *6

Only those RELM and REQM events with the specified memory classes are recorded.

SLOT-MEMORY-CLASS =

Controls the recording of SLOT events on the basis of their memory class.

SLOT-MEMORY-CLASS = *UNCHANGED

The currently specified memory classes for SLOT events are not changed.

SLOT-MEMORY-CLASS = *ANY

The recording of SLOT events is independent of their memory class.

SLOT-MEMORY-CLASS = list-poss(4): *3 / *4 / *5 / *6

Only those SLOT events with the specified memory classes are recorded.

PEND-CODE =

Controls the recording of PEND events on the basis of their pend code.

PEND-CODE = *UNCHANGED

The currently specified pend codes are not changed.

PEND-CODE = *ANY

The recording of PEND events is independent of their pend code.

PEND-CODE = list-poss(16): <integer 1..22>

Only those PEND events with the specified pend code are recorded.

LOCK-ID =

Controls the recording of LOCK events on the basis of their lock ID.

LOCK-ID = *UNCHANGED

The currently specified lock IDs are not changed.

LOCK-ID = *ANY

The recording of LOCK events is independent of their lock ID.

LOCK-ID = list-poss(4): <alphanum-name 1..2>

Only those LOCK events with the specified lock IDs are recorded.

TLT-DESCRIPTOR =

Controls the recording of TLT on the basis of their TLT descriptor (TLT = Task Location Table).

TLT-DESCRIPTOR = *UNCHANGED

The currently specified values for the TLT descriptor are not changed.

TLT-DESCRIPTOR = *ANY

The recording of TLT events is independent of their TLT descriptor.

TLT-DESCRIPTOR = list-poss(8): <alphanum-name 1..3>

Only those TLT events with the specified TLT descriptors are recorded.

TSKI-SWITCH =

Controls the recording of TSKI events on the basis of their TIC (Task in Control).

TSKI-SWITCH = *UNCHANGED

The currently specified value for TSKI-SWITCH is not changed.

TSKI-SWITCH = *ANY

The recording of TSKI events is independent of their TIC.

TSKI-SWITCH = *TASK

Only the first TSKI event of a TIC is recorded.

TSVC-SVC-NUMBER =

Controls the recording of TSVC events on the basis of their SVC numbers.

TSVC-SVC-NUMBER = *UNCHANGED

The currently specified SVC numbers are not changed.

TSVC-SVC-NUMBER = *ANY

The recording of TSVC events is independent of their SVC number.

TSVC-SVC-NUMBER = list-poss(8): <integer 1..255>

The TSVC events are recorded for the specified SVC numbers.

UNLOAD =

Specifies the time at which the COSMOS subsystem is to be unloaded.

UNLOAD = *UNCHANGED

The currently specified value is not changed.

UNLOAD = *AT-MEASUREMENT-PROGRAM-STOP

The COSMOS subsystem is unloaded at the end of COSMOS monitoring.

UNLOAD = *AT-SM2-STOP

The COSMOS subsystem is unloaded at the end of SM2 monitoring.

MEASUREMENT-TIME =

Specifies the duration of the monitoring process.

MEASUREMENT-TIME = *UNCHANGED

The currently specified duration is not changed.

MEASUREMENT-TIME = *NOT-SPECIFIED

Monitoring is terminated by the user with the STOP-MEASUREMENT-PROGRAM statement.

MEASUREMENT-TIME = <integer 1..60>

Specifies the time in minutes after which monitoring is to be terminated automatically.

MODIFY-MEASUREMENT-PERIODS

Modify SM2 monitoring cycle

Function

This statement is used to modify the SM2 time periods which control the cyclical acquisition of SM2 monitored data.

Format

MODIFY-MEASUREMENT-PERIODS

```
OFFLINE-PERIOD = *UNCHANGED / <integer 10..3600>
,ONLINE-PERIOD = *UNCHANGED / *SAME-AS-OFFLINE / <integer 10..3600>
,SAMPLING-PERIOD = *UNCHANGED / <integer 200..10000>
```

Operands

OFFLINE-PERIOD =

Specifies the SM2 monitoring cycle during which monitored data is collected and written to a file.

OFFLINE-PERIOD = *UNCHANGED

The monitoring cycle defined here remains unchanged. At the time the program started this value was defined as 150 seconds.

OFFLINE-PERIOD = <integer 10..3600>

Defines the SM2 monitoring cycle in seconds.

ONLINE-PERIOD =

Specifies the SM2 monitoring cycle during which the monitored data is collected for screen output and then displayed. The cycle of the background monitoring operations (namely gathering and writing the monitored data to the SM2 output file) is not changed.

ONLINE-PERIOD = *UNCHANGED

The online cycle remains unchanged. At program start time, this value is set to *SAME-AS-OFFLINE, i.e. no separate online cycle is defined.

ONLINE-PERIOD = *SAME-AS-OFFLINE

The online cycle is the same as for background monitoring. This setting is the optimum setting for internal management of data. If the online cycle is not required for a longer period of time, this offline setting is selected.

ONLINE-PERIOD = <integer 10..3600>

Defines an online cycle in seconds.

Note

If the same value is selected for OFFLINE-PERIOD and ONLINE-PERIOD, this is not the equivalent of "ONLINE-PERIOD = *SAME-AS-OFFLINE". What it does mean is that internally separate buffers are maintained and provided with data. For reasons relating to the system load, such a parameter setting should be avoided.

SAMPLING-PERIOD =

Changes the sampling cycle during which samples are taken of some of the SM2 monitored variables.

SAMPLING-PERIOD = *UNCHANGED

The sampling cycle remains unchanged. At program start time, this value is set to 800 milliseconds.

SAMPLING-PERIOD = <integer 200..10000>

Defines a sampling cycle in milliseconds. Values which are entered are rounded down to multiples of 100 (milliseconds).

MODIFY-RESPONSETIME-PARAMETER

Modify parameters for RESPONSETIME monitoring

Function

This statement is used to modify the RESPONSETIME monitoring program definition.

Format

MODIFY-RESPONSETIME-PARAMETER

```
SCOPE = *UNCHANGED / list-poss(2): *BUCKET / *CATEGORY
,DEFINITION = *UNCHANGED / *1 / *2
,CONNECTION-NUMBER = *UNCHANGED / <integer 1..8187>
,RESPONSETIME-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
,THINKTIME-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
,TRANSACTION-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
,WAITTIME-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
```

Operands

SCOPE =

Defines whether recording of the response time data is to be bucket-specific or category-specific.

SCOPE = *UNCHANGED

The scope defined by this time will not be changed.

SCOPE = *BUCKET

The response time data is to be recorded based on buckets.

SCOPE = *CATEGORY

The response time data is to be recorded based on categories.

DEFINITION =

Defines the type of response time to be monitored.

DEFINITION = *UNCHANGED

The type of response time defined by this time will not be changed.

DEFINITION = *1

The response time valid is the period between user input and the first relevant output.

DEFINITION = *2

In addition to the response time defined by the value 1, the periods between output following any entry are output individually as response times.

CONNECTION-NUMBER =

Specifies the maximum number of connections to be monitored.

CONNECTION-NUMBER = *UNCHANGED

The number of connections defined at this time for response time statistics remains unchanged.

CONNECTION-NUMBER = <integer 1..8187>

The specified maximum number of connections is recorded.

RESPONSETIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100 ms) in which the response times are to be stored by order of magnitude.

RESPONSE-BUCKETS = *UNCHANGED

The currently defined upper limits of the ranges for response times are not changed.

RESPONSE-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for responses time to 5, 10, 20, 50 and 100.

RESPONSE-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for response times. These must be specified in ascending order.

THINKTIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the think times are to be stored by order of magnitude.

THINKTIME-BUCKETS = *UNCHANGED

The currently defined upper limits of the ranges for think times are not changed.

THINKTIME-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for think times to 50, 150, 300, 600 and 1200.

THINKTIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for think times. These must be specified in ascending order.

TRANSACTTIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the transaction times are to be stored by order of magnitude.

TRANSACTTIME-BUCKETS = *UNCHANGED

The currently defined upper limits of the ranges for transaction times are not changed.

TRANSACTTIME-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for transaction times to 5, 10, 20, 50 and 100.

TRANSACTTIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for transaction times. These must be specified in ascending order.

WAITTIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the wait times in the BCAM pool are to be stored by order of magnitude.

WAITTIME-BUCKETS = *UNCHANGED

The currently defined upper limits of the ranges for wait times in the BCAM pool are not changed.

WAITTIME-BUCKETS =*STD-LIMITS

Sets the upper limits of the ranges for wait times in the BCAM pool to 1, 2, 5, 10 and 20.

WAITTIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for wait times in the BCAM pool. These must be specified in ascending order.

MODIFY-USER-ADMISSION

Define authorizations for nonprivileged users

Function

This statement is used by the primary SM2 administrator to specify which users are permitted to execute user-specific monitoring programs.

Format

MODIFY-USER-ADMISSION
<pre> TASK = *UNCHANGED / *ALLOW(...) / *INHIBIT *ALLOW(...) USER-ID = *ALL / list-poss(16): <alphanum-name 1..8> ,FILE = *UNCHANGED / *ALLOW(...) / *INHIBIT *ALLOW(...) USER-ID = *ALL / list-poss(16): <alphanum-name 1..8> ,ISAM = *UNCHANGED / *ALLOW(...) / *INHIBIT *ALLOW(...) USER-ID = *ALL / list-poss(16): <alphanum-name 1..8> </pre>

Operands

TASK =

Authorization for user-specific task monitoring is defined.

TASK = *UNCHANGED

The authorization for task monitoring defined at this point in time remains unchanged. At program start time, user-specific task monitoring is not permitted.

TASK = *ALLOW(...)

User-specific task monitoring is permitted. The BS2000 commands /START-TASK-MEASUREMENT and /STOP-TASK-MEASUREMENT are used to activate or deactivate task monitoring.

USER-ID =

Specifies the users for whom task monitoring is permitted. An asterisk (*) is also permitted as the last character in a wildcard specification.

USER-ID = *ALL

Task monitoring is permitted for all BS2000 users.

USER-ID = list-poss(16): <alphanum-name 1..8>

Task monitoring is permitted for users under the specified user IDs. These must be specified without the "\$" sign.

TASK = *INHIBIT

User-specific task monitoring using the BS2000 commands /START- and /STOP-TASK-MEASUREMENT is prohibited. All currently active task monitoring operations are terminated.

FILE =

Authorization for file monitoring by nonprivileged users is defined.

FILE = *UNCHANGED

The authorization for file monitoring defined at this point in time remains unchanged. At program start time, file monitoring by the nonprivileged user is not permitted.

FILE = *ALLOW(...)

File monitoring is permitted for nonprivileged users. The SM2 FILE statement is used to activate a file to be monitored.

USER-ID =

Specifies the users for whom file monitoring is permitted.

USER-ID = *ALL

File monitoring is permitted for all BS2000 users.

USER-ID = list-poss(16): <alphanum-name 1..8>

File monitoring is permitted for users under the specified user IDs. These must be specified without the "\$" sign.

FILE = *INHIBIT

File monitoring is prohibited for nonprivileged users.

ISAM =

Authorization for monitoring ISAM pools by nonprivileged users is specified.

ISAM = *UNCHANGED

The authorization for monitoring ISAM pools defined at this point in time remains unchanged. At program start time, monitoring of ISAM pools by a nonprivileged user is not permitted.

ISAM = *ALLOW(...)

Monitoring of ISAM pools is permitted for nonprivileged users.

USER-ID =

Specifies the users for whom the monitoring of ISAM pools is permitted.

USER-ID = *ALL

Monitoring of ISAM pools is permitted for all BS2000 users.

USER-ID = list-poss(16): <alphanum-name 1..8>

Monitoring of ISAM pools is permitted for users under the specified user IDs. These must be specified without the "\$" sign.

ISAM = *INHIBIT

Monitoring of ISAM pools by means of the START-ISAM-STATISTICS or STOP-ISAM-STATISTICS statement is prohibited. All ISAM pool monitoring operations currently in progress for nonprivileged SM2 users are terminated.

Notes

- The restriction regarding the maximum number of objects to be monitored is not changed.
- If the *INHIBIT parameter is specified to withdraw execution permission from all users, any objects monitored by a user are automatically deactivated for monitoring purposes. If the list of user IDs is updated (*ALLOW(USER-ID=...)), users who had previously started a monitoring operation can complete this operation, i.e. monitoring is not deactivated automatically.

OPEN-LOG-FILE

Open SM2 output file

Function

This statement is used to open an SM2 output file. The current monitoring cycle is interrupted.

Format

OPEN-LOG-FILE

```
FILE = *STD / *BY-LINK-NAME  
,BUFFER-OUTPUT = *NORMAL / *IMMEDIATE
```

Operands

FILE =

An SM2 output file is opened; it includes the options listed below. If any other SM2 output file has already been opened at this point in time, it will be closed immediately.

FILE = *STD

A SAM file with the name SM2.hostname.yyyy-mm-dd.sss.nn is opened, where hostname stands for the name of the system as it appears on the screens, yyyy.mm.dd for the day and the point in time the file was created, sss for the number of the BS2000 session and nn for the current number of the SM2 output file within this session (counting from 1). The file is created under the ID from which the OPEN statement was issued. For information on the file attributes, see section "Writing to the SM2 output file" on page 195.

FILE = *BY-LINK-NAME

Opens a SAM or PAM file with the name and file attributes previously defined in a ADD-FILE-LINK command. The link name SMLINK is to be used.

BUFFER-OUTPUT =

Defines file output.

BUFFER-OUTPUT = *NORMAL

A buffer, when full, is always written to a file.

BUFFER-OUTPUT = *IMMEDIATE

At the end of each monitoring cycle, a record for identifying the end of the cycle is written, after which the output buffer is output immediately. Even buffers which are not completely filled with data are output. This could lead to block corruption. Consequently, a file generated in this way should not be processed using SM2U1; the sections of the block not filled with data are removed in this case. This method of file output should be employed when using SM2R1-PC and SM2ONLINE-PC V1.0, but it is no longer required for SM2ONLINE-PC V2.0 or later.

REMOVE-BCAM-CONNECTION-SET

Exclude connection set(s) from BCAM-CONNECTION monitoring

Function

This statement is used to define the connection set(s) to be removed from the BCAM-CONNECTION monitoring program definition.

Format

REMOVE-BCAM-CONNECTION-SET
SET-NAME = <u>*ALL</u> / <alphanum-name 1..16>

Operands

SET-NAME =

Specifies the name of the connection set to be removed from the monitoring program definition.

SET-NAME = *ALL

All connection sets previously included in the monitoring process are now to be excluded.

SET-NAME = <alphanum-name 1..16>

Name of the connection set to be excluded from the monitoring process.

REMOVE-CONNECTION-SET

Exclude connection set(s) from RESPONSETIME monitoring

Function

This statement is used to define the connection set(s) to be removed from the RESPONSETIME monitoring program definition. The connection set *GLOBAL (see also ADD-CONNECTION-SET) cannot be removed.

Format

REMOVE-CONNECTION-SET
SET-NAME = <u>*ALL</u> / <alphanum-name 1..16>

Operands

SET-NAME =

SET-NAME = *ALL

All connection sets (apart from *GLOBAL) previously included in the monitoring process are now to be excluded.

SET-NAME = <alphanum-name 1..16>

Name of the connection set to be excluded from the monitoring process.

REMOVE-COSMOS-EVENT

Remove events from COSMOS monitoring parameters

Function

This statement is used to define events which are to be removed from the COSMOS monitoring program definition.

Format

REMOVE-COSMOS-EVENT

```
EVENT-NAME = *STANDARD-EVENTS / *ALL / list-poss(67): *STANDARD-EVENTS / *ACF / *BCAM /
*BCPT / *BLS / *BOUR / *CHTM / *CMD / *CMS / *DAB / *DCAM / *DLM / *EIA / *EIA2 /
*EIA3 / *FITC / *GSAC / *HAL / *IDLE / *INTR / *IONQ / *ISEV / *ISPL / *KAI / *LOCK / *MSG / *NSM /
*PAGE / *PAM / *PCCC / *PCTC / *PDEA / *PEND / *PIO / *PMIO / *PRGS / *PRGT /
*PRTY / *RELM / *REQM / *SDV / *SLOT / *SNAP / *STD1 / *STD1 / *STDN / *SVC /
*TGMA / *TGMP / *TGMT / *TIC / *TINF / *TLM / *TLM / *TLT / *TSKI / *TSVC / *UTM / *VMCH / *VMH /
*VMI / *VMLK / *VMPD / *VMPR / *VMS / *VM2 / *WSCT / *XEIA
```

Operands

EVENT-NAME =

Specifies the names of the events to be removed from the monitoring program definition.

EVENT-NAME = *STANDARD-EVENTS

The following standard events are to be removed from the monitoring program definition: ACF, BLS, BOUR, CHTM, CMS, DAB, EIA2, EIA3, FITC, IDLE, INTR, IONQ, PAGE, PAM, PCCC, PCTC, PEND, PMIO, PRGS, PRGT, RELM, REQM, SDV, SVC, TSKI, TSVC, WSCT.

EVENT-NAME = *ALL

All events - except the mandatory events CREA, DEST, INIT, LGON, MMRC, PTKS and STAT - are removed from the monitoring program definition.

EVENT-NAME = list-poss(67): *STANDARD-EVENTS / *ACF / *BCAM / *BCPT / *BLS / *BOUR / *CHTM / *CMD / *CMS / *DAB / *DCAM / *DLM / *EIA / *EIA2 / *EIA3 / *FITC / *GSAC / *HAL / *IDLE / *INTR / *IONQ / *ISEV / *ISPL / *KAI / *LOCK / *MSG / *NSM / *PAGE / *PAM / *PCCC / *PCTC / *PDEA / *PEND / *PIO / *PMIO / *PRGS / *PRGT / *PRTY / *RELM / *REQM / *SDV / *SLOT / *SNAP / *STD1 / *STDI / *STDN / *SVC / *TGMA / *TGMP / *TGMT / *TIC / *TINF / *TLM / *TLT / *TSKI / *TSVC / *UTM / *VMCH / *VMH / *VMI / *VMLK / *VMPD / *VMPR / *VMS / *VM2 / *WSCT / *XEIA

The events specified in the list are removed from the monitoring program definition.

The mandatory events CREA, DEST, INIT, LGON, MMRC, PTSK and STAT are not removed.

REMOVE-FILE

Remove file(s) from FILE monitoring parameters

Function

This statement is used to define the file(s) to be removed from the FILE monitoring program definition.

Format

REMOVE-FILE
FILE-NAME = <u>*ALL</u> / <filename 1..54>

Operands

FILE-NAME =

FILE-NAME = *ALL

All files previously included in the monitoring process are now to be excluded.

FILE-NAME = <filename 1..54>

Specifies the name of the file to be excluded from the monitoring process. The name specified must be the fully qualified name.

REMOVE-ISAM-POOL

Remove ISAM pool(s) from ISAM monitoring parameters

Function

This statement is used to define the ISAM pool(s) to be removed from the ISAM monitoring program definition.

Format

REMOVE-ISAM-POOL
<pre> POOL-NAME = <u>*ALL</u> / <alphanum-name 1..8> ,SCOPE = <u>*ANY</u> / *HOST-SYSTEM / *TASK(...) / *USER(...) *TASK(...) TSN = <alphanum-name 1..4> *USER(...) USER-ID = <alphanum-name 1..8> ,CAT-ID = <u>*ANY</u> / *HOME-PVS / <cat-id 1..4> </pre>

Operands

POOL-NAME =

POOL-NAME = *ALL

All ISAM pools previously included in the monitoring process are now to be excluded. The SCOPE and CAT-ID entries are disregarded in this case.

POOL-NAME = <alphanum-name 1..8>

Specifies the name of the ISAM pool to be excluded from the monitoring process.

SCOPE =

Defines the type of ISAM pool to be excluded.

SCOPE = *ANY

Global, task-specific, and user-specific pools are to be excluded.

SCOPE = *HOST-SYSTEM

The pool is a global ISAM pool.

SCOPE = *TASK(...)

The pool is a task-specific ISAM pool.

TSN = <alphanum-name 1..4>

Specifies the TSN of the task under which the task-specific ISAM pool has been set up.

SCOPE = *USER(...)

The pool is a user-specific ISAM pool.

USER-ID = <alphanum-name 1..8>

Specifies the user ID under which the ISAM pool has been set up. This must be specified without the "\$" sign.

CAT-ID =

Specifies the catalog ID of the public volume set to which the ISAM pool has been assigned.

CAT-ID = *ANY

Pools with any catalog ID are to be excluded.

CAT-ID = *HOME-PVS

The catalog ID is the catalog ID of the home pubset.

CAT-ID = <cat-id 1..4>

Catalog ID of the public volume set to which the ISAM pool is assigned.

SELECT-HOSTS

Define hosts for SM2 statements and screen output

Function

This statement is used to define the hosts for which SM2 administration statements are to apply and for which screens are to be output. If reports are output, the selected remote hosts send their monitored data to the local host.

The statement only works locally for the user who issues it. Any caller with administration rights can define his or her own list of hosts. The END statement deletes the definition.

Format

SELECT-HOSTS

```
HOST-NAME = *ALL / LOCAL / list-poss(16): <alphanum-name 1..8>  
,PARTNER-TYPE = *XCS / CCS
```

Operands

HOST-NAME =

Specifies the appropriate host names.

HOST-NAME = *ALL

Selects all hosts.

HOST-NAME = LOCAL

Selects the user's own host.

HOST-NAME = list-poss(16): <alphanum-name 1..8>

Selects the hosts specified via the host names.

PARTNER-TYPE =

Specifies the MSCF-specific partner type of the host.

PARTNER-TYPE = *XCS

Selects hosts of partner type XCS.

PARTNER-TYPE = CCS

Selects hosts of partner type CCS.

Note

The host name uniquely identifies a host in a processor network. This name must be specified in the SELECT-HOSTS statement and is output on the screens as the host name.

Note that when an HIPLEX MSCF connection is set up, a processor name must be specified.

The processor name can be different from the host name. The processor name only identifies a system locally for one other system, not globally for the whole network. The host name is the same as the local processor name.

SET-BCAM-CONNECTION-PARAMETER

Define BCAM-CONNECTION monitoring parameters

Function

This statement is used to define the global monitoring parameters for the BCAM-CONNECTION monitoring program.

Format

SET-BCAM-CONNECTION-PARAMETER

```
INWAIT-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
,REACT-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
,INPROC-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
,OUTPROC-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
```

Operands

INWAIT-BUCKETS =

Defines the upper limits of up to four ranges (in units of 1 ms) in which the INWAIT times are to be stored by order of magnitude.

INWAIT-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for INWAIT times to 100, 200, 500 and 1000 ms.

INWAIT-BUCKETS = *UNCHANGED

The upper limits of the ranges for INWAIT times currently defined in BCAM are not changed.

INWAIT-BUCKETS = list-poss(4): <integer 1..999999>

Defines the upper limits of the ranges for INWAIT times. These must be specified in ascending order.

REACT-BUCKETS =

Defines the upper limits of up to four ranges (in units of 1 ms) in which the REACT times are to be stored by order of magnitude.

REACT-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for REACT times to 500, 1000, 2000 and 4000.

REACT-BUCKETS = *UNCHANGED

The upper limits of the ranges for REACT times currently defined in BCAM are not changed.

REACT-BUCKETS = list-poss(4):<integer 1..999999>

Defines the upper limits of the ranges for REACT times. These must be specified in ascending order.

INPROC-BUCKETS =

Defines the upper limits of up to four ranges (in units of 1 ms) in which the INPROC times are to be stored by order of magnitude.

INPROC-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for INPROC times to 100, 200, 500 and 1000 ms.

INPROC-BUCKETS = *UNCHANGED

The upper limits of the ranges for INPROC times currently defined in BCAM are not changed

INPROC-BUCKETS = list-poss(4):<integer 1..999999>

Defines the upper limits of the ranges for INPROC times. These must be specified in ascending order.

OUTPROC-BUCKETS =

Defines the upper limits of up to four ranges (in units of 1 ms) in which the OUTPROC times are to be stored by order of magnitude.

OUTPROC-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for OUTPROC times to 100, 200, 500 and 1000 ms.

OUTPROC-BUCKETS = *UNCHANGED

The upper limits of the ranges for OUTPROC times currently defined in BCAM are not changed.

OUTPROC-BUCKETS = list-poss(4):<integer 1..999999>

Defines the upper limits of the ranges for REACT times. These must be specified in ascending order.

SET-CHANNEL-IO-PARAMETER

Define CHANNEL-IO monitoring parameters

Function

This statement is used to define the channels for the CHANNEL-IO monitoring program.

Format

SET-CHANNEL-IO-PARAMETER
CHANNELS = <u>*ALL</u> / list-poss(64): <x-string 1..4>

Operands

CHANNELS =

CHANNELS = *ALL

All channels are to be monitored.

CHANNELS = list-poss(64): <x-string 1..4>

Specifies the channel addresses (channel path IDs) of the channels to be monitored. A check is carried out to establish whether these channels are defined in the configuration.

SET-COSMOS-PARAMETER

Define COSMOS monitoring parameters

Function

This statement is used to define the monitoring parameters for the COSMOS monitoring program. The mandatory events CREA, DEST, INIT, LGON, MMRC, PTSK and STAT are defined automatically. Events specified beforehand with the ADD-COSMOS-EVENT statement remain in the monitoring program definition.

The files specified with OUTPUT and ADDITIONAL-INFO=*VM2000 must already be created.

The PRIMARY-ALLOCATION value of the SPACE operand (CREATE-FILE command) must be at least twice the specified number of buffers for writing the events (NUMBER-OF-BUFFERS) when creating the COSMOS output file(s).

The SECONDARY-ALLOCATION value of the SPACE operand (CREATE-FILE command) must be set to zero when creating the COSMOS output file for WRAP-AROUND.

Format

(part 1 of 2)

SET-COSMOS-PARAMETER
<pre> TITLE = C 'COSMOS' / <c-string 1..80> ,BUFFER-SIZE = <u>2</u> / <integer 1..7> ,NUMBER-OF-BUFFERS = <u>2</u> / <integer 2..128> ,ADDITIONAL-INFO = *CONFIGURATION / *NONE / list-poss(2): *CONFIGURATION / *VM2000(...) *VM2000(...) FILE-NAME = <filename 1..54 without-gen-vers> ,OUTPUT = *DISK (...) / *WRAP-AROUND(...) / *TAPE(...) / *STREAM-TAPE(...) *DISK(...) FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers> *WRAP-AROUND(...) FILE-NAME = <filename 1..54 without-gen-vers> </pre>

Continued →

```

*TAPE(...)
  | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
*STREAM-TAPE(...)
  | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
,TASK-SELECTION = *ALL / *SPECIFIED(...)
*SPECIFIED(...)
  | .JOB-NAME = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
  | ,CATEGORY = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..7 with-wild>
  | ,USER-ID = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
  | ,TSN = *NOT-SPECIFIED / list-poss(16): <alphanum-name 1..4 with-wild>
  | ,TYPE = *NOT-SPECIFIED / list-poss(4): *SYSTEM / *BATCH / *DIALOG / *TP
,EVENT-SELECTION = *ALL-BY-ADD-COSMOS-EVENT / *SPECIFIED(...)
*SPECIFIED(...)
  | EIA-INTERRUPT-CLASS = *ANY / list-poss(5): *SVC / *PROGRAM / *MACHINE-CHECK / *IO /
  |                               *EXTERNAL
  | ,EIA-SVC-NUMBER = *ANY / list-poss(8): <integer 1..255>
  | ,IO-DEVICE = *ANY / list-poss(8): <alphanum-name 2..4>
  | ,DAB-CACHE-ID = *ANY / list-poss(8): <alphanum-name 1..32>
  | ,MEMORY-CLASS = *ANY / list-poss(4): *3 / *4 / *5 / *6
  | ,SLOT-MEMORY-CLASS = *ANY / list-poss(4): *3 / *4 / *5 / *6
  | ,PEND-CODE = *ANY / list-poss(16): <integer 1..22>
  | ,LOCK-ID = *ANY / list-poss(4): <alphanum-name 1..2>
  | ,TLT-DESCRIPTOR = *ANY / list-poss(8): <alphanum-name 1..3>
  | ,TSKI-SWITCH = *ANY / *TASK
  | ,TSVC-SVC-NUMBER = *ANY / list-poss(8): <integer 1..255>
,UNLOAD = *AT-MEASUREMENT-PROGRAM-STOP / *AT-SM2-STOP
,MEASUREMENT-TIME = *NOT-SPECIFIED / <integer 1..60>

```

Operands

TITLE =

Specifies the title of the COSMOS monitoring process.

TITLE = C'COSMOS'

Sets the title of the COSMOS monitoring process to "COSMOS".

TITLE = <c-string 1..80>

Sets the title of the COSMOS monitoring process to the value specified here.

BUFFER-SIZE =

Specifies the number of 4K pages per buffer.

BUFFER-SIZE = 2

The buffers created have a default size of two pages.

BUFFER-SIZE = <integer 1..7>

The buffers created have the specified number of pages.

NUMBER-OF-BUFFERS =

Specifies the number of buffers.

NUMBER-OF-BUFFERS = 2

By default, two buffers are created for writing events.

NUMBER-OF-BUFFERS = <integer 2..128>

COSMOS creates the specified number of buffers for writing the events.

ADDITIONAL-INFO =

Specifies the additional data to be recorded.

ADDITIONAL-INFO = *CONFIGURATION

The configuration at the start of monitoring is also recorded.

ADDITIONAL-INFO = *NONE

No additional data is recorded.

ADDITIONAL-INFO = *VM2000(...)

The VM2000 events are also recorded. For this purpose, they must be explicitly opened (ADD-COSMOS-EVENT statement).

FILE-NAME = <filename 1..54 without-gen-vers>

Specifies the name of the file to which the VM2000 events are written.

OUTPUT =

Specifies how the COSMOS output files are written. The files must have already been created. File link names are no longer necessary.

OUTPUT = *DISK(...)

The COSMOS monitored data is written sequentially to the files on hard disk; i.e. there is one write task for each output file. If a monitored data buffer is full, a write task is activated that writes the buffer to the appropriate file.

FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>

Specifies the file(s) to which the COSMOS monitored data is written.

OUTPUT = *WRAP-AROUND(...)

COSMOS monitored data is written to a file on disk. If the disk space allocated (PRIMARY-ALLOCATION) is insufficient, the file is overwritten from the top. The secondary allocation (SECONDARY-ALLOCATION) must be set to zero.

FILE-NAME = <filename 1..54 without-gen-vers>

Specifies the file to which COSMOS monitored data is written.

OUTPUT = *TAPE(...)

The COSMOS monitored data is written sequentially to the files on tape (this works as described for OUTPUT=*DISK).

FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>

Specifies the file(s) to which COSMOS monitored data is written.

OUTPUT = *STREAM-TAPE(...)

The COSMOS output files are written in streaming mode. This reduces the chances of events not being recorded, because the files are written to the tape continuously without any repositioning of the tape.

FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>

Specifies the file(s) to which COSMOS monitored data is written.

TASK-SELECTION =

Specifies the tasks to be monitored.

TASK-SELECTION = *ALL

All tasks are monitored.

TASK-SELECTION = *SPECIFIED(...)

Specifies the tasks to be monitored by means of their TSN, user ID, job name, category or type.

JOB-NAME =

The tasks are selected by means of their job name.

JOB-NAME = *NOT-SPECIFIED

No tasks are selected by means of their job name.

JOB-NAME = list-poss(8): <alphanum-name 1..8 with-wild>

Specifies the job names of the tasks to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification.

CATEGORY =

The tasks are selected by means of their category.

CATEGORY = *NOT-SPECIFIED

No tasks are selected by means of their category.

CATEGORY = list-poss(8): <alphanum-name 1..7 with-wild>

Specifies the categories of the tasks to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification.

USER-ID =

The tasks are selected by means of their user ID.

USER-ID = *NOT-SPECIFIED

No tasks are selected by means of their user ID.

USER-ID = list-poss(8): <alphanum-name 1..8 with-wild>

Specifies the user IDs of the tasks to be monitored. These must be specified without the "\$" sign. An asterisk (*) is also permitted as the last character in a wildcard specification.

TSN =

The tasks are selected by means of their TSN.

TSN = *NOT-SPECIFIED

No tasks are selected by means of their TSN.

TSN = list-poss(16): <alphanum-name 1..4 with-wild>

Specifies the TSNs of the tasks to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification.

TYPE =

The tasks are selected by means of their type.

TYPE = *NOT-SPECIFIED

No tasks are selected by means of their type.

TYPE = *SYSTEM

All system tasks are to be monitored.

TYPE = *BATCH

All batch tasks are to be monitored.

TYPE = *DIALOG

All interactive tasks are to be monitored.

TYPE = *TP

All TP tasks are to be monitored.

EVENT-SELECTION =

Specifies the events to be recorded. Their recording is linked to specific conditions.

EVENT-SELECTION = *ALL-BY-ADD-COSMOS-EVENT

All open events are recorded.

EVENT-SELECTION = *SPECIFIED(...)

Only those events that satisfy the specified conditions are recorded.

EIA-INTERRUPT-CLASS =

Controls the recording of EIA events on the basis of their interrupt class (IC).

EIA-INTERRUPT-CLASS = *ANY

The recording of EIA events is independent of their IC.

EIA-INTERRUPT-CLASS = list-poss(5): *SVC / *PROGRAM / *MACHINE-CHECK / *IO / *EXTERNAL

Only those EIA events with the specified IC are recorded.

EIA-SVC-NUMBER =

Controls the recording of EIA events on the basis of their SVC.

EIA-SVC-NUMBER = *ANY

The recording of EIA events is independent of their SVC.

EIA-SVC-NUMBER = list-poss(8): <integer 1..255>

Only those EIA events with the specified SVC(s) are recorded.

IO-DEVICE =

Controls the recording of SDV, CHTM, IONQ, and PMIO events on the basis of their mnemonic device name.

IO-DEVICE = *ANY

The recording of SDV, CHTM, IONQ, and PMIO events is independent of their mnemonic device name.

IO-DEVICE = list-poss(8): <alphanum-name 2..4>

Only those SDV, CHTM, IONQ, and PMIO events with the specified mnemonic device names are recorded.

DAB-CACHE-ID =

Controls the recording of DAB events on the basis of their DAB cache IDs.

DAB-CACHE-ID = *ANY

The recording of DAB events is independent of their DAB cache IDs.

DAB-CACHE-ID = list-poss(8): <alphanum-name 1..32>

Only those DAB events with the specified DAB cache IDs are recorded.

MEMORY-CLASS =

Controls the recording of RELM and REQM events on the basis of their memory class.

MEMORY-CLASS = *ANY

Only those RELM and REQM events with the specified memory classes are recorded.

SLOT-MEMORY-CLASS =

Controls the recording of SLOT events on the basis of their memory class.

SLOT-MEMORY-CLASS = *ANY

The recording of SLOT events is independent of their memory class.

SLOT-MEMORY-CLASS = list-poss(4): *3 / *4 / *5 / *6

Only those SLOT events with the specified memory classes are recorded.

PEND-CODE =

Controls the recording of PEND events on the basis of their pend code.

PEND-CODE = *ANY

The recording of PEND events is independent of their pend code.

PEND-CODE = list-poss(16): <integer 1..22>

Only those PEND events with the specified pend code are recorded.

LOCK-ID =

Controls the recording of LOCK events on the basis of their lock ID.

LOCK-ID = *ANY

The recording of LOCK events is independent of their lock ID.

LOCK-ID = list-poss(4): <alphanum-name 1..2>

Only those LOCK events with the specified lock IDs are recorded.

TLT-DESCRIPTOR =

Controls the recording of TLT on the basis of their TLT descriptor (TLT = Task Location Table).

TLT-DESCRIPTOR = *ANY

The recording of TLT events is independent of their TLT descriptor.

TLT-DESCRIPTOR = list-poss(8): <alphanum-name 1..3>

Only those TLT events with the specified TLT descriptors are recorded.

TSKI-SWITCH =

Controls the recording of TSKI events on the basis of their TIC (Task in Control).

TSKI-SWITCH = *ANY

The recording of TSKI events is independent of their TIC.

TSKI-SWITCH = *TASK

Only the first TSKI event of a TIC is recorded.

TSVC-SVC-NUMBER =

Controls the recording of TSVC events on the basis of their SVC numbers.

TSVC-SVC-NUMBER = *ANY

The recording of TSVC events is independent of their SVC number.

TSVC-SVC-NUMBER = list-poss(8): <integer 1..255>

The TSVC events are recorded for the specified SVC numbers.

UNLOAD =

Specifies the time at which the COSMOS subsystem is to be unloaded.

UNLOAD = *AT-MEASUREMENT-PROGRAM-STOP

The COSMOS subsystem is unloaded at the end of COSMOS monitoring.

UNLOAD = *AT-SM2-STOP

The COSMOS subsystem is unloaded at the end of SM2 monitoring.

MEASUREMENT-TIME =

Specifies the duration of the monitoring process.

MEASUREMENT-TIME = *NOT-SPECIFIED

Monitoring is terminated by the user with the STOP-MEASUREMENT-PROGRAM statement.

MEASUREMENT-TIME = <integer 1..60>

Specifies the time in minutes after which monitoring should be terminated automatically.

SET-DISK-PARAMETER

Define DISK monitoring parameters

Function

This statement is used to define the disk devices for the DISK monitoring program.

Format

SET-DISK-PARAMETER
DEVICES = list-poss(256): <alphanum-name 2..4 with-wild>

Operands

DEVICES = list-poss(256): <alphanum-name 2..4 with-wild>

Specifies the mnemonic device names of the disk devices to be monitored. A check is carried out to establish whether these disk devices are defined in the configuration and are in the “attached” state. An asterisk (*) is also permitted as the last character in a wildcard specification.

Note

Up to 256 devices are monitored. If partial qualification means than more than 256 devices are defined, these are selected in the following order of priority:

- devices whose mnemonic device names have been specified in their entirety
- devices whose mnemonic device names have been specified in partially qualified form
- the sequence in the PDT (Physical Device Table)

SET-DISK-FILE-PARAMETER

Define DISK-FILE monitoring parameters

Function

This statement is used to define the disk devices for the DISK-FILE monitoring program.

Format

SET-DISK-FILE-PARAMETER
DEVICES = list-poss(8): <alphanum-name 2..4>

Operands

DEVICES = list-poss(8): <alphanum-name 2..4>

Specifies the mnemonic device names of the disk devices to be monitored. A check is carried out to establish whether these disk devices are defined in the configuration.

SET-PERIODIC-TASK-PARAMETER

Define PERIODIC-TASK monitoring parameters

Function

This statement is used to define the tasks from which monitored data is to be written to the SM2 output file for the PERIODIC-TASK monitoring program.

Format

SET-PERIODIC-TASK-PARAMETER
<pre>LOG-TASKS = *NONE / *ALL / *SPECIFIED(...) *SPECIFIED(...) USER-ID = *NOT-SPECIFIED / list-poss(64): <alphanum-name 1..8> ,JOB-NAME = *NOT-SPECIFIED / list-poss(64): <alphanum-name 1..8></pre>

Operands

LOG-TASKS =

Specifies the tasks for which monitored data is to be written to the SM2 output file.

LOG-TASKS = *NONE

No records are written to the SM2 output file.

LOG-TASKS = *ALL

Monitored data on all tasks is written to the SM2 output file.

LOG-TASKS = *SPECIFIED(...)

Monitored data on selected tasks is written to the SM2 output file.

USER-ID =

Tasks are selected on the basis of their user ID.

USER-ID = *NOT-SPECIFIED

Tasks are not selected on the basis of their user ID.

USER-ID = list-poss(64): <alphanum-name 1..8>

Monitored data on the tasks with the specified user IDs is written to the SM2 output file. These user IDs must be specified without the "\$" sign.

JOB-NAME =

Tasks are selected on the basis of their job names.

JOB-NAME = *NOT-SPECIFIED

Tasks are not selected on the basis of their job names.

JOB-NAME = list-poss(64): <alphanum-name 1..8>

Monitored data on the tasks with the specified job names is written to the SM2 output file.

SET-RESPONSETIME-PARAMETER

Define RESPONSETIME monitoring parameters

Function

This statement is used to define the monitoring parameters for the RESPONSETIME monitoring program.

Format

SET-RESPONSETIME-PARAMETER

```
SCOPE = *BUCKET / list-poss(2): *BUCKET / *CATEGORY
,DEFINITION = *1 / *2
,CONNECTION-NUMBER = *1024 / <integer 1..8187>
,RESPONSETIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>
,THINKTIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>
,TRANSACTIONTIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>
,WAITTIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>
```

Operands

SCOPE =

Defines whether the response time data is to be recorded by bucket or by category.

SCOPE = *BUCKET

The response time data is to be recorded by bucket.

SCOPE = *CATEGORY

The response time data is to be recorded by category.

DEFINITION =

Defines the type of response time to be monitored.

DEFINITION = *1

This response time is the time between user input and the next output operation.

DEFINITION = *2

In addition to the response time defined with 1, the times between follow-up output operations to an input are recorded individually as response times.

CONNECTION-NUMBER =

Defines the maximum number of connections to be monitored.

CONNECTION-NUMBER = *1024

A maximum of 1024 connections are recorded.

CONNECTION-NUMBER = <integer 1..8187>

The maximum specified number of connections is recorded.

RESPONSETIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the response times are to be stored by order of magnitude.

RESPONSETIME-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for response times to 5, 10, 20, 50 and 100.

RESPONSETIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for response times. These must be specified in ascending order.

THINKTIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the think times are to be stored by order of magnitude.

THINKTIME-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for think times to 50, 150, 300, 600 and 1200.

THINKTIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for think times. These must be specified in ascending order.

TRANSACTTIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the transaction times are to be stored by order of magnitude.

TRANSACTTIME-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for transaction times to 5, 10, 20, 50 and 100.

TRANSACTTIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for transaction times. These must be specified in ascending order.

WAITTIME-BUCKETS =

Defines the upper limits of up to five ranges (in units of 100ms) in which the wait times in the BCAM pool are to be stored by order of magnitude.

WAITTIME-BUCKETS = *STD-LIMITS

Sets the upper limits of the ranges for wait times in the BCAM pool to 1, 2, 5, 10 and 20.

WAITTIME-BUCKETS = list-poss(5): <integer 1..99999>

Defines the upper limits of the ranges for wait times in the BCAM pool. These must be specified in ascending order.

SET-SERVICETIME-PARAMETER

Define SERVICETIME monitoring parameters

Function

This statement is used to define the devices for the SERVICETIME monitoring program.

Format

SET-SERVICETIME-PARAMETER
DEVICES = list-poss(256): <alphanum-name 2..4 with-wild>

Operands

DEVICES = list-poss(256): <alphanum-name 2..4 with-wild>

Specifies the mnemonic device names of the devices to be monitored. A check is carried out to establish whether these devices are defined in the configuration. An asterisk (*) is also permitted as the last character in a wildcard specification.

Note

Up to 256 devices are monitored. If partial qualification means that more than 256 devices are defined, these are selected in the following order of priority:

- devices whose mnemonic device names have been specified in their entirety
- devices whose mnemonic device names have been specified in partially qualified form
- the sequence in the PDT (Physical Device Table)

SET-SYSSTAT-PARAMETER

Define SYSSTAT monitoring parameters

Function

This statement is used to define the devices for the SYSSTAT monitoring program.

Format

SET-SYSSTAT-PARAMETER
USED-DEVICES = <u>*NONE</u> / *ALL / list-poss(64): *DISK / *TAPE / <alphanum-name 2..4 with-wild>

Operands

USED-DEVICES =

USED-DEVICES = *NONE

No devices are to be monitored by the SYSSTAT monitoring program.

USED-DEVICES = *ALL

All devices are to be monitored with the exception of the communication controllers (CTCCs, TRANSDATA 960s, 8170 Cluster Controllers, LAN adapters, HNCs and SCPs).

USED-DEVICES = list-poss(64): *DISK

All disk devices are to be monitored.

USED-DEVICES = list-poss(64): *TAPE

All tape devices are to be monitored.

USED-DEVICES = list-poss(64): <alphanum-name 2..4 with-wild>

Specifies the mnemonic device names of the devices to be monitored. A check is carried out to establish whether these devices are defined in the configuration. An asterisk (*) is also permitted as the last character in a wildcard specification.

Note

SM2R1 uses the devices defined here to determine, among other things, the time equivalent for the productive performance of the peripherals (SM2R1 report 61) and the dilation factor (SM2R1 report 57). If possible, all devices should be monitored to capture precise values. If these reports are required, it is recommended that you specify USED-DEVICES=(*DISK,*TAPE).

SET-TASK-PARAMETER

Define TASK monitoring parameters

Function

This statement is used to define the tasks and devices for the TASK monitoring program. All tasks can be selected, but this results in a higher system load. Tasks can be explicitly defined using a list of TSNs, user IDs, job names and job classes. Tasks can also be selected for monitoring by specifying a task attribute. If tasks are defined by specifying multiple selection criteria, the selection is made by logical ORing, i.e. a task is selected if at least one of the specified criteria has been satisfied.

Format

SET-TASK-PARAMETER

```
TASK-SELECTION = *ALL / *SPECIFIED(...)
  *SPECIFIED(...)
    TSN = *NOT-SPECIFIED / list-poss(64): <alphanum-name 1..4>
    ,USER-ID = *NOT-SPECIFIED / list-poss(32): <alphanum-name 1..8 with-wild>
    ,JOB-NAME = *NOT-SPECIFIED / list-poss(32): <alphanum-name 1..8 with-wild>
    ,JOB-CLASS = *NOT-SPECIFIED / list-poss(32): <alphanum-name 1..8 with-wild>
    ,TYPE = *NOT-SPECIFIED / list-poss(4): *SYSTEM / *BATCH / *DIALOG / *TP
    ,DEVICES = *NONE / *ALL / list-poss(64): *DISK / <alphanum-name 2..4 with-wild>
```

Operands

TASK-SELECTION =

Specifies the tasks to be monitored.

TASK-SELECTION = *ALL

All tasks are to be monitored.

TASK-SELECTION = *SPECIFIED(...)

The tasks to be monitored are selected via their TSN, user ID, job name, job class or their type.

TSN =**TSN = *NOT-SPECIFIED**

No tasks are selected using the TSN.

TSN = list-poss(64): <alphanum-name 1..4>

Specifies the TSNs of the tasks to be monitored. A task with the specified TSN is, however, only monitored if it already existed when the task monitoring program was started.

USER-ID =**USER-ID = *NOT-SPECIFIED**

No tasks are selected using the user ID.

USER-ID = list-poss(32): <alphanum-name 1..8>

Specifies the user ID of the tasks to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification. All tasks of the specified user ID which existed at the start of the task monitoring program or which were created during the monitoring program run are monitored. The user IDs must be specified without the "\$" sign.

JOB-NAME =**JOB-NAME = *NOT-SPECIFIED**

No tasks are selected via their job names.

JOB-NAME = list-poss(32): <alphanum-name 1..8>

Specifies the job name of the task to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification. All tasks with the job name specified at selection time using the START-MEASUREMENT-PROGRAM or LOGON command are monitored.

JOB-CLASS =**JOB-CLASS = *NOT-SPECIFIED**

No tasks are selected via their job class.

JOB-CLASS = list-poss(32): <alphanum-name 1..8>

Specifies the job class of the tasks to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification. All tasks with the job name specified at selection time using the START-MEASUREMENT-PROGRAM or LOGON command are monitored.

TYPE =

The tasks to be monitored are selected via their task attribute. All tasks with the attributes specified at selection time using the START-MEASUREMENT-PROGRAM or LOGON command are monitored. If the task attribute of a task is changed in the course of the monitoring program session, this will not influence the measurement itself, i.e. the task is neither excluded from nor included in monitoring as a result.

TYPE = *NOT-SPECIFIED

No tasks are selected via the task attribute.

TYPE = list-poss(4): *SYSTEM / *BATCH / *DIALOG / *TP

- *SYSTEM: All system tasks are to be monitored.
- *BATCH: All batch tasks are to be monitored.
- *DIALOG: All interactive tasks are to be monitored.
- *TP: All TP tasks are to be monitored.

DEVICES =

Specifies the devices to be monitored by the task monitoring program for each task. A check is carried out to establish whether these devices are defined in the configuration. It is possible to monitor up to 64 devices. If more than 64 devices are defined by means of partial qualification or *DISK, these are selected in the following order of priority:

- devices whose mnemonic device names have been specified in their entirety
- devices whose mnemonic device names have been specified in partially qualified form
- *DISK

With *DISK and *ALL, up to 64 mnemonic names are selected in the order given in the PDT (Physical Device Table).

DEVICES = *NONE

No devices are to be monitored.

DEVICES = *ALL

All devices are to be monitored, with the exception of communication controllers (CTCCs, TRANSDATA 960s, 8170 Cluster Controllers, LAN adapters and HNCs).

DEVICES = list-poss(64): *DISK

All disk devices are to be monitored.

DEVICES = list-poss(32): <alphanum-name 2..4 with-wild>

The specified devices are to be monitored. An asterisk (*) is also permitted as the last character in a wildcard specification.

SHOW-ACTIVE-PARAMETER

Output active monitoring parameters

Function

This statement is used to output the current objects and monitoring parameters for each active monitoring program.

Format

SHOW-ACTIVE-PARAMETER

TYPE = *ALL / list-poss(12): *BCAM-CONNECTION / *CHANNEL-IO / *COSMOS / *DISK / *DISK-FILE / *FILE / *ISAM / *PERIODIC-TASK / *RESPONSETIME / *SERVICETIME / *SYSSTAT / *TASK

Operands

TYPE =

Specifies the type of the active monitoring program for which the current objects and monitoring parameters are to be output.

TYPE = *ALL

Outputs the objects and monitoring parameters for all active monitoring programs.

TYPE = *BCAM-CONNECTION

Outputs the objects and monitoring parameters for the active BCAM-CONNECTION monitoring program. Only the bucket values currently set in BCAM are displayed.

TYPE = *CHANNEL-IO

Outputs the objects for the active CHANNEL-IO monitoring program.

TYPE = *COSMOS

Outputs the objects for the active COSMOS monitoring program.

TYPE = *DISK

Outputs the objects and monitoring parameters for the active DISK monitoring program.

TYPE = *DISK-FILE

Outputs the objects for the active DISK-FILE monitoring program.

TYPE = *FILE

Outputs the objects for the active privileged FILE monitoring program.

TYPE = *ISAM

Outputs the objects and monitoring parameters for the active privileged ISAM monitoring program.

TYPE = *PERIODIC-TASK

Outputs the objects and monitoring parameters for the active PERIODIC-TASK monitoring program.

TYPE = *RESPONSETIME

Outputs the objects and monitoring parameters for the active RESPONSETIME monitoring program.

TYPE = *SERVICETIME

Outputs the objects for the active SERVICETIME monitoring program.

TYPE = *SYSSTAT

Outputs the objects for the active SYSSTAT monitoring program.

TYPE = *TASK

Outputs the objects and monitoring parameters for the active TASK monitoring program.

SHOW-DEFINED-PARAMETER

Output defined monitoring parameters

Function

This statement is used to output the objects and monitoring parameters currently defined for each definable monitoring program.

Format

SHOW-DEFINED-PARAMETER

```
TYPE = *ALL / list-poss(12): *BCAM-CONNECTION / *CHANNEL-IO / *COSMOS / *DISK / *DISK-FILE /
      *FILE /*ISAM / *PERIODIC-TASK / *RESPONSETIME / *SERVICETIME /*SYSSTAT /*TASK
```

Operands

TYPE =

Specifies the type of the monitoring program for which the currently defined objects and monitoring parameters are to be output.

TYPE = *ALL

Outputs the objects and monitoring parameters currently defined for all definable monitoring programs.

TYPE = *BCAM-CONNECTION

Outputs the bucket values currently set in BCAM, provided the SET-BCAM-CONNECTION-PARAMETER statement has not yet been issued. If the SET-BCAM-CONNECTION-PARAMETER statement is entered with *UNCHANGED, the bucket values currently set in BCAM are adopted by SM2 and can be output using the SHOW-DEFINED-PARAMETER statement.

TYPE = *CHANNEL-IO

Outputs the objects and monitoring parameters currently defined for the CHANNEL-IO monitoring program.

TYPE = *COSMOS

Outputs the objects and monitoring parameters currently defined for the COSMOS monitoring program.

TYPE = *DISK

Outputs the objects and monitoring parameters for the active DISK monitoring program.

TYPE = *DISK-FILE

Outputs the objects for the active DISK-FILE monitoring program.

TYPE = *FILE

Outputs the objects for the active privileged FILE monitoring program.

TYPE = *ISAM

Outputs the objects and monitoring parameters for the active privileged ISAM monitoring program.

TYPE = *PERIODIC-TASK

Outputs the objects and monitoring parameters for the active PERIODIC-TASK monitoring program.

TYPE = *RESPONSETIME

Outputs the objects and monitoring parameters for the active RESPONSETIME monitoring program.

TYPE = *SERVICETIME

Outputs the objects for the active SERVICETIME monitoring program.

TYPE = *SYSSTAT

Outputs the objects for the active SYSSTAT monitoring program.

TYPE = *TASK

Outputs the objects and monitoring parameters for the active TASK monitoring program.

SHOW-MEASUREMENT-STATUS

Output monitoring status

Function

This statement is used to output the MEASUREMENT STATUS screen.

Format

SHOW-MEASUREMENT-STATUS

SHOW-SELECTED-HOSTS

Output selected hosts

Function

This statement is used to output the hosts selected with the SELECT-HOSTS statement. The display includes the host name, the processor name (from the point of view of the host from which the statement was issued), and the time of the last monitored data queried.

If a new file is not available, the message "RSLT NOT VALID" may be output in place of the clock. Possible reasons for this are listed below:

- Monitored data was not queried since the SELECT-HOSTS statement.
- The remote host is not sending.
- The remote host shows a different system time or uses a different SM2 monitoring cycle. Data from the respective hosts (including the local host) is output separately.

Format

SHOW-SELECTED-HOSTS

SHOW-SM2-STATUS

Output status of SM2 system tasks

Function

This statement is used to output information on the status of individual SM2 system tasks and of the subsystems used by SM2.

Format

SHOW-SM2-STATUS
<pre> INFORMATION = *STD / *TASK / *EVENT-TRACE(...) *EVENT-TRACE(...) FROM = *ACTUAL / <integer 1..32767> </pre>

Operands

INFORMATION =

Provides information on the status of the SM2 system components.

INFORMATION = *STD

Provides information on the status of the SM2 system tasks and of the subsystems used by SM2. The most recent event trace entries are also shown. The event trace entries contain important events during execution of SM2. These events include:

- start and termination of SM2 tasks
- beginning and end of the use of other subsystems
- any errors which occurred during execution of SM2 components

INFORMATION = *TASK

The status of the SM2 system tasks and of the subsystems used by SM2 is output.

INFORMATION = *EVENT-TRACE(...)

Event trace entries are output.

FROM =

Specifies the position as of which the trace entries are to be output. The position specified corresponds to the most recent entry (the one with the highest number). If trace entries which do not yet exist are selected, the most recent ones are output. The fact that the trace buffer is overwritten cyclically means that it is possible that the required entries are no longer all available. The last available entry is marked with the symbol "===>".

FROM = *ACTUAL

The most recent trace entries are output.

FROM = <integer 1..32767>

The trace entries are output as of the specified number.

Note

For those users who are interested, the layout of the event trace entries is described under the new STATUS TABLE screen.

SHOW-USER-MEASURED-OBJECTS

Output monitored objects and associated users

Function

This statement is used to output the objects currently being monitored by users, together with the associated users. Depending on the user's system privileges (see table "Table of authorizations" on page 13), the display includes either the user's own objects or all users' objects.

Format

SHOW-USER-MEASURED-OBJECTS
TYPE = <u>*ALL</u> / list-poss(3): *FILE / *ISAM / *TASK

Operands

TYPE =

Specifies the type of the user monitoring program for which the currently monitored objects and corresponding users are to be output.

TYPE = *ALL

Outputs the objects currently monitored and the associated users for all user monitoring programs.

TYPE = *FILE

Outputs the objects currently monitored and the associated users for the FILE monitoring program.

TYPE = *ISAM

Outputs the objects currently monitored and the associated users for the ISAM monitoring program.

TYPE = *TASK

Outputs the objects currently monitored and the associated users for the TASK monitoring program.

START-MEASUREMENT-PROGRAM

Start monitoring program run

Function

This statement is used to start the monitoring programs specified under TYPE.

Format

START-MEASUREMENT-PROGRAM

```
TYPE = list-poss(31): *BCAM-CONNECTION / *CHANNEL-IO / *CMS / *COSMOS / *DAB / *DISK /
  *DISK-FILE / *DLM / *FILE / *GS / *GSVOL / *HSMS / *ISAM / *MSCF / *NET-DEVICE /
  *NSM / *PCA /*PERIODIC-TASK / *PFA / *POSIX / *RESPONSETIME / *SERVICETIME /
  *SVC / *SYSSTAT / *TASK / *TCP-IP /*TLM / *UTM / *VM
```

Operands

TYPE =

Specifies the monitoring program to be started (the descriptions below are in alphabetical order).

TYPE = *BCAM-CONNECTION

Starts the BCAM-CONNECTION monitoring program.

TYPE = *CHANNEL-IO

Starts the CHANNEL-IO monitoring program.

TYPE = *CMS

Starts the CMS monitoring program.

TYPE = *COSMOS

Starts the COSMOS monitoring program. This must be defined before it is started. If the monitoring program has not been prepared, it is prepared implicitly (INITIATE-COSMOS).

TYPE = *DAB

Starts the DAB monitoring program.

TYPE = *DISK

Starts the DISK monitoring program.

TYPE = *DISK-FILE

Starts the DISK-FILE monitoring program.

TYPE = *DLM

Starts the DLM monitoring program.

TYPE = *FILE

Starts the FILE monitoring program.

TYPE = *GS

Starts the GS monitoring program.

TYPE = *GSVOL

Starts the GSVOL monitoring program.

TYPE = *HSMS

Starts the HSMS monitoring program.

TYPE = *ISAM

Starts the ISAM monitoring program.

TYPE = *MSCF

Starts the MSCF monitoring program.

TYPE = *NET-DEVICE

Starts the NET-DEVICE monitoring program.

TYPE = *NSM

Starts the NSM monitoring program.

TYPE = *PCA

Starts the PCA monitoring program.

TYPE = *PERIODIC-TASK

Starts the PERIODIC-TASK monitoring program.

TYPE = *PFA

Starts the PFA monitoring program.

TYPE = *POSIX

Starts the POSIX monitoring program.

TYPE = *RESPONSETIME

Starts the RESPONSETIME monitoring program.

TYPE = *SERVICETIME

Starts the SERVICETIME monitoring program.

TYPE = *SVC

Starts the SVC monitoring program.

TYPE = *SYSSTAT

Starts the SYSSTAT monitoring program.

TYPE = *TASK

Starts the TASK monitoring program.

TYPE = *TCP-IP

Starts the TCP-IP monitoring program.

TYPE = *TLM

Starts the TLM monitoring program.

TYPE = *UTM

Starts the UTM monitoring program.

TYPE = *VM

Starts the VM monitoring program.

Notes

- For the BCAM-CONNECTION, CHANNEL-IO, COSMOS, DISK, DISK-FILE, FILE, ISAM, PERIODIC-TASK, RESPONSETIME, SERVICETIME, SYSSTAT and TASK monitoring programs, the monitoring parameters/monitored objects must be defined using the appropriate statements before the program is started.
- For further information on the monitoring programs, see page 33 ff.

Restriction

With SR2000, monitored data cannot be collected for the GS and GSVOL monitoring programs.

STOP-MEASUREMENT-PROGRAM

Terminate monitoring program run

Function

This statement is used to terminate the monitoring programs specified under TYPE.

Format

STOP-MEASUREMENT-PROGRAM

```
TYPE = *ALL / list-poss(31): *BCAM-CONNECTION / *CHANNEL-IO / *CMS / *COSMOS / *DAB / *DISK /
      *DISK-FILE / *DLM / *FILE / *GS / *GSVOL / *HSMS / *ISAM / *MSCF / *NET-DEVICE /
      *NSM / *PCA / *PERIODIC-TASK / *PFA / *POSIX / *RESPONSETIME / *SERVICETIME /
      *SVC / *SYSSTAT / *TASK / *TCP-IP / *TLM / *UTM / *VM
```

Operands

TYPE =

Specifies the type of monitoring program to be terminated (the descriptions below are in alphabetical order).

TYPE = *ALL

Terminates all active monitoring programs.

TYPE = *BCAM-CONNECTION

Terminates the BCAM-CONNECTION monitoring program.

TYPE = *CHANNEL-IO

Terminates the CHANNEL-IO monitoring program.

TYPE = *CMS

Terminates the CMS monitoring program.

TYPE = *COSMOS

Terminates the COSMOS monitoring program.

TYPE = *DAB

Terminates the DAB monitoring program.

TYPE = *DISK

Terminates the DISK monitoring program.

TYPE = *DISK-FILE

Terminates the DISK-FILE monitoring program.

TYPE = *DLM

Terminates the DLM monitoring program.

TYPE = *FILE

Terminates the FILE monitoring program.

TYPE = *GS

Terminates the GS monitoring program.

TYPE = *GSVOL

Terminates the GSVOL monitoring program.

TYPE = *HSMS

Terminates the HSMS monitoring program.

TYPE = *ISAM

Terminates the ISAM monitoring program.

TYPE = *MSCF

Terminates the MSCF monitoring program.

TYPE = *NET-DEVICE

Terminates the NET-DEVICE monitoring program.

TYPE = *NSM

Terminates the NSM monitoring program.

TYPE = *PCA

Terminates the PCA monitoring program.

TYPE = *PERIODIC-TASK

Terminates the PERIODIC-TASK monitoring program.

TYPE = *PFA

Terminates the PFA monitoring program.

TYPE = *POSIX

Terminates the POSIX monitoring program.

TYPE = *RESPONSETIME

Terminates the RESPONSETIME monitoring program.

TYPE = *SERVICETIME

Terminates the SERVICETIME monitoring program.

TYPE = *SVC

Terminates the SVC monitoring program.

TYPE = *SYSSTAT

Terminates the SYSSTAT monitoring program.

TYPE = *TASK

Terminates the TASK monitoring program.

TYPE = *TCP-IP

Terminates the TCP-IP monitoring program.

TYPE = *TLM

Terminates the TLM monitoring program.

TYPE = *UTM

Terminates the UTM monitoring program.

TYPE = *VM

Terminates the VM monitoring program.

4.4 Statements for nonprivileged users

These statements enable the nonprivileged user to select monitored data for output and control the screen output. They can also be used by the SM2 administrator provided he/she switches to the analysis subinterval using the CALL-EVALUATION-PART statement. This automatically resets the status of the administrator; privileges and special authorizations associated with some statements remain unchanged (see section “Users” on page 12).

These SM2 functions cannot be addressed through SDF. For a description of the ISP syntax, see the appendix.

Default values for statements

All functions covered by the SM2 statements are predefined by means of default values at program start time. The user must enter statements himself only if he wishes to change the defaults or activate additional (optional) output operations.

An exception to the above is the START statement, which the user must employ to initiate output of a report, as well as the END statement, which then terminates the SM2 session for the particular user.

Statements for selecting monitored data for screen output

The following statements define the monitored data which is to be output to the individual reports or which need not be output.

Statement	Function
DEVICE	Select devices with monitored data
FILE	Monitor files
SELECT-DAB-CACHE	Select DAB cache
SELECT-PCA-CONTROLLER	Select controllers for the PCA-CACHE report
SELECT-PCA-CACHE	Select cache for the PCA-DEVICE report
SELECT-PERIODIC-TASK-PARAMETER	Select sort criterion and output information for the PERIODIC TASK report
SELECT-PFA-CACHE	Select PFA cache
SELECT-SYMMETRIX-CONTROLLER	Select SYMMETRIX controllers
SELECT-UTM-APPLICATION	Select UTM applications
SHOW-USER-MEASURED-OBJECTS	Output monitored objects
SELECT-UTM-APPLICATION	Select UTM applications
SHOW-USER-MEASURED-OBJECTS	Output monitored objects
START-ISAM-STATISTICS	Monitor ISAM pools

Statement	Function
CHANGE-ISAM-STATISTICS	Include and exclude ISAM pools
STOP-ISAM-STATISTICS	Terminate the monitoring of ISAM pools

Statements for controlling reports

The following statements are used to control reports.

Statement	Function
OUTPUT	Define the output mode. Reports are output either automatically at regular intervals (automatic output mode) or at the request of the user (controlled mode).
REPORT	Select reports
RESTART	Start the output of selected reports. Unlike the START statement, this statement does not allow for the retrieval of new monitored data.
START	Start report output

In **automatic output mode**, the selected reports are output regularly over a defined period of time. The overflow screens are not output in this mode.

The period of time over which reports are output is known as the **output cycle**. When the program is started, this is preset to the current length of the monitoring cycle, but can be changed by the user. The interval between reports depends on the number of reports output in the last output cycle. In the first output cycle, reports are output without a delay. The user must ensure that a practical relationship is maintained between the monitoring cycle and the output cycle. Further information can be found under "Relationship between the monitoring cycle and the output cycle" on page 153.

In **controlled mode**, the individual reports are output at the request of the user, i.e. the user can control SM2 report output or enter another statement.

The following scroll commands are available for controlling the output of SM2 reports which may comprise one or more screens:

1. **++** selects the first screen of the first report of the next monitoring cycle.
2. **--** selects the first screen of the first report of the current monitoring cycle.
3. **+R** selects the first screen of the next report.
If the current screen is the last for this monitoring cycle, the first screen of the first report of the next monitoring cycle is displayed.
4. **-R** selects the first screen of the preceding report.
If the current screen is the first for this monitoring cycle, the current screen is displayed again.
5. **+** selects the next sequential screen of the current report.
If the current screen is the last of the current report, the first screen of the next report is displayed. The DUE or DÜ1 key can also be pressed instead of the + key.
6. **-** selects the preceding screen of the current report. If the current screen is the first of this report, the first screen of the preceding report is displayed.
7. **>** selects the overflow screen for the current report. Overflow reports can exist for DAB, PCA or UTM reports if it is not possible for all the monitored objects to fit on the same screen.
If there is no overflow screen, > has the same effect as +.
8. **<** selects the previous overflow screen.
If there is no overflow screen, < has the same effect as -.
9. **<<** selects the first screen of a report with overflow screens.
If there is no overflow screen, << has the same effect as -.
10. **+N** selects the first report of the next host.
If the current screen is the last one of this monitoring cycle, the first screen of the first report from the next monitoring cycle is displayed.
In this case, the reports with network-specific data are displayed first, provided such reports were selected.
11. **-N** selects the first report of the preceding host.
If the current report is the first one of the first host, the first report with network-specific data is displayed, provided such a report was selected.

This method is useful for checking that suitable output and control statements have been entered for a specific task or when a specific report is to be displayed for extended investigation at the terminal.

Starting report output

Report output is started with the START or RESTART statement. In the case of the START statement, new monitoring data is obtained from the central buffer of SM2 and then output. In the case of the RESTART statement, reports are output with the data of the last START statement.

SM2 enters the monitoring data in output forms called **reports**. Their format is fixed and cannot be modified by the user. By means of statements, the user can specify that the selected reports are to be output to the terminal, to the high-speed printer or to both devices.

The reports contain factually related data (see the report types in chapter "SM2 screen output" on page 201).

Monitoring then proceeds cycle after cycle. The reports are output either automatically or upon user request.

Input during monitoring

The automatic output mode can be interrupted with the BREAK function (terminal key). To allow interruption, the time interval between two consecutive reports is at least 2 seconds.

The /INFORM-PROGRAM command permits the user to return from system mode to SM2 program mode. All output statements can be entered as at program start time. Monitoring is continued in the meantime. The output cycle begins when the START statement is entered. The data monitored during the last completed monitoring cycle is again output following the /INFORM-PROGRAM command.

In controlled mode, any output statement can be entered at any time instead of a scroll statement without monitoring being interrupted. After the START statement, the reports for the last completed monitoring cycle can be requested.

Relationship between the monitoring cycle and the output cycle

The first monitoring cycle begins when the SM2 monitoring task is initiated. In each cycle, all of the required data is collected, edited and entered in a central buffer at the end of the cycle. The SM2 user tasks fetch the output data from this buffer.

The output cycle of an SM2 user task begins when the START statement is entered. The data collected during the last completed monitoring cycle is then fetched and output.

This means that the first reports can be output at the earliest one monitoring cycle length after SM2 monitoring task initiation.

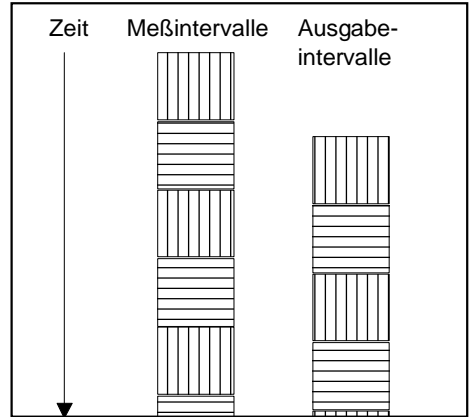
Depending on the output mode and the length of the two cycles, the following situations are possible:

A Automatic output mode

A1 Monitoring cycle and output cycle have the same length

Monitored data acquisition and report output take place at intervals of the same length

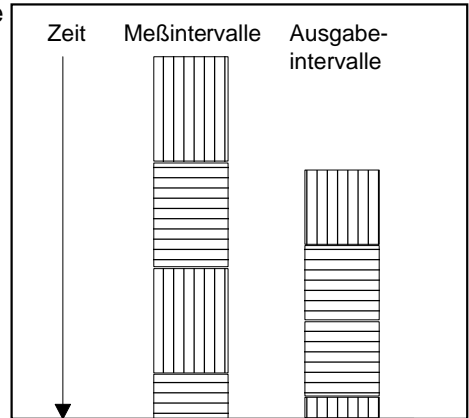
If the system load is high, the time required for output to the terminal may be considerably increased; this may result in the data of a particular monitoring cycle being skipped during output.



A2 Monitoring cycle longer than output cycle

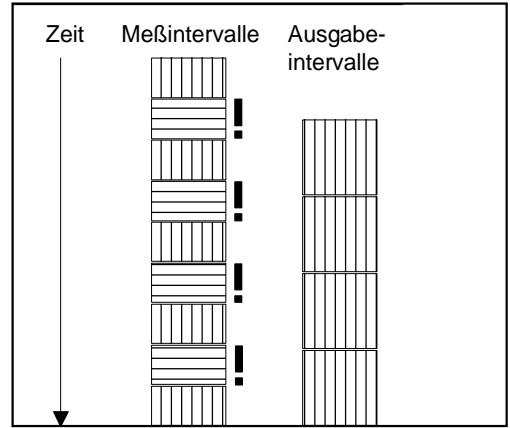
After all reports for a monitoring cycle have been output, SM2 waits until data of the next monitoring cycle becomes available.

This causes the output interval to be extended.



A3 Monitoring cycle shorter than output cycle

Monitored data is lost because the central buffer of the monitoring task is cleared faster than the data is output during the output cycle.



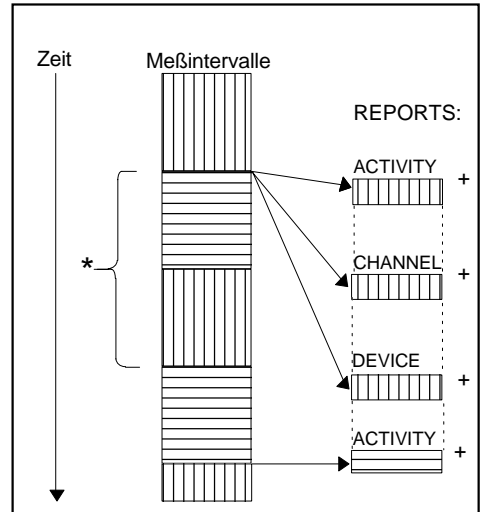
B Controlled mode

If the user does not succeed in having all the reports of a monitoring cycle output before the central buffer is filled again by the monitoring tasks, some monitoring cycles will be lost. When a report is requested again, the first report of the new monitoring cycle is output.

Note

The ACTIVITY, CHANNEL, and DEVICE reports are requested in this example.

The data of the monitoring cycles marked with * was overwritten in the central buffer before the user requested all the reports of the monitoring cycle shown first.



Statement for outputting information

The STATUS statement outputs the SM2-MEASUREMENT STATUS screen.

Statement	Function
STATUS	Output the monitoring status

General statements

The following statements control the SM2 run of the user (BREAK, END) and provide assistance as required (HELP, REMARK).

Statement	Function
BREAK	Change to system mode
HELP	Request user help information
REMARK	Insert remarks
END	Terminate monitoring

The following description of the statements for nonprivileged users is arranged in alphabetical order.

BREAK

Switch to system mode

Function

This statement is used to interrupt SM2 processing and switch to the system's command mode.

Format

Operation	Operands
BREAK	

CHANGE-ISAM-STATISTICS

Include and exclude ISAM pools

Function

This statement is used to include and exclude ISAM pools in the monitoring process. ISAM pools can only be monitored if this is permitted by the SM2 primary administrator. If this is the case, the entry ISAM appears in the USER MEASUREMENTS ALLOWED line of the SM2 MEASUREMENT STATUS screen. SM2 supports the simultaneous monitoring of up to 16 ISAM pools for the set of all users.

Format

Operation	Operand
CHANGE-ISAM-STATISTICS	$\left[\begin{array}{l} \text{ADD-POOL} = \left\{ \begin{array}{l} \text{*NONE} \\ \text{(*POOL(} \left\{ \begin{array}{l} \text{POOL-NAME=poolname1} \\ \text{[,SCOPE =} \left\{ \begin{array}{l} \text{*HOST-SYSTEM} \\ \text{*TASK(TSN=tsn)} \\ \text{*USER} \end{array} \right\} \\ \text{[,CAT-ID =} \left\{ \begin{array}{l} \text{*HOME-PVS} \\ \text{catid} \end{array} \right\} \end{array} \right\} \end{array} \right\} \text{),*POOL()]...)} \end{array} \right. \\ \\ \left. \begin{array}{l} \text{,REMOVE-POOL} = \left\{ \begin{array}{l} \text{*NONE} \\ \text{(*POOL(} \left\{ \begin{array}{l} \text{POOL-NAME=poolname1} \\ \text{[,SCOPE =} \left\{ \begin{array}{l} \text{*HOST-SYSTEM} \\ \text{*TASK(TSN=tsn)} \\ \text{*USER} \end{array} \right\} \\ \text{,CAT-ID =} \left\{ \begin{array}{l} \text{*HOME-PVS} \\ \text{catid} \end{array} \right\} \end{array} \right\} \end{array} \right\} \text{),*POOL()]...)} \\ \text{*OWN} \end{array} \right. \end{array} \right]$

Operands

ADD-POOL

Defines which ISAM pools are to be included in the monitoring process.

- =*NONE No ISAM pools are included in the monitoring process (default).
- =*POOL() Defines which ISAM pools are to be monitored. Up to 16 ISAM pools can be defined in one list.
- POOL-NAME
=poolname1
Defines a pool name up to 8 characters in length.
- SCOPE Defines the type of ISAM pool.
- =*HOST-SYSTEM
The pool is a global ISAM pool (default).
- =*TASK() The pool is a task-specific ISAM pool. The TSN operand defines the task under which the ISAM pool has been set up.
- TSN=tsn
TSN of the task under which the task-specific ISAM pool has been set up.
- =*USER The pool is a user-specific ISAM pool. It is only possible to include and exclude ISAM pools under the user's own ID.
- CAT-ID Catalog ID of the public volume set to which the ISAM pool has been assigned. This specification is part of the identification of the ISAM pool (in addition to the specifications for POOL-NAME and SCOPE).
- =*HOME-PVS
The catalog ID is the one of the home pubset (default).
- =catid Catalog ID of the public volume set to which the ISAM pool has been assigned.
- REMOVE-POOL Defines which ISAM pools are to be excluded from the monitoring process.
- =*NONE No ISAM pools are to be excluded from the monitoring process (default).
- =*OWN Only those ISAM pools included by a user in the monitoring process are excluded.
- =*POOL() See the description of ADD-POOL=*POOL()

The *POOL structure name can be omitted, but if so it must not occur anywhere else in the statement.

DEVICE

Select devices with monitored data

Function

This statement is used to select the devices and monitored data to be output in the DEVICE report:

- disk devices with the greatest amount of activity during the monitoring cycle (default value)
- other devices with the greatest amount of activity during the monitoring cycle
- devices to which the user has assigned a high output priority

The statement also defines devices which are no longer output individually during the subsequent output cycle.

In the DEVICE report, as many as eight devices and their monitored data can be listed individually. All other active devices are output in the ACTIVE line by device name. The number of these further devices depends on the length of the mnemonic names of the devices which have been output.

This applies even if the user has specified a high priority for more than eight devices and if more than eight devices were active in the course of a monitoring cycle.

SM2 outputs the values of the eight individual devices which experienced the most activity during the monitoring cycle. The values of the other active devices are not output, although their device names are (sorted according to activity).

The devices are addressed using 2 to 4-digit alphanumeric device identifiers assigned in the DVC statement at system generation time. The current device IDs are logged in the PHYSICAL DEVICE LISTING created at system generation time.

If you specify the PRINT-CONFIGURATION statement in SM2R1, a configuration table will be output (see Volume 2 of the SM2 manual [21]). The current device identifiers can likewise be taken from this table.

The monitored data does not cover the activities of the communication processors, local cluster controllers, CTCCs, TRANSDATA 960s, 8170 Cluster Controllers, LAN adapters, HNCs, SCP or GS.

Format

Operation	Operands
DEVICE	$\left\{ \begin{array}{l} *DISK \\ *ALL \\ \left[\left\{ \begin{array}{l} + \\ - \end{array} \right\} \text{dev-name} \right] \end{array} \right\} \left\{ \left\{ \begin{array}{l} + \\ - \end{array} \right\} \text{dev-name} \right\}$

Operands

- *DISK** Specifies the monitored data of up to 8 disk devices with the greatest activity during the monitoring cycle. The disk devices are sorted in descending order according to activity, and the DEVICE report includes their monitored data. This operand is predefined at program start time. It must only be specified if the presetting has been changed but is to be reactivated.
- *ALL** Specifies the monitored data of up to 8 devices with the greatest activity during the monitoring cycle. The devices are sorted in descending order according to activity, and the DEVICE report includes their monitored data.
- $\left\{ \begin{array}{l} + \\ - \end{array} \right\} \text{dev-name] ..}$ Designates devices whose monitored data is to be output separately in the DEVICE report (+) or no longer to be output (-). In the case of the first device in an input line, the sign can be omitted. In this case this entry completely replaces the previously valid device selection, and, at the same time, the presetting goes into effect. If the first device name in the input line is preceded by a sign, the devices of this input line are added to those previously selected or removed. Each further device in the input line must be preceded by a sign.
- dev-name** Mnemonic name for the device as assigned at system generation (see the PDT - Physical Device Table).

- + Defines devices whose monitored data is to be output separately. The monitored data is output only if the device was not active during the monitoring cycle.

If the user has assigned a high output priority to less than eight devices and at least eight devices in total were active and the user did not withdraw priority from them, SM2 will take the free space and give it the monitoring data of other active devices.
- Defines devices to which the user does not wish to assign output priority. The mnemonic names of these devices are output in the ACTIVE line of the DEVICE report only if they are among the devices with the greatest activity during the monitoring cycle which do not appear in the individual output list.

Example

```
DEVICE +H1
```

Device H1 is assigned a higher output priority to be able to better observe the monitored data of this device for the report output. The values of the devices are output individually and independent of their activity.

END

Terminate monitoring

Function

This statement is used to terminate the SM2 run for the user.

Format

Operation	Operands
END	

FILE

Monitor files

Function

This statement is used to select one or more files whose monitored data is to be output in the next monitoring cycle or is no longer to be output. The user may only include files in the monitoring process if this is permitted by the SM2 primary administrator.

If this is the case, the entry FILE appears in the USER MEASUREMENTS ALLOWED line of the SM2 MEASUREMENT STATUS screen.

Provided file monitoring is allowed, each user can include and exclude files which have been set up under his user ID in the monitoring process. It is also possible to include and exclude files which do not exist.

SM2 supports the simultaneous monitoring of up to 16 files for all users.

Format

Operation	Operands
FILE	NAME=filename [{ [,STATS = ON] }] [{ ,STATS = OFF }]

Operands

NAME

=filename Specifies the name of the file whose access values are to be monitored or to be excluded from further monitoring.
As a general rule, fully qualified file names must be specified, e.g. :A:\$USERID.FILE1 (see the "DMS Macros" manual [2]).

STATS

=ON Includes the specified file in the monitoring process if this has not already been done (default).
=OFF Excludes the specified file from the monitoring process.

HELP

Request user help information

Function

This statement is used to request an overview of all SM2 statements.

Format

Operation	Operands
HELP	

Output includes the statement name followed by a brief explanation of the statement.

OUTPUT

Define output mode

Function

This statement is used to:

- define the device (data display terminal and/or printer) to which the reports are output, and
- define the mode of output.

Reports are output either automatically at regular intervals (automatic output mode) or at the request of the user (controlled mode).

Format

Operation	Operands
OUTPUT	$\left\{ \begin{array}{l} \text{TERMINAL} \\ \text{TER} \end{array} \right\} = \left\{ \begin{array}{l} \text{Y[ES]} \\ \text{N[O]} \end{array} \right\}$ $\left\{ \begin{array}{l} \text{HARDCOPY} \\ \text{HC} \end{array} \right\} = \left\{ \begin{array}{l} \text{Y[ES]} \\ \text{N[O]} \end{array} \right\}$ $\left\{ \begin{array}{l} \text{INTERVAL} \\ \text{INT} \end{array} \right\} = \left\{ \begin{array}{l} \text{[number]} \\ \text{C[ONTROLLED]} \end{array} \right\}$

Operands

TERMINAL

- =YES Directs output of the reports to the data display terminal (default).
- =NO Deactivates report output to the data display terminal.

HARDCOPY

- =YES Directs output of the reports to the system file SYSLST. If SM2 runs in batch mode, the reports are always output to SYSLST.
- =NO Prevents output of the report to the system file SYSLST (default).

INTERVAL	Specifies the output mode.
=number	Specifies automatic output mode (see page 154). “number” defines the output cycle during which the reports are to be output at regular intervals. This can be an integer between 10 and 3600 seconds. The INTERVAL=number specification is not mandatory. If it is omitted, SM2 inserts the value for the output cycle by using the value of the online monitoring cycle (default). An exception to this is the first output cycle, in which the reports are output in direct succession. With a normal workload, the system requires approximately one second to output a report. The value for the output cycle should be at least as large as the sum of the output times of the selected reports.
=CONTROLLED	Each report is output only at the request of the user (controlled mode). The reports of the last completely executed cycle are available for output. Each report can be requested using a paging statement (see page 152) once SM2 displays the ENTER COMMAND message. In place of the paging statements, any other statement can also be used to request the report. The statement OUTPUT INTERVAL=number can be used to switch to automatic output mode.

Note

Before changing the output cycle, please refer to “Relationship between the monitoring cycle and the output cycle” on page 153.

Example 1

```
OUTPUT INT=C
```

SM2 output is prompted via the data display terminal. Following every output operation, the user is requested to enter a command. SM2 then executes the statement. The user also has the option of controlling report output.

Example 2

```
OUTPUT TER=NO,HC=YES
```

SM2 output is to the SYSLST system file. There is no output to the data display terminal. Output takes place in automatic mode. The analysis period is equal to the monitoring cycle.

REMARK

Insert remarks

Function

This statement is used to insert remarks in order to document procedures.

Format

Operation	Operands
REMARK	[any text]

Operands

any text

Any text can be inserted; the text can extend beyond more than one line. Continuation lines must be marked by means of a hyphen (continuation symbol). See also "Length of the statements" on page 423 of the Appendix.

REPORT

Select reports

Function

This statement is used to select the reports to be output.

Format

Operation	Operands
REPORT	$\left[\begin{array}{l} \text{STD} \\ \text{ALL} \\ \left[\left[\begin{array}{l} + \\ - \end{array} \right] \text{report-type} \right] \end{array} \right\} \left[\left[\begin{array}{l} + \\ - \end{array} \right] \text{report-type} \right]$

Operands

STD

Selects the following reports:

- ACTIVITY report
- MEMORY report
- CHANNEL report
- DEVICE report

for output in the same order as shown above.

This operand must be specified only if the default value has been changed and is to be reactivated.

ALL

All reports are output.

If a monitoring program has not been activated or is not supplying any data at the moment, an appropriate message is output.

{ $\begin{matrix} + \\ - \end{matrix}$ } report-type]...

Updates the list of reports to be output.

“report-type” designates the output reports, the identifiers of which are as follows:

Report ID	Guarant. abbrev.	Report name
ACF		ACF report
ACTIVITY	A, ACT	ACTIVITY report
BCAM		BCAM CONNECTION report
CATEGORY	CAT	CATEGORY report
CATQ		CATEGORY QUEUE report
CATW		CATEGORY WSET report
CHANNEL	C, CHA	CHANNEL report
CMS		CMS report
CPU		CPU report
DAB		DAB report
DEVICE	D, DEV	DEVICE report
DISK_FILE	DFILE	DISK FILE report
DLM		DLM report
FILE	F, FIL	FILE report
GLOBAL	G	GLOBAL report
GS		GS report
GSVOL		GSVOL report
ISAM		ISAM report
MEMORY	M, MEM	MEMORY report
MSCF		MSCF report
NET_DEVICE	NET	NET DEVICE report
NSM		NSM report
PCA		PCA reports
PCS		PCS report
PERIODIC	PER	PERIODIC TASK report (privileged and nonprivileged ¹ users)
PFA		PFA report

Table 5: Report identifiers, abbreviations and names

Report ID	Guarant. abbrev.	Report name
POSIX	POS	POSIX report
RESPONSE	R, RES	RESPONSETIME report
SHARED_PVS	SHA	SHARED PVS report
SVC		SVC report
SYMMETRIX	SYM	SYMMETRIX report
TCP_IP	TCP	TCP/IP report
TLM		TLM report
UTM		UTM report
VM		VM2000 report

¹⁾ For nonprivileged users, the PERIODIC TASK report contains only those tasks under their own user ID.

Table 5: Report identifiers, abbreviations and names

The user can specify both an individual report identifier with or without prefix and multiple report identifiers (with prefix) one after the other.

The sign preceding the first report type of a line is not mandatory. If omitted, the newly specified report types of this line completely replace the ones previously set.

If the first report type of a line is specified using a prefix, the reports specified in this line are added to (+) or removed from (-) the previous ones.

All further reports of an input line must be prefixed by a sign.

Example 1

```
REPORT +DAB+CMS
```

The reports for DAB and CMS are added to the reports already activated.

Example 2

```
REPORT ALL-DAB
```

All existing reports are activated, with the exception of the DAB report.

Restriction

With SR2000, the GS and GSVOL reports are not available.

RESTART

Start output of selected reports

Function

This statement is used to start the output of reports with the data of the last START statement.

Thus, unlike the START statement, it does not retrieve new monitored data from the central buffer of SM2. The advantage of this for SM2 users is that new control and output statements can take effect before the next monitoring cycle. It only makes sense to use the RESTART statement in controlled mode.

Format

Operation	Operands
RESTART	

SELECT-DAB-CACHE

Select DAB cache

Function

This statement is used to select one or more DAB caches to be displayed in the DAB report. For each selected DAB cache, a DAB-CACHE report is then output containing monitored data on the subareas or files.

Format

Operation	Operands
SELECT-DAB-CACHE	$[\text{ADD-CACHE-ID} = \left\{ \begin{array}{l} \text{cache-id} \\ (\text{cache-id1}[\text{,cache-id2}]...) \end{array} \right\}]$ $[\text{,REMOVE-CACHE-ID} = \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{cache-id} \\ (\text{cache-id1}[\text{,cache-id2}]...) \end{array} \right\} \\ \text{*ALL} \end{array} \right\}]$

Operands

ADD-CACHE-ID

=cache-id

Specifies up to 16 names of DAB caches. The monitored data of the corresponding caches is output starting with the next monitoring cycle. "cache-id" is the name of a DAB cache and can be up to 32 characters in length.

REMOVE-CACHE-ID

=cache-id

Specifies up to 16 names of DAB caches in a list. The monitored data of the corresponding DAB caches is no longer output starting with the next monitoring cycle. "cache-id" is the name of a DAB cache and can be up to 32 characters in length.

=*ALL

Deletes all previously specified DAB caches from the name list, i.e. their monitored data is no longer output starting with the next monitoring cycle (default).

SELECT-PCA-CACHE

Select cache for PCA DEVICE report

Function

This statement is used to select one or more caches of a controller to be displayed in the PCA CACHE report. For each selected cache, a PCA DEVICE report is then output containing monitored data on the individual devices supported by the cache.

Format

Operation	Operands
SELECT-PCA-CACHE	$\text{CACHE} = \left\{ \begin{array}{l} \text{*NONE} \\ \text{*ALL} \\ ((\text{CONTROLLER}=\text{cont1}, \text{CACHE-ID}=\left\{ \begin{array}{l} \text{number1} \\ \text{*ALL} \end{array} \right\})[\dots]) \end{array} \right\}$

Operands

CACHE	Defines the caches for which monitored data is to be output in the PCA DEVICE report.
=*NONE	The PCA DEVICE report is not to be output.
=* <u>ALL</u>	Monitored data is to be output for all caches of all controllers (default).
=(.....)	
CONTROLLER=cont	Specifies the superordinate controller for the caches whose IDs are subsequently specified. This must be specified using the controller's mnemonic name, which is up to 4 characters in length.
CACHE-ID=number	Specifies the cache IDs for the superordinate controller to be taken into account when outputting the PCA DEVICE report. "number" is a number between 0 and 62 inclusively.

CACHE-ID=*ALL

All caches of the superordinate controller are to be taken into account when outputting the PCA DEVICE report (default).

Note

It is possible to specify up to 32 pairs of controllers and caches.

SELECT-PCA-CONTROLLER

Select controllers for PCA CACHE report

Function

This statement is used to select one or more controllers to be displayed in the PCA CONTROLLER report. For each selected controller, a PCA CACHE report is then output containing monitored data on the controller caches.

Format

Operation	Operands
SELECT-PCA-CONTROLLER	CONTROLLER = { <ul style="list-style-type: none"> *NONE *<u>ALL</u> controller (controller1[,controller2]...) }

Operands

CONTROLLER	Defines the controllers for which cache monitored data is to be output in the PCA CACHE report.
=*NONE	The PCA CACHE report is not to be output.
=* <u>ALL</u>	Monitored data on the caches of all controllers are to be output (default).
=controller	Specifies the mnemonic names (up to 4 characters) of the controllers for which cache values are to be output. Up to 32 controllers may be specified.

SELECT-PERIODIC-TASK-PARAMETER

Select sort criterion and output information for PERIODIC TASK report

Function

This statement is used to specify the sort criterion and output information for the PERIODIC TASK report.

Nonprivileged users can only select tasks belonging to their own user ID.

Format

Operation	Operands
SELECT-PERIODIC-TASK-PARAMETER	$\left[\begin{array}{l} \text{OUTPUT-INFORMATION} = \left\{ \begin{array}{l} \text{USER-ID} \left(\left\{ \begin{array}{c} \text{\textit{*ALL}} \\ (\text{userid1}[, \text{userid2}] \dots) \end{array} \right\} \right) \\ \text{JOB-NAME} \left(\left\{ \begin{array}{c} \text{\textit{*ALL}} \\ (\text{jobname1}[, \text{jobname2}] \dots) \end{array} \right\} \right) \end{array} \right\} \\ \text{[SORT = [SERVICE-UNITS][, CPU][, IO][, UPG][, PAGING-READ]]} \end{array} \right]$

Operands

OUTPUT-INFORMATION

Selects user IDs or job names whose data is to be output on the screen.

=USER-ID(...)

Outputs user IDs.

*ALL:

All tasks are output. A user ID can only be output if it exists (default).

userid:

The tasks with the specified user IDs (up to 16) are output. User IDs must be specified without the "\$" sign.

=JOB-NAME(...) Outputs job names.

*ALL:

All tasks are output. The job name can only be output if it exists (default).

jobname:

The tasks with the specified job names (up to 16) are output.

SORT

Specifies sort criteria. A PERIODIC TASK report is created for each sort criterion specified.

=SERVICE-UNITS, CPU, IO, UPG, PAGING-READ

The tasks are sorted on the basis of the specified criteria. If there are several sort criteria, the variously sorted reports are output one after the other.

If no task is found with the selected output information, the following message appears:

"NO PERIODIC TASK DATA FOR SELECTED <output-information>".

If no task is found with the specified sort criterion, "*NONE" is output in the first line under TSN.

SELECT-PFA-CACHE

Select PFA cache

Function

This statement is used to request a PFA CONTROLLER report for specific caches listed in the PFA CACHE report.

The PFA CONTROLLER report can only be output for caches served by PCA and provides monitored data for the various controllers assigned to the pubset disks served by the caches.

The monitored data contained in the PFA CONTROLLER report overlaps with the data provided in the PCA reports for 3421 controllers.

Format

Operation	Operands
SELECT-PFA-CACHE	$[\text{ADD-CACHE-ID} = \left\{ \begin{array}{l} \text{cache-id} \\ \text{cache-id1}[\text{,cache-id2}] \dots \end{array} \right\}]$ $[\text{REMOVE-CACHE-ID} = \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{cache-id} \\ (\text{cache-id1}[\text{,cache-id2}] \dots) \end{array} \right\} \\ \text{*ALL} \end{array} \right\}];$

Operands

ADD-CACHE-ID

=cache-id Specifies the names of the PFA caches (up to 4 characters) for which CONTROLLER reports are to be output. Up to 16 names can be specified.

REMOVE-CACHE-ID

=cache-id Specifies the names of the PFA caches (up to 4 characters) for which CONTROLLER reports are no longer to be output. Up to 16 names can be specified.

=*ALL CONTROLLER reports are no longer to be output for all PFA caches specified previously (default).

SELECT-SYMMETRIX-CONTROLLER

Select SYMMETRIX controllers

Function

This statement is used to select up to 16 SYMMETRIX controllers to be displayed in the SYMMETRIX CONTROLLER report.

For each selected controller, a SYMMETRIX DEVICE report is then output containing monitored data on the individual devices supported by the controller.

Format

Operation	Operands
SELECT-SYMMETRIX-CONTROLLER	$[\text{ADD-CONTROLLER-MN} = \left\{ \begin{array}{l} \text{controller-mn} \\ (\text{controller-mn1}[\text{,controller-mn2}]...) \end{array} \right\}]$ $[\text{,REMOVE-CONTROLLER-MN} = \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{controller-mn} \\ (\text{controller-mn1}[\text{,controller-mn2}]...) \end{array} \right\} \\ \text{*ALL} \end{array} \right\}]$

Operands

ADD-CONTROLLER-MN

=controller-mn Defines the controllers for which SYMMETRIX DEVICE reports are to be output using the first controller mnemonic of the emulated 3860 controllers.

In all SM2 output, both controller mnemonics of an emulated 3860 controller are always output separated by a slash.

The following two mnemonic variants are available:

- alphanum-name 2..2
- x-text 4..4

In this statement, you need only specify the first controller mnemonic. It is possible to define up to 16 controller mnemonics.

REMOVE-CONTROLLER-MN

- =controller-mn Defines the controllers for which SYMMETRIX DEVICE reports are no longer to be output using the first controller mnemonic. The following two mnemonic variants are available:
- alphanum-name 2..2
 - x-text 4..4
- In this statement, you need only specify the first controller mnemonic. It is possible to define up to 16 controller mnemonics.
- =*ALL SYMMETRIX-DEVICE reports are no longer to be output for any previously specified controllers (default).

SELECT-UTM-APPLICATION

Select UTM applications

Function

This statement is used to select up to 16 UTM applications to be displayed in the UTM report. For each selected UTM application, a UTM APPLICATION report is then output.

Format

Operation	Operands
SELECT-UTM-APPLICATION	$[\text{ADD-APPLICATION} = \left\{ \begin{array}{l} \text{name} \\ (\text{name1}[\text{name2}]\dots) \end{array} \right\}]$ $[,\text{REMOVE-APPLICATION} = \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{name} \\ (\text{name1}[\text{name2}]\dots) \end{array} \right\} \\ \text{*ALL} \end{array} \right\}]$

Operands

ADD-APPLICATION

=name Specifies up to 16 UTM applications. "name" is the name of a UTM application and can be up to 8 characters in length.

REMOVE-APPLICATION

=name Specifies up to 16 UTM applications in a list. "name" is the name of a UTM application and can be up to 8 characters in length.

=*ALL All the UTM application names specified previously are deleted from the name list, i.e. the monitored data for these applications will no longer be output as of the next monitoring cycle (default).

SHOW-USER-MEASURED-OBJECTS

Output monitored objects

Function

This statement is used to show an SM2 user the objects he/she is currently monitoring.

Format

Operation	Operands
SHOW-USER-MEASURED-OBJECTS	TYPE = TASK

Operands

TYPE

=TASK

Outputs the user's tasks currently being monitored by the user-specific task monitoring program.

START

Start report output

Function

This statement is used to start report output.

Format

Operation	Operands
START	

START-ISAM-STATISTICS

Monitor ISAM pools

Function

This statement is used to select one or more ISAM pools whose monitored data is to be output in the next monitoring cycle.

The user may include ISAM pools in the monitoring process only if the SM2 primary administrator has authorized the monitoring of ISAM pools. If this is the case, the entry ISAM appears in the USER MEASUREMENTS ALLOWED line of the SM2 MEASUREMENT STATUS screen.

If ISAM pool monitoring has been permitted, each user can activate or deactivate global ISAM pools and all task-specific and user-specific ISAM pools which have been or will be set up under his/her user ID.

SM2 supports the simultaneous monitoring of as many as 16 ISAM pools for all nonprivileged users.

Only the input of the last START-ISAM-STATISTIC statement applies here. If you wish to monitor several ISAM pools, these must be specified in a START-ISAM-STATISTIC statement.

Format

Operation	Operands
START-ISAM-STATISTICS	$\text{POOL} = \left\{ (*\text{POOL} \left\{ \begin{array}{l} \text{POOL-NAME}=\text{poolname1} \\ \left[\text{SCOPE}=\left\{ \begin{array}{l} *HOST-SYSTEM \\ *TASK(\text{TSN}=\text{tsn}) \\ *USER \end{array} \right\} \right] \\ \left[\text{CAT-ID}=\left\{ \begin{array}{l} *HOME-PVS \\ \text{catid} \end{array} \right\} \right] \end{array} \right\} \right\} [, *POOL() \dots] \right\}$

Operands

POOL

=(*POOL(...)) Defines which ISAM pools are to be monitored. Up to 16 ISAM pools can be defined in one list.

POOL-NAME

=poolname1 Defines a pool name of up to 8 characters in length.

SCOPE

Defines the type of ISAM pool.

=*HOST-SYSTEM The pool is a global ISAM pool (default).

=*TASK(...) The pool is a task-specific ISAM pool. The TSN operand defines the task to which the ISAM pool belongs.

TSN= TSN of the task to which a task-specific ISAM pool belongs.

=*USER The pool is a user-specific ISAM pool. Only ISAM pools under the user's own ID can be included or excluded in the monitoring process.

CAT-ID

Catalog ID of the public volume set to which the ISAM pool is assigned. The specification is part of the identification of an ISAM pool (in addition to the POOL-NAME and SCOPE specifications).

=*HOME-PVS The ID is the catalog ID of the home pubset (default).

=catid Catalog ID of the public volume set to which the ISAM pool has been assigned.

The *POOL structure name can be omitted, but if so it must not occur anywhere else in the statement.

STATUS

Output monitoring status

Function

This statement is used to output the MEASUREMENT STATUS screen.

Format

Operation	Operands
STATUS	

STOP-ISAM-STATISTICS

Terminate monitoring of ISAM pools

Function

This statement is used to terminate monitoring of the ISAM pools previously included in the monitoring process.

Format

Operation	Operands
STOP-ISAM-STATISTICS	

Note

If permission to monitor the ISAM pools has been withdrawn by the SM2 primary administrator, all ISAM pools previously included in the output are automatically excluded.

4.5 BS2000 commands for activating user task monitoring

Any user can have SM2 monitor tasks under his/her own ID, provided the SM2 primary administrator has given permission for user task monitoring (by issuing the SM2 statement `MODIFY-USER-ADMISSION TASK=*ALLOW`. The total number of tasks which can be monitored simultaneously is limited to 16).

Only users who have been assigned the system privilege `SW-MONITOR-ADMINISTRATION` can start or terminate monitoring of any tasks.

Function

The BS2000 command `/START-TASK-MEASUREMENT` is used to specify the tasks to be included in the monitoring process. The SM2 software monitor then records task-specific monitored data and enters this data in a user-specific file.

In addition to task-specific monitoring data, program counter statistics and SVC statistics on program runs can also be requested.

In the case of program counter statistics for counting commands, the program is interrupted at defined intervals (using a timer) and the address of the next command to be executed and contained in the program counter is transferred to the user-specific SM2 output file (registering the number of times the counter sampled the program).

In the case of SVC statistics, all SVC program macros called during task monitoring are recorded, and SVC numbers and macro addresses are also stored in the SM2 output file.

If the BS2000 command `/STOP-TASK-MEASUREMENT` is issued or the task is terminated, user task monitoring ends and the user-specific SM2 output file is closed. In addition, withdrawal of the primary SM2 administrator's permission to monitor tasks (`MODIFY-USER-ADMISSION TASK=*INHIBIT`) as well as deactivation of SM2 (`STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2`) will terminate any currently executing task measurement operations.

The product SM2-PA is provided to analyze the SM2 output file generated for user task monitoring (for further information, please refer to the "SM2-PA" manual [8]).

Note

The user-specific SM2 output file can exceed the limit specified for the user by `PUBLIC-SPACE-LIMIT` in the `ADD-USER-` or `MODIFY-USER-ATTRIBUTES` command, even if `PUBLIC-SPACE-EXCESS=*NO` is specified.

Formats

START-TASK-MEASUREMENT

TSN = *OWN / <alphanum-name 1..4>
,FILE = *STD / ***BY-LINK-NAME**
,PCOUNTER-INTERVAL = *NONE / <integer 1..10000>
,SVC-STATISTICS = *OFF / ***ON**
,LOAD-INFO = *STD / ***DETAILED**

STOP-TASK-MEASUREMENT

TSN = *OWN / <alphanum-name 1..4>

Operands

TSN =

Specifies the task to be monitored or for which monitoring is to be terminated.

TSN = *OWN

The task invoking the command will be monitored or monitoring of that task will be terminated.

TSN = <alphanum-name 1..4>

The task with the TSN specified is monitored or monitoring of that task is terminated. Only users who have been assigned the system privilege SW-MONITOR-ADMINISTRATION can start or terminate monitoring of any tasks. All other users can only monitor their own tasks.

Restriction: The task SM2U, which processes the user-specific SM2 output files, cannot be monitored.

FILE =

Specifies the user-specific SM2 output file.

FILE = *STD

The user-specific SM2 output file contains the file attributes which are defined in the following table.

FILE = *BY-LINK-NAME

The user defines the file name and further file attributes using the corresponding BS2000 commands. The file is assigned via the link name. The link name for the user-specific SM2 output file is PALINK.

PCOUNTER-INTERVAL =

Defines the sampling cycle for command counter statistics (in CPU milliseconds).

PCOUNTER-INTERVAL = *NONE

The command counter is not activated.

PCOUNTER-INTERVAL = <integer 1..10000>

Sampling cycle in CPU milliseconds. The only samples recorded are those with the status TU.

SVC-STATISTICS =

The SVC macros of the task to be measured are recorded and written to the user-specific SM2 output file.

SVC-STATISTICS = *OFF

SVC statistics are not activated.

SVC-STATISTICS = *ON

SVC statistics are activated. The only SVCs recorded are those with the status TU.

LOAD-INFO =

Specifies the point at which the module loading information is to be recorded.

LOAD-INFO = *STD

The module loading information is only recorded when the program is started or terminated (or when monitoring is started or terminated).

LOAD-INFO = *DETAILED

The module loading information is recorded when the program is started (or when monitoring is started) and every time the task performs a load or unload operation.

Command return codes

(SC2)	SC1	Maincode	Meaning/guaranteed messages
	0	CMD0001	No errors
	32	NPS0050	System error in SM2 modules, command rejected
	64	NPS0044	No authorization for monitoring task, command rejected
	64	NPS0045	Task already monitored by SM2
	64	NPS0046	Task monitoring not started by /START-TASK-MEASUREMENT, command rejected
	64	NPS0047	Specified task does not exist
	64	NPS0051	User cannot monitor specified task
	64	NPS0065	Cannot monitor any more tasks
	64	NPS0066	Invalid file attributes for user-specific SM2 output file
	64	NPS0067	DMS code '&00' in the case of a macro '&01' for user-specific SM2 output file

Note

You will find a general description of the command return codes in the “Commands” manual [15].

Attributes of the user-specific SM2 output file

Operand for file creation	FILE =*STD	FILE =*BY-LINK-NAME
Definition of file attributes	Predefined	Optional
File name	\$userid.SM2. TASKSTATISTIK.nnnn ¹⁾	filename
Block length	BUFFER-LENGTH = *STD(SIZE=16)	BUFFER-LENGTH = *STD(SIZE=number) ³⁾
Storage space allocation	SPACE = *RELATIVE (PRIMARY-ALLOCATION=48, SECONDARY-ALLOCATION=48)	SPACE = *RELATIVE (PRIMARY-ALLOCATION=number1, SECONDARY-ALLOCATION= number2) ^{2),3)}
Access method	SAM	No selection option, SAM format is mandatory.
Open mode	EXTEND	No selection option, the existing file is always extended
Format of the data blocks	BLOCK-CONTROL-INFO is defined by the corresponding (class 2) system parameter	BLOCK-CONTROL-INFO = *PAMKEY/ *WITHIN-DATA-BLOCK/ *NO ⁴⁾

¹⁾ nnnn = TSN of the task to be monitored

²⁾ PRIMARY-ALLOCATION and SECONDARY-ALLOCATION each 48 unless defined otherwise by the user.

³⁾ In the case of an SM2 output file assigned using link names, the BUFFER-LENGTH and SPACE attributes are taken from the standard file, unless specified otherwise by the user.

⁴⁾ The BLOCK-CONTROL-INFO=*NO operand is treated like BLOCK-CONTROL-INFO=*WITHIN-DATA-BLOCK, because only SAM format is permitted for the file.

Notes

To generate module-related program counter and SVC statistics, the load information (the load address and length) of each module is required for each module which has been linked into the monitored program or is to be loaded by the monitored program. When the program or measurement is terminated by means of the /STOP-TASK-MEASUREMENT command, SM2 determines this module information and writes it to the SM2 output file.

Under certain circumstances SM2 can only supply incomplete information or none at all:

- If the program to be monitored uses overlay techniques, the module loading information should be recorded using LOAD-INFO=DETAILED. If this is not done, the samples and SVCs for all overlaid modules are assigned to the module loaded at the time monitoring is terminated.
- No information will be supplied for modules/subsystems loaded as SHARED.
- No information will be supplied for programs which are linked and loaded without LSD (List for Symbolic Debugging).
- No information will be supplied for code sections which were not generated with the aid of load events (e.g. if the code was put in memory dynamically requested by means of MOVE commands).

4.6 Writing to the SM2 output file

Introduction

In addition to report output at the terminal and on the printer, consecutive output of monitored data to the SM2 output file is provided for.

At file creation time, a system task is generated for writing to the SM2 output file. This system task terminates when the SM2 output file is closed.

Use of the SM2 output file is recommended

- when system utilization is to be monitored for an extended period of time (standard case, trend monitoring)
- for bottleneck analysis (peak load analysis) if special monitored data is required in addition to the global system monitored data. The corresponding monitoring programs must be activated for this purpose.

Only the SM2 administrator can create and close the SM2 output file.

The file attributes are preset by SM2, but the SM2 administrator can change the preset default options.

The SM2R1 analysis routine converts the monitored data to bar charts and/or tables with statistical data before output.

The SM2R1 data interface (SM2R1 transfer file) is available to users who wish to analyze monitored data using their own programs. For information on the record structure of this file, see the chapter “SM2R1 analysis routine” in Volume 2 of the SM2 manual [21]).

Attributes of the SM2 output file

The SM2 administrator can choose to create an SM2 output file with the preset file attributes or to open an SM2 output file with freely selected attributes.

SM2 output file with preset file attributes

This file is opened with the statement OPEN-LOG-FILE FILE=*STD. SM2 opens a SAM file in output mode and catalogs it under the name SM2.hostname.yyyy-mm-dd.sss.nn.

Here, hostname indicates the assignment to a host, yyyy.mm.dd is the date on which the file was created, sss is the number of the BS2000 session and nn is the consecutive number of the SM2 output file within that session (counted from 1).

SM2 output file with freely selected file attributes

Such a file is created with the statement OPEN-LOG-FILE FILE=*BY-LINK-NAME after the name and attributes have been defined with the ADD-FILE-LINK command.

It is possible to define

- a PAM file in output mode with a freely selectable name, or
- a SAM file with freely selectable open mode and file name.

The following table contains the file attributes which are preset in SM2 or can be defined with the FILE command:

File creation operand	FILE=*STD	FILE=*BY-LINK-NAME	
File attribute definition	Preset	Optional	
File name	SM2.hostname. yyyy-mm-dd.sss.nn	filename ¹⁾	
File link name		SMLINK	
Block size ²⁾	BUFFER-LENGTH = *STD (SIZE=16)	BUFFER-LENGTH = *STD (SIZE=16)	
Storage space allocation	SPACE=*RELATIVE (PRIMARY- ALLOCATION=512, SECONDARY- ALLOCATION=512)	selectable ²⁾	
Access method	SAM	ACCESS-METHOD = *UPAM [,SHARED-UPDATE= YES] ³⁾	ACCESS-METHOD = *SAM
Open mode	OUTIN	OPEN-MODE = *OUTIN	OPEN-MODE = *OUTPUT / *EXTEND
Format of the data blocks	BLOCK-CONTROL- INFO = *WITHIN- DATA-BLOCK	BLOCK-CONTROL-INFO = *PAMKEY / *WITHIN-DATA-BLOCK / *NO	

Table 6: Possible attributes of the SM2 output file

SM2 treats the operand BLOCK-CONTROL-INFO= *NO in the same way as BLOCK-CONTROL-INFO= *WITHIN-DATA-BLOCK.

- 1) It is advisable to select a file name that indicates the date and time of file creation, so as to facilitate file sequencing in the input order required by SM2U1.
- 2) Only block lengths of 16 are used. If no block length is specified, this is set to 16 by SM2. If BUFFER-LENGTH is specified without the SPACE operand, SM2 uses the default value 512 for the primary storage allocation and for the secondary storage allocation.
- 3) ACCESS-METHOD=*UPAM,SHARED-UPDATE=*YES should be selected if the SM2 monitored data is to be analyzed using SM2R1-PC or SM2ONLINE-PC (V1.0 only). This means that BUFFER-OUTPUT = *IMMEDIATE must be selected in the OPEN-LOG-FILE statement.

If the SM2 output file is created on a private volume (additional operands in the CREATE-FILE command VOLUME=...,DEVICE-TYPE=...), the private disk must be defined as "SYSTEM" with /SET-DISK-PARAMETER .. USER-ALLOCATION=*SHARE.

Note

The high block length may result in mismatches, which in turn cause the file to become very large, particularly if BUFFER-OUTPUT=*IMMEDIATE was selected in the OPEN-LOG-FILE statement. However, this setting allows you to minimize the number of "MISSED RECORDS". The majority of mismatches can be eliminated by executing an SM2U1 run, which means the advantages of this setting far outweigh the disadvantages.

"MISSED RECORDS" are records that could not be written to the SM2 output file due to an input/output bottleneck and were therefore lost. They are indicated in the STATUS TABLE screen and by SM2R1 in EVALUATION STATISTICS.

Managing the SM2 output file

PAM output file

PAM output files are formatted in blocks.

The records are not separated by block boundaries.

An SM2 output file created with SHARED-UPDATE=*YES can be analyzed by SM2R1-PC during the monitoring process or converted to a SAM file by SM2U1 and then analyzed using SM2R1.

SAM output file

The SAM output file format is logically similar to the PAM output file format.

An advantage of SAM output files is that they need not be converted before the SM2R1 analysis routine is called (see the chapter “SM2U1 utility routine” in Volume 2 of the SM2 manual [21]).

In the OUTPUT open mode, a new SAM output file can be created or a file can be replaced by another file with the same name.

In the EXTEND open mode, an existing file can be expanded to accommodate further record groups. This obviates the need to call the SM2U1 routine for merging several SM2 output files.

Opening and closing the SM2 output file

The OPEN-LOG-FILE statement opens the SM2 output file, while the CLOSE-LOG-FILE statement closes the SM2output file; likewise the SM2 output file is implicitly closed when SM2 is stopped (STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2).

Notes

After a system breakdown or if the SM2 output file was not closed properly for some other reason, the file must be processed with the SM2U1 routine.

The SM2 output file can exceed the limit specified by PUBLIC-SPACE-LIMIT in the ADD-USER- or MODIFY-USER-ATTRIBUTES command, even if PUBLIC-SPACE-EXCESS=*NO has been specified.

If the SM2 output file is already open, the OPEN-LOG-FILE statement closes it and then opens a new SM2 output file. The monitoring programs DISK, SERVICETIME and TASK, which write monitored data exclusively to the SM2 output file (see table “Overview of the SM2 monitoring programs” on page 34), are not terminated in the process.

An SM2 output file created with SHARED-UPDATE=*YES, can be analyzed during the monitoring process using SM2R1-PC or SM2ONLINE-PC (V1.0 only).

4.7 SM2 monitoring program: examples

Example 1

This simple example illustrates how SM2 is started and stopped again later on.

The following default options are used:

- monitoring cycle: 150 seconds
- sampling cycle: 800 milliseconds

Reports A (ACTIVITY), M (MEMORY), C (CHANNEL) and D (DEVICE) are output at the terminal in automatic output mode. SM2 is interrupted after some time with the BREAK function (terminal key) and terminated.

```
/START-SM2
START
.           (Output of the reports)
.
.
BREAK or K2
/INFORM-PROGRAM
END
```

Example 2

In this example, SM2 is started with data output to the SM2 output file. The file is given the default name SM2.hostname.yyyy.mm.dd.sss.nn. The monitoring cycle is preset to 150 seconds and the sampling cycle to 800 milliseconds. The RESPONSETIME monitoring program is started (in accordance with definition 1), and monitors up to 1024 connections. The default options are used for the number of ranges and for the range limits for the response, think, transaction and wait times.

The SM2 user task is then terminated and monitoring continues in the background.

SM2 is called again after some time to terminate the RESPONSETIME monitoring program and close the SM2 output file.

```

/START-SM2
CALL-ADMINISTRATION-PART
SET-RESPONSETIME-PARAMETER
START-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME
OPEN-LOG-FILE FILE=*STD
END
.
.
.
.
/START-SM2
CALL-ADMINISTRATION-PART
STOP-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME
CLOSE-LOG-FILE
END

```

Example 3

In this example, SM2 is started with data output to the SM2 output file. The file is given the default name SM2.hostname.yyyy.mm.dd.sss.nn. The monitoring cycle is set to 20 seconds and the sampling cycle to 200 ms. The RESPONSETIME monitoring program is started in accordance with definition 1, and monitors up to 1024 connections. The default options are used for the number of ranges and for the range limits for the response, think, transaction and wait times. All monitored data is written to the SM2 output file. At the terminal, the A (ACTIVITY), M (MEMORY), C (CHANNEL) and D (DEVICE) reports are output in automatic output mode.

After some time, SM2 is interrupted with the BREAK function (terminal key) and terminated. However, the SM2 output file remains open and the RESPONSETIME monitoring program continues running.

```

/START-SM2
CALL-ADMINISTRATION-PART
SET-RESPONSETIME-PARAMETER
START-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME
OPEN-LOG-FILE FILE=*STD
MODIFY-MEASUREMENT-PERIODS OFFLINE-PERIOD=20,SAMPLING-PERIOD=200
CALL-EVALUATION-PART
START
.      (Output of the Reports)
.
.
BREAK or K2
/INFORM-PROGRAM
END

```

5 SM2 screen output

The monitoring task collects monitored data during an online monitoring cycle, edits it, and enters it in the central buffer when the online monitoring cycle is completed.

From the central buffer, each SM2 user task transfers the data into its own buffer and enters it in output forms called reports.

These monitored data reports can then either be output at regular intervals throughout the output cycle (automatic output mode), or can be requested individually by the user (controlled mode). See "Statements for controlling reports" on page 151.

In addition, SM2 information screens are available, some in the administration facility only and others in the analysis subinterval and the administration facility. Instead of monitored data, these contain information on the monitoring process and on the status of SM2. The following information screens can be output at the request of the user:

- MEASUREMENT STATUS
- USER MEASURED OBJECTS
- DEFINED PARAMETER
- ACTIVE PARAMETER
- STATUS TABLE
- SELECTED HOSTS

SM2 reports

The monitored data is broken down into factually related groups and entered in various reports. The following reports may be output without the SM2 administrator having to activate an optional monitoring program.

ACF report	Overview of activation control of system task management
ACTIVITY report	Overview of the overall system load
CATEGORY QUEUE report	Overview of the queue occupancy of all categories
CATEGORY WSET report	Overview of the working sets of all categories
CHANNEL report	Overview of the current channel occupancy. The CHANNEL report is a special case: The values BUSY and NON OVERLAP are output by default. For other monitored data, you must use the CHANNEL-IO monitoring program.
CPU report	Overview of CPU utilization for the various CPUs
DEVICE report	Overview of peripheral activities
GLOBAL report	Overview of host-specific monitored data on important system activities
MEMORY report	Overview of main memory load and virtual address space
PCS report	Overview of PCS (Performance Control Subsystem) activity (used only if PCS is installed)
SHARED PVS report	Overview of the I/Os and the queue lengths of the shared pubsets

The following reports can only be output if the SM2 administrator has activated the corresponding optional monitoring program beforehand or authorized the appropriate user monitoring operations (MODIFY-USER-ADMISSION):

BCAM CONNECTION report	Overview of bucket-specific time statistics and information on data sent and received
CATEGORY report	Overview of the consumption statistics of all categories
CHANNEL report	Overview of the current channel occupancy. The CHANNEL report is a special case: The values BUSY and NON OVERLAP are output by default. For other monitored data, you must use the CHANNEL-IO monitoring program.
CMS report	Overview of the activities of the catalog management system (CMS)
DAB report	Overview of the activities of the disk access buffer function (for a more detailed overview, see the DAB-CACHE report)
DISK FILE report	Overview of the file activities of selected disk devices
DLM report	Overview of the activities of the Distributed Lock Manager
FILE report	Overview of the access values of files previously designated
GS report	Overview of the utilization of global storage
GSVOL report	Overview of the utilization of emulated volumes in global storage (GS)
ISAM report	Overview of ISAM buffer management performance
MSCF report	Overview of the monitored data of the MSCF subsystem
NET DEVICE report	Overview of the utilization of network devices (ZAS, mainframe interface controller)
NSM report	Overview of host-specific monitoring values of the Distributed Lock Manager
PCA report	Overview of the monitored on the cache controllers managed by the PCA subsystem (for more detailed information see the PCA CACHE report and the PCA DEVICE report)
PERIODIC TASK report	Overview of the most important utilization data of all tasks: privileged users receive information on all tasks, while nonprivileged users receive information relating only to those tasks under their own user IDs

PFA CACHE report	Overview of the use of various caches (for more detailed information, see the PFA CONTROLLER report)
POSIX report	Output of the monitoring data of the POSIX subsystem
RESPONSETIME report	Overview of the response time behavior throughout the system
SVC report	Overview of the number of SVCs called
SYMMETRIX CONTROLLER report	Overview of the utilization of SYMMETRIX controllers (for more detailed information, see the SYMMETRIX DEVICE report)
SYMMETRIX DEVICE report	Overview of the monitored data on selected controllers
TCP/IP report	Overview of the volume of data transmitted per IP address and port number
TLM report	Overview of the Task Lock Manager calls (for privileged users only)
UTM report	Overview of the consumption statistics for UTM applications and detailed values for the individual applications in the UTM APPLICATION report
VM2000 report	Overview of values for the individual virtual machines of a VM2000 system

SM2 information screens

The information screens are special in that they contain no monitored data, but provide information on the monitoring run and on the SM2 status. These screens are only output if explicitly requested by the user.

The first two screens listed are available in both the analysis subinterval and the administration facility. The others are only available to privileged users in the administration facility.

MEASUREMENT STATUS	Overview of all defined and active monitoring programs
USER MEASURED OBJECTS	Overview of user-monitored objects
DEFINED PARAMETER	Overview of the monitoring parameters and monitored objects defined for the individual monitoring programs
ACTIVE PARAMETER	Overview of the monitoring parameters and monitored objects defined for the individual monitoring programs
STATUS TABLE	Status of the SM2 system tasks and of the subsystems used by SM2
SELECTED HOSTS	Overview of the hosts selected using the SELECT-HOSTS statement

Displaying follow-up screens to information screens

Entry	Meaning
'+' or key K3 or DUE	Page forward
'-' or key K1	Page backward (if you page backward from the first page, the first page is output again)
'--'	Page back to the first page
'END'	Terminate output of follow-on screens

All other entries have the same effect as '+'.
The scroll commands can also be used to output the information screens of various hosts.

Note

It is not possible to page in batch and procedure modes. All follow-on screens are always output.

The header line of each screen contains global information, namely:

CYCLE	Duration of the (online) monitoring cycle in seconds, i.e. period after which the collected values are available for output
SAMPLES	Number of samples taken within the (online) monitoring cycle

These values are output if they are relevant to the current screen.

The host name is output in the top left-hand corner.

The date and time are output in the top right-hand corner of the screen. In the case of statistics screens, this is the point at which the last (online) monitoring cycle was terminated. For all other screens, it is the current time when the screen is output.

In the screens which concern the host network (GLOBAL, NSM, SHARED-PVS), the header line displays the data of the first host listed in the report or of the first selected host. If the list of selected hosts contains the local host, this host is always the first one in the list. The remaining hosts appear in the order in which they were specified by the user in the SELECT-HOSTS statement.

Representation of values in SM2 output screens

The string ***** is output in place of a value if no value is available.

The string <<<<< is output if computation is not possible. The string >digit digit digit ... is output if the value does not fit into the available space.

Special terminals

– 3270 terminals

The reports can also be output on a 3270 terminal. The terminal type is queried (by means of the TSTAT macro) and, if the 3270 terminal is recognized, the 23rd line (blank line) of each report is omitted.

– Terminals with a German keyboard

When reports are output on terminals with a German keyboard, for the sake of clarity, the delimiter “|” is output as “!” rather than “ö”. The TSTAT macro is also used to query the keyboard. In this case, PDN must be generated appropriately. When generating PDN, the parameter DEUTSCH = JA / NEIN (German=yes/no) in the XOPCH macro must be set to JA. The default setting is NEIN (see the “PDN Generation” manual [12]).

– Terminal emulations on the PC

In the case of terminal emulations on the PC (e.g. MT9750), the character set “International” must be set in the keyboard configuration in order to output the delimiter “/”.

Output sequence

Report name	Identifiers			
	N	O	M	P
GLOBAL	N	O		
NSM	N	O	M	
SHARED PVS	N	O		
ACTIVITY				
MEMORY				
CHANNEL		O	M ¹⁾	
DEVICE				
PERIODIC TASK		O	M	
PRIVILEGED FILE			M	
USER FILE				P
RESPONSETIME			M	
ACF				
CATEGORIE QUEUE				
CATEGORIE WSET				
PCS				
DAB		O	M	
DAB CACHE	F	O	M	
CMS		O	M	
UTM		O	M	
UTM APPLICATION	F		M	
PRIVILEGED ISAM			M	
USER ISAM				P
VM2000			M	
TLM			M	
PCA CONTROLLER		O	M	
PCA CACHE	F	O	M	
PCA DEVICE	F	O	M	
CPU		O		
SVC			M	
PFA CACHE		O	M	
PFA CONTROLLER	F	O	M	

Table 7: Output sequence

Report name	Identifiers			
POSIX			M	
CATEGORIE			M	
MSCF			M	
NET DEVICE		O	M	
DLM			M	
GSVOL		O	M	
GS		O	M	
TCP IP		O	M	
BCAM CONNECTION		O	M	
DISK FILE		O	M	
SYMMETRIX CONTROLLER		O	M	
SYMMETRIX DEVICE	F	O	M	

Table 7: Output sequence

- N: Network report
- F: Follow-up screen requested by means of a special statement
- O: Report containing an overflow screen for further monitored objects
- M: Monitoring program must be activated
- P: Monitoring process must be permitted for the nonprivileged user

- 1) The CHANNEL report contains information from the CHANNEL-IO monitoring program as well as standard monitored data.

This sequence is maintained even if the user has suppressed output of some reports. The suppressed records are simply skipped without any time being lost.

The same applies to output in controlled mode.

The reports of a given monitoring cycle can be requested in the above sequence. The data of the next monitoring cycle is output only after the last record of the preceding cycle has been output.

The reports are listed in alphabetical order in the following description.

5.1 SM2 reports

ACF report

This report supplies information on the activation control function (ACF) of the PRIOR task scheduler. The data can be used to assess the internal activation decisions. Data interpretation and consequential actions presuppose intimate familiarity with the activation algorithm used in the PRIOR task scheduler and should therefore be left to system specialists.

Report output

The REPORT ACF statement is used to request the output of the ACF report.

```

D016ZE04 SM2 ACF                                     99-03-24 14:30:00

```

COUNTERS PER MIN							
ACTIVA	FORCDA	PREEMT	INVOCL	INVOCS	MICTSR	YSERSV	FVI
3739.6	0.0	0.0	42.9	3738.1	5013.3	38.4	6712.5

RESOURCE UTILIZATION IN LAST INTERVAL			
RESOURCE	LOW	MEDIUM	HIGH
CPU	64.0 %	24.4 %	11.6 %
MEMORY	100.0 %	0.0 %	0.0 %
PAGING	100.0 %	0.0 %	0.0 %

Monitoring information

COUNTERS PER MIN

The number of calls per minute is output for each of the variables listed in the table.

ACTIVA Total number of task activations per minute

FORCDA Number of task deactivations per minute enforced by ACF

PREEMT	Number of preemptions per minute
INVOCL	Number of "long" ACF invocations per minute
INVOCS	Number of "short" ACF invocations per minute
MICTSR	Number of micro-time-slice runouts per minute
SYSERV	Number of system services runouts per minute
FVI	Number of "Fremd vor Idle" (remote before idle) accesses per minute. "Fremd vor Idle" access: a processor initiates a task from the local Q1 of another processor if its own Q1 is empty, so as not to become idle.

If all counts in a monitoring cycle are zero, SM2 outputs the message NO ACTIVATION CONTROL FUNCTION ACTIVITY IN LAST INTERVAL.

D016ZE04 SM2 ACF		99-03-24 14:30:00					
COUNTERS PER MIN							
ACTIVA	FORCDA	PREEMT	INVOCL	INVOCS	MICTSR	SYSERV	FVI
3739.6	0.0	0.0	42.9	3738.1	5013.3	38.4	6712.5
RESOURCE UTILIZATION IN LAST INTERVAL							
RESOURCE	LOW	MEDIUM	HIGH				
CPU	64.0 %	24.4 %	11.6 %				
MEMORY	100.0 %	0.0 %	0.0 %				
PAGING	100.0 %	0.0 %	0.0 %				

RESOURCE UTILIZATION IN LAST INTERVAL

Utilization of the resources CPU, memory and paging is classified as low, medium and high utilization. The percentages given in the table represent the share of total calls in the monitoring cycle.

ACTIVITY report

This report provides the user with an overview of the most important system activities.

Report output

The REPORT ACTIVITY statement is used to request the output of the ACTIVITY report. POSIX and RESPONSE data can only be output if the corresponding monitoring program is activated.

When analyzing the monitoring results, it should be remembered that the SM2 monitoring task is a system task that is kept active for the duration of the whole monitoring process. Another system task is created for data entry in the SM2 output file, which is likewise kept active for the duration of the whole monitoring process; the same applies to user task monitoring.

When systems comprising a number of logical machines are being monitored, the mean values of the monitored data for all active logical machines are output.

D016ZE04 SM2 ACTIVITY (VM) CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00									
CPU UTILIZATION (2 LM'S)					PCS DATA		IO'S PER SEC		
TU	TPR	SIH	IDLE	/390	SRACT	RDACT	TOTAL	DISK	PAGE
22.6%	22.5%	10.4%	44.3%	0.0%	42739	1.0	402.7	210.5	0.0
TASKS (CURRENT TASK TYPE)					TASKS IN SCHEDULER QUEUES				
BATCH	DIALOG	TP	SYS	#-TASKS	#-ACT	CPU-Q	IO-Q	PAG-Q	
62.0	368.5	46.0	198.8	675.6	95.0	1.7	2.7	0.0	
MEMORY			POSIX DATA			RESPONSE STATISTICS			
NPP	WS-ACT	WS-WACT	SCALL/S	FORK/S	NRESP/S	ART(S)	ATT(S)		
480617	8915	0	490.6	0.3	38.2	0.1	0.6		

Monitoring information

(VM) This abbreviation will be output in the first line if the system monitored is a VM2000 system.

CPU UTILIZATION

(2 LM'S) This additional information indicates how many logical machines were active.

Proportion of CPU time during which the CPU was in the following processor states:

TU	User programs
TPR	Processing of program interrupts
SIH	Analysis of program interrupts
IDLE	Inactive

For systems comprising a number of logical machines, mean values for all active logical machines are output.

The sum of the TU, TPR, SIH and IDLE times is always 100%. For evaluation of the TU and TPR percentages, see section "Accuracy of the SM2 data" on page 343ff.

In the monitoring cycle in which reconfiguration took place, these values and the number of I/O operations are marked as invalid (*).

SM2 supplies a STOP time for each logical machine. This value indicates the proportion of time during which the relevant logical machine was inoperable.

The STOP time is output in the SM2 report CPU and by SM2R1 in the *CPU report group when the parameter PROCESSOR-SPLITTING=*YES is specified.

/390 This value is supplied only on SR2000 machines. It indicates the relative proportion of TU that has elapsed in /390 mode.

Note

The monitored data on CPU utilization and on service units is based on native CPU time (see "CPU time and CPU service units on SR2000" on page 446 of the glossary).

PCS DATA

SRACT Current overall system service rate

RDACT Current delay of all jobs in the overall system

These fields will not contain any data if PCS was inactive during the last monitoring cycle.

IO'S PER SEC

These counts indicate the number of input/output operations (EXCP calls).

TOTAL Sum of all I/O operations per second (including paging)

DISK Number of DMS I/O operations to disk units per second (without paging I/O operations)

PAGE Number of paging I/O operations per second.
All paging operations (reading and writing) are counted.

D016ZE04 SM2 ACTIVITY (VM) CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00										
CPU UTILIZATION (2 LM'S)					PCS DATA			IO'S PER SEC		
TU	TPR	SIH	IDLE	/390	SRACT	RDACT	TOTAL	DISK	PAGE	
22.6%	22.5%	10.4%	44.3%	0.0%	42739	1.0	402.7	210.5	0.0	
TASKS (CURRENT TASK TYPE)					TASKS IN SCHEDULER QUEUES					
BATCH	DIALOG	TP	SYS	#-TASKS	#-ACT	CPU-Q	IO-Q	PAG-Q		
62.0	368.5	46.0	198.8	675.6	95.0	1.7	2.7	0.0		
MEMORY			POSIX DATA			RESPONSE STATISTICS				
NPP	WS-ACT	WS-WACT	SCALL/S	FORK/S	NRESP/S	ART(S)	ATT(S)			
480617	8915	0	490.6	0.3	38.2	0.1	0.6			

Monitoring information

TASKS (CURRENT TASK TYPE)

- BATCH Average number of batch tasks during the monitoring cycle
- DIALOG Average number of interactive tasks during the monitoring cycle
- TP Average number of TP tasks during the monitoring cycle
- SYS Average number of system tasks during the monitoring cycle
- #-TASKS Average number of all tasks logged on to the system during the monitoring cycle

Note

All batch, interactive, TP and system tasks are assigned to the TYPE to which they belong at the time of sampling.

TASKS IN SCHEDULER QUEUES

#-ACT	Average number of all active tasks (including SM2 tasks)
CPU-Q	Average number of tasks waiting to use the processor(s) and of tasks currently using the processor(s) (task queues 0 and 1, without the SM2 monitoring task)
IO-Q	Average number of tasks waiting for I/O termination (tasks in task queue 4 with I/O pend code)
PAG-Q	Average number of tasks waiting for paging (tasks in task queue 3)

D016ZE04 SM2 ACTIVITY (VM) CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00										
CPU UTILIZATION (2 LM'S)					PCS DATA			IO'S PER SEC		
TU	TPR	SIH	IDLE	/390	SRACT	RDACT	TOTAL	DISK	PAGE	
22.6%	22.5%	10.4%	44.3%	0.0%	42739	1.0	402.7	210.5	0.0	
TASKS (CURRENT TASK TYPE)					TASKS IN SCHEDULER QUEUES					
BATCH	DIALOG	TP	SYS	#-TASKS	#-ACT	CPU-Q	IO-Q	PAG-Q		
62.0	368.5	46.0	198.8	675.6	95.0	1.7	2.7	0.0		
MEMORY			POSIX DATA			RESPONSE STATISTICS				
NPP	WS-ACT	WS-WACT	SCALL/S	FORK/S	NRESP/S	ART(S)	ATT(S)			
480617	8915	0	490.6	0.3	38.2	0.1	0.6			

Monitoring information

MEMORY

- NPP Number of pageable pages available in main memory
- WS Internal planning value (PPC = planned page count) which determines the size of the page working set of a task when the next activation decision is taken (unit: 4-Kb pages)
- WS-ACT Sum of the average planned page counts of all active tasks (including the SM2 monitoring task) (task queues 0 to 4)
- WS-WACT Sum of the average planned page counts of all ready interactive tasks (task queue 5, with PCS also task queue 6)

POSIX DATA

SCALL/S Number of all system calls per second

FORK/S Number of FORK system calls per second

These two ACTIVITY report values are the same as the corresponding values of the POSIX screen.

These fields will not contain any values if the POSIX monitoring program is not activated.

RESPONSE STATISTICS

NRESP/S Number of responses per second

ART(S) Average response time in seconds

ATT(S) Average think time in seconds

These three ACTIVITY report response time values are the same as the corresponding values of the global RESPONSETIME report screen.

These fields will not contain any values if the RESPONSETIME monitoring program is not started.

BCAM CONNECTION report

This report supplies information on the data sent and received as well as bucket-specific time statistics for defined connection sets.

Report output

The REPORT BCAM statement is used to request the output of the BCAM CONNECTION report.

The report can only be output if the SM2 administrator has

- defined the monitoring parameters using the SET-BCAM-CONNECTION-PARAMETER statement
- defined the connection sets to be monitored using the ADD-BCAM-CONNECTION-SET statement
- started the monitoring process using the START-MEASUREMENT-PROGRAM TYPE=*BCAM-CONNECTION statement

A separate screen is output for each of the connection sets to be monitored (up to 32). If the number of connections to be monitored within a connection set is zero, no report is output for that connection set.

D016ZE04 SM2 BCAM CONNECTION				CYCLE: 120 S				99-03-24 14:30:00			
SET: DIALOG				# CONNECTIONS: 304							
	TSDU	DATA	BUFFER	%	PWIN	PDATA		SCOM	ZWR		
IN	2.1	0.2	0.0	0	5.7	9.2		0.0	0.0		
OUT	8.8	3.2	0.2	0	3.9	10.9					
INWAIT TIME		REACT TIME		INPROC TIME		OUTPROC TIME					
BUCKET	COUNT	BUCKET	COUNT	BUCKET	COUNT	BUCKET	COUNT				
5	256	500	238	5	255	5	776				
10	2	1000	8	10	3	10	21				
100	0	2000	3	100	0	100	156				
1000	0	4000	5	1000	0	1000	106				
> 1000	0	> 4000	4	> 1000	0	> 1000	2				

Monitoring information

SET	Name of the connection set
# CONNECTIONS	Number of (active) connections in the connection set. The computation includes only those connections that were active both at the current monitoring time and at the end of the preceding monitoring cycle.
IN/OUT	Data sent and received
TSDU	Number of TSDUs per second TSDUs (Transport Data Service Units) correspond to application jobs on BCAM.
DATA	Average volume of data in KB per TSDU
BUFFER	Amount of cache space occupied by unretrieved messages in KB and as a percentage of the maximum buffer size. This value describes the status at the end of the monitoring cycle, and not the mean value over the entire monitoring cycle.
PWIN	Number of packets without user data (Packet WINDOW) per second
PDATA	Number of packets with user data (Packet DATA) per second
SCOM	Number of send jobs per second in the event of a resource bottleneck (Send Call Over Maximum)
ZWR	Number of packets with Zero Window Information per second, i.e. where the partner application does not allow the sending of any further data
INWAIT TIME	Time between the display of a message and the retrieval of that message from the application
REACT TIME	Time between an application's send call and the receive call which immediately precedes it
INPROC TIME	Time between the arrival of a message at BCAM and the retrieval of that message by the application
OUTPROC TIME	Time between a send call and the transfer of the last byte of a message to the network
BUCKET	Limit values in milliseconds of the ranges within which the monitored data is arranged by order of magnitude. > indicates overflow values.
COUNT	Number of messages sent/received in the individual ranges

CATEGORY report

This report provides an overview of the consumption statistics of the individual categories. For each category, the percentage CPU time and the I/O operations for paging and disk devices are output.

Report output

The REPORT CATEGORY statement is used to request the output of the CATEGORY report.

The report can only be output if the SM2 administrator has

- defined the devices to be monitored using the SET-SYSSTAT-PARAMETER statement
- started the monitoring process using the START-MEASUREMENT-PROGRAM TYPE=*SYSSTAT statement

D016ZE04 SM2 CATEGORY		CYCLE: 120 S		99-03-25 10:44:00	
CATEGORY NAME	CPU-TIME (%)	PAGING-IO (1/S)	DISK-IO (1/S)	(2 LM'S)	
SUM	57.3	0.0	544.9		
SYS	5.0	0.0	34.0		
DIALOG	0.7	0.0	5.9		
BATCH	0.8	0.0	6.5		
TP	0.4	0.0	0.6		
TP1	6.9	0.0	22.6		
BATCHDB	0.0	0.0	0.0		
BATCHF	1.6	0.0	99.6		
DIALOG1	6.3	0.0	150.3		
DIALOG2	5.9	0.0	65.1		
DIALOG3	29.2	0.0	160.2		

Monitoring information

This report contains the totals (SUM) for all categories in the first line following the table header. The data for the individual categories (up to 16) is output in the following lines.

The columns contain the following data:

CATEGORY NAME	Task category designation
CPU-TIME (%)	Each category's percentage of the elapsed time in the monitoring cycle (TU+TPR+SIH+IDLE)
PAGING-IO (1/S)	Total number of paging I/Os per second of the monitoring cycle The pseudo-category SUM contains all paging I/Os (read, write). In the individual categories, only the paging I/Os of type read are output.
DISK-IO (1/S)	Total number of I/O operations performed on disk devices per second of the monitoring cycle
(2 LM's)	Number of active logical machines

Note on SR2000

The monitored data on CPU utilization is based on native CPU time (see "CPU time and CPU service units on SR2000" on page 446 of the glossary).

CATEGORY QUEUE report

The PRIOR task scheduler uses three criteria for controlling main memory and CPU utilization by the tasks. These criteria are

- the task category,
- the multiprogramming level, and
- the task priority.

Detailed information on these criteria can be found in the manuals "Introductory Guide to Systems Support" [6] and "Performance Handbook" [5]. In the following, only information that is relevant for the SM2 reports is discussed.

Task category

In BS2000, 16 task categories are distinguished at present, i.e. the 4 standard categories

- SYS (internal tasks and remote batch processing)
- DIALOG (interactive mode)
- BATCH (batch mode)
- TP (inquiry-and-transaction mode)

and up to 12 categories that can be defined freely by the system administrator.

Multiprogramming level

The multiprogramming level denotes the number of tasks of a given category that may use main memory concurrently, i.e. the number of active tasks of a category.

In the /MODIFY-TASK-CATEGORIES command the system administrator uses the category attributes

MIN MPL
MAX MPL
WEIGHT

to specify the relative priority of each category in order to make decisions regarding activation (= allocation of authorization to use main memory).

MIN MPL is used to specify a minimum number of active tasks of a category. The system tries to reach the specified MIN MPL value first.

MAX MPL is used when there is no fixed limit, i.e. activation continues even after the maximum MPL value as long as no resource bottleneck occurs.

WEIGHT is used to control the sequence of activation.

Report output

The REPORT CATQ statement is used to request the output of the CATEGORY QUEUE report.

```
D016ZE04 SM2 CATEGORY QUEUE CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00
```

CATEGORY NAME	TASKS IN SCHEDULER QUEUES							MPL		
	CPU-Q	IO-Q	PAG-Q	ACT	WACT	NADM	ALL	MIN	MAX	WEIGHT
SUM	1.7	2.7	0.0	95.0	0.0	0.0	675.6			
SYS	0.2	0.2	0.0	49.3	0.0	0.0	198.9	30	64	512
DIALOG	0.0	0.0	0.0	0.9	0.0	0.0	33.1	1	8	119
BATCH	0.0	0.0	0.0	1.8	0.0	0.0	9.0	2	4	95
TP	0.0	0.0	0.0	20.4	0.0	0.0	34.0	24	31	115
TP1	0.0	0.0	0.0	2.9	0.0	0.0	12.0	4	10	126
BATCHDB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	2	126
BATCHF	0.1	1.5	0.0	8.3	0.0	0.0	53.0	6	8	40
DIALOG1	0.5	0.6	0.0	3.6	0.0	0.0	327.8	2	9	52
DIALOG2	0.2	0.2	0.0	3.8	0.0	0.0	3.8	3	9	79
DIALOG3	0.7	0.2	0.0	4.0	0.0	0.0	4.0	3	5	55

Monitoring information

This report contains the totals (SUM) for all categories in the first line following the table header. The data for the individual categories (up to 16) is output in the following lines.

The columns contain the following data:

CATEGORY NAME Task category designation

TASK IN SCHEDULER QUEUES

CPU-Q	Average number of tasks of a category waiting to use the processor(s) and of tasks currently using the processor(s) (task queues 0 and 1, excluding the SM2 monitoring task)
IO-Q	Average number of tasks of a category waiting for I/O termination (tasks in task queue 4 with I/O pend code)
PAG-Q	Average number of tasks of a category waiting for paging (tasks in task queue 3)
ACT	Average number of active tasks of a category
WACT	Average number of inactive ready tasks of a category (tasks in task queue 5)
NADM	Average number of tasks of a category waiting for activation (tasks in task queue 6; this value is supplied only if PCS is used)
ALL	Total number of all tasks of a category
MPL	
MIN	Average value of the minimum multiprogramming level used to determine the activation of tasks of a category
MAX	Average value of the maximum multiprogramming level used to determine the activation of tasks of a category. This value is used primarily to prevent overloading by setting a load limit.
WEIGHT	Average weight used to determine the activation sequence for the task categories

In PCS mode the MIN MPL, MAX MPL and WEIGHT values are modified dynamically, i.e. they no longer contain the system administrator specifications.

CATEGORY WSET-Report

Report output

The REPORT CATW statement is used to request the output of the CATEGORY WSET report.

D016ZE04 SM2 CATEGORY WSET CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00

CATEGORY NAME	WS-ALL		WS-ACT		WS-WACT	
	PPC	UPG	PPC	UPG	PPC	UPG
SUM	53579	386151	8915	62377	0	0
SYS	5265	43006	3962	41027	0	0
DIALOG	2052	6901	56	148	0	0
BATCH	486	1352	146	478	0	0
TP	2430	3402	1839	2938	0	0
TP1	2101	4921	455	1181	0	0
BATCHDB	0	0	0	0	0	0
BATCHF	1482	2611	463	1079	0	0
DIALOG1	38278	311814	509	3382	0	0
DIALOG2	430	2498	430	2498	0	0
DIALOG3	1055	9646	1055	9646	0	0

Monitoring information

This report contains the totals (SUM) for all categories in the first line following the table header. The data for the individual categories (up to 16) is output in the following lines. The columns contain the following data:

CATEGORY NAME Task category designation

WS-ALL

PPC Sum of the average planned page counts of all tasks in a category

UPG Sum of the average used page counts of all tasks in a category

WS-ACT

PPC Sum of the average planned page counts of the active tasks in a category

UPG Sum of the average used page counts of the active tasks in a category

WS-WACT

PPC Sum of the average planned page counts of the tasks in a category waiting for activation.

UPG Sum of the average used page counts of the tasks in a category waiting for activation.

For an explanation of the values PPC and UPG, see “paging in BS2000” on page 452 of the glossary.

CHANNEL report

This report contains monitored data on the activity of block multiplexer I/O channels.

Report output

The REPORT CHANNEL statement is used to request the output of the CHANNEL report. The values BUSY and NON OVERLAP are recorded by default.

Other monitored data can be output only if the SM2 administrator has

- defined the channels to be monitored using the SET-CHANNEL-IO-PARAMETER statement
- started the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*CHANNEL .

Data is sorted in accordance with the BUSY value.

Overflow screens may be requested for this report.

D016ZE04 SM2 CHANNEL									CYCLE: 120 S			SAMPLES: 293		99-03-24		14:30:00	
CHANNEL PATH-ID	BUSY	NON OVERLAP	IOS	PAM		BYTES		NODATA IOS	IOS	#PAGES	IOS	#PAGES	IOS	#PAGES	IOS	#PAGES	
				IOS	#PAGES	IOS	#PAGES										
032	20 %	6 %	7.0	336.1	0.0	0.0	0.0	0.0									
024	8 %	3 %	27.3	225.1	0.0	0.0	0.0	0.0									
02F	6 %	2 %	23.3	96.9	0.0	0.0	0.4	0.0									
022	5 %	1 %	24.0	201.2	0.0	0.0	0.0	0.0									
02E	4 %	1 %	0.0	0.0	119.7	24.4	0.0	0.0									
052	4 %	2 %	27.5	226.8	0.0	0.0	0.0	0.0									
054	4 %	2 %	27.3	227.4	0.0	0.0	0.0	0.0									
05F	4 %	0 %	23.1	99.3	0.0	0.0	0.5	0.0									
05A	3 %	0 %	22.6	98.1	0.0	0.0	0.5	0.0									
02A	3 %	1 %	23.3	99.9	0.0	0.0	0.4	0.0									
05E	1 %	1 %	0.0	0.0	71.5	5.0	0.0	0.0									
055	0 %	0 %	0.0	0.0	0.0	0.0	0.0	0.0									
056	0 %	0 %	0.0	0.0	0.0	0.0	0.0	0.0									
058	0 %	0 %	0.5	0.8	0.0	0.0	0.0	0.0									
026	0 %	0 %	0.0	0.0	0.0	0.0	0.0	0.0									
013	0 %	0 %	0.0	0.0	0.8	0.1	0.0	0.0									
02D	0 %	0 %	0.0	0.0	0.0	0.0	0.0	0.0									

Monitoring information

The values BUSY and NON OVERLAP are recorded by default. All other values are output only if the CHANNEL-IO monitoring program has been activated for the monitored channels. In the case of non-monitored channels, blanks are entered.

CHANNEL-PATH-ID	Channel address.
BUSY	Percentage of the monitoring cycle during which the corresponding channel was active.
NON OVERLAP	Percentage of the monitoring cycle during which the corresponding channel was active and all processors were inactive.
PAM	PAM block transfer: Number of I/O operations or number of 2K pages transferred per second.
BYTES	Byte transfer: Number of I/O operations or number of 2K pages transferred per second.
NODATA	Number of I/O operations without data transfer per second.

Notes

- Byte multiplexer channels cannot be monitored, since their activity is of secondary importance. Depending on the channel type, the CPU and the type of device connected, activities which have a load between 0% and 100% are listed. In contrast to block multiplexer channels, high load values do not mean that there is a channel bottleneck, i.e. high load values can be ignored.
- SM2 is not notified of device management commands (see the “Commands” manual [15]). In the monitoring cycle in which the operator enters such commands, the data for the affected channels may be incorrect
- No load values can be determined for CPUs with bus peripherals.
- When using VM2000, please note that the channel occupancy values BUSY and NON OVERLAP always indicate the overall load of the channel. The percentage utilization by an individual guest system cannot be determined. The value NON OVERLAP is therefore insignificant. The monitored data supplied by the CHANNEL-IO monitoring program always refers to the respective guest system.
- In the case of SR2000 systems, the values BUSY and NON OVERLAP cannot be recorded for the BUS channels (channels 0 - F). The value 0 is always output.

CMS report

This report supplies performance data on the CMS (Catalog Management System). Data is collected separately for each catalog. A separate screen is output for each PVS (public volume set) imported during the last monitoring cycle and for all private volumes. The home PVS is marked. Detailed information on CMS is contained in the manuals "HIPLEX MSCF" [4] and "Introductory Guide to Systems Support" [6].

Multiprocessor systems

In a multiprocessor system, the CMS report supplies access data for the tasks of the system which manages the catalog (LOCAL) as well as access data for tasks running on remote computers. This data is listed under REMOTE.

In an integrated shared pubset, access by so-called slave processors is also recorded on the master processor (SHARED identifier).

Report output

The REPORT CMS statement is used to request the output of the CMS report. The report can only be output if the SM2 administrator has started the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*CMS.

D016ZE04 SM2 CMS		CYCLE: 120 S		SAMPLES: 293		99-03-24 14:30:00		
CAT-ID: 20SG(MASTER)			HIT-RATE: 86.2%			#-BMT:128 (RESIDENT)		
REQ. QU	SER. QU	BLOCK QU	USERID QU	CE QU	SFP QU	SMP QU	PH-RD/S	PH-WRT/S
0.03	0.00	0.03	0.03	0.16	0.00	0.00	0.6	0.7
ITEMS	READ	READ-LBN	SCAN	UPD-RENAME	WRITE/CLEAR			
RESPONSETIME (MS)	1	0	2		40			
LOCAL-FILE (/S)	0.9	0.0	2.1	0.0	0.6			
JV (/S)	0.0	0.0	0.0	0.0	0.0			
REMOTE-FILE (/S)	0.0	0.0	0.0	0.0	0.0			
JV (/S)	0.0	0.0	0.0	0.0	0.0			
SHARED-FILE (/S)	0.1	0.0	0.2	0.0	0.0			
JV (/S)	0.0	0.0	0.0	0.0	0.0			

Monitoring information

CAT-ID

Catalog identifier

POOL OF

PRIVATE DISKS This is output for private disks in place of CAT-ID. The monitoring data refers to the F1 label accesses of all private disks.

HOME-PVS The catalog is marked with HOME-PVS if it belongs to the home public volume set.

MASTER If the catalog belongs to an integrated shared pubset and the SM2 executes on the associated master processor, the catalog is identified as the MASTER catalog.

SLAVE If the catalog belongs to an integrated shared pubset and the SM2 executes on the associated slave processor, the catalog is identified as the SLAVE catalog.

HIT-RATE No read access is required if a wanted catalog entry is already in a CMS storage area. HIT-RATE is the percentage of such (non-physical) accesses of all read accesses.

For information on the CMS storage area refer to the "System Installation" manual [7].

#-BMT Number of buffer management tables or buffers used by CMS (refer to the "System Installation" manual [7])

PAGEABLE Buffers are pageable (class 4 memory)

or

RESIDENT Buffers are resident (class 3 memory). Refer to the "System Installation" manual [7].

D016ZE04 SM2 CMS		CYCLE: 120 S		SAMPLES: 293		99-03-24 14:30:00		
CAT-ID: 20SG(MASTER)			HIT-RATE: 86.2%			#-BMT:128 (RESIDENT)		
REQ. QU	SER. QU	BLOCK QU	USERID QU	CE QU	SFP QU	SMP QU	PH-RD/S	PH-WRT/S
0.03	0.00	0.03	0.03	0.16	0.00	0.00	0.6	0.7
ITEMS	READ	READ-LBN	SCAN	UPD-RENAME	WRITE/CLEAR			
RESPONSETIME (MS)	1	0	2		40			
LOCAL-FILE (/S)	0.9	0.0	2.1	0.0	0.6			
JV (/S)	0.0	0.0	0.0	0.0	0.0			
REMOTE-FILE (/S)	0.0	0.0	0.0	0.0	0.0			
JV (/S)	0.0	0.0	0.0	0.0	0.0			
SHARED-FILE (/S)	0.1	0.0	0.2	0.0	0.0			
JV (/S)	0.0	0.0	0.0	0.0	0.0			

Monitoring information

REQ. QU	<p>Average number of requests waiting for the release of a buffer management table or currently using a buffer management table.</p> <p>If the request queue is always long, this means that there are too few buffers compared to the number of CMS calls, i.e. that the number of buffer management tables should be increased. If the maximum number of buffer management tables is already being used, the PVS can be subdivided into smaller pubsets. The desired number of buffer management tables can be specified at system setup using the BMTNUM parameter.</p>
SER. QU	<p>Average number of requests waiting for a serialization lock for exclusively searching a suitable buffer management table or currently using this lock (relevant for system engineers)</p>
BLOCK QU	<p>Average number of requests waiting for an exclusive lock for processing a block of a partition or currently using this lock (a partition corresponds to a user ID)</p>
USERID QU	<p>Average number of requests waiting for a partition lock or currently using this lock. This lock is not normally exclusive.</p>
CE QU	<p>Average number of requests waiting for an exclusive lock for processing a catalog entry of a block of a partition or currently using this lock</p>
SFP QU	<p>Average number of requests to the speedcat for single-feature pubsets</p>
SMP QU	<p>Average number of requests to the catalog index for system-managed pubsets</p>
PH-RD/S	<p>Number of physical read accesses per second (one access operation for each half-page read)</p>
PH-WRT/S	<p>Number of physical write accesses per second (one access operation for each half-page written)</p>

REQ. QU		SER. QU	BLOCK QU	USERID QU	CE QU	SFP QU	SMP QU	PH-RD/S	PH-WRT/S
0.03		0.00	0.03	0.03	0.16	0.00	0.00	0.6	0.7
ITEMS	READ	READ-LBN	SCAN	UPD-RENAME	WRITE/CLEAR				
RESPONSETIME (MS)	1	0	2		40				
LOCAL-FILE (/S)	0.9	0.0	2.1	0.0	0.6				
JV (/S)	0.0	0.0	0.0	0.0	0.0				
REMOTE-FILE (/S)	0.0	0.0	0.0	0.0	0.0				
JV (/S)	0.0	0.0	0.0	0.0	0.0				
SHARED-FILE (/S)	0.1	0.0	0.2	0.0	0.0				
JV (/S)	0.0	0.0	0.0	0.0	0.0				

Monitoring information

The table columns contain the following data:

ITEMS	Name of the monitored variable
READ	Number of read accesses to catalog entries without LBN specification
READ-LBN	Number of read accesses to catalog entries with LBN specification
SCAN	Number of SCAN accesses to catalog entries
UPD-RENAME	Number of write accesses to catalog entries merely involving manipulation of file attributes
WRITE/CLEAR	Number of write or erase accesses to catalog entries

The individual lines contain the following data:

RESPONSETIME (MS)	Global response times for the above data for files and job variables and for all accesses, regardless of their origin (local or remote computer).
LOCAL-FILE (/S)	File entry accesses originating from the local computer.
JV (/S)	Job variable entry accesses originating from the local computer.
REMOTE-FILE (/S)	File entry accesses originating from a remote computer.
JV (/S)	Job variable entry accesses originating from a remote computer.
SHARED-FILE (/S)	File entry accesses by a slave.
JV (/S)	Job variable entry accesses by a slave.

CPU report

The CPU report provides you with an overview of the utilization of the individual processors.

Report output

The REPORT CPU statement is used to request the output of the CPU report. An overflow screen may be requested for this report.

D016ZE04 SM2 CPU		CYCLE: 120 S					99-03-24 14:30:00				
NORMED TO 100 %							MEASURED				
LM	TU %	TPR %	SIH %	IDLE %	/390 %	STOP %	TU %	TPR %	SIH %	IDLE %	
AVG	22.6	22.5	10.4	44.3	0.0	0.0	21.8	21.6	10.1	42.6	
0	22.3	22.3	10.4	44.7	0.0	0.0	21.5	21.5	10.1	43.1	
1	22.9	22.6	10.4	43.9	0.0	0.0	22.1	21.7	10.0	42.2	

Monitoring information

LM	Logical machine number.
	Percentage of time during which the processor was in the following states:
	TU (user programs)
	TPR (processing of program interrupts)
	SIH (analysis of program interrupts)
	IDLE (inactive)
/390 %	This value is only supplied on SR2000 machines. It indicates the relative proportion of TU that has elapsed in /390 mode.
STOP %	Percentage of time during which the processor was not operable

- NORMED** In the NORMED TO 100 % section, the sum of the percentage values for TU, TPR, SIH and IDLE is 100 %.
- MEASURED** The percentage values measured for TU, TPR, SIH and IDLE are output in the MEASURED section.
- When using VM2000, there may be discrepancies between the NORMED value and the MEASURED value (see also section “SM2 together with VM2000” on page 347). In particular, you should remember that the times specified refer to the assigned CPUs of the VM and not to the system as a whole. The average values across all processors are output in the AVG row.
- SR2000:**
Under VM2000/SR, the real CPUs are assigned exclusively to guest systems, i.e. the values under MEASURED are the same as those under NORMED.

Notes

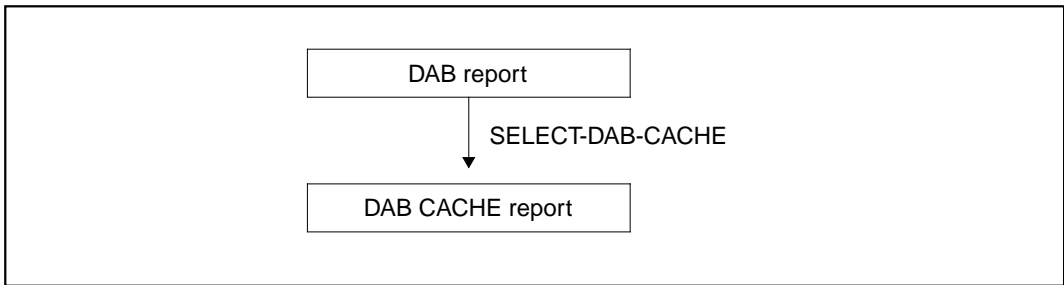
While SM2 records the sum of the TU and TPR times precisely, this total is divided into TU and TPR times on the basis of the proportion of the samples that fall to TU and TPR. This causes statistical inaccuracies in the calculation of TU and TPR times, which can be noticeable in the case of small TU and TPR values (i.e. when a small number of samples fall to TU and TPR). TU or TPR values of 0.0 % (online reports) or 0.0 milliseconds (TIME_IO buffer of the C interface), in particular, should therefore be interpreted with caution. The monitored data on CPU utilization is based on native CPU time (see “CPU time and CPU service units on SR2000” on page 446 of the glossary).

DAB reports

These reports provide information on DAB (Disk Access Buffer) activity (for an explanation of the DAB function, please refer to the “DAB” manual [1]).

The DAB report outputs access statistics for each DAB cache. The DAB CACHE report contains detailed information on the subareas and files served by a particular DAB cache.

The figure below illustrates the hierarchy of reports and shows the statements used to request them:



DAB report

This report supplies monitored data on the various DAB caches.

Report output

The REPORT DAB statement is used to request the output of the DAB report. The report can only be output if the SM2 administrator has started the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*DAB statement. The monitored data output is sorted under the categories READ and WRITE.

Overflow screens may be requested for this report.

D017ZE03 SM2 DAB		CYCLE: 60 S		99-03-24 11:11:02			
CACHE-ID	SIZE	READ (1/S)	RD HIT (%)	WRITE (1/S)	WR HIT (%)	OVER (1/S)	
BUFFER#001 (DAB13V23)	12.0 MB	117.2	99.4	113.7	0.0	0.0	

Monitoring information

Each line of the report contains data on the different DAB caches created by the BS2000 system administrator using the /START-DAB-CACHING command.

The individual columns contain the following data:

CACHE-ID	Name of the DAB cache defined by the user in the CACHE-ID operand of the /START-DAB-CACHING command or assigned internally by DAB. If the DAB cache is located in GS (global storage), the name of the partition is also output in brackets.
SIZE	Size of the DAB cache in KB, MB or GB.
READ (1/S)	Number of read operations per second in all subareas or files served by the DAB cache.

RD HIT (%)	Percentage of read operations without disk access. SM2 compares the number of read operations for which disk access was not required (as the data to be read was already in the cache) with the total number of read operations in all subareas or files served by the DAB cache.
WRITE (1/S)	Number of write operations per second to all subareas or files served by the DAB cache
WR HIT (%)	Percentage of write operations in which data was written to the cache in relation to the total number of write operations to all subareas or files served by the DAB cache
OVER (1/S)	Number of failed attempts to use the DAB cache per second due to an overload

Note

While the SM2 DAB report contains the data of the last monitoring cycle, the BS2000 command /SHOW-DAB-CACHING supplies the READ, WRITE and HIT values since the DAB buffer was set up. The values of the DAB report and those of the SHOW-DAB-CACHING command cannot therefore be compared directly.

DAB CACHE report

This report supplies information on the subareas or files served by a DAB cache.

Report output

The DAB CACHE report is output only at the explicit request of the SM2 user by means of the SELECT-DAB-CACHE statement (see page 173). After this statement has been entered, the user receives during the next monitoring cycle not only the DAB report, but also the DAB CACHE report for the DAB caches he or she has selected.

The DAB CACHE report provides detailed information on the subareas or files served by DAB. It can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*DAB statement.

Overflow screens may be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

It is possible to output information on up to 16 DAB caches.

D017ZE03 SM2 DAB CACHE		CYCLE: 60 S		99-03-24 11:11:02			
ID: BUFFER#001		(DAB13V23) MOD: R		MED:GS SIZE(FIX): 12.0 MB			
VSN / FILE	FIRST-HP, LAST-HP	S	READ (1/S)	RD-HIT (%)	WRITE (1/S)	WR-HIT (%)	OVER (1/S)
*SUMMARY	1-	1	117.2	99.4	113.7	0.0	0.0

Monitoring information

ID Name of the appropriate DAB cache as selected via the ADD-CACHE-ID operand of the SELECT-DAB-CACHE statement. If the DAB cache is located in GS (global storage), the name of the partition is also output in brackets.

MOD

R: The cache is used as a read cache.

W: The cache is used as a write cache.

W/R: The cache is used as a read/write cache.

PFA: The cache is used as a PFA cache.

In the case of the R/W, W and PFA modes, the Force Out parameter is also specified. This indicates whether and at what fill level data written to the cache should be written back to the external data volumes.

N Data is not written back (No)

L Low fill level

H High fill level

MED Cache medium

MM: Main memory

ES: Expanded storage

GS: Global storage

SIZE(FIX) Size of the DAB cache. This can be fixed (FIX) or variable (VAR).
SIZE(VAR) In the case of (VAR), the size at the time of data acquisition is output.

```

DD017ZE03 SM2 DAB CACHE          CYCLE:  60 S          99-03-24 11:11:02
ID: BUFFER#001          (DAB13V23) MOD: R          MED:GS SIZE(FIX): 12.0 MB
+-----+-----+-----+-----+-----+-----+-----+-----+
| VSN / FILE | FIRST-HP, LAST-HP | S | READ | RD-HIT | WRITE | WR-HIT | OVER |
|            |                   |   | (1/S) | (%)    | (1/S) | (%)    | (1/S) |
+-----+-----+-----+-----+-----+-----+-----+
| *SUMMARY  |          1-       | 1 | 117.2 | 99.4   | 113.7 | 0.0   | 0.0   |
+-----+-----+-----+-----+-----+-----+

```

Monitoring information

Each line in this report contains data on the different subareas or files served by the cache with the specified CACHE-ID.

The individual columns contain the following data:

VSN / FILE	VSN of the volume containing the subarea or, if DAB supports a file, the name of the file containing the subarea. If there is more than one subarea on the same volume or in the same file, these subareas are listed in successive lines. The relevant VSN or file name can be found only in the first line of this list. If the file name is longer than 21 characters, it is truncated on the right.
FIRST-HP, LAST-HP	First and last <u>physical</u> block numbers of the subarea, if a volume is listed in column 1. First and last <u>logical</u> block numbers of the subarea, if a file name is listed in column 1.
S	Any subarea which was not served during the last monitoring cycle is marked with an asterisk (*) in this column (S = served). No data is output for this subarea.

The columns READ, RD-HIT, WRITE, WR-HIT and OVER have the same meaning as in the DAB report. However, the information they contain refers to individual subareas or files and not to the DAB cache as a whole.

Note

In order to limit the data recorded, the following modification has been introduced in DAB V6.0A for the DAB-CACHE report:

If the cache is created with `AREA=*BY-SYSTEM(ADM-PFA)` or with `CACHED-FILES=*BY-SYSTEM(USER-PFA)`, the output does not include a list of the files served. Instead, it contains a summary of the entire cache. The (VSN/FILE=*SUMMARY) row of the DAB CACHE report thus contains the same data as the DAB report. As a result, the information in the FIRST-HP, LAST-HP column is irrelevant.

Monitored data on the files served by the cache can be output using the DAB statement `SHOW-DAB-CACHING CACHE-ID=*ALL, INF=*SYSTEM-CACHED-FILES (CACHING=*ACTIVE)`.

DEVICE report

This report contains data on the I/O operations performed with peripheral devices during one monitoring cycle.

It counts the number of EXCP calls per second (see glossary, page 448).

The user can specify up to eight devices in the DEVICE statement for which the data is to be output separately. If more than 8 devices were active in the monitoring cycle, the mnemonic device names of other devices are displayed in the ACTIVE line. The number of further devices depends on the length of the mnemonic names of the devices which have been output.

Report output

The REPORT DEVICE statement is used to request the output of the DEVICE report. The devices defined using the DEVICE statement are output first, followed by all other devices. These are sorted in accordance with their load.

The activities of the communication controllers (CTCCs, TRANSDATA 960s, 8170 controllers, LAN adapters, HNCs) and of GS are not monitored.

Notes

- Following successful reconfiguration in the multiprocessor systems, all I/O counts for the last monitoring cycle are represented by ***** as they may be incorrect.
- SM2 is not notified of device management commands (see the “Commands” manual [15]). In the monitoring cycle in which such commands are entered, incorrect data may be produced for the affected devices.

D016ZE04 SM2 DEVICE							CYCLE: 120 S		SAMPLES: 293		99-03-24 14:30:00	
IO(/S)	TOTAL	DISK	PAGE	TAPE	PRINT	OTHER						
	402.7	210.5	0.0	0.2	0.0	192.0						

MN	DEVICE	TYPE	VOLUME	ACTIVITY			UTILIZATION					
				IO(/S)	Q-LGTH	IO%	PG%	0	20	40	60	80
431C	DISK	20SC.1	50.5	0.3	25		-----					
4354	DISK	20SC.4	23.7	0.3	17		----					
4350	DISK	20SL.0	26.7	0.1	16		----					
4310	DISK	20SL.0	26.4	0.1	14		----					
4361	DISK	20SG.0	9.6	3.6	8		--					
4342	DISK	WORK01	9.4	0.0	8		--					
4343	DISK	QVS2.0	2.3	0.0	5		-					
4338	DISK	20WI.1	1.3	0.0	5		-					

ACTIVE: EV 435C 436B 4303 4335 4356 4313 434C 4378 4304 431A 4344 4312

Monitoring information

- IO(/S)** Number of I/O operations (EXCP calls) per second (for information on paging operations, counting I/O operations and their duration, refer to page 445 of the glossary)
- TOTAL** Total number of input/output operations per second, i.e. the sum of all following columns
- DISK** Number of disk I/O operations of the Data Management System (without paging I/Os)
- PAGE** Number of I/O operations with paging devices in response to paging requests; all types of paging operations are counted.
- TAPE** Number of tape I/O operations
- PRINT** Number of output operations on all printers
- OTHER** Number of I/O operations of all other active devices

D016ZE04 SM2 DEVICE							CYCLE: 120 S		SAMPLES: 293		99-03-24 14:30:00		
IO(/S)	TOTAL	DISK	PAGE	TAPE	PRINT	OTHER							
	402.7	210.5	0.0	0.2	0.0	192.0							
MN	DEVICE	TYPE	VOLUME	ACTIVITY		IO%	PG%	UTILIZATION					
				IO(/S)	Q-LGTH			0	20	40	60	80	100%
431C	DISK	20SC.1	50.5	0.3	25		-----						
4354	DISK	20SC.4	23.7	0.3	17		----						
4350	DISK	20SL.0	26.7	0.1	16		----						
4310	DISK	20SL.0	26.4	0.1	14		----						
4361	DISK	20SG.0	9.6	3.6	8		--						
4342	DISK	WORK01	9.4	0.0	8		--						
4343	DISK	QVS2.0	2.3	0.0	5		-						
4338	DISK	20WI.1	1.3	0.0	5		-						
ACTIVE: EV 435C 436B 4303 4335 4356 4313 434C 4378 4304 431A 4344 4312													

Monitoring information

DEVICE

MN Mnemonic device names of the eight most active devices or of the devices specified in the DEVICE statement

TYPE Device type code

VOLUME Designation of the volumes installed for the entire duration of the last monitoring cycle. If no volume has been specified, either the volume was changed during the last monitoring cycle, or access to the volume table was not possible at the time the query was made, due to internal system-related reasons.

ACTIVITY

IO(/S) Number of input/output operations per second for the corresponding device

Q-LGTH Average length of the device queue, including jobs currently being serviced

D016ZE04 SM2 DEVICE							CYCLE: 120 S		SAMPLES: 293		99-03-24 14:30:00		
IO(/S)	TOTAL	DISK	PAGE	TAPE	PRINT	OTHER							
	402.7	210.5	0.0	0.2	0.0	192.0							
MN	DEVICE	TYPE	VOLUME	ACTIVITY		UTILIZATION							
				IO(/S)	Q-LGTH	IO%	PG%	0	20	40	60	80	100%
431C	DISK	20SC.1	50.5	0.3	25			I	I	I	I	I	I
4354	DISK	20SC.4	23.7	0.3	17			I	I	I	I	I	I
4350	DISK	20SL.0	26.7	0.1	16			I	I	I	I	I	I
4310	DISK	20SL.0	26.4	0.1	14			I	I	I	I	I	I
4361	DISK	20SG.0	9.6	3.6	8			I	I	I	I	I	I
4342	DISK	WORK01	9.4	0.0	8			I	I	I	I	I	I
4343	DISK	QVS2.0	2.3	0.0	5			I	I	I	I	I	I
4338	DISK	20WI.1	1.3	0.0	5			I	I	I	I	I	I
ACTIVE: EV 435C 436B 4303 4335 4356 4313 434C 4378 4304 431A 4344 4312													

Monitoring information

UTILIZATION

IO% PG% Percentage of time during which the device was active during the monitoring cycle due to DMS input/output operations (IO) or paging input/output operations (PG)

One dash represents 4%.

The time data of the most active devices or of the devices specified in the DEVICE statement is given (for the mnemonic devices names, see "DEVICE Select devices with monitored data" on page 160).

In the case of disk devices, the character "P" represents the share of monitoring cycle time of the paging I/O operations.

ACTIVE Mnemonic device names of further active devices, including active devices whose individual output priority has been withdrawn. The devices are sorted according to their activity in the monitoring cycle. The maximum number of devices which can be output depends on the length (MN value of 2 or 4 bytes).

DISK FILE report

This report contains information on the input/output operations on all files of selected disk devices.

Report output

The REPORT DISK_FILE statement is used to request the output of the DISK FILE report. The report can only be output if the SM2 administrator has

- defines the disk devices to be monitored using the SET-DISK-FILE-PARAMETER statement
- started the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*DISK-FILE

The statistics for each disk devices are output in a separate screen. Overflow screens may also be requested for this report. The monitored data output is sorted under the categories READ and WRITE.

D016ZE04 SM2 DISK FILE		CYCLE: 120 S	99-03-24 14:30:00
READ	WRITE	FILENAME	(MN: 4310, VSN: 20SL.0)
0.0	0.0	*OVERRUNS	
28.4	2.5	:20SL:\$TSOS.TSOSCAT	
14.1	0.0	:20SL:\$TSOS.SINLIB.POSIX-BC.040.SHELL	
3.8	0.0	:20SL:\$TSOS.SYS.AIDITO	
1.3	0.0	:20SL:\$TSOS.SYS.SDF.LOGON.SYSPROC	
0.0	0.8	:20SL:\$TSOS.SYSSRPM	
0.5	0.0	:20SL:\$TSOS.PLAMLIB	
0.3	0.1	:20SL:\$SYSSPOOL.PRFILE	
0.3	0.0	:20SL:\$TSOS.SYSLNK.SM2.130.SM2	
0.3	0.0	:20SL:\$TSOS.SYSLNK.CRTE	
0.2	0.0	:20SL:\$TSOS.SYSPRG.BCAM.150	
0.2	0.0	:20SL:\$TSOS.SYSLNK.EDT.166	
0.1	0.0	:20SL:\$TSOS.SYSSDF.LMS.032.112	
0.1	0.0	:20SL:\$TSOS.LMS	
0.0	0.0	:20SL:\$TSOS.SYSSDF.COBOL85-R.023	
0.0	0.0	:20SL:\$TSOS.SYSMES.EDT.166	
0.0	0.0	:20SL:\$TSOS.EDT	
0.0	0.0	:20SL:\$TSOS.EDOR	

Monitoring information

READ	Number of read operations per second
WRITE	Number of write operations per second
FILENAME	Name of the monitored file. The first row always contains the value *OVERRUNS. This entry includes all input/output operations that could not be assigned to a file entry because the internal SM2 table was full during the monitoring cycle. It is generally set to zero or to a low value. In the FILENAME column, not all names are in the format: <catid>:<\$userid>.<filename>. In the case of special disk accesses (e.g. by DAB), this format is not applied.
MN	Mnemonic device name of the monitored disk device
VSN	VSN of the monitored disk device

DLM report

This report contains monitored data from the DLM (Distributed Lock Manager).

Report output

The REPORT DLM statement is used to request the output of the DLM report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*DLM.

D016ZE04 SM2 DLM		CYCLE: 120 S	99-03-24 14:30:00	
		TU	TPR	NSM
NUMBER ENQUEUE	(1/S)	0.0	1.5	1.4
NUMBER CONVERT	(1/S)	0.0	40.6	40.6
NUMBER DEQUEUE	(1/S)	0.0	1.5	1.4
NUMBER INFORMATION	(1/S)	0.0	0.2	0.0
NUMBER GRANT EVENTS	(1/S)	0.0	0.0	1.4
NUMBER RELEASE EVENTS	(1/S)	0.0	0.0	0.0

Monitoring information

The individual entries have the following meanings:

NUMBER ENQUEUE (1/S)

Number of enqueue lock requests per second from TU, TPR or NSM

NUMBER CONVERT (1/S)

Number of convert lock requests per second from TU, TPR or NSM

NUMBER DEQUEUE (1/S)

Number of dequeue lock requests per second from TU, TPR or NSM

NUMBER INFORMATION (1/S)

Number of information lock requests per second
from TU or TPR. The "NSM" column always contains the value 0.

NUMBER GRANT EVENTS (1/S)

Number of grant events (information about lock allocations)
per second

via TU contingency,
via bourse (or user eventing),
from NSM (information about lock allocations on the local host).

NUMBER RELEASE EVENTS (1/S)

Number of release events (requests for lock releases)
per second

via TU contingency,
via bourse (or user eventing),
from NSM (requests for lock release from remote hosts).

FILE reports

The FILE reports contain monitored data on access to a file.

Report output

The REPORT FILE statement is used to request the output of the FILE reports.

The FILE report consists of the following sections:

- the USER FILE report for files included in the monitoring process by specific users
- the PRIVILEGED FILE report for privileged users

The USER FILE report can only be output if the SM2 administrator has

- permitted file monitoring using the statement MODIFY-USER-ADMISSION
FILE=*ALLOW
- included files in the monitoring process using the FILE statement

The PRIVILEGED FILE report can only be output if the SM2 administrator has

- defined files using the ADD-FILE statement
- permitted file monitoring using the statement START-MEASUREMENT-PROGRAM
TYPE=*FILE

Outputting monitored data in the FILE reports

In the **USER FILE report**, the nonprivileged user obtains precisely those values for the files he or she included in the monitoring process within the nonprivileged file statistics.

In the **PRIVILEGED FILE report**, the privileged user is shown the values for all the files included in the monitoring process by an SM2 administrator for the monitoring program. These values are also written to the SM2 output file.

The layout of the FILE reports for nonprivileged and privileged users is identical, except for the headers (the former are entitled SM2 USER FILE REPORT, the latter are entitled SM2 PRIVILEGED FILE REPORT).

D016ZE04 SM2 PRIVILEGED FILE CYCLE: 120 S

99-03-24 14:30:00

WAIT	CHECK	READ	WRITE	TIME	FILENAME
0.0	0.0	0.0	0.0	*	:20SX:\$TSOS.TSOSCAT
0.0	0.0	0.0	0.0	*	:20SW:\$TSOS.TSOSCAT
0.0	0.0	0.0	0.0	*	:20S2:\$TSOS.TSOSCAT
0.0	0.0	0.0	0.0	*	:2S06:\$TSOS.TSOSCAT
0.0	0.0	0.0	0.0	*	:20S7:\$TSOS.TSOSCAT
0.0	0.0	0.0	0.0	16.3	:20RZ:\$TSOS.TSOSCAT
0.5	0.0	0.5	0.0	2.4	:20SQ:\$TSOS.TSOSCAT
0.0	0.0	0.0	0.0	21.2	:20SL:\$TSOS.EQUISAMQ
0.0	0.0	0.0	0.0	*	:20S6:\$TSOS.SYSEAM
0.0	0.0	0.0	0.0	*	:20SX:\$TSOS.SYSEAM
0.0	0.0	0.0	0.0	*	:20S2:\$TSOS.SYSEAM
0.0	0.0	0.0	0.0	*	:20S7:\$TSOS.SYSEAM
0.0	0.0	0.0	0.0	13.6	:20S6:\$NEI.SM2.SAM.MANUAL.V13.0

Monitoring information

WAIT

The number of WAIT operations per second is incremented if:

- reading from the file to main memory was initiated and the task is waiting for the end of the read operation, or
- writing from main memory to the file was initiated and the task is waiting for the end of the write operation.

WAIT operations not combined with read or write operations are ignored.

CHECK

The number of CHECK operations per second is incremented whenever a check is made to see whether the preceding write operation was performed properly (read-after-write check). Only those read-after-write checks are counted which were initiated together with a write operation.

READ

Number of READ operations per second

WRITE

Number of WRITE operations per second

TIME Average duration of an input/output operation in milliseconds; * means that no input/output operation has taken place.

Note

The value shown here represents the logical duration of the input/output operation from initiation to completion of the job from the point of view of the software. In the case of asynchronous input/output operations, this may be considerably greater than the hardware time.

The < sign indicates that the value cannot be fully accommodated in the field.

FILENAME Name of the monitored file

In the case of composite PAM operations such as Read and Wait for Termination, both values are incremented (READ and WAIT).

GLOBAL report

The GLOBAL report contains data on a host network. It provides the user with an overview of the most important system activities (CPU utilization, I/O rates, size of pageable memory) for each host.

Report output

The REPORT GLOBAL statement is used to request the output of the GLOBAL report.

Overflow screens may also be requested for this report.

The SM2 administrator can use the SELECT-HOSTS statement to select the hosts to be displayed in the GLOBAL report. If these include the local host, this is output in the first line, followed by the remaining hosts in the order specified in the SELECT-HOSTS statement. The header contains information on the first host for which valid data is found. If valid information cannot be found on a particular host, the string “***” appears in place of the monitored data.

For further information, please refer to the description of the SELECT-HOSTS statement on page 110.

D016ZE04 SM2 GLOBAL										CYCLE: 120 S		99-03-24 14:30:00	
HOST	LM	CPU UTILIZATION (%)				MEMORY	IO'S (1/S)						
		TU	TPR	SIH	IDLE		NPP	TOTAL	DISK	PAGE			
D016ZE04	2	22.6	22.5	10.4	44.3	480617	402.7	210.5	0.0				
D016ZE02	5	0.6	0.6	1.8	96.8	182773	79.5	53.2	0.0				
D016ZE07	3	33.3	26.4	12.4	27.7	122570	555.5	321.5	4.3				

Monitoring information

The monitored data displayed here is the same as that of the ACTIVITY report.

GS report

This report supplies partition-specific monitored data on the utilization of global storage.

Report output

The REPORT GS statement is used to request the output of the GS report.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*GS.

Overflow screens may also be requested for this report.

The monitored data output is sorted in accordance with the total number of READ and WRITE operations.

D017ZE03 SM2 GS		CYCLE: 60 S		99-03-24 11:11:02	
PARTITION	UNIT	READ		WRITE	
		(1/S)	(KB/S)	(1/S)	(KB/S)
DAB13V23	1	146.0	239.8	163.3	300.3
GSV0300	1	0.0	0.0	0.0	0.0
GSV0301	1	0.0	0.0	0.0	0.0
GSV0302	1	0.0	0.0	0.0	0.0

Monitoring information

PARTITION Name of the partition in global storage

UNIT Unit on which the partition lies.

A dual partition consists of a contiguous address space on both GS units, whose start addresses are differentiated by the HW constant "DUPLICATION-BOUNDARY".

READ Number of read operations per second and number of KB transferred per second

WRITE Number of write operations per second and number of KB transferred per second

GSVOL report

This report provides monitored data on emulated volumes in global storage.

Report output

The REPORT GSVOL statement is used to request the output of the GSVOL reports. This report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*GSVOL.

Overflow screens may also be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

D017ZE03 SM2 GSVOL		CYCLE: 60 S		99-03-20 11:11:02	
DEVICE-MN	UNIT	READ (1/S)	WRITE (1/S)		
0381	1	822.2	355.2		
0380	1	765.2	336.4		
0382	1	787.3	290.3		
0383	1	0.2	0.1		

Monitoring information

DEVICE-MN Mnemonic device name of the emulated volume

UNIT GS unit on which the volume was created
A dual partition consists of a contiguous address space on both GS units, whose start addresses are differentiated by the HW constant "DUPLICATION-BOUNDARY".

READ (1/S) Number of read I/O operations

WRITE (1/S) Number of write I/O operations

When comparing with the values of the GS report, note that in the GSVOL report the I/O operations refer to the emulated volumes. One I/O operation can hide several GS accesses (additional key, block length).

ISAM reports

These reports provide performance data on ISAM buffer management.

Report output

The REPORT ISAM statement is used to request the output of the ISAM report.

The ISAM report consists of the following sections:

- the USER ISAM report for ISAM pools included in the monitoring process by specific users
- the PRIVILEGED ISAM report for privileged users

The USER ISAM report can only be output if the SM2 administrator has

- permitted ISAM pool monitoring using the MODIFY-USER-ADMISSION ISAM=*ALLOW statement
- included ISAM pools in the monitoring process using the START/CHANGE-ISAM-STATISTICS statement

The PRIVILEGED ISAM report can only be output if the SM2 administrator has

- defined ISAM pools using the ADD-ISAM-POOL statement
- permitted ISAM pool monitoring using the START-MEASUREMENT-PROGRAM TYPE=*ISAM statement

Outputting monitored data in the ISAM reports

In the **USER ISAM report**, the nonprivileged user obtains exactly those values for the ISAM pools he/she has included in the monitoring process, provided that ISAM pool monitoring is permitted.

In the **PRIVILEGED ISAM report**, the privileged user is shown the values for all the ISAM pools included in the monitoring process by an SM2 administrator for the ISAM monitoring program. These values are also written to the SM2 output file.

The layout of the ISAM reports for nonprivileged users and for privileged users is identical, except for the header (report entitled SM2 USER ISAM REPORT for nonprivileged users, and SM2 PRIVILEGED ISAM REPORT for privileged users).

D016ZE04 SM2 PRIVILEGED ISAM CYCLE: 120 S 99-03-24 14:30:00

POOLNAME	SC	CAT-ID	UID/TSN	FIX-OP	FIX-HIT	FIX-WAIT	SLT-WAIT	FXD PGS	SIZE
\$SYS01	HS	20SL		0.3	92.1%	0.0%	0.0%	1.2%	82
SRPMP00L	TA	20SL	RP01	0.0	99.9%	0.0%	0.0%	0.7%	138
SESF00L	HS	20SL		0.0	99.4%	0.0%	0.0%	0.3%	524
SDFP00LN	TA	20SL	7IY4						

Monitoring information

POOLNAME	Name of the monitored ISAM pool
SC	Identifies the relevant ISAM pool as global (HOST-SYSTEM, HS), task-specific (TASK, TA) or user-specific (USER-ID, UI)
CAT-ID	Catalog ID (PVS ID) of the public volume set specified for the monitored ISAM pool
UID/TSN	Task sequence number (TSN) of the task under which a task-specific ISAM pool was created or user ID (USER-ID) under which a user-specific ISAM pool was created. This column remains empty for global ISAM pools.
FIX-OP	Number of FIX operations per second (number of FIX hits + number of FIX IOs)
FIX-HIT	Percentage of FIX operations where the desired buffer page is already in the ISAM pool (i.e. no read operation from disk is required) relative to the total number of all FIX operations
FIX-WAIT	Percentage of FIX operations requiring a waiting period until one or more buffer pages are released relative to the total number of all FIX operations
SLT-WAIT	Percentage of RESERVE-SLOT operations leading to a wait state for the requested task due to a slot bottleneck relative to the total number of all RESERVE-SLOT operations

FXD PGS	Mean percentage of fixed pages relative to the number of all ISAM pool pages used for buffering in the last monitoring cycle
SIZE	Size of the ISAM pool in 4-KB pages (excluding some administration data)

If an ISAM pool is never addressed during a monitoring cycle, the last five columns contain blanks.

MEMORY report

This report provides an overview of main memory and virtual address space utilization.

Report output

The REPORT MEMORY statement is used to request the output of the MEMORY report.

D016ZE04 SM2 MEMORY (SYS) CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00									
MAIN MEMORY FRAMES						WORK. SET (PPC)			
TOTAL	PAGEABLE	R-ONLY-Q	RD-WR-Q	SYS-GLOB	TASK-LOC	ALL	ACT		
499713	480617	37969	56452	386164	0	53579	8915		
PAGING AREA FRAMES			# PAGES IN VIRTUAL MEMORY					USED PAGES	
TOTAL	GS	USED	CL1	CL2	CL3	CL4	CL4-S	ACT	
1536363	0	692412	721	2076	14533	32301	584	62377	
PAGE FAULTS			PAGE TRANSFERS		PAGE TRANSFERS (GS)				
TOTAL	1ST-READ	RECLAIMS	READ	WRITE	READ	WRITE			
1168.9	1157.2	11.6	0.0	0.0	0.0	0.0			

Monitoring information

The type of main memory management specified at system generation is displayed in the first line of the MEMORY report and is enclosed in parentheses.

SM2 MEMORY REPORT (SYS)

For system-global management

SM2 MEMORY REPORT (SEL)

For selective management

SM2 MEMORY REPORT (***)

Type of main memory management (modified during the last cycle)

MAIN MEMORY FRAMES

TOTAL	Total number of 4-Kb pages in main memory
PAGEABLE	Number of pageable 4-Kb pages in main memory
R-ONLY-Q	Average number of 4-Kb read-only pages in the free pool (read-only queue)
R-WR-Q	Average number of 4-Kb read/write pages in the free pool (read/write queue)
SYS-GLOB	Average number of system-globally managed 4-Kb page frames
TASK-LOC	Average number of task-locally managed 4-Kb page frames
WORK. SET (PPC)	
ALL	Sum of planned page counts (PPCs) of all tasks in the system
ACT	Sum of planned page counts of all active tasks in the system (including the SM2 tasks) (Task queues 0-4)

D016ZE04 SM2 MEMORY (SYS) CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00

MAIN MEMORY FRAMES						WORK. SET (PPC)	
TOTAL	PAGEABLE	R-ONLY-Q	RD-WR-Q	SYS-GLOB	TASK-LOC	ALL	ACT
499713	480617	37969	56452	386164	0	53579	8915

PAGING AREA FRAMES			# PAGES IN VIRTUAL MEMORY					USED PAGES
TOTAL	GS	USED	CL1	CL2	CL3	CL4	CL4-S	ACT
1536363	0	692412	721	2076	14533	32301	584	62377

PAGE FAULTS			PAGE TRANSFERS		PAGE TRANSFERS (GS)	
TOTAL	1ST-READ	RECLAIMS	READ	WRITE	READ	WRITE
1168.9	1157.2	11.6	0.0	0.0	0.0	0.0

Monitoring information

PAGING AREA FRAMES

TOTAL	Maximum number of pageable 4-Kb pages in all paging devices
GS	Number of 4-Kb pages used for paging in global storage (GS)
USED	Number of pageable 4-Kb pages used in all paging devices

Note

The TOTAL value includes the pages on disk as well as those in global storage, if any is provided.

PAGES IN VIRTUAL MEMORY

CL1	Number of class 1 pages (4 Kb) in the virtual address space
CL2	Number of class 2 pages (4 Kb) in the virtual address space
CL3	Number of class 3 pages (4 Kb) in the virtual address space
CL4	Number of all class 4 pages (4 Kb) in the virtual address space
CL4-S	Number of class 4 pages (4 Kb) for shareable modules in the virtual address space; CL4-S is included in CL4

USED PAGES

ACT	Sum of used page counts (UPG) of all active tasks in the system
------------	---

D016ZE04 SM2 MEMORY (SYS) CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00									
MAIN MEMORY FRAMES						WORK. SET (PPC)			
TOTAL	PAGEABLE	R-ONLY-Q	RD-WR-Q	SYS-GLOB	TASK-LOC	ALL	ACT		
499713	480617	37969	56452	386164	0	53579	8915		
PAGING AREA FRAMES				# PAGES IN VIRTUAL MEMORY					USED PAGES
TOTAL	GS	USED		CL1	CL2	CL3	CL4	CL4-S	ACT
1536363	0	692412		721	2076	14533	32301	584	62377
PAGE FAULTS			PAGE TRANSFERS			PAGE TRANSFERS (GS)			
TOTAL	1ST-READ	RECLAIMS	READ	WRITE		READ	WRITE		
1168.9	1157.2	11.6	0.0	0.0		0.0	0.0		

Monitoring information

PAGE FAULTS

TOTAL Number of page fault interrupts per second (without "genuine" paging errors)

1ST-READ Number of page fault interrupts per second caused by the first access to a 4-Kb page

RECLAIMS Number of page fault interrupts per second for which the addressed 4-Kb page is still in main memory

Note

The TOTAL value also contains the number of page fault interrupts leading to transfer from/to global storage, if any.

PAGE TRANSFERS

READ	Number of 4-Kb pages read per second
WRITE	Number of 4-Kb pages written per second

Note

The sum of read and written pages does **not** match the IO'S PER SEC PAGE value of the ACTIVITY report. Memory management tries to group up to eight 4-Kb page-out pages (WRITE) for one input/output operation (SDV or START-SUCHANNEL). Each READ causes one 4-Kb page to be transferred, i.e. causes one input/output operation (SDV or START-SUBCHANNEL) (see also section "page fault" on page 451 of the glossary).

The READ and WRITE values do not include transfers from/to global storage, if any.

PAGE TRANSFERS (GS)

READ	Number of 4-Kb pages read per second from global storage (GS)
WRITE	Number of 4-Kb pages written per second to global storage (GS)

MSCF report

This report contains monitored data from the MSCF subsystem.

Report output

The REPORT MSCF statement is used to request the output of the MSCF reports. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*MSCF.

D016ZE04 SM2 MSCF		CYCLE: 120 S		99-03-24 14:30:00	
		# SERVER TASKS		TASK LIMITS	
CALLS	39.8 /S	ORIGINAL	4	MAXIMAL	20
SHORTAGES	0.2 /S	ACTUAL	5	FLOW SET	15
HOSTS	6	OCCUPIED	0	FLOW RESET	10
REQUEST WITH REPLY			FLOW STATE		
AVG TIME	17 MS	AVG TIME	***** MS	# FLOWS	0.0 /S
AVG WAIT	16 MS	ACTUAL STATE	NO FLOW		
# REQUESTS	2.6 /S				

Monitoring information

The entries have the following meanings:

- CALLS** Number of send jobs per second
- SHORTAGES** Number of send jobs rejected per second due to line overload
- HOSTS** Number of hosts entered in MSCF with which the local host maintains a connection (excluding the local host)

SERVER TASKS

ORIGINAL	Number of server tasks originally requested
ACTUAL	Number of current server tasks
OCCUPIED	Number of current server tasks which could cause a bottleneck

These values merely indicate the status at the end of the monitoring cycle and do not represent the mean value over the entire monitoring cycle.

TASK LIMITS

MAXIMUM	Maximum number of server tasks
FLOW SET	Limit value for the number of occupied server tasks as of which the FLOW state is set
FLOW RESET	Limit value for the number of occupied server tasks as of which the FLOW state is reset

The MSCF subsystem sets its own FLOW or NO FLOW state, depending on the number of occupied server tasks. If the FLOW state is set, the maximum number of server tasks can be exceeded.

For further information on server tasks and their limit values, see the "HIPLEX MSCF" manual [4].

D016ZE04 SM2 MSCF		CYCLE: 120 S		99-03-24 14:30:00		
			# SERVER TASKS		TASK LIMITS	
CALLS	39.8 /S	ORIGINAL	4	MAXIMAL	20	
SHORTAGES	0.2 /S	ACTUAL	5	FLOW SET	15	
HOSTS	6	OCCUPIED	0	FLOW RESET	10	
REQUEST WITH REPLY			FLOW STATE			
AVG TIME	17 MS	AVG TIME	*****	MS		
AVG WAIT	16 MS	# FLOWS		0.0 /S		
# REQUESTS	2.6 /S	ACTUAL STATE		NO FLOW		

Monitoring information

REQUEST WITH REPLY

- AVG TIME Average total time of REQUEST WITH REPLY jobs from the beginning of the job to the first reply, in milliseconds
- AVG WAIT Average wait time with REQUEST WITH REPLY jobs for the first reply from the receiving host, in milliseconds
- # REQUESTS Number of REQUEST WITH REPLY jobs per second

FLOW STATE

- AVG TIME Average dwell time in the FLOW state; only the transitions from FLOW to NO FLOW are recorded
- # FLOWS Number of changes from the FLOW state to the NO FLOW state per second
- ACTUAL STATE Current state: FLOW or NO FLOW

For the average times, "*****" is output if no events have occurred.

NET DEVICE report

This report provides data on I/O operations of the network devices.

The data is recorded for each port, i.e. according to the respective mnemonic device names.

Report output

The REPORT NET_DEVICE statement is used to request the output of the NET DEVICE report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*NET-DEVICE.

Overflow screens may also be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

D016ZE04 SM2 NET DEVICE		CYCLE: 120 S		99-03-24 14:30:00	
MN	DEVICE TYPE	READ (1/S)	WRITE (1/S)	# BYTES (1/IO)	
P5	ZAS-LAN	64.7	0.0	398	
P4	ZAS-LAN	0.0	54.8	456	
U4	ZAS-LAN	0.0	35.5	219	
U5	ZAS-LAN	35.2	0.0	69	
UH	ZAS-LAN	0.6	0.0	164	
Y3	ZAS-BCAM	0.0	0.4	414	
Y4	ZAS-BCAM	0.3	0.0	29	
CH	SKP2	0.2	0.0	0	
RP	ZAS-LAN	0.1	0.0	107	
CI	SKP2	0.1	0.0	0	
Y6	ZAS-BCAM	0.0	0.0	2	
Y7	ZAS-BCAM	0.0	0.0	2	
UG	ZAS-LAN	0.0	0.0	22	
RO	ZAS-LAN	0.0	0.0	20	
Y5	ZAS-DUMP	0.0	0.0	0	
Y8	ZAS-DUMP	0.0	0.0	0	
YL	ZAS-BCAM	0.0	0.0	0	
YM	ZAS-BCAM	0.0	0.0	0	

Monitoring information

The columns contain the following data:

MN	Mnemonic name of the port of the network device
DEVICE TYPE	Alias of the device type
READ (1/S)	Number of read operations in the last monitoring cycle
WRITE (1/S)	Number of write operations in the last monitoring cycle
#BYTES (1/IO)	Number of transferred bytes per I/O operation

NSM report

This report provides data from the NSM (Node Serialization Manager) subsystem for a computer network.

Report output

The REPORT NSM statement is used to request the output of the NSM report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*NSM.

Overflow screens may also be requested for this report.

The SM2 administrator can use the SELECT-HOSTS statement to select the hosts to be displayed in the NSM report. If these include the local host, this is output in the first line, followed by the remaining hosts in the order specified in the SELECT-HOSTS statement. The header contains information on the first host for which valid data is found. If valid information cannot be found on a particular host, the string “***” appears in place of the monitored data.

For further information, please refer to the description of the SELECT-HOSTS statement on page 110.

D016ZE04 SM2 NSM		CYCLE: 120 S		99-03-24 14:30:00	
MAX MSG LENGTH:		5 KB	USED MSG LENGTH:		1.0 %
CIRC TIME:		166.5 MS			
HOST	DURATION TIME (MS)	#WAIT MSG	# LOCK-SERVER	TOTAL REQ (1/S)	LOCAL REQ (%)
D016ZE04	1.0	0.0	107	43.4	96.7
D016ZE02	1.0	0.0	7	0.1	100.0
D016ZE07	1.0	0.0	32	13.4	87.0

Monitoring information

MAX MSG LENGTH Length of the NSM message buffer in the token in KB

USED MSG LENGTH Percentage of the NSM message buffer used

CIRC TIME Circulation time of the token in milliseconds

This data is output by the first host.

HOST Name of the host on which the data is collected

DURATION
TIME (MS) Dwell time of the token in the host in milliseconds

#WAIT MSG Number of messages waiting for space in the token

#LOCKSERVER Number of lock servers.
Each lock server represents a resource. It is created at the first enqueue and released at the last dequeue.

TOTAL REQ (1/S) Total number of requests (enqueue, dequeue, convert, cancel) per second

LOCAL REQ (%) Percentage of all requests that are local requests.
A local request is a request in which the lock server already exists and is located on the local host.

PCA reports

SM2 collects monitored data on 3419/21 controllers with a cache which are managed by the PCA subsystem. Unlike other SM2 monitoring programs, this information is not host-specific, rather refers globally to a controller. This must be taken into account particularly when interpreting the data.

The PCA CONTROLLER report supplies summary information for all installed 3419/21 controllers. If you require detailed information (cache and device data), you can also request a PCA CACHE and PCA DEVICE report.

Notes

Only the PCA values of devices assigned a cache area are counted.

In the case of access values, I/O operations are counted.

Only the value #PEND.BLOCKS is counted in PAM blocks or 4K blocks, depending on the disk type (K/NK2 or NK4). The disks for which caching is carried out under a CACHE-ID must have a homogeneous format: either all disks must have the K/NK2 format or they must all have the NK4 format; i.e. the #PEND.BLOCKS can be counted either in 2Kb or 4Kb blocks for each CACHE-ID. When this monitoring value is interpreted, the block size must be taken into account.

The summary information for #PEND.BLOCKS in the PCA-CONTROLLER report does not supply a usable value for different block sizes.

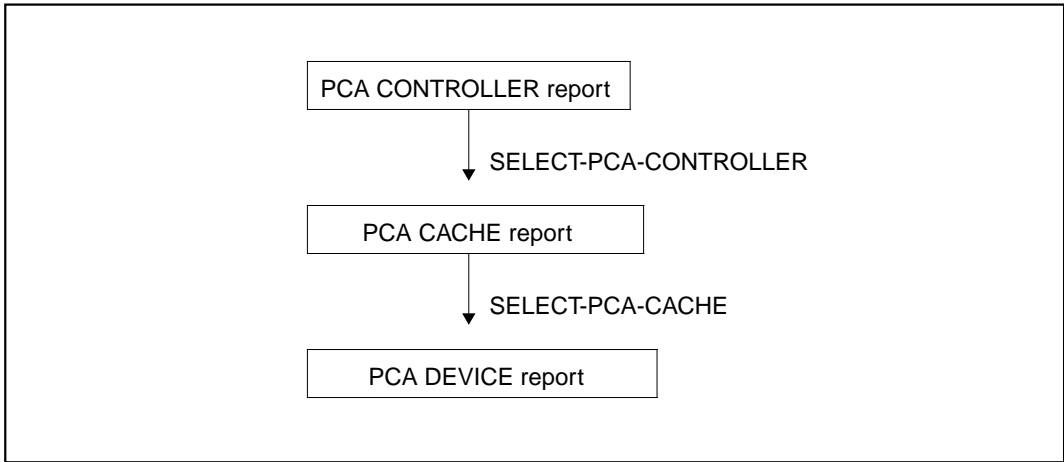
Information on formatting disks can be found in the SM2R1 CONFIGURATION-TABLE (see Volume 2).

SM2 does not output any PCA-SSD values, since SSDs (solid state disks of type 3409) are handled as normal devices by SM2.

In "write mode", 100% is output for READ H-RATE if there are any read hits. If this is not the case, 0% is output.

In the case of a purely read cache, "fast writes" are counted, provided the blocks to be written are already in the cache (as a result of a previous read operation), but input/output is executed quickly.

The figure below illustrates the hierarchy of reports and the statements used to request them:



PCA CACHE report

This report provides monitored data on the caches of selected controllers.

Report output

The PCA CACHE report is output only at the explicit request of the SM2 user with the help of the SELECT-PCA-CONTROLLER statement (see page 176). This statement is used to output a PCA CONTROLLER report together with a PCA CACHE report for the selected controllers. The PCA CACHE report supplies detailed information on the controller caches. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PCA.

Overflow screens may be requested for this report.

The monitored data output is sorted in accordance with the size of the cache (CACHE SIZE). It is possible to output data on up to 32 controllers.

D017ZE03 SM2 PCA CACHE										
CYCLE: 60 S										
99-03-24 11:11:02										
CTL-DEV-MN: A93F										
CACH ID	CACHE SIZE	PREF. LEN.	#PEND. BLOCKS	READ (1/S)	C-READ (1/S)	READ-H-R. %	WRITE (1/S)	FAST W. (1/S)	C-OVER (1/S)	
5	20	0	594	324.8	324.8	100.0	178.0	178.0	0.0	
4	4	16	0	0.0	0.0	0.0	0.0	0.0	0.0	

Monitoring information

- CTL-DEV-MN Mnemonic name of the controller's CONTROL DEVICE
- CACH ID Cache ID
- CACHE SIZE Size of the cache in MB
- PREF. LEN. Prefetch length for high-speed caching reads in input/output operations
- #PEND. BLOCKS Number of blocks (2Kb/4Kb, depending on the disk format) still to be relocated to disk
- READ (1/S) Total number of read operations (in I/Os per second)
- C-READ (1/S) Total number of read operations to be executed as fast reads (caching reads) (in I/Os per second)

READ H-R. (%)	Percentage of hits based on the total number of read operations to be executed as fast reads
WRITE (1/S)	Total number of write operations (in I/Os per second)
FAST W. (1/S)	Total number of high-speed write operations (in I/Os per second)
C-OVER (1/S)	Number of unsuccessful attempts to use the cache due to a cache overrun (in I/Os per second)

Notes

If a miss occurs during a caching read operation ("fast read"), the data is read from disk and (in contrast to a read operation) stored in the cache. Cache overruns can only occur in write operations. In the event of an overrun, the write operation bypasses the cache and is performed directly on the disk.

PCA CONTROLLER report

This report provides global monitored data on the individual 3419/21 controllers. One line is output for each controller.

Report output

The REPORT PCA statement is used to request the output of the PCA CONTROLLER report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PCA.

Overflow screens may also be requested for this report.

The monitored data output is sorted in accordance with the size of the cache (CACHE SIZE).

D017ZE03 SM2 PCA CONTROLLER CYCLE: 60 S 99-03-24 11:11:02										
CTL DEV	CACHE SIZE	# CACH	#PEND. BLOCKS	READ (1/S)	C-READ (1/S)	READ H-R. %	WRITE (1/S)	FAST W. (1/S)	C-OVER (1/S)	
453F	128	1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9A3F	80	2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A93F	24	2	594	324.8	324.8	100.0	178.0	178.0	0.0	0.0
463F	10	1	0	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Monitoring information

The individual entries have the following meanings:

- CTL DEV** Mnemonic name of the controller's CONTROL DEVICE
- CACHE SIZE** Amount of memory reserved for caching in MB
- #CACH** Number of caches
- #PEND. BLOCKS** Number of blocks (2K/4K, depending on the disk format) still to be relocated to disk
- READ (1/S)** Total number of read operations to disks for which caching is performed (in I/Os per second)
- C-READ (1/S)** Total number of read operations to be executed as fast reads (caching reads) (in I/Os per second)

READ H-R (%)	Percentage of hits based on the total number of read operations to be executed as fast reads
WRITE (1/S)	Total number of write operations to disks for which caching is performed (in I/Os per second)
FAST W. (1/S)	Total number of fast write operations executed (in I/Os per second)
C-OVER (1/S)	Number of unsuccessful attempts to use the cache due to a cache overrun (in I/Os per second)

Notes

If a miss occurs during a caching read operation ("fast read"), the data is read from disk and (in contrast to a read operation) stored in the cache. Cache overruns can only occur in write operations. In the event of an overrun, the write operation bypasses the cache and is performed directly on the disk.

PCA DEVICE report

This report provides monitored data on the devices of a 3419/21 controller which have been allocated a cache.

Report output

The PCA DEVICE report is output only at the explicit request of the SM2 user with the help of the SELECT-PCA-CACHE statement (see page 174). This statement is used to output a PCA CONTROLLER report together with a PCA DEVICE report for the selected cache of a controller. The PCA DEVICE report supplies detailed information on the devices of a 3419/21 controller which have been allocated a cache.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PCA.

Overflow screens may be requested for this report.

The monitored data output is sorted in accordance with the total number of access operations.

It is possible to output data on up to 32 pairs of controllers and caches.

D017ZE03 SM2 PCA DEVICE										CYCLE: 60 S		99-03-24 11:11:02	
CTL-DEV-MN: A93F				CACHE-ID: 5		CACHE-SIZE: 20 MB							
DEVICE MN	VSN	# SHAR	#PEND. BLOCKS	READ (1/S)	C-READ (1/S)	READ-H-RATE%	WRITE (1/S)	FAST W. (1/S)	C-OVER (1/S)				
A90A	A90A.0	1	594	324.8	324.8	100.0	178.0	178.0	0.0				

Monitoring information

CTL-DEV-MN	Mnemonic name of the controller's CONTROL DEVICE
CACHE-ID	Cache ID
CACHE SIZE	Size of the cache MB
DEVICE MN	Mnemonic name of the device supported by the cache
DEVICE VSN	VSN of the device supported by the cache
#SHAR	Number of systems which service the device via the cache
#PEND. BLOCKS	Number of blocks (2K/4K blocks, depending on the disk format) yet to be relocated to disk

READ (1/S)	Total number of read operations (in I/Os per second)
C-READ (1/S)	Total number of read operations to be executed as fast reads (caching reads) (in I/Os per second)
READ H-RATE %	Percentage of hits based on the total number of read operations to be executed as fast reads
WRITE (1/S)	Total number of write operations (in I/Os per second)
FAST W. (1/S)	Total number of all fast write operations performed (in I/Os per second)
C-OVER (1/S)	Number of unsuccessful attempts to use the cache due to a cache overrun (in I/Os per second)

Notes

If a miss occurs during a caching read operation ("fast read"), the data is read from disk and (in contrast to a read operation) stored in the cache. Cache overruns can only occur in write operations. In the event of an overrun, the write operation bypasses the cache and is performed directly on the disk.

PCS report

This report provides an overview of the activities of the Performance Control Subsystem.

Report output

The REPORT PCS statement is used to request the output of the PCS report.

The report can only be output if PCS was active during the last monitoring cycle.

D016ZE04 SM2 PCS CYCLE: 120 S SAMPLES: 293 99-03-24 14:30:00									
CATEGORY NAME	SRACT (1/SEC)			SQPLN (%)	SQACT (%)	RDACT	DUR-R0 (1/SEC)	DUR-R0-P (1/SEC)	
	TOTAL	IO	CPU						
SUM	42739	5765	30845		100.0	1.0	0.657	0.000	
SYS	5442	1659	3688	0.0	12.7	1.0	0.000	0.000	
DIALOG	57	0	57	1.0	0.1	1.2	0.000	0.000	
BATCH	520	29	472	2.3	1.2	1.1	0.000	0.000	
TP	447	8	392	5.1	1.0	1.6	0.000	0.000	
TP1	63	4	55	21.2	0.1	1.0	0.000	0.000	
BATCHDB	0	0	0	11.7	0.0	**	0.000	0.000	
BATCHF	818	720	94	1.1	1.9	1.0	0.000	0.000	
DIALOG1	12227	2352	7888	20.7	28.6	1.0	0.491	0.000	
DIALOG2	7002	564	5395	20.0	16.3	1.0	0.166	0.000	
DIALOG3	16163	429	12805	16.4	37.8	1.1	0.000	0.000	

Monitoring information

This report contains the totals (SUM column) for all categories (except for the SQPLN and RDACT values) in the first line below the table header. The data for the individual categories (up to 16) is output in the following lines.

- CATEGORY NAME Name of a category
- SRACT (1/SEC) Service rate used by this category, specified as TOTAL, IO and CPU
- TOTAL Total number of all service rates used by this category (sum of IO, CPU and memory service rates)
- IO IO service rates used by this category
- CPU CPU service rates used by this category

SQLPN (%)	System performance percentage planned for this category. (This variable is irrelevant for the SUM category and is therefore replaced by blanks.)
SQACT(%)	Current percentage of system performance for this category
RDACT	Current delay of all jobs in this category. If no dilation was sensed, '***' is output (see section on "dilation factor" on page 447 of the glossary). (A system-global value is given in the SUM line.)
DUR-RO (1/SEC)	Number of DURATION time slice runouts for tasks in this category. (The given service rate has been used up, the task is placed in the defined continuation category.)
DUR-RO-P (1/SEC)	Number of DURATION time slice runouts with preemption for tasks or jobs in this category. (Meaning as above; since the defined continuation category is not permitted because of overloading, the task is entered in task queue 6.)

Note on SR2000

The monitored data on service units is based on native CPU time (see "CPU time and CPU service units on SR2000" on page 446 of the glossary).

PERIODIC TASK report

This report provides information on the most important consumption statistics of all tasks.

Report output

The REPORT PERIODIC statement (synonymous with REPORT TASK) is used to request the output of the PERIODIC TASK report. The report can only be output if the SM2 administrator has

- defined the tasks whose monitored data is to be written to the SM2 output file using the SET-PERIODIC-TASK-PARAMETER statement
- activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PERIODIC-TASK

Privileged users receive monitored data on all tasks. Nonprivileged users receive monitored data only on the tasks belonging to their user ID.

The monitored data output is sorted in accordance with the sort criterion defined in the SELECT-PERIODIC-TASK-PARAMETER statement (see page 177). By default, it is sorted in accordance with the service units.

Overflow screens may also be requested for this report.

D016ZE04 SM2 PERIODIC TASK (S-U) CYCLE: 120 S								99-03-24 14:30:00	
TU + TPR= 45.2 % SIH= 10.5 % IDLE= 44.3 %								IO(/S)= 402.8 (2 LM'S)	
TSN	USERID	TYP	SERV-RATE	CPU-TIME	IO(/S)	UPG	PAG READ		
9PF9	CCC	DIA	7089.3	6.6%	0.1	14457	0.0		
9XJM	LKLK	DIA	5637.3	6.3%	7.5	5423	0.0		
9XI6	LKLK	DIA	2929.8	3.9%	0.3	743	0.0		
9RBI	DRR	DIA	2677.7	3.0%	18.5	2433	0.0		
9XIW	LKLK	DIA	2575.5	3.3%	2.3	743	0.0		
9XJA	SD222222	DIA	1527.7	1.6%	8.9	506	0.0		
BCAM		SYS	1356.2	0.2%	191.7	818	0.0		
9UYY	GRR	DIA	1108.8	1.4%	7.3	347	0.0		
9XJN	SD222222	DIA	1062.2	1.1%	8.9	506	0.0		
9XIF	SD222222	DIA	916.5	0.9%	8.9	506	0.0		
SM2G		SYS	880.7	1.2%	0.1	539	0.0		
9XII	SD222222	DIA	808.4	0.8%	8.9	496	0.0		
9UMB	WBB	DIA	750.5	0.9%	0.7	1686	0.0		
9XIZ	SD222222	DIA	748.7	0.7%	8.9	506	0.0		
9XJS	SD222222	DIA	734.1	0.7%	9.8	515	0.0		
9WJ7	TSOS	BAT	724.0	0.0%	7.0	207	0.0		

Monitoring information

The first header line shows the report name and the sort criterion used (CPU, IO, UPG or S-U for service units).

The second header line displays the following global system values:

TU+TPR	Percentage of the (TU+TPR+SIH+IDLE) time accounted for by the (TU+TPR) time
SIH	Percentage of the (TU+TPR+SIH+IDLE) time accounted for by the SIH time
IDLE	Percentage of the (TU+TPR+SIH+IDLE) time accounted for by the IDLE time
IO(/S)	Total number of I/Os per second in the last cycle
(2 LM'S)	Number of logical machines which were active

The PERIODIC TASK report contains data for the tasks selected with the SELECT-PERIODIC-TASK-PARAMETER statement (see page 177). By default, the data of all tasks is output.

D016ZE04 SM2 PERIODIC TASK (S-U) CYCLE: 120 S								99-03-24 14:30:00	
TU + TPR= 45.2 %		SIH= 10.5 %		IDLE= 44.3 %		IO(/S)= 402.8		(2 LM'S)	
TSN	USERID	TYP	SERV-RATE	CPU-TIME	IO(/S)	UPG	PAG	READ	
9PF9	CCC	DIA	7089.3	6.6%	0.1	14457	0.0		
9XJM	LKLK	DIA	5637.3	6.3%	7.5	5423	0.0		
9XI6	LKLK	DIA	2929.8	3.9%	0.3	743	0.0		
9RBI	DRR	DIA	2677.7	3.0%	18.5	2433	0.0		
9XIW	LKLK	DIA	2575.5	3.3%	2.3	743	0.0		
9XJA	SD222222	DIA	1527.7	1.6%	8.9	506	0.0		
BCAM		SYS	1356.2	0.2%	191.7	818	0.0		
9UYY	GRR	DIA	1108.8	1.4%	7.3	347	0.0		
9XJN	SD222222	DIA	1062.2	1.1%	8.9	506	0.0		
9XIF	SD222222	DIA	916.5	0.9%	8.9	506	0.0		
SM2G		SYS	880.7	1.2%	0.1	539	0.0		
9XII	SD222222	DIA	808.4	0.8%	8.9	496	0.0		
9UMB	WBB	DIA	750.5	0.9%	0.7	1686	0.0		
9XIZ	SD222222	DIA	748.7	0.7%	8.9	506	0.0		
9XJS	SD222222	DIA	734.1	0.7%	9.8	515	0.0		
9WJ7	TSOS	BAT	724.0	0.0%	7.0	207	0.0		

Monitoring information

TSN TSN of the task

Depending on whether the output value USER-ID or JOB-NAME was selected in the SELECT-PERIODIC-TASK-PARAMETER statement, the second column contains either

USERID User ID of the task

or

JOB-NAME Job name of the task

TYP Current task type at the end of the monitoring cycle

SERV-RATE Elapsed service units of the task per second

CPU-TIME Task's percentage of the (TU+TPR+SIH+IDLE) time (without the share of the hypervisor under VM)

IO(/S) Number of I/Os for the task per second

UPG Mean UPG of the task

PAG READ Number of page reads per second for the task

Notes

- Physical writing of pages to the paging disk is assigned to the system task with the TSN "PGE" for the purposes of consumption statistics.
- The monitored data on CPU utilization is based on native CPU time (see "CPU time and CPU service units on SR2000" on page 446 of the glossary).

PFA reports

The PFA monitoring program enables SM2 to record monitored data on the use of various caches. These caches can be served by the products DAB and PCA.

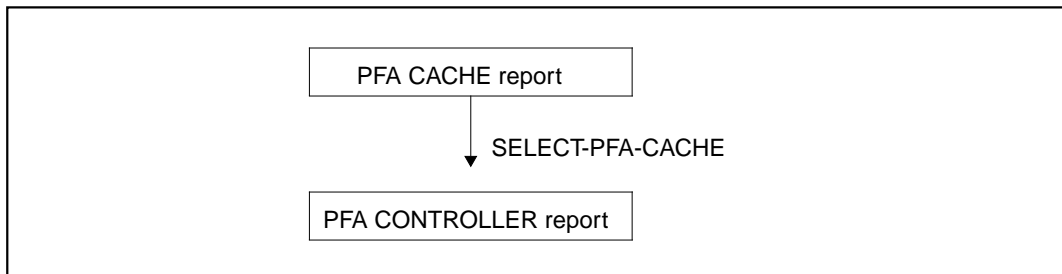
DAB supports the caches in main memory, expanded storage and global storage. PCA supports the caches in the 3419, 3421, 3860 and SYMMETRIX controllers.

If PFA serves the cache via DAB and the DAB monitoring program is activated, DAB monitored data will be supplied in addition to PFA monitored data and output in the DAB reports. If PFA serves the caches of 3419/21 controllers via PCA and the PCA monitoring program is activated, PCA monitored data will be supplied and output in the PCA reports. When serving the caches of SYMMETRIX controllers, you need only activate the PFA monitoring program in order to output monitored data in the SYMMETRIX reports.

Unlike other SM2 monitoring programs, the information recorded by PCA is not host-specific, rather refers globally to a controller. This must be taken into account particularly when interpreting the data.

The PFA CACHE report provides a non-product-specific overview of the use of all caches. The PFA CONTROLLER report supplies controller-specific monitored data on a PFA cache served by PCA and whose devices can be assigned to different controllers.

The figure below illustrates the hierarchy of reports and the statement used to request them:



PFA CACHE report

This report provides an overview of the use of all PFA caches for the products DAB and PCA. The PFA CACHE report only contains data supplied in the same manner from the different products.

Report output

The REPORT PFA statement is used to request the output of the PFA CACHE report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PFA.

Overflow screens may be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

D016ZE04 SM2 PFA CACHE				CYCLE: 60 S		99-04-11 15:08:00			
CACHE ID	CACHE MED	BLK SIZE	SIZE	READ (1/S)	RD HIT (%)	WRITE (1/S)	WR HIT (%)	OVERRUNS (1/S)	
1MD3	*CTL	2 K	254 MB	317.8	99.7	106.9	99.3	0.5	
1MD4	*CTL	2 K	254 MB	317.4	99.8	107.2	98.8	0.9	

Monitoring information

CACHE ID Cache ID. This is identical to the PVS ID of the pubset served.

CACHE MED Cache medium MM: Main memory
 ES: Expanded storage
 GS: Global storage
 CTL: Disk controller unit

If the medium is marked with an asterisk (*XX), this means that a second, more detailed report (PFA CONTROLLER report) can be output for this cache.

BLK SIZE	Block size of the cache
SIZE	Size of the cache
READ	Number of read operations to hiperfiles (in I/Os per second)
RD HIT	Percentage of hits in the total number of read operations to hiperfiles
WRITE	Number of write operations to hiperfiles (in I/Os per second)
WR HIT	Percentage of fast write operations in the total number of write operations to hiperfiles
OVERRUNS	Number of unsuccessful attempts to use the cache due to overload (per second)

Notes

- The number of read and write accesses is output to one decimal place. Read and write rates less than 0.05 per second are rounded down to 0.0 per second and hit rates are calculated.
- In SYMMETRIX controllers, all write operations are executed via the cache as fast writes. An exception are delayed fast writes: if the cache is filled with unsaved write data, these may be forced to wait temporarily for a cache slot to become available. A WR HIT is one write operation that need not be delayed. Only very high write loads will cause the WR HIT rate to fall below 100%. If this occurs, delayed fast writes will be output under OVERRUNS.

PFA CONTROLLER report

This report provides detailed monitored data on a single PFA cache served by PCA and whose pubset disks can be assigned to various controllers.

Report output

The PFA CONTROLLER report is output only at the explicit request of the SM2 user with the help of the SELECT-PFA-CACHE statement (see page 179). The PFA CACHE report indicates the caches for which subreports can be selected. In addition to the PFA CACHE report, this statement is used to output a PFA CONTROLLER report for the selected caches. The PFA CONTROLLER report supplies detailed information on the cache controllers.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PFA.

Overflow screens may be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

It is possible to output data on up to 16 caches.

D016ZE04 SM2 PFA CONTROLLER				CYCLE: 60 S				99-04-11 15:08:00			
CACHE-ID: 1MD3				CONTROLLER-TYPE: 3860				PREFETCH LENGTH: NONE			
CTL MN	#DEV	SEC NR	SIZE	READ (1/S)	RD HIT (%)	WRITE (1/S)	WR HIT (%)	OVERRUNS (1/S)			
00	8	0	0 MB	317.8	99.7	106.9	99.3	0.5			

Monitoring information

CACHE ID Cache ID. This is identical with the PVS ID of the pubset served.

CONTROLLER TYPE 3419
 3421
 3860
 SYMMETRIX

PREFETCH LENGTH	Information on the prefetching strategy (only supported for 3419/21) NONE: No prefetching LOW: A small number of blocks are prefetched HIGH: A large number of blocks are prefetched
CTL MN	Mnemonic name of the controller or of the CONTROL DEVICE (3419/21)
#DEV	Number of disk devices supported by the cache
SEC NR	Cache sector number on this controller (3419/21 only)
SIZE	Size of the cache sector in this controller in MB (3419/21 only)
READ	Number of read operations to hiperfiles (in I/Os per second)
RD HIT	Percentage of hits in the total number of read operations to hiperfiles
WRITE	Total number of write operations (in the case of 3860, the number of fast write operations) to hiperfiles (in I/Os per second)
WR HIT	Percentage of fast write operations in the total number of write operations to hiperfiles
OVERRUNS	Number of unsuccessful attempts to use the cache due to overload (per second)

Note

The PFA controller screens are output in the order in which the caches occur in the PFA CACHE report.

If PFA serves the cache via DAB and the DAB monitoring program is activated, DAB monitored data will be supplied in addition to PFA monitored data. If PFA serves the caches of 3419/21 controllers via PCA and the PCA monitoring program is activated, PCA monitored data will be supplied.

POSIX report

Report output

The REPORT POSIX statement is used to request the output of the POSIX report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*POSIX.

```

D016ZE04 SM2 POSIX          CYCLE: 120 S          99-03-24 14:30:00
----- OPTION A -----
  IGET/S      NAMEI/S
    7.9       133.9
----- OPTION M -----
  MSG/S      SEMA/S
    0.0       1.8
----- OPTION B -----
  BREAD/S    BWRITE/S    LREAD/S    LWRITE/S    RCACHE %    WCACHE %
    0.4       1.2       44.1      30.8       99.1       96.1
  PREAD/S    PWRITE/S
    0.0       0.0
----- OPTION C -----
  SCALL/S    SREAD/S    SWRITE/S    FORK/S    EXEC/S    RCHAR/S
  490.7     115.0      5.3        0.4       0.7     592915.6
  WCHAR/S
 79299.5
    
```

Monitoring information

The individual entries have the following meanings (see the description of the sar command in the manual "Reliant Unix V5.44, Volume 4" [19]:

OPTION A provides information on the use of system routines for file access:

- IGET/S Number of files determined by means of the Inode entry in the UFS (Berkeley "fast file system") file system
- NAMEI/S Number of times per second a path name is searched for in the file system

OPTION M provides information on message and semaphore activities:

- MSG/S Number of accesses to messages per second
- SEMA/S Number of semaphore activities per second

OPTION B provides information on buffer utilization:

BREAD/S, BWRITE/S Number of data transmissions per second between the system buffer and the hard disk or other block-oriented devices

LREAD/S, LWRITE/S Accesses to the system buffer per second

RCACHE, WCACHE Cache-memory hit percentage, i.e.
RCACHE 1-BREAD/LREAD (in percent)
WCACHE 1-BWRITE/LWRITE (in percent)

PREAD/S, PWRITE/S Number of physical data transmissions per second (raw device)

OPTION C provides information on system calls:

SCALL/S All types of system call per second

SREAD/S, SWRITE/S, FORK/S, EXEC/S
Specific system calls

RCHAR/S, WCHAR/S Characters transmitted by means of read() and write() system calls

RESPONSETIME report

This report contains data on response times, think times, transaction times and wait times for messages in the BCAM pool.

Report output

The REPORT RESPONSE statement is used to request the output of the RESPONSETIME report.

The report can only be output if the SM2 administrator has

- defined the monitoring parameters for response time statistics using the SET-RESPONSETIME-PARAMETER statement
- specified the connection sets to be monitored using the ADD-CONNECTION-SET statement
- activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*RESPONSETIME

Depending on the definition of the SCOPE operand in the SET-RESPONSETIME-PARAMETER or MODIFY-RESPONSETIME-PARAMETER statement, SM2 output bucket-specific or category-specific screens.

In the case of SCOPE=*BUCKET, the user receives a separate screen for each of the connection sets to be monitored (up to 16, including global statistics) with bucket-specific values. Global statistics are output first.

Example

Bucket-specific screen for the selected connection set (\$DIALOG,*ALL,*ALL)

```

D016ZE04 SM2 RESPONSETIME (BUCKETS) CYCLE: 120 S          99-03-24 14:30:00
DIALOG                APPLICATION: $DIALOG
                      PARTNER:      *ALL
CONN-TYPE:REMOTE     PROCESSOR:     *ALL
-----+-----+-----+-----+-----+-----+-----+-----+-----+
      | RESP. TIME (1) |   THINK TIME   |   TRANS. TIME   |   WAIT TIME   |
      | BUCKET  COUNT | BUCKET  COUNT | BUCKET  COUNT | BUCKET  COUNT |
      |-----+-----+-----+-----+-----+-----+-----+-----+
      | 0.5   243 | 5.0   150 | 0.5   217 | 0.1    0 |
      | 1.0    8 | 15.0   68 | 1.0    16 | 0.2    0 |
      | 2.0    3 | 30.0   15 | 2.0    8  | 0.5    0 |
      | 5.0    5 | 60.0    9 | 5.0   11 | 1.0    0 |
      | 10.0   3 | 120.0   7 | 10.0   3  | 2.0    0 |
      |> 10.0   1 |> 120.0  12 |> 10.0   5  |> 2.0    0 |
-----+-----+-----+-----+-----+-----+-----+-----+
AVG SEC | 0.2 | 9.0 | 0.4 | 0.0 |
NR. INTER | 262 | 249 | 255 | 0 |
RATE 1/SEC | 2.2 | 2.1 | 2.1 | 0.0 |
-----+-----+-----+-----+-----+-----+-----+-----+
INPUT-LEN: 77.5   OUTPUT-LEN: 1004

```

In the case of SCOPE=*CATEGORY, the user receives a separate screen for each of the connection sets to be monitored (up to 16, including global statistics) with category-specific values. Global statistics are output first.

If both SCOPE=*CATEGORY and SCOPE=*BUCKET are specified, a screen is output for bucket-specific values first, followed by one for category-specific values.

Example

Category-specific screen for the selected connection set (\$DIALOG,*ALL,*ALL)

```

D016ZE04 SM2 RESPONSETIME (CATEGORY) CYCLE: 120 S          99-03-24 14:30:00
DIALOG                APPLICATION: $DIALOG
                      PARTNER:      *ALL
CONN-TYPE:REMOTE     PROCESSOR:     *ALL

```

CATGORY NAME	RESPONSE TIME			THINK TIME			TRANSACTION TIME			WAIT TIME		
	AVG	#INT	RATE	AVG	#INT	RATE	AVG	#INT	RATE	AVG	#INT	RATE
SUM	0.2	262	2.2	9.0	249	2.1	0.4	255	2.1	0.0	0	0.0
SYS	0.0	21	0.2	13.1	21	0.2	0.3	22	0.2	0.0	0	0.0
DIALOG	0.0	1	0.0	78.5	1	0.0	1.6	1	0.0	0.0	0	0.0
TP1	0.0	15	0.1	2.0	14	0.1	0.3	15	0.1	0.0	0	0.0
DIALOG1	0.2	219	1.8	8.7	208	1.7	0.4	217	1.8	0.0	0	0.0
DIALOG2	1.5	3	0.0	7.9	2	0.0	0.0	0	0.0	0.0	0	0.0
DIALOG3	6.2	3	0.0	4.9	3	0.0	0.0	0	0.0	0.0	0	0.0

Categories for which no values have been specified are not output. If values are specified for more than 13 categories, the screen is scrolled upwards by the corresponding number of lines so that the topmost lines of the report are not visible on the screen.

Bucket-specific screen

D016ZE04 SM2 RESPONSETIME (BUCKETS) CYCLE: 120 S 99-03-24 14:30:00									
*GLOBAL		APPLICATION: *ALL							
		PARTNER: *ALL							
CONN-TYPE:REMOTE		PROCESSOR: *ALL							
RESP. TIME (1)		THINK TIME		TRANS. TIME		WAIT TIME			
BUCKET	COUNT	BUCKET	COUNT	BUCKET	COUNT	BUCKET	COUNT	BUCKET	COUNT
0.5	4523	5.0	4461	0.5	4482	0.1	71		
1.0	9	15.0	80	1.0	18	0.2	0		
2.0	10	30.0	19	2.0	16	0.5	0		
5.0	27	60.0	14	5.0	35	1.0	0		
10.0	14	120.0	7	10.0	12	2.0	0		
> 10.0	19	> 120.0	15	> 10.0	28	> 2.0	0		
AVG SEC		0.1		0.6		0.1		0.0	
NR. INTER		4583		4581		4563		71	
RATE 1/SEC		38.2		38.2		38.0		0.6	
INPUT-LEN:472.8					OUTPUT-LEN:551.8				

Monitoring information

For each screen, the associated connections or connection groups are output above the monitoring data, as well as the connection set name ("GLOBAL" is the name given in the example), when the ADD-CONNECTION-SET statement is defined).

CONN-TYPE	Types of connections taken into account during monitoring: REMOTE: Remote connections only LOCAL: Local connections only BOTH: Local and remote connections
RESP. TIME (1)	Response time data; the type of response time monitored (as specified via the DEFINITION operand of the SET- and MODIFY-RESPONSETIME-PARAMETER statements) is output (1): Response time as per definition 1 (2): Response time as per definition 2
THINK TIME	Think time data
TRANS. TIME	Transaction time data
WAIT TIME	Wait time data (in the BCAM pool)
AVG SEC	Average duration of an interaction in seconds (without overflow data)

NR. INTER	Total number of interactions in the monitoring cycle (without overflow data)
RATE 1/SEC	Number of monitored interactions per second (without overflow data)
BUCKET	Corresponds to the bucket limits in seconds in which monitored data is arranged in accordance with duration. The last line of the columns (>) contains the overflow data. Data displayed there is not used for computing AVG SEC, NR. INTER and RATE 1/SEC.
COUNT	Corresponds to the number of interactive operations in the individual buckets

The SM2 administrators can modify the bucket limits and the number of buckets by means of the SET- and MODIFY-RESPONSETIME-PARAMETER statements if the default options are not suitable. If no interactions were recorded in the last monitoring cycle, the message NOTE: SOME INTERACTIONS MISSED:<number> is displayed in the bottom line of each of the RESPONSE TIME screens. This may be the case, for example, if the number of active connections is greater than that defined in the CONNECTION-NUMBER parameter of the SET- or MODIFY-RESPONSETIME-PARAMETER statement.

INPUT-LEN	The average lengths in bytes of the input or
OUTPUT-LEN	output messages

Category-specific screen

```

D016ZE04 SM2 RESPONSETIME (CATEGORY) CYCLE: 120 S          99-03-24 14:30:00

*GLOBAL                APPLICATION: *ALL
                        PARTNER:    *ALL
CONN-TYPE:REMOTE      PROCESSOR:   *ALL

```

CATGORY NAME	RESPONSE TIME			THINK TIME			TRANSACTION TIME			WAIT TIME		
	AVG	#INT	RATE	AVG	#INT	RATE	AVG	#INT	RATE	AVG	#INT	RATE
SUM	0.1	4583	38.2	0.6	4581	38.2	0.1	4563	38.0	0.0	71	0.6
SYS	0.1	4255	35.5	0.1	4252	35.4	0.1	4288	35.7	0.0	56	0.5
DIALOG	0.0	1	0.0	78.5	1	0.0	1.6	1	0.0	0.0	0	0.0
TP	1.7	42	0.4	7.0	50	0.4	1.8	41	0.3	0.0	5	0.0
TP1	0.5	17	0.1	2.5	18	0.2	0.5	16	0.1	0.0	10	0.1
DIALOG1	0.4	259	2.2	7.2	252	2.1	0.4	217	1.8	0.0	0	0.0
DIALOG2	1.1	4	0.0	5.3	3	0.0	0.0	0	0.0	0.0	0	0.0
DIALOG3	6.1	5	0.0	2.9	5	0.0	0.0	0	0.0	0.0	0	0.0

Monitoring information

For each screen the associated connections or connection groups are output over the monitoring values; the connection set name (in the example it is *GLOBAL) is output, too. (A connection set with the name *GLOBAL, in which all connections are monitored (CONNECTION (*ALL,*ALL,*ALL)), is automatically defined using the SET-RESPONSETIME-PARAMETER statement.)

CONN-TYPE:	Types of connections taken into account during monitoring:
REMOTE:	Remote connections only
LOCAL:	Local connections only
BOTH:	Local and remote connections
CATGORY NAME	Name of the category
RESPONSETIME	Monitoring data for the response time
THINK TIME	Monitoring data for the think time
TRANSACTION TIME	Monitoring data for the transaction time
WAIT TIME	Monitoring data for the wait times (in the BCAM pool)
AVG	Average duration of the transaction (in seconds) (without overflow values)

#INT	Total number of transactions during the monitoring cycle (without overflow values)
RATE	Number of interactions monitored per second (without overflow values)

SHARED PVS report

This report contains monitored data on I/O operations on shared pubsets for a host network.

Report output

The REPORT SHARED_PVS statement is used to request the output of the SHARED PVS report.

The SM2 administrator can use the SELECT-HOSTS statement (see page 110) to select the hosts whose monitored data is to be displayed in the report.

The header contains information on the local host (if this is selected) or on first host for which valid data is found. If valid information cannot be found on a particular host, the string "SOME DATA MISSED" appears in the second line.

Overflow screens may be requested for this report.

The monitored data output is sorted in accordance with the number of I/O operations.

D016ZE04 SM2 SHARED PVS		CYCLE: 120 S		99-03-24 14:30:00	
MN	VOLUME	IO (1/S)	Q-LGTH		
437A	20SG.8	173.0	6.6		
4343	QVS2.0	102.6	20.1		
4303	QCV1.0	56.5	1.1		
431C	20SC.1	50.5	0.3		
4354	20SC.4	23.7	0.3		
4361	20SG.0	9.8	3.6		
435C	20SC.5	7.0	0.0		
4313	2RZV.2	5.9	0.0		
431A	2RZV.1	5.7	0.0		
4304	QVS4.0	4.0	0.0		
430B	QVS1.0	2.6	0.0		
4324	1DQM.6	2.2	0.0		
4344	6VS2.0	1.7	0.0		
A800	10SY.0	1.7	0.0		
4312	2RZV.0	1.6	0.0		
4356	20SC.C	1.6	0.0		
4314	20SC.0	1.5	0.0		
434C	6VS3.0	1.1	0.0		

Monitoring information

The values correspond to those of the DEVICE report and form the sum of the values from the individual hosts.

SM2 cannot automatically determine the percentage utilization of the disks (as in the DEVICE report).

Each host recognizes only its own accesses to the disk. The disk is already considered active when the I/O chaining starts, even if the system still has to wait until another host has completed its access. This can cause a dilation of the local utilization, which depends on the level of the local or remote loads and their distribution over time.

SVC report

This report provides an overview of the SVC calls.

Report output

The REPORT SVC statement is used to request the output of the SVC report.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*SVC.

The monitored data output is sorted in accordance with the total number of calls from TU and TPR. The maximum number of entries that can be output is the number that will fit on the screen. In addition, the sum is output for all SVCs and, if necessary, a value for SVCs that do not appear on this page. Only one screen is output.

D016ZE04 SM2 SVC			CYCLE: 60 S			99-03-26 16:30:00					
SVC	TU	TPR	SVC	TU	TPR	SVC	TU	TPR	SVC	TU	TPR
SUM	2306.4	1856.3	250	0.0	762.4	135	549.6	0.0	146	234.4	220.5
183	236.9	0.0	168	0.1	225.9	125	225.4	0.0	191	220.1	0.0
235	0.0	219.8	1	144.0	0.4	234	0.0	117.1	39	2.0	110.8
145	110.6	0.0	49	109.9	0.6	14	109.8	0.0	185	109.8	0.0
246	0.0	87.8	47	52.4	23.6	44	63.6	0.0	128	45.8	0.0
170	21.0	19.1	215	0.0	33.9	187	26.7	0.0	214	0.0	12.4
188	10.9	0.9	123	5.8	0.0	149	5.4	0.0	241	0.0	4.6
89	1.2	2.9	73	3.1	0.0	229	0.0	2.9	186	0.2	2.6
87	2.7	0.0	124	2.6	0.0	85	2.6	0.0	7	1.7	0.3
144	1.4	0.5	172	1.2	0.3	161	0.1	1.4	228	0.0	1.3
52	1.2	0.0	236	0.0	1.0	58	0.9	0.0	76	0.0	0.9
51	0.7	0.0	70	0.4	0.3	222	0.0	0.7	83	0.6	0.0
213	0.0	0.3	233	0.0	0.3	96	0.1	0.1	45	0.2	0.0
9	0.2	0.0	237	0.0	0.2	28	0.0	0.1	42	0.1	0.0
72	0.1	0.0	32	0.0	0.1	67	0.1	0.0	68	0.1	0.0
108	0.0	0.1	38	0.0	0.0	66	0.1	0.0	88	0.1	0.0
56	0.0	0.0	86	0.0	0.0	158	0.0	0.0	75	0.0	0.0
80	0.0	0.0	16	0.0	0.0	33	0.0	0.0	RST	0.0	0.0

Monitoring information

SVC	SVC number
TU	Number of SVC calls in TU per second
TPR	Number of SVC calls in TPR per second
SUM	
TU	Sum of all SVCs per second from TU
TPR	Sum of all SVCs per second from TPR
RST	
TU	Remaining SVCs per second from TU
TPR	Remaining SVCs per second from TPR

SYMMETRIX reports

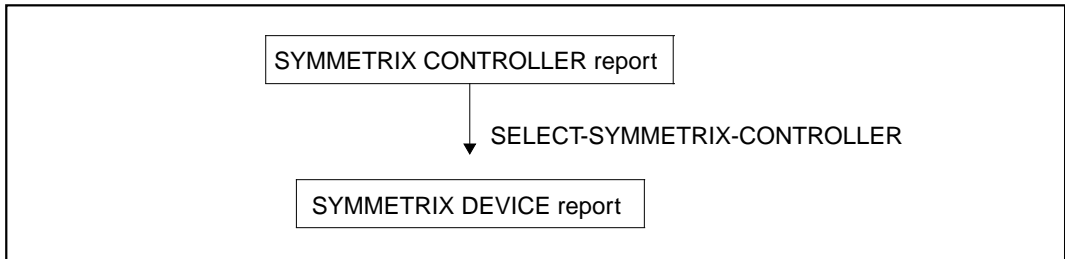
SM2 collects monitored data on the use of SYMMETRIX controllers.

- The SYMMETRIX CONTROLLER report provides summary data on all installed SYMMETRIX controllers.
- The SYMMETRIX DEVICE report provides monitored data on the devices of selected controllers.

The acquisition of monitored data is controlled by the PFA monitoring program.

Unlike other SM2 monitoring programs, the information recorded on SYMMETRIX controllers is not host-specific, rather refers globally to a particular controller. This must be taken into account particularly when interpreting the data.

The figure below illustrates the hierarchy of reports and the statement used to request them:



SYMMETRIX CONTROLLER report

This report provides an overview of the use of caches in the individual emulated 3860 controllers of a SYMMETRIX subsystem.

Report output

The REPORT SYMMETRIX statement is used to request the output of the SYMMETRIX CONTROLLER report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PFA.

Overflow screens may be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

017ZE03 SM2 SYMMETRIX CONTROLLER CYCLE: 60 S 99-03-24 11:11:02							
CONTROLLER MN	SIZE	READ (1/S)	RD HIT (%)	WRITE (1/S)	WR HIT (%)	TOT HIT (%)	
S6 /S7	1628 MB	420.3	100.0	229.6	100.0	100.0	

Monitoring information

CONTROLLER MN Mnemonic name of an emulated 3860 controller.

In all SM2 output, two controller mnemonics are always output (separated by a slash) for an emulated 3860 controller. The following two variants are provided:

- alphanum-name 2..2
- x-text 4..4

SIZE Size of the usable cache in the SYMMETRIX subsystem

READ Number of read operations per emulated 3860 controller and per second

RD HIT Percentage of read operations completed by the cache in relation to the total number of read operations

WRITE Number of write operations per emulated 3860 controller and per second

WR HIT	Percentage of write operations that did not need to be delayed (see notes)
TOT HIT	Percentage of read and write operations completed by the cache in relation to the total number of access operations executed

Notes

The monitored data output here refers to the controller as a whole, i.e. it includes access operations from other hosts.

WR HIT:

All write operations are executed via the cache as fast writes. An exception are delayed fast writes: if the cache is filled with unsaved write data, these may be forced to wait temporarily for a cache slot to become available. A WR HIT is one write operation that need not be delayed. Only very high write loads will cause the WR HIT rate to fall below 100%.

SYMMETRIX DEVICE report

This report provides monitored data on the use of caches in the devices of a SYMMETRIX subsystem.

Report output

The SYMMETRIX DEVICE report is output only at the explicit request of the SM2 user with the help of the SELECT-SYMMETRIX-CONTROLLER statement (see page 180). This statement is used to output a SYMMETRIX CONTROLLER report together with a SYMMETRIX DEVICE report for the selected controllers. The SYMMETRIX DEVICE report supplies detailed information on the devices of a controller. It is possible to output data on up to 16 controllers.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*PCA.

Overflow screens may be requested for this report.

The monitored data output is sorted under the categories READ and WRITE.

D017ZE03 SM2 SYMMETRIX DEVICE CYCLE: 60 S 99-03-24 11:11:02						
CONTROLLER-MN: S6 /S7						
DEVICE MN	READ (1/S)	RD HIT (%)	WRITE (1/S)	WR HIT (%)	TOT HIT (%)	
500D	420.3	100.0	229.6	100.0	100.0	
5001	0.0	0.0	0.0	0.0	0.0	
5002	0.0	0.0	0.0	0.0	0.0	
5003	0.0	0.0	0.0	0.0	0.0	
5004	0.0	0.0	0.0	0.0	0.0	
5005	0.0	0.0	0.0	0.0	0.0	
5006	0.0	0.0	0.0	0.0	0.0	
5007	0.0	0.0	0.0	0.0	0.0	
5008	0.0	0.0	0.0	0.0	0.0	
5009	0.0	0.0	0.0	0.0	0.0	
500A	0.0	0.0	0.0	0.0	0.0	
500B	0.0	0.0	0.0	0.0	0.0	
500C	0.0	0.0	0.0	0.0	0.0	
5000	0.0	0.0	0.0	0.0	0.0	

Monitoring information

CONTROLLER MN	Mnemonic name of an emulated 3860 controller. In all SM2 output, two controller mnemonics are always output (separated by a slash) for an emulated 3860 controller. The following two variants are provided: <ul style="list-style-type: none">– alphanum-name 2..2– x-text 4..4
DEVICE MN	Mnemonic name of the device
READ	Number of read operations per device and per second
RD HIT	Percentage of read operations completed by the cache in relation to the total number of read operations
WRITE	Number of write operations per device and per second
WR HIT	Percentage of write operations that did not need to be delayed (see notes)
TOT HIT	Percentage of read and write operations completed by the cache in relation to the total number of access operations executed

Notes

The monitored data output here refers to the controller as a whole, i.e. it includes access operations from other hosts.

WR HIT:

All write operations are executed via the cache as fast writes. An exception are delayed fast writes: if the cache is filled with unsaved write data, these may be forced to wait temporarily for a cache slot to become available. A WR HIT is one write operation that need not be delayed. Only very high write loads will cause the WR HIT rate to fall below 100%.

TCP/IP report

This report provides the IP and port numbers as well as data on input and output for each TCP/IP connection.

Report output

The REPORT TCP statement is used to request the output of the TCP/IP report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*TCP-IP.

Overflow screens may be requested for this report.

The monitored data output is sorted in accordance with the total number of bytes sent and received.

D016ZE04 SM2 TCP/IP		CYCLE: 120 S				99-03-24 14:30:00				
	LOCAL IP	:139. 22. 16.164								
1.	REMOTE IP	:139. 25.114. 14								
		REMOTE PORT:	1057			LOCAL PORT:	1400			
2.		:139. 25.113.253								
		REMOTE PORT:	1074			LOCAL PORT:	1110			
3.		:139. 25.105. 6								
		REMOTE PORT:	1054			LOCAL PORT:	1110			
4.		:139. 25.105.157								
		REMOTE PORT:	1092			LOCAL PORT:	1110			
5.		:139. 25.112.114								
		REMOTE PORT:	1120			LOCAL PORT:	1110			
		INPUT					OUTPUT			
	TSDU(/S)	(KB/S)	BUF (KB)	WIN (KB)	TSDU(/S)	(KB/S)	BUF (KB)	WIN (KB)		
1.	0.0	0.0	0.0	2.4	12.0	1.5	0.0	7.4		
2.	0.0	0.0	0.0	2.0	0.5	1.0	0.0	8.3		
3.	0.3	0.0	0.0	5.3	3.7	0.3	0.0	7.2		
4.	0.1	0.0	0.0	2.6	0.1	0.3	0.0	7.5		
5.	0.1	0.0	0.0	2.1	0.1	0.2	0.0	8.3		

Monitoring information

The individual entries have the following meanings:

LOCAL IP	IP address of the local host
REMOTE IP	IP address of the remote host
REMOTE PORT	Port number via which the application on the remote host communicates
LOCAL PORT	Port number via which the application on the local host communicates

INPUT

TSDU (/S)	Number of TSDUs received. TSDUs (Transport Service Data Units) correspond to jobs of the application on BCAM.
(KB/S)	Number of KB received
BUF (KB)	Cache space occupied by messages which have not yet been retrieved
WIN (KB)	Last window size received from the partner

OUTPUT

TSDU (/S)	Number of TSDUs sent TSDUs (Transport Service Data Units) correspond to jobs of the application on BCAM.
(KB/S)	Number of KB sent
BUF (KB)	Cache space occupied by messages which have not yet been sent or acknowledged
WIN (KB)	Last window size sent to the partner

Notes

- The values for sent and received window sizes only apply for remote connections.
- The values BUF and WIN merely reflect the status at the end of the monitoring cycle, and do not represent mean values over the entire monitoring cycle.

TLM report

This report provides monitored data on the occupation of locks managed by the Task Lock Manager (TLM).

Report output

The REPORT TLM statement is used to request the output of the TLM report.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*TLM.

The monitored data output is sorted in accordance with OCCUPATIONS.
Only one screen is output.

D016ZE04 SM2 TLM			
		CYCLE: 120 S	SAMPLES: 293
		99-03-24 14:30:00	
NAME	WAITING TASKS	OCCUPATIONS	
LKSI089A	0.00	100.0	
LKSI000G	0.00	100.0	
LKSI000F	0.00	100.0	
LKAL0174	0.00	6.1	
LKFT	0.00	5.8	
LKBV0174	0.00	4.7	
LKSDFSF	0.00	2.7	
LKCMB091	0.00	2.3	
LKCMB060	0.00	2.3	
LKCMB009	0.00	1.3	
LKCMB031	0.00	1.3	
LKCMB025	0.00	1.0	
LKCMB013	0.00	0.6	
LKCMB065	0.00	0.6	
LKCMB074	0.00	0.6	
LKCMB004	0.00	0.6	

Monitoring information

NAME	Name of the monitored task lock (non-printable characters are represented as blanks)
WAITING TASK	Mean number of tasks in the queue of the lock
OCCUPATIONS	Relative frequency with which the task lock is occupied (in percent)

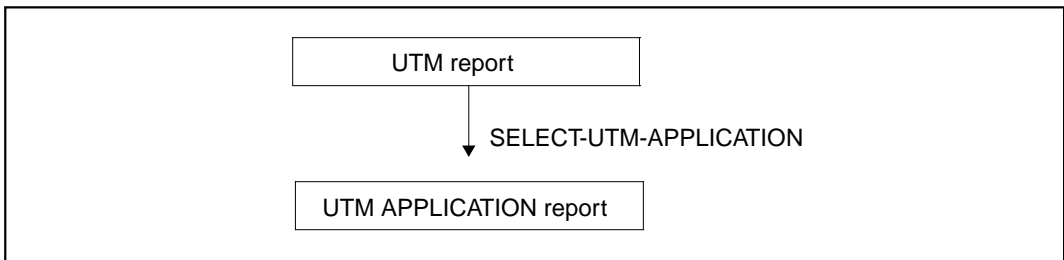
UTM reports

These reports output application-specific data to the screen. In the following description, you should note that the terms used are the same as those used in UTM. This results in some discrepancies compared with the terms used in the RESPONSETIME reports (e.g. "transaction"). Please refer to the UTM manuals for an explanation of the terms used in UTM.

The UTM report provides an overview of all UTM applications which supply data to SM2. The decision as to whether a UTM application supplies data to SM2 is taken when the application is generated and/or by means of a statement from the UTM administrator. For further information, please refer to "UTM Monitored data on UTM applications" on page 53 and the UTM manual "Generating and Administering Applications" [10].

The UTM APPLICATION report provides detailed information on a UTM application.

The figure below illustrates the hierarchy of reports and the statement used to request them:



UTM REPORT

This report provides monitored data on UTM applications.

Report output

The REPORT UTM statement is used to request the output of the UTM report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*UTM.

The UTM report contains only dialog-oriented monitored data. The data relating to database calls and distributed processing (DDP) is averaged out for all the steps in a dialog, even for those steps which contain no DB calls or distributed processing calls.

Overflow screens may also be requested for this report.

The monitored data output is sorted in accordance with the number of dialog steps performed (#DS).

D016ZE04 SM2 UTM		CYCLE: 60 S		96-04-11 15:08:00						
APPLI-NAME	M	TIME (S/DS)	DB (%)	TAC-CL (%)	DDP (%)	# DS (1/S)	#DB-CALL (1/DS)	# TSK	# USER	
F2POOL	S	0.1	0.0	0.0	0.0	0.0	0.0	3	1	
PAHT	S	0.2	0.0	0.0	0.0	0.0	0.0	1	1	

Monitoring information

APPLI-NAME Name of the UTM application

M Mode of the UTM application
 S: UTM-S application
 F: UTM-F application

TIME Average total dwell time in seconds for a dialog step (DS) measured by UTM as the time elapsed between UTM accepting a message and sending a message

The following three values indicate average percentages of the total time shown under TIME:

DB	Wait time in UTM for execution of database calls by database systems
TAC-CL	Wait time as a result of TAC class bottlenecks
DDP	Wait time in UTM for messages from remote applications (DDP = distributed data processing)
# DS	Number of dialog steps executed per second
#DB-CALL	Number of database calls executed per dialog step
# TSK	Number of tasks currently running for the application
# USER	Number of users currently signed on to the application

UTM APPLICATION report

This report provides detailed information on a UTM application.

Report output

The UTM APPLICATION report is output only at the explicit request of the SM2 user with the help of the SELECT-UTM-APPLICATION statement (see page 182). This statement is used to output a UTM report together with a UTM APPLICATION report for the selected applications. The UTM APPLICATION report supplies detailed information on the UTM applications.

It is possible to output data on up to 16 applications.

The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*UTM.

Overflow screens may be requested for this report.

```

D016ZE04 SM2 UTM APPLICATION      CYCLE:   60 S                99-04-11  15:08:00
  
```

APPL: F2POOL JOB: JOBUTM01 UTM-VERS: V03.3A10 MODE: UTM-F # DB'S: 2			
MEAN VALUE FOR	IALOG	ASYNCH	
TOTAL TIME (S/RQ)	0.1	0.0	# DIAL STEPS (1/S) 0.0
TOT TIME WITH DB (S/RQ)	0.0	0.0	# DIAL TA'S (1/S) 0.0
STEPS WITH DB (1/S)	0.0	0.0	# ASYN TA'S (1/S) 0.0
TIME IN DB (S/RQ)	0.0	0.0	# ASYN CONV (1/S) 0.0
# DB CALLS (1/RQ)	0.0	0.0	# TASKS 3
CPU TIME IN DB (MS/RQ)	0.0	0.0	# MAX ASYN TASKS 2
# IO IN DB (1/RQ)	0.0	0.0	# CONNECTED USERS 1
TOT TIME WITH DDP (S/RQ)	0.0	0.0	# WAITING PRINTS 1
STEPS WITH DDP (1/S)	0.0	0.0	# WAITING ATACS 0
TIME IN DDP (S/RQ)	0.0	0.0	# WAITING DPUTS 14
CPU TIME (MS/RQ)	22.5	0.0	# DIALOG CURR CONV 1
# IO (1/RQ)	5.5	0.0	# ASYN CURR CONV 0
			CACHE HIT RATE (%) 86
			FREE PAGE POOL (%) 4
			BOURSE WAIT T (MS) 0

Monitoring information

APPL	Name of the UTM application
JOB	BS2000 job name for the first task started for the UTM application
UTM-VERS	UTM version
MODE	UTM-S or UTM-F mode

# DB'S	Number of database systems the application works with
The following entries are all average values which refer to dialog steps (DIALOG) and asynchronous conversations (ASYNCH). The descriptions of the entries use the term "step" as a general term for both these items.	
TOTAL TIME	For dialog steps: the total time for each dialog step from acceptance of the entry by UTM to the sending of a dialog message by UTM For asynchronous conversations: the total time for each asynchronous conversation from the start of processing to the end of processing (not including the wait time before the start of processing)
TOT TIME WITH DB	Value analogous to TOTAL TIME, but only for steps with database calls (*)
STEPS WITH DB	Number of steps per second with database calls
TIME IN DB	Time per step UTM waits for the execution of database calls (*)
# DB CALLS	Number of database calls per step (*)
CPU TIME IN DB	CPU time in milliseconds consumed per step in database systems (*) (***)
# IO IN DB	Number of I/Os per step in the called database systems (*) (***)
TOT TIME WITH DDP	Value analogous to TOTAL TIME, but only for steps with distributed processing calls (**)
STEPS WITH DDP	Number of steps per second with distributed processing calls
TIME IN DDP	Time per step UTM waits for the arrival of a message from a remote application (**)
CPU TIME	CPU time consumed by UTM for processing the step, including user subroutines
# IO	Number of I/Os to/from UTM tasks which occur during processing of the step, including user subroutines
(*)	Only those steps are included where database calls occur
(**)	Only those requests are included where distributed processing calls occur
(***)	Not all database systems which coordinate with UTM supply these values. Some database systems allow the database administrator to activate the provision of monitoring data by issuing a statement. For further details see the UTM manual "Concepts and Functions" [11] and the relevant database system manuals.

The monitored data is set to zero for database systems which do not supply any values. If several database systems are being used, and only some of these provide monitoring data, this should be taken into account when interpreting the average values.

The next four values show the application's throughput (performance data).

# DIAL STEPS	Number of completed dialog steps per second
# DIAL TA'S	Number of completed dialog transactions per second
ASYN TA'S	Number of completed asynchronous transactions per second
ASYN CONV	Number of completed asynchronous conversations per second

The remaining values indicate the current status of the application.

# TASKS	Number of tasks running for the application
# MAX ASYN TASKS	Maximum number of tasks available for asynchronous processing
# CONNECTED USERS	Number of users signed on to the application
# WAITING PRINTS	Number of print jobs waiting for execution
# WAITING ATACS	Number of jobs for asynchronous programs waiting for processing
# WAITING DPUTS	Number of time-driven jobs waiting (ATAC and output jobs)
# DIAL CURR CONV	Number of open dialog conversations
# ASYN CURR CONV	Number of open asynchronous conversations
CACHE HIT RATE	Hit rate in % when searching for a UTM page in the UTM cache
FREE PAGE POOL	Percentage of free pages in the UTM page pool
BOURSE WAIT T	Time in milliseconds a request waits in the job queue for a UTM application. This value is approximated by generating an internal test message.

Note

Asterisks (***) are output in place of invalid or unavailable monitoring data.

VM2000 report

This report provides monitored data for the individual virtual machines of a VM2000 system.

Report output

The REPORT VM statement is used to request the output of the VM2000 report. The report can only be output if the SM2 administrator has activated the monitoring process using the statement START-MEASUREMENT-PROGRAM TYPE=*V . The values for all VMs are only output if SM2 is running on the monitor machine VM1. If this is not the case, only the values for the VM on which SM2 is running are output

D016ZE04 SM2 VM		CYCLE: 120 S		99-03-29 11:14:01			
HYPERVISOR:		IDLE: 33.2%	ACTIVE: 8.1%	NUMBER OF PHYS. CPU'S: 2			
INDEX	NAME	MAIN MEMORY SIZE (MB)	MAX	CPU (%) PLAN	MEAS	NUMBER OF CPU'S	
2	D016ZE04	1952	100.0	31.0	46.2	2	

Monitoring information

On SR2000 (VM2000/SR V1.0A or later), some monitored data has a special significance in the context of VM2000. This is indicated below with “*SR2000*”.

HYPERVISOR

IDLE Percentage of ELAPSED TIME accounted for by IDLE time
SR2000:
 Percentage of physically available CPUs which have been identified as unused.
 Unused CPUs are not assigned to any VM, are in the “detached” state, or belong to an inactive VM.

ACTIVE Percentage of ELAPSED TIME spent by the hypervisor in active time
SR2000:
 Percentage of active time of the hypervisor averaged out over all CPUs

NUMBER OF PHYS. CPU'S

Number of physically available CPUs

INDEX Index of the virtual machine

NAME Name of the virtual machine

MAIN MEMORY SIZE (MB)

Main memory size of the virtual machine in megabytes

CPU MAX Maximum percentage of CPU performance that can be accounted for by individual virtual machines
SR2000:
 Percentage of physically available CPUs that have been assigned (NUMBER OF CPUs / NUMBER OF PHYS. CPUs)

CPU PLAN Planned percentage of CPU performance that can be accounted for by individual virtual machines
SR2000:
 Percentage of physically available CPUs that have been assigned (NUMBER OF CPUs / NUMBER OF PHYS. CPUs)

CPU MEAS Percentage of ELAPSED TIME that can be accounted for by the CPU time of the individual virtual machines. This value represents the share of the entire system. Virtual machines which have not used any CPU time during the monitoring cycle are not listed. Newly started virtual machines are not recorded until the subsequent monitoring cycle is completed.

SR2000:

The value output here must not exceed that output under "CPU PLAN", as the CPUs are assigned to guest systems.

NUMBER OF CPU'S

Number of CPUs assigned to the virtual machine

Note

ELAPSED TIME is the length of the SM2 monitoring cycle.

5.2 SM2 information screens

ACTIVE PARAMETER

This screen displays the parameters set for the active monitoring programs. As many screens as are necessary are output. If sufficient space is available, all the parameters for one monitoring program are displayed on a single screen. It is only possible to request output from the administration section using the SHOW-ACTIVE-PARAMETER statement.

```

D016ZE04 SM2 ACTIVE PARAMETER                                99-03-24  14:20:59
-----
BCAM CONNECTION PARAMETER
-----
INWAIT-BUCKETS      : 5, 10, 100, 1000
REACT-BUCKETS      : 500, 1000, 2000, 4000
INPROC-BUCKETS     : 5, 10, 100, 1000
OUTPROC-BUCKETS    : 5, 10, 100, 1000

BCAM CONNECTION SET
SET-NAME           : DIALOG                                PORT1110
CONNECTION-TYPE    : REMOTE                                REMOTE
HOST-SELECTION
(LLOCAL / PARTNER ) (*ANY / *ANY )                      (*ANY / *ANY )
CONNECTION-SELECTION : *BY-NEA-NAME                       *BY-PORT-NUMBER
(LLOCAL / PARTNER ) ($DIALOG / *ANY )                    ( 1110 / *ANY )

CHANNEL-IO PARAMETER
-----
CHANNELS           : *ALL

```

Monitoring information

BCAM-CONNECTION-PARAMETER

INWAIT-BUCKETS	Definition of the upper limits of up to four ranges in which the INWAIT times are listed by order of magnitude
REACT-BUCKETS	Definition of the upper limits of up to four ranges in which the REACT times are listed by order of magnitude
INPROC-BUCKETS	Definition of the upper limits of up to four ranges in which the INPROC times are listed by order of magnitude
OUTPROC-BUCKETS	Definition of the upper limits of up to four ranges in which the OUTPROC times are listed by order of magnitude

BCAM-CONNECTION-SET

SET-NAME Name of the selected connection set

CONNECTION-TYPE Type of connected to be monitored (REMOTE, LOCAL or BOTH)

HOST-SELECTION Hosts between which the connections are established

CONNECTION-SELECTION Type of connection set (*BY-PORT-NUMBER or *BY-NEA-NAME) and the selected port numbers or application names

CHANNEL-IO PARAMETER

CHANNELS Channel addresses for the channels monitored

```

D016ZE04 SM2 ACTIVE PARAMETER                               99-03-24 14:20:59
COSMOS PARAMETER
-----
TITLE                : COSMOS
BUFFER-SIZE          : 2
NUMBER-OF-BUFFERS   : 2
ADDITIONAL-INFO      : *CONFIGURATION
OUTPUT               : *DISK
                   : :20S6:$NNN.COSMOS.TEST

TASK-SELECTION
TSN                  : *NONE
USER-ID              : *NONE
JOB-NAME             : *NONE
CATEGORY             : *NONE
TYPE                 : SYSTEM, BATCH, DIALOG, TP

EVENT-SELECTION
EIA-INTERRUPT-CLASS : *ANY

```

Monitoring information

COSMOS PARAMETER

TITLE Title of the COSMOS monitoring process

BUFFER-SIZE Number of 4K pages per buffer

NUMBER-OF-BUFFERS

Number of buffers

ADDITIONAL-INFO

Additional data to be included

OUTPUT

Way in which the COSMOS output files are to be written

TASK-SELECTION

Conditions on the basis of which the tasks are to be monitored

TSN

Selection by TSN

USER-ID

Selection by user ID

JOB-NAME

Selection by job name

CATEGORY

Selection by category

TYPE

Selection by task type

EVENT-SELECTION

Conditions on the basis of which the events are selected

EIA-INTERRUPT-CLASS

Selection of EIA events on the basis of the interrupt code

D016ZE04 SM2 ACTIVE PARAMETER

99-03-24 14:20:59

```

EIA-SVC-NUMBER      : *ANY
IO-DEVICE           : *ANY
DAB-CACHE-ID       : *ANY
MEMORY-CLASS       : *ANY
SLOT-MEMORY-CLASS  : *ANY
PEND-CODES         : *ANY
LOCK-ID            : *ANY
TLT-DESCRIPTOR     : *ANY
TSKI-SWITCH        : *ANY
TSVC-SVC-NUMBER    : *ANY

UNLOAD              : AT-MEASUREMENT-PROGRAM-STOP
MEASUREMENT-TIME   : *NOT-SPECIFIED

OPENED EVENT       : INIT, STAT, PTSK, CREA, DEST, MMRC, LGON

DISK PARAMETER
-----
DEVICES            : 430D, 4310, 4312, 4314, 434C, 4350

```

Monitoring information

EIA-SVC-NUMBER	Selection of EIA events on the basis of the SVC number
IO-DEVICE	Selection of PMIO, SDV, CHTM and IONQ events on the basis of the mnemonic device name
DAB-CACHE-ID	Selection of DAB events on the basis of the device VSN
MEMORY-CLASS	Selection of the REQM and RELM event on the basis of the memory class
SLOT-MEMORY-CLASS	Selection of the SLOT event on the basis of the memory class
PEND-CODE	Selection of the PEND event on the basis of the pend code
LOCK-ID	Selection of the LOCK event on the basis of the lock ID
TLT-DESCRIPTOR	Selection of the TLT event on the basis of the TLT descriptor
TSKI-SWITCH	Selection of the TSKI event
TSVC-SVC-NUMBER	Selection of the TSVC events on the basis of the SVC numbers
UNLOAD	Time at which the COSMOS subsystem is to be unloaded
MEASUREMENT-TIME	Timing of the monitoring process
OPENED EVENTS	Events opened for recording
DISK PARAMETER	
DEVICES	Mnemonic device names of the monitored disk devices

D016ZE04 SM2 ACTIVE PARAMETER

99-03-24 14:20:59

DISK-FILE PARAMETER

DEVICES : 430D, 4310, 4312, 4314, 434C, 4350

FILE PARAMETER

FILENAME : :20SX:\$TSOS.TSOSCAT
 :20SW:\$TSOS.TSOSCAT
 :20S2:\$TSOS.TSOSCAT
 :2S06:\$TSOS.TSOSCAT
 :20S7:\$TSOS.TSOSCAT
 :20RZ:\$TSOS.TSOSCAT
 :20SQ:\$TSOS.TSOSCAT
 :20SL:\$TSOS.EQUISAMQ
 :20S6:\$TSOS.SYSEAM
 :20SX:\$TSOS.SYSEAM
 :20S2:\$TSOS.SYSEAM
 :20S7:\$TSOS.SYSEAM
 :20S6:\$NNN.SM2.SAM.MANUAL.V13.0

Monitoring information

DISK-FILE PARAMETER

DEVICES Mnemonic device names of the monitored disk devices

FILE PARAMETER

FILENAME Name of the file whose access values are monitored

D016ZE04 SM2 ACTIVE PARAMETER

99-03-24 14:20:59

ISAM PARAMETER

POOL-NAME (SCOPE) : :20SL:\$SYS01 (*HOST), :20SL:SRPMPPOOL(TA=RP01),
 :20SL:SESFPOOL(*HOST), :20SL:SDFPOOLN(TA=7IY4)

PERIODIC-TASK PARAMETER

USER-ID : NNN, SD222222, TSOS, ZZZ
 JOB-NAME : *NONE

RESPONSETIME PARAMETER

SCOPE : (BUCKET,CATEGORY)
 DEFINITION : 1
 CONNECTION-NUMBER : 1024
 RESPONSE-BUCKETS : 5, 10, 20, 50, 100
 THINKTIME-BUCKETS : 50, 150, 300, 600, 1200
 TRANSACT-BUCKETS : 5, 10, 20, 50, 100
 WAITTIME-BUCKETS : 1, 2, 5, 10, 20

Monitoring information

ISAM PARAMETER

POOL-NAME Name of the monitored ISAM pool with the catalog ID of the public volume set to which the ISAM pool is assigned

(SCOPE) Defined type of the ISAM pool:
*HOST or UI=user-id or TA=tsn

PERIODIC-TASK PARAMETER

LOG TASKS Tasks whose monitored data is to be written to the SM2 output file
Selected tasks are specified under the selection criteria

USER-ID and

JOB-NAME

RESPONSETIME PARAMETER

SCOPE Indicates whether the response time data has been recorded according to buckets (BUCKET) or categories (CATEGORY)

DEFINITION Definition of the type of response time monitored

CONNECTION-NUMBER

Maximum number of connections monitored

RESPONSE-BUCKETS

Definition of the upper limits of up to five ranges in which the response times are stored by order of magnitude

THINKTIME-BUCKETS

Definition of the upper limits of up to five ranges in which the think times are stored by order of magnitude

TRANSACT-BUCKETS

Definition of the upper limits of up to five ranges in which the transaction times are stored by order of magnitude

WAITTIME-BUCKETS

Definition of the upper limits of up to five ranges in which wait times in the BCAM pool are stored by order of magnitude

D016ZE04 SM2 ACTIVE PARAMETER

99-03-24 14:20:59

```

CONNECTION SET
SET-NAME           : *GLOBAL                DIALOG
SET-DEFINITION    : BY-CONNECTION          BY-CONNECTION
CONNECTION-TYPE   : REMOTE                  REMOTE
CONNECTION        : (*ALL ,*ALL ,*ALL )($DIALOG ,*ALL ,*ALL )
(APPL,PARTNER,PROC)

```

```

CONNECTION SET
SET-NAME           : OMNIS
SET-DEFINITION    : BY-CONNECTION
CONNECTION-TYPE   : REMOTE
CONNECTION        : ($OMNIS ,*ALL ,*ALL )
(APPL,PARTNER,PROC)

```

```

430D, 4310, 4312, 4314, 434C, 4350

```

Monitoring information

CONNECTION-SET

SET-NAME Name of the selected connection set
SET-DEFINITION Type of connection set monitored (BY or EXCEPT)
CONNECTION-TYPE Type of connection monitored (REMOTE, LOCAL or BOTH)
CONNECTION Selection of up to five connection groups
 APPL Name of the selected application
 PARTNER Name of the selected partner
 PROC Name of the selected partner computer

SERVICETIME PARAMETER

DEVICES Mnemonic device names of the monitored devices

D016ZE04 SM2 ACTIVE PARAMETER

99-03-24 14:20:59

SYSSTAT PARAMETER

DEVICES : 431C, 4310, 4330, 434B, 434C, 4350, 4354, 4361, 4363,
4370, 4379

TASK PARAMETER

TASK SELECTION : *ALL
DEVICES : 430D, 4310, 4312, 4314, 434C, 4350

Monitoring information

SYSSTAT PARAMETER

DEVICES Mnemonic device names of the monitored devices or *NONE, *ALL, *TAPE or *DISK

TASK PARAMETER

TASK SELECTION *ALL: All tasks are monitored.

Tasks whose monitored data is to be written to the SM2 output file.

Selected tasks are specified under the selection criterion TSN, USER-ID, JOB-NAME, JOB-CLASS or TYPE.

DEVICES Mnemonic device names monitored by the task monitoring program for each task or *NONE, *ALL or *DISK

Note

If a selected monitoring program is not active, the message "MEASUREMENT NOT ACTIVE" is displayed in place of the parameters.

DEFINED PARAMETER

This screen displays the parameters set for the defined monitoring programs. As many screens as are necessary are output. If sufficient space is available, all the parameters for one monitoring program are displayed on a single screen. It is only possible to request output from the administration section using the SHOW-DEFINED-PARAMETER statement. The layout of the screen is the same as the ACTIVE PARAMETER screen, with the difference that the first line contains the header DEFINED PARAMETER.

Note

If no parameters are defined for a selected monitoring program, the message "NO PARAMETERS DEFINED" is displayed in place of the parameters.

MEASUREMENT STATUS

This screen provides the user with information on the current status of the measurement at any time. Output to the terminal comprises three parts. The first two parts contain general administration data and the third part provides information on the functions permitted and on monitoring programs which have been defined and which are running.

In the analysis subinterval, output of the MEASUREMENT STATUS screen is requested by means of the STATUS statement, and in the administration facility it is requested by means of the SHOW-MEASUREMENT-STATUS statement.

```

D016ZE04 SM2 MEASUREMENT STATUS                               99-03-24  14:25:00
TSN OF SM2 PRIMARY ADMINISTRATOR : 9V43
NUMBER OF PRIVILEGED SM2 USERS.. : 3
NUMBER OF NONPRIVILEGED SM2 USERS: 2

SM2 GATHERING TASK CREATED AT... : 99-03-17  13:42:03
OFFLINE PERIOD..... : 240 S
ONLINE PERIOD..... : 120 S
SAMPLING PERIOD..... : 400 MS
SM2 LOGGING FILE..... : :20S6:$NNN.SM2.SAM.MANUAL.V13.0

SECONDARY ADMINISTRATOR ALLOWED. : YES
USER MEASUREMENTS ALLOWED..... : FILE      ISAM      TASK
USER MEASURED OBJECTS..... : FILES ( 0) ISAM-POOLS ( 0) TASKS ( 0)
PRIVILEGED MEASUREMENTS DEFINED. : BCAM    CHA-IO  COSM+   DISK    D-FILE
  FILE    ISAM    PERTSK  RTIME    SVTIME  SYSTEM  TASK
PRIVILEGED MEASUREMENTS ACTIVE.. : BCAM    CHA-IO  CMS      DAB     DISK
  D-FILE  DLM    FILE    HSMS    ISAM    MSCF    NDV     NSM     PCA
  PERTSK  PFA    POSIX   RTIME   SVC     SVTIME  SYSTEM  TASK   TCPIP
  TLM

```

General administration data

TSN OF SM2 PRIMARY ADMINISTRATOR

Task sequence number (TSN) of the SM2 primary administrator or, if none exists yet, *NONE.

Note

In a host network, it is possible to perform administration from a remote host. In this case, the host name is output after the TSN.

NUMBER OF PRIVILEGED SM2 USERS

Number of privileged users currently working with SM2 (including the primary administrator)

NUMBER OF NONPRIVILEGED SM2 USERS

Number of nonprivileged users currently working with SM2

Either

SM2 GATHERING TASK CREATED AT

Date (using the ISO format) and time the monitoring task was created (provided the SM2 monitoring task is active)

or

SUBSYSTEM SM2 IN DELETE !!!

Subsystem SM2 in the DELETE state.

With this status, no further users are allowed to log on. Permission for user-specific task monitoring is withdrawn. The SM2 output file and user-specific SM2 output files are closed automatically. Repeated attempts to open the file are rejected. Subsystem SM2 then terminates operations, after which the SM2 program also terminates.

or

SM2 GATHERING TASK TERMINATED !!!

SM2 monitoring task terminated (due to error)

OFFLINE PERIOD Length of the monitoring cycle for background monitoring (in seconds).

ONLINE PERIOD Length of the monitoring cycle for online analysis (in seconds). or SAME AS OFFLINE: no separate monitoring cycle for online analysis exists.

SAMPLING PERIOD Length of the sampling period in milliseconds.

SM2 LOGGING FILE

*NONE if no SM2 output file is defined

or

*OPEN if an SM2 output file is open
(output for nonprivileged users)

or

name of the open SM2 output file
(output for privileged users)

Status data on additional functions

SECONDARY ADMINISTRATOR ALLOWED:

YES: The primary administrator has permitted other SM2 administrators

NO: Parallel SM2 administration is not permitted

USER MEASUREMENTS ALLOWED

List of the user monitoring programs permitted. Each user sees precisely those user monitoring programs he/she is allowed to use. The following entries are possible: FILE, ISAM, TASK.

USER MEASURED OBJECTS

The total number of monitored objects is output for each permitted user monitoring program. If this number is zero, the corresponding user monitoring program is permitted (for some or all users), but nobody has yet activated an object.

The following entries are possible: FILES, ISAM-POOLS, TASKS.

PRIVILEGED MEASUREMENTS DEFINED

List of monitoring programs defined.

The following entries are possible: BCAM, CHA-IO, COSM, DISK, D-FILE, FILE, ISAM, PERTSK, RTIME, SVTIME, SYSTEM, TASK.

PRIVILEGED MEASUREMENTS ACTIVE

List of active monitoring programs.

The following entries are possible: BCAM, CHA-IO, CMS, COSM, DAB, DISK, D-FILE, DLM, FILE, GS, GSVOL, HSMS, ISAM, MSCF, NDV, NSM, PCA, PERTSK, PFA, POSIX, RTIME, SVC, SVTIME, SYSTEM, TASK, TCPIP, TLM, UTM, VM.

Meaning of abbreviations for the monitoring programs:

BCAM	BCAM-CONNECTION monitoring program
CHA-IO	CHANNEL-IO monitoring program
CMS	CMS monitoring program
COSM+	COSMOS (“+” means that COSMOS has been initialized but not started)
DAB	DAB monitoring program
D-FILE	DISK-FILE monitoring program
DISK	DISK monitoring program
DLM	DLM monitoring program
FILE	FILE monitoring program (privileged users)
GS	GS monitoring program
GSVOL	GSVOL monitoring program
HSMS	HSMS monitoring program
ISAM	ISAM monitoring program (privileged users)
MSCF	MSCF monitoring program
NDV	NET-DEVICE monitoring program
NSM	NSM monitoring program
PCA	PCA monitoring program
PERTSK	PERIODIC-TASK monitoring program
PFA	PFA monitoring program
POSIX	POSIX monitoring program
RTIME	RESPONSETIME monitoring program
SVC	SVC monitoring program
SVTIME	SERVICETIME monitoring program
SYSTEM	SYSSTAT monitoring program
TASK	TASK monitoring program
TCPIP	TCP-IP monitoring program
TLM	TLM monitoring program
UTM	UTM monitoring program
VM	VM2000 monitoring program

Table 8: Abbreviations for monitoring programs

If a monitoring program is followed by an asterisk (e.g. PCA*), this means that the monitoring program is active as far as SM2 is concerned, but that the corresponding subsystem is currently not supplying any data (e.g. because it has not been started).

SELECTED HOSTS

This screen displays the hosts which were selected by means of the SELECT-HOSTS statement.

The output can only be requested in the administration facility using the SHOW-SELECTED-HOSTS statement.

D016ZE04 SM2 SELECTED HOSTS			99-03-24 14:29:30
HOST-NAME	PROCESSOR-NAME	LAST BUFFER	
*LOCAL	D016ZE04	14:28:00	
D016ZE02	D016ZE02	14:29:00	
D016ZE07	D016ZE07	14:29:00	

Information on the selected hosts

HOST-NAME Name of the host

PROCESSOR-NAME Processor name from the point of view of the local host (for information on host and processor names, see the note in the description of the SELECT-HOSTS statement on page 110)

LAST BUFFER Time stamp of the last monitoring data called; this time stamp is identical to the time in the top right-hand corner of the reports

RSLT NOT VALID means that no (up-to-date) data is available.

Possible reasons:

- No data has been requested.
- Data has been requested but not transferred because the monitoring cycle on the addressed host was not yet terminated or the transfer was unsuccessful.

STATUS TABLE

No monitoring data is output in the STATUS TABLE.

Output to the terminal comprises two parts. The first part provides the user with information on which SM2 tasks exist and on the status of the subsystems used by SM2. The line containing "MISSED RECORDS" is only output if unwritten records exist. The second part outputs as many of the most recent trace entries as can be accommodated on one screen.

The SHOW-SM2-STATUS statement is used to request the output of the STATUS TABLE. This statement is only available to privileged users in the administration facility.

TASK / SS		START	TIME	STATUS		END TIME	
GATHERER		1999-03-24	07:25:00	RUNNING			
WRITE-TASK		1999-03-24	07:25:07	RUNNING			
USER-WRITE-TASK		1999-03-24	07:25:18	RUNNING			
BCAM-SM2		1999-03-24	07:25:19	IN USE			
MSCF		1999-03-24	07:25:19	IN USE			
DLM		1999-03-24	07:25:19	IN USE			
NSM		1999-03-24	07:25:19	IN USE			
LAST TRACED EVENTS		TSN	REASON	TYPE	MODUL	ID	CODE
CUR#	TIME						
8	07:25:19	SM2G	NSM-STA	SS	NSM	0000	00000000
7	07:25:19	SM2G	DLM-STA	SS	DLM	0100	00000000
6	07:25:19	SM2G	MSC-STA	SS	MSCF	0100	00000000
5	07:25:19	SM2G	BCM-STA	SS	DSSM	0000	00000000
4	07:25:18	SM2U	CREATE	TASK	UDM	0000	00000000
3	07:25:07	SM2W	CREATE	TASK	GDM	0000	00000000
2	07:25:00	SM2G	CREATE	TASK	GAT4	0000	00000000

Monitoring information

TASK / SS Name of the task or subsystem

START TIME Date (in ISO4 format) and time at which the task or subsystem was created

STATUS Status of the task or subsystem

Meanings of the entries for tasks:

RUNNING:	Task running normally
ENDED:	Task terminated normally
ABENDED:	Task terminated abnormally

Meanings of the entries for subsystems:

IN USE:	SM2 is working with the subsystem
UNAVAIL:	SM2 requires data from the subsystem, but the subsystem is not running
UNUSED:	SM2 is no longer working with the subsystem (of its own accord)
ABENDED:	SM2 is no longer working with the subsystem because the subsystem is no longer running
STOPPED:	SM2 has unloaded the subsystem
END TIME	Date (in ISO4 format) and time at which the task was terminated or at which the subsystem stopped being used
MISSED RECORDS	This information is omitted if SUM = 0.
SUM:	Total number of unwritten records (in the current SM2 output file)
LAST INTERVAL:	Unwritten records in the last cycle
LAST TRACED EVENTS	
CUR#	Number of the trace entry (descending)
TIME	Time of the trace entry
TSN	TSN of the task in which a trace entry was written. The SM2 system tasks have the following default TSNs: GATHERER: SM2G WRITE-TASK: SM2W USER-WRITE-TASK: SM2U

REASON	Reason for the trace entry. In many cases (with TYPE=S-ER) this is the name of the system function which reported an error.	
CREATE:	Creation of task	
TERM:	Termination of task	
Subsystem-STA:	Start of subsystem use	
Subsystem-STO:	End of subsystem use	
Subsystem-NLD:	Subsystem not loaded	
TYPE		
I-ER:	Internal error	(internal error during execution of SM2)
S-ER:	System error	(error calling a BS2000 system function)
TASK:	Task event	(start/end/crash of an SM2 task)
SS:	Subsystem event	(start/end of subsystem use by SM2)
MODUL	Abbreviated name of the SM2 module writing the trace entry (without "NPS", "NPFS")	
ID	Identifies the location at which the error occurred. In many cases this is the offset within the module. If the error is unique within the module, this field contains no entry.	
CODE	Return code of the system function called (for TYPE=S-ER) or additional information (for TYPE=I-ER) or zero	

Note

The trace entries (particularly those with TYPE=I-ER,S-ER) are only relevant for SM2.

USER MEASURED OBJECTS

This screen displays the parameters set for the monitoring programs defined by the user. As many screens as are necessary are output. If sufficient space is available, all the parameters for one monitoring program are displayed on a single screen. In the analysis section, only the parameters for the user task statistics are displayed, together with the objects users have activated for themselves.

The SHOW-USER-MEASURED-OBJECTS statement is used to request the output of this screen.

```

D016ZE04 SM2 USER MEASURED OBJECTS                               99-03-24  19:10:57
-----
FILE PARAMETER
-----
FILENAME                   : :20S6:$NNN.LIB.TOPAS.130
BY TASK                    : 9S37

ISAM PARAMETER
-----
POOL                       : :20SL:SDFPOOLN(TA=9S37      )
BY TASK                    : 9S37

TASK PARAMETER
-----
MEASURED TSN              : 9S37
MEASURED USER-ID        : NNN
MEASURING TSN            : 9S37
MEASURING USER-ID      : NNN
PC-INTERVAL              : 10
SVC-STATISTICS          : ON
    
```

Monitoring information

FILE PARAMETER

FILENAME Name of the file for which access values are to be monitored
BY TASK Task sequence number of the tasks monitoring the file

ISAM PARAMETER

POOL Name of the ISAM pool being monitored
BY TASK Task sequence number of the tasks monitoring the ISAM pool

TASK PARAMETER

MEASURED TSN TSN of the task being monitored

MEASURED USER-ID

User ID of the task being monitored

MEASURING TSN TSN of the task which initiated monitoring

MEASURING USER-ID

User ID of the task which initiated monitoring

PC-INTERVAL Sampling cycle for program counter statistics in milliseconds, or 0 if the program counter statistics are not activated.

SVC-STATISTICS Indicates whether SVC statistics are activated (ON) or deactivated (OFF).

Note

If no objects have been defined for a selected monitoring program, the message "NO OBJECTS DEFINED" is issued in place of the parameters. If the user is not authorized for monitoring or if the monitoring is not permitted for this user, the message "MEASUREMENT NOT ALLOWED" is issued in place of the parameters.

6 Notes on SM2 operation

6.1 System resource utilization by SM2

To perform monitoring, SM2 must use the resources of the system to be monitored. This section provides an overview of SM2 resources requirements and information on assessing and restricting the induced system utilization.

With regard to system utilization, only the following basic resources are considered:

- external storage
- CPU
- main memory

During monitoring, only the resources utilized by the monitoring task are analyzed (i.e. without considering any parallel SM2 user programs), this being the way SM2 is most usually operated.

6.1.1 External storage utilization

The disk storage space requirements for SM2 output files can be restricted by:

- appropriate organizational measures (e.g. transfer of old SM2 output files to tape and creation of a new SM2 output file for each monitoring task)
- modifying SM2 parameters (e.g. specification of the monitoring cycle with the OFFLINE-PERIOD operand)
- specifying the monitoring programs to be activated
- compressing the output files with the SM2U1 statement SET-COMPRESSION

6.1.2 CPU utilization

To facilitate understanding of the factors affecting CPU utilization, readers should be familiar with the monitoring methods (see section “Acquisition of monitored data” on page 15).

Method based on monitoring cycle

At the end of the monitoring cycle, the measured values of the previous monitoring cycle are calculated for all monitoring programs (with the exception of DISK and TASK). In contrast to the sample cycle, the monitoring cycle is so much longer that system utilization by this method based can be disregarded.

Method based on samples

A monitoring task routine is activated at specific intervals (see the SAMPLING-PERIOD operand of the MODIFY-MEASUREMENT-PERIODS statement) to take samples.

For each activation of the sampling routine, a basic load has to be processed, regardless of the variables (devices and tasks) to be monitored.

In addition to this basic load, further instructions are processed which depend on the number of objects to be monitored (devices, channels, tasks).

If this number remains constant in the monitoring cycle, CPU utilization is almost directly proportional to the sampling rate (i.e. halving the sampling cycle, for example, causes the induced system load to be doubled).

Lengthening the sampling cycle should be balanced by lengthening the monitoring cycle to prevent a deterioration in sampling precision.

The sample-driven method is used for device and channel utilization, the length of queues, and the monitoring programs CMS and TLM.

Method based on events

When this method is used, the monitor is the “passive” component in contrast to the other system components, which are “active”. When specific events occur in the system (e.g. starting of an I/O operation), specific monitoring programs are activated which collect the relevant data (e.g. which device, which task, etc.).

While the monitor is inactive, no system utilization is induced.

If, however, events occur which are to be monitored, utilization increases in proportion to the load (i.e. to the number of calls).

When this monitoring method is used, the system load can be reduced only by reducing the number of objects to be monitored.

The event-driven method is used by the monitoring programs CHANNEL-IO, DISK, DISK-FILE, ISAM, NET-DEVICE, PERIODIC-TASK, RESPONSETIME, SERVICETIME, SYSSTAT and TASK, as well as for user task statistics.

UTM monitoring program

If UTM applications are running on the system and these applications provide data for SM2, the following additional load occurs in each UTM task: an additional 500 instructions (approx.) are required at the end of each dialog step and each asynchronous conversation in order to provide this data. For a typical application, this amounts to considerably less than 1% of the entire processing volume.

The resulting additional load on the system thus depends on the throughput in the applications, but can generally be ignored.

If values are also provided from the database systems, an additional load arises in these database systems in order to capture the monitored data. This load depends on the database system itself and the version used. For this reason, no general rule can be given.

Write task and I/O buffer

SM2 creates a write task (system task with TSN=SM2W) for writing to the SM2 output file. This task exists only from OPEN to CLOSE and is activated only when an I/O buffer is full. The input/output operation is controlled by the write task, and the CPU is required for task execution (CPU time for TPR and SIH states). The CPU time required for writing to the I/O buffer is assigned not to the write task but to the initiating task (system task or SIH processor state).

The data rate for writing to the I/O buffer depends on whether the record is written

- by the monitoring task at the end of a monitoring cycle,
- by another task, or
- in the SIH processor state

In the first case, the data rate depends on the number of active monitoring programs (data records) and monitored objects, as well as the duration of the monitoring cycle (OFFLINE-PERIOD operand in the MODIFY-MEASUREMENT-PERIODS statement). If the same data records remain active during monitoring, the workload is inversely proportional to the duration of the monitoring cycle. The second and third cases only apply to the monitoring programs TASK and DISK.

User task statistics

The system load caused by the activation of user task statistics by the BS2000 user with the aid of the /START-TASK-MEASUREMENT command is mainly the result of program counter statistics and SVC statistics.

Program counter statistics

The system load caused by program counter statistics depends on the following factors:

- the sampling cycle selected
- the number of tasks monitored

6.1.3 Main memory utilization

SM2 requires storage space for its code and for tables and I/O buffers.

The subsystems for the monitoring programs RESPONSETIME and UTM are loaded subsequently if required.

Some system modules are resident, others are paging modules. The size of the tables depends on the number of objects to be monitored.

6.2 Accuracy of the SM2 data

This section indicates the major factors affecting the accuracy of the data supplied by SM2 or SM2R1. The accuracy of some particularly important variables is also discussed.

Inaccuracies resulting from rounding problems are not considered here.

6.2.1 Causes of inaccuracies

Like all software monitors, SM2 runs under the system to be monitored and thus requires certain resources for its own operation; therefore, strictly speaking, it modifies the system to be monitored. However, this influence is small and can generally be disregarded. For a description of system utilization, see section 7.1.

Inaccuracies resulting from marginal problems

Ideally, the SM2 activities during monitoring activation and deactivation, during the taking of samples and at the end of a monitoring cycle operand, should take no time at all. This being impossible, certain inaccuracies result. However, this effect is minimal and decreases in direct proportion to the number of actions that have to be performed at any given time (small number of tasks, devices etc. to be monitored).

Inaccuracies resulting from classification

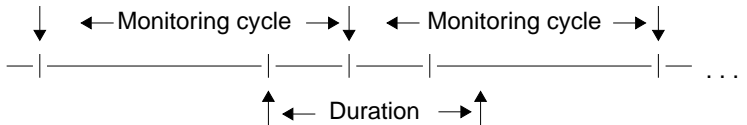
Some SM2 values are gathered on a system-global basis, on a category-specific basis, and/or on a task-specific basis. For category-specific data, SM2 uses the category assignment that is valid at the time the data is collected (sample or event). However, SM2 does not recognize category switches for the TASK monitoring program. This is why comparisons between task data accumulated by category and category-specific SM2 data may lead to interpretation errors.

Monitoring method inaccuracies

Different inaccuracies can occur depending on the monitoring method used:

1. Event-driven monitoring method

This method supplies very precise data at the cost of increased system workload. Problems can occur only when the duration of events is monitored.



As shown above, the duration of an event (and, if applicable, an activity count) is assigned to the second monitoring cycle even though part of it should be assigned to the first cycle. The relative magnitude of the monitoring error decreases in inverse proportion to the length of the monitoring cycle.

2. Sample-driven monitoring method

The accuracy of this monitoring method is subject to the laws of statistics.

A requirement for the validity of the monitored data is that the samples are independent of the monitored events. SM2 uses the system timers to control sampling by having itself activated at regular intervals.

Hardware interrupts are used for this purpose. However, such an interrupt is not permitted whenever the CPU is in a non-interruptible state. This results in a sampling delay and thus in a certain dependency on system events.

Certain unavoidable system activities cause further delays between interrupt acceptance and sampling by SM2. If statistical independence of the samples is assumed, the accuracy of the monitored data depends on the number of samples.

An assessment of the accuracy can be obtained by using confidence intervals (e.g. deviation of not more than 1% in 99% of all cases).

It should be noted that a high sampling rate increases the system workload. Therefore, a long monitoring cycle is preferable to excessively frequent sampling.

6.2.2 Notes on particular variables

CPU utilization

The term “percentage deviation” used in the following always denotes the absolute deviation, in other words:

X and Y have a deviation of P if $\text{abs}(X-Y) \leq P$.

TU/TPR/SIH time, IDLE time, or /390 time with SR2000.

The operating system uses timers to determine three time components: the total for TU and TPR times, the SIH time and the IDLE time. In the case of SR2000, the /390 time is also determined as a fourth time component. Consequently, falsifications due to the non-interruptible SIH code cannot occur. Investigations have shown that this timer is sufficiently precise for realistic monitoring cycles. As a rule, comparative measurements made with hardware monitors under typical load conditions have shown deviations of less than 1%.

SM2 divides the total for TU and TPR times into separate values for the TU time and the TPR time on the basis of samples taken during the sampling period. The accuracy of this procedure depends on the number of samples, which means that large deviations are possible if few samples are taken. The /390 time is also affected by this inaccuracy, because it is output as a relative proportion of TU.

Device utilization

As regards the hardware, the device is busy from the time an I/O request is received until data transfer terminates. As regards the software, the device is busy from the time an I/O request arrives in the I/O system module until channel termination.

The values determined by the software monitor should therefore always be higher than the actual device utilization. However, this systematic monitoring error is virtually balanced out by the sampling delays caused primarily by the non-interruptible system states.

Comparative measurements with hardware monitors for typical load conditions and about 6000 samples have shown that the maximum deviation is $\pm 2\%$.

Channel utilization

SM2 uses a special machine instruction to determine whether a channel is active or not. Thus there are no deviations between hardware and software monitors in the interpretation of this condition (see also restrictions on the ability of monitoring the channel load, description of the CHANNEL report). The sampling delays caused primarily by non-interruptible system states result in the values determined by SM2 always being smaller than the actual values. Comparative measurements with a hardware monitor for typical load conditions and about 6000 samples have shown that the deviation is less than 2%.

6.2.3 Measures for reducing the error sources

From the above explanations, the following recommendations can be deduced; they should be observed if high importance is placed on the accuracy of the data.

1. Minimization of marginal problems

The monitoring cycles should be long but not too long. Short-term peak loads will not be detected if the monitoring cycles are too long because SM2R1 only supplies the total activity or the average value for the whole monitoring cycle.

All desired monitoring functions should be activated before (not during) the monitoring cycle.

Similarly, the desired monitoring functions should be kept active somewhat longer than the monitoring cycle. For later analysis with SM2R1 the desired monitoring cycle should be specified as the analysis period.

2. Reduction of the number of objects to be monitored

This reduces the induced system workload, which results in less falsification of the monitored system.

3. Sufficiently large number of samples

As a rule, this should be implemented not by increasing the sampling rate but by lengthening the monitoring cycle. The sampling rate should be increased only if the system workload permits or if it is not possible to lengthen the monitoring cycle.

6.3 Special applications

6.3.1 SM2 together with VM2000

If monitoring is executed under VM2000 control within BS2000 systems, the following special considerations are applicable for the implementation of the SM2 program and for the interpretation of the monitored data:

- Generally speaking, SM2 is executable under any guest system and provides monitored data relevant to the respective local guest system.
- The sum TU + TPR + SIH + IDLE is relativized in every guest system to 100% in the ACTIVITY report, PERIODIC-TASK report, CPU report (NORMED column), and SM2R1 report 1.
The result of this relativation is the manual formation of the sums of the percentage load for all guest systems, **not** the total CPU utilization.
- In the SM2R1 report 2 and the CPU report (MEASURED column), the non-relativized values for TU, TPR, SIH and IDLE are shown, i.e. the real load values determined by the relevant guest systems.

Under VM2000/SR, the real CPUs are assigned exclusively to the guest system, i.e. the non-relativized values for TU, TRP, SIH, and IDLE correspond to the relativized values.

The time components of CPU utilization in the CPU report (MEASURED column) cannot be compared with the data in the VM2000 report (CPU MEAS). The data in the CPU report relate to the assigned CPUs of the VM, while the utilization values in the VM2000 report relate to the physically available CPUs.

- The values in SM2R1 reports 62 and 60 are also not relativized! In this case the real CPU times (TU + TPR) or the time equivalent of the CPU time will be listed for the local guest system and for each category.
- The CPU time given in the task statistics report is likewise the real CPU time consumed by a task in processor states TU + TPR.
- A summary of the overall CPU utilization, distribution of the CPU capacity among the individual guest systems, and the CPU time used by the individual guest systems is represented for the SM2 which is brought to execution on the privileged machine (VM1). (See also VM2000 report or SM2R1 report 98 and 99.)
- If SM2 is running on a normal guest system, only the values relevant to this guest system are identified in the VM2000 report or SM2R1 report 98.
The channel utilization is an exception, as the overall utilization is always output here.
- For information on the accuracy of the TU and TPR times, see “Notes on particular variables” on page 345.

Note

The corresponding values can also be output by using the VM2000 command SHOW-VM-STATUS (see the “VM2000” manual [9]).

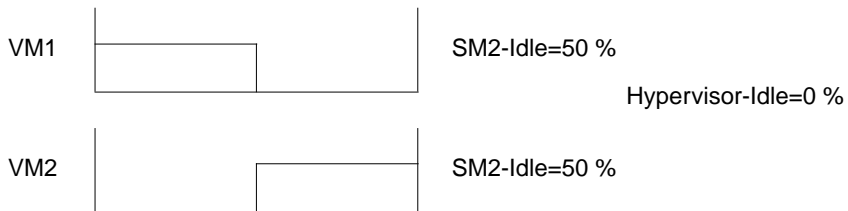
VM2000 operation on /390 architecture

The overall CPU utilization is determined by taking the HYPERVISOR-IDLE value and extrapolating the difference to 100%.

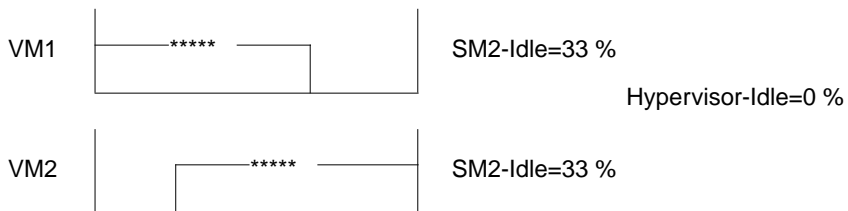
The IDLE value given by the SM2 monitoring program loses its original meaning, in which case it merely acts as an indicator of the percentage for a given time period, one during which the respective guest system was inactive of its own volition.

Example: 2 guest systems, VM1 and VM2
 Each guest system is to be active for 50 s within the time period of 100 s.

- Ideal situation: No idling occurs



- Realistic case: idling does occur for half of the required active period (***)



The SM2 idle value of 33% is explained by the fact that SM2 precisely monitors the active time (50 s), adds the voluntary inactive time (reduced to 25 s as the result of idling), and relativizes it to 100%.

Even if system utilization is 100% (Hypervisor-Idle=0%), it makes sense for SM2 to provide an IDLE value for the following reasons:

Full utilization of system load can be the result of a low-priority guest system which has highly intense CPU time (in the extreme case: CPU loop), the system always obtaining control as soon as the other guest systems voluntarily revert to IDLE mode.

The SM2 IDLE value permits the operator of a high-priority guest system to estimate the extent to which additional load can be utilized. In this case the lower-priority system is idle to the appropriate degree specified.

The general rule is: dilation resulting from other guest systems is always included in all SM2 monitoring values formed by the difference between two time values. This includes the following monitoring information:

- all I/O times for the monitoring programs DISK, TASK, SYSSTAT and FILE
- response times for the monitoring program RESPONSETIME
- catalog access times for the monitoring program CMS
- QUEUE values in the task statistics
- QUEUE values for queues Q1 to Q13 for the QUEUE-TRANSITION operand

Q0 (CPU-QUEUE) is without dilation, as the real CPU requirements from the product TU + TPR are output!

The monitoring values supplied by the SERVICETIME monitoring program for systems which use DCS, namely the values

- DEVICE DISCONNECT TIME
- DEVICE CONNECT TIME
- FUNCTION PENDING TIME

represent the real hardware times (determined by DMS) without dilation by other guest systems. Dilation of I/O times is reflected in the (REMAINING) SERVICETIME value.

All SM2 monitored data with "per second" (1/s) units refers to the elapsed time, and not to the time assigned by the hypervisor for a guest system. As a result, the values determined are less than those which actually occur during the time the guest system was active (for example I/Os/sec. per disk, paging rate).

Disk utilization is determined by the sampling method while the corresponding guest system is still active, in other words the values are not corrupted by other guest systems (in contrast, the number of I/O operations does not refer to the active time per second, rather to the seconds elapsed, and therefore the value appears to be lower).

In the case of the channel utilization values, the overall utilization per channel is output. The percentage load caused by any one guest system cannot be determined here; as a consequence the NON OVERLAP value (CPU and CHANNEL simultaneously active) has no significance when an individual guest system is involved.

In the case of the CHANNEL-IO monitoring program, the values supplied (e.g. the I/O operations per channel) always refer to the respective guest system. Correlation of these values on channel utilization is not possible, due to the above-mentioned restriction.

For CPUs with DCS, the SERVICETIME monitoring program can only be started by one guest system. Any attempt to activate this function from a second guest system is accepted without an error message, but no DCS-specific monitored data will be supplied.

The VM2000 command /SHOW-VM-RESOURCES INFORMATION=*STD/*ALL can be used to check whether SERVICETIME monitoring is already active in a guest system. If it is, message VMS2035 is output. In the case of SHARED-DEVICES under VM2000 (TYPE=*STD), DCS-specific monitoring values are generally not supplied by any guest system (see also the "VM2000" manual [9]).

VM2000 operation on RISC architecture (VM2000/SR)

The real CPUs are assigned exclusively to the guest systems under VM2000/SR. The CPU MAX and CPU PLAN values output in the VM2000 report therefore correspond with the relationship of the assigned CPUs to the total number of physical CPUs in the VM2000/SR system (NUMBER OF CPU'S / NUMBER OF PHYS. CPU'S).

Due to the exclusive assignment of CPUs, the CPU MEAS value corresponds to the utilization of the guest system, apart from the active times of the hypervisor and the asynchronous firmware activities.

The active times of the hypervisor are contained in the HYPERVISOR ACTIVE value, while the times for asynchronous firmware activities are contained in the CPU MEAS value.

The IDLE value corresponds to the relationship of unused CPUs to physically available CPUs.

The HYPERVISOR ACTIVE value corresponds to the average value of active times of the hypervisor over all CPUs.

In contrast to the VM2000 report, the active times of the hypervisor in the CPU/ACTIVITY report are contained in the respective interrupted processor states (TU, TPR, SIH or IDLE). The asynchronous firmware activities are likewise contained in the interrupted processor states (TU, TPR, SIH or IDLE).

Asynchronous firmware or hypervisor activities may have been caused by a remote guest system (e.g. when processing asynchronous I/O events of shared disks).

In the case of SM2 monitoring values formed by the difference between two time values, there is no direct dilation by other guest systems under VM2000/SR. However, minimal dilation by the hypervisor activities and asynchronous firmware activities is unavoidable.

6.3.2 VOLUME load with installed DRV

The product DRV (Dual Recording by Volume) can be used to keep double copies of disk drives in the form of mirror images. This increases the availability factor for data stored on the disks. Each write request made by DMS is sent to both disks, and each read request is executed on the disk with the shortest access time available (shortest positioning path, lowest queue length prior to the disk drive).

The duplicate of the disk has its own mnemonic device address, yet the same VSN as the original disk. When interpreting the monitoring values, the consequences of this are the following ones:

- The VSN is duplicated in the CONFIGURATION table (with different mnemonic name values), provided that DRV was in operation before SM2 started.
- In the DEVICE report as well, a VSN can appear in duplicate (with monitoring values).
- In Report 12 (percentage of device utilization per VSN), SM2R1 lists the monitored data of both drives; in extreme cases utilization values of up to 200% may be the case.

6.3.3 Channel load with BUS peripherals

It is not possible to determine load values for bus channels. On SR2000 systems, channels 0-F are always bus channels (see information on the CHANNEL report, page 227).

6.3.4 SERVICETIME monitoring values with SYMMETRIX control

- When the remote copy function SRDF (Symmetrix Remote Data Facility, see manual SHC-OSD [22]) is used, the resulting remote copy times are counted with remaining service time in the case of synchronous or semi-synchronous processing.
- If the total hit rate is 100%, the device discount time is zero.

6.4 Sample procedures

The following procedures serve as examples for automating frequently recurring operations when the SM2 is used in normal computer center operation. They can also be found in the SYSLIB.SM2.130 library.

The first procedure starts short-term monitoring with output to a separate file, defining and starting monitoring programs.

The second procedure presupposes that the preceding monitoring operation has already been in progress for some time (e.g. 30 minutes). It terminates monitoring and closes the SM2 output file.

The third procedure makes the preparations for analysis with SM2R1 and updates the master output file. In the example it is assumed that the master output file is on disk. If it is on tape, the procedure has to be modified.

Input files Old master output file and the SM2 output file that was just closed.

Output file New master output file.

The fourth procedure causes the SM2 output file just closed to be analyzed.

1) Start short-term monitoring (SM2.START.MEASUREMENT)

```

/BEGIN-PROCEDURE LOGGING=C,PARAMETERS=YES(PROCEDURE-PARAMETERS=(      -
/      &CYCLE=300,&SAMPLE=500,&TSN='(BCAM,BCAT)',&DEVICE=                -
/      '(FOOA,FOOB)'),ESCAPE-CHARACTER=C'&' )
/ASSIGN-SYSDTA TO-FILE=*SYSCMD

/REMARK =====
/REMARK *** EXAMPLE 1 ***
/REMARK *** DEFAULT FOR MONITORING CYCLE      = 300 S AND ***
/REMARK *** FOR SAMPLING CYCLE                = 500 MS   ***
/REMARK =====

/REMARK =====
/REMARK *** DEFINE SM2 OUTPUT FILE AND LOAD SM2 ***
/REMARK =====

/DELETE-FILE FILE-NAME=SM2.OUTPUT
/SET-JOB-STEP

/CREATE-FILE FILE-NAME=SM2.OUTPUT,SUPPORT=PUBLIC-DISK(SPACE=RELATIVE(  -
/      PRIMARY-ALLOCATION=200,SECONDARY-ALLOCATION=100))
/ADD-FILE-LINK LINK-NAME=SMLINK,FILE-NAME=SM2.OUTPUT,ACCESS-METHOD=SAM,-
/      OPEN-MODE=OUTPUT

```


/START-SM2

```
REMARK =====
REMARK ****   BRANCH TO ADMINISTRATION PART           ****
REMARK =====
```

CALL-ADMINISTRATION-PART

```
REMARK =====
REMARK ****   DEFINE SYSSTAT MONITORING PROGRAM       ****
REMARK ****   MONITOR ALL DISKS AND TAPES             ****
REMARK =====
```

SET-SYSSTAT-PARAMETER USED-DEVICES=(*DISK,*TAPE)

```
REMARK =====
REMARK ****   DEFINE TASK MONITORING PROGRAM           ****
REMARK ****   MONITOR TASKS WITH TSNS 1111 AND 1112 AND ****
REMARK ****   WITH THE JOB NAME TEST                   ****
REMARK ****   MONITOR DISK FOOB ONLY                   ****
REMARK =====
```

SET-TASK-PARAMETER TASK-SELECTION=*SPECIFIED(TSN=&TSN, JOBNAME= -
TEST), DEVICES=&DEVICE

```
REMARK =====
REMARK ****   DEFINE DISK MONITORING PROGRAM           ****
REMARK ****   MONITOR DISK FOOH                       ****
REMARK =====
```

SET-DISK-PARAMETER DEVICES=&DEVICE

```
REMARK =====
REMARK ****   DEFINE FILE MONITORING PROGRAM           ****
REMARK =====
```

ADD-FILE FILE-NAME=:A:\$TSOS.TSOSCAT

```
REMARK =====
REMARK ****   DEFINE RESPONSETIME MONITORING PROGRAM   ****
REMARK ****   DEFINE CONNECTIONS TO BE MONITORED      ****
REMARK =====
```

```

SET-RESPONSETIME-PARAMETER
ADD-CONNECTION-SET SET-NAME=CONN1,SET-DEFINITION=*BY-CONNECTION,      -
    CONNECTION-SET=*CONNECTION(APPLICATION=$DIALOG,PARTNER=*ALL,      -
    PROCESSOR=*ALL)
ADD-CONNECTION-SET SET-NAME=CONN2,SET-DEFINITION=*BY-CONNECTION,      -
    CONNECTION-SET=*CONNECTION(APPLICATION=UTM1,PARTNER=*ALL,        -
    PROCESSOR=*ALL)

REMARK  =====
REMARK  ****   OPEN SM2 FILE, SPECIFY MONITORING CYCLE AND           ****
REMARK  ****   SAMPLING CYCLE                                       ****
REMARK  =====

MODIFY-MEASUREMENT-PERIODS OFFLINE-PERIOD=&CYCLE,SAMPLING-PERIOD=&SAMPLE
OPEN-LOG-FILE FILE=*BY-LINK-NAME

REMARK  =====
REMARK  ****   START MONITORING PROGRAMS                             ****
REMARK  =====

START-MEASUREMENT-PROGRAM TYPE=(*SYSSTAT,*TASK,*DISK,*FILE,*RESPONSETIME)

REMARK  =====
REMARK  ****   TERMINATE SM2 USER PROGRAM                           ****
REMARK  ****   MONITORING CONTINUES IN THE BACKGROUND !!!          ****
REMARK  =====

END

/END-PROCEDURE

```

2) *Terminate short-term monitoring and resume former monitoring operations (SM2.STOP.MEASUREMENT)*

It is assumed that SM2 was started with the preceding procedure.

```

/BEGIN-PROCEDURE LOGGING=C,PARAMETERS=YES(PROCEDURE-PARAMETERS=(
/      &CYCLE=300,$SAMPLE=500),ESCAPE-CHARACTER=C'&')
/ASSIGN-SYSDTA TO-FILE=*SYSCMD

/REMARK =====
/REMARK ***   EXAMPLE 2                                     ***
/REMARK ***   DEFAULT FOR MONITORING CYCLE           = 300 S AND   ***
/REMARK ***   FOR SAMPLING CYCLE                     = 500 MS     ***
/REMARK =====

/REMARK =====
/REMARK ***   DELETE NON-CATALOGED FILE               ***
/REMARK =====

/DELETE-FILE FILE-NAME=SM2.CHANGE
/SET-JOB-STEP

/REMARK =====
/REMARK ***   LOAD SM2 USER PROGRAM                   ***
/REMARK =====

/START-SM2

REMARK =====
REMARK ***   BRANCH TO ADMINISTRATION PART AND TERMINATE   ***
REMARK ***   ALL ACTIVE MONITORING PROGRAMS                 ***
REMARK =====

CALL-ADMINISTRATION-PART
STOP-MEASUREMENT-PROGRAM TYPE=(*SYSSTAT,*TASK,*DISK,*FILE,*RESPONSE TIME)

REMARK =====
REMARK ***   CLOSE SM2 FILE                               ***
REMARK =====

CLOSE-LOG-FILE

REMARK =====
REMARK ***   THE MONITORING PROGRAM DEFINITIONS ARE         ***
REMARK ***   STILL VALID                                    ***
REMARK =====

```

```
REMARK =====  
REMARK ***   TERMINATE SM2 USER PROGRAM           ***  
REMARK ***   RENAME CLOSED FILE                   ***  
REMARK =====
```

END

```
/MODIFY-FILE-ATTRIBUTES FILE-NAME=SM2.OUTPUT,NEW-NAME=SM2.CHANGE, -  
/      SUPPORT=PUBLIC-DISK(SPACE=RELEASE(100))
```

/END-PROCEDURE

3) Prepare for SM2R1 analysis with the SM2U1 utility (SM2U1.PREPARE)

Update the master output file with all the records with the exception of those for the TASK and DISK monitoring programs.

```
/BEGIN-PROCEDURE LOGGING=C,PARAMETERS=YES( PROCEDURE-PARAMETERS=(           -
/      &SM2UIN=SM2.CHANGE,&SM2UTASK=SM2.SAM.TASK,&SM2MASTER=SM2.MASTER),-
/      ESCAPE-CHARACTER=C'&' )
/ASSIGN-SYSDTA TO-FILE=*SYSCMD
```

```
/REMARK =====
/REMARK ***   ASSIGN INPUT FILE                               ***
/REMARK =====
```

```
/ADD-FILE-LINK LINK-NAME=SM2UI1,FILE-NAME=&SM2UIN
```

```
/REMARK =====
/REMARK ***   ASSIGN OUTPUT FILE (SM2 MASTER FILE)         ***
/REMARK =====
```

```
/ADD-FILE-LINK LINK-NAME=SM2U0,FILE-NAME=&SM2MASTER
```

```
/REMARK =====
/REMARK ***   LOAD SM2U1, UPDATE SM2 MASTER FILE AND ALL   ***
/REMARK ***   RECORDS EXCEPT THOSE FOR THE TASK AND DISK ***
/REMARK ***   MONITORING PROGRAMS                          ***
/REMARK =====
```

```
/START-SM2U1
```

```
SELECT-MEASUREMENT-GROUPS SELECTION=*ALL(EXCEPT=( *DISK-STATISTICS,      -
*TASK-STATISTICS))
END
```

```
/REMARK =====
/REMARK ***   ASSIGN INPUT FILE                               ***
/REMARK =====
```

```
/ADD-FILE-LINK LINK-NAME=SM2UI1,FILE-NAME=&SM2UIN
```

```
/REMARK =====
/REMARK ***   ASSIGN OUTPUT FILE FOR TASK RECORDS          ***
/REMARK =====
```

```
/DELETE-FILE FILE-NAME=&SM2UTASK
/SET-JOB-STEP
/ADD-FILE-LINK LINK-NAME=SM2U0,FILE-NAME=&SM2UTASK
```

```
/REMARK =====  
/REMARK ***   LOAD SM2U1, CREATE SM2 FILE FOR TASK   ***  
/REMARK ***   ANALYSIS.                               ***  
/REMARK =====
```

```
/START-SM2U1
```

```
SELECT-MEASUREMENT-GROUPS SELECTION=*TASK-STATISTICS  
END  
/END-PROCEDURE
```

4) Perform analysis with SM2R1 (SM2R1.EVALUATION)

This procedure analyzes the SM2 output file just closed.

```

/BEGIN-PROCEDURE LOGGING=C,PARAMETERS=YES(PROCEDURE-PARAMETERS=(      -
/      &SM2OUT=SM2.CHANGE,&SM2R1OUT=SM2R1.OUT,&SM2UTASK=SM2.SAM.TASK,  -
/      &SM2R1OTASK=SM2R1.OUT.TASK),ESCAPE-CHARACTER=C'&')
/MODIFY-TERMINAL-OPTIONS OVERFLOW-CONTROL=NO-CONTROL
/ASSIGN-SYSDTA TO-FILE=*SYSCMD

/DELETE-FILE FILE-NAME=&SM2R1OUT
/SET-JOB-STEP

/REMARK =====
/REMARK ***          LOAD SM2R1 AND ANALYZE SM2 FILE          ***
/REMARK =====

/START-SM2R1 MONITOR-FILE-NAME=&SM2OUT,LIST-FILE-NAME=&SM2R1OUT
PRINT-CONFIGURATION
SET-TITLE TEXT='*** STANDARD-STATISTIKEN ***'
PRINT-REPORTS REPORT-LIST=(*STD,*FILE)
PRINT-DISK-STATISTICS
PRINT-QUEUE-TRANSITION
END

/REMARK =====
/REMARK ***          PRINT SM2R1 OUTPUT FILE          ***
/REMARK =====

/PRINT-DOCUMENT FROM-FILE=&SM2R1OUT,DELETE-AFTER-PRINT=*YES,DOCUMENT-  -
/      FORMAT=*TEXT(LINE-SPACING=*BY-EBCDIC-CONTROL)

/REMARK =====
/REMARK ***          ANALYZE TASK          ***
/REMARK =====

/DELETE-FILE FILE-NAME=&SM2R1OTASK
/SET-JOB-STEP

/REMARK =====
/REMARK ***          LOAD SM2R1 AND ANALYZE SM2 FILE          ***
/REMARK ***          (TASK RECORDS)          ***
/REMARK =====

/START-SM2R1 MONITOR-FILE-NAME=&SM2UTASK,LIST-FILE-NAME=&SM2R1OTASK
SET-TITLE TEXT='*** TASKSTATISTIK ***'
PRINT-TASK-STATISTICS INFORMATION=*HIGH
END

```

```
/REMARK =====  
/REMARK ***      PRINT SM2R1 OUTPUT FILE      ***  
/REMARK =====
```

```
/PRINT-DOCUMENT FROM-FILE=&SM2R1OTASK,DELETE-AFTER-PRINT=*YES,      -  
/      DOCUMENT-FORMAT=*TEXT(LINE-SPACING=*BY-EBCDIC-CONTROL)
```

```
/MODIFY-TERMINAL-OPTIONS OVERFLOW-CONTROL=USER-ACKNOWLEDGE  
/END-PROCEDURE
```


7 Variables reports

7.1 Table of monitored variables

In the following table, the SM2 monitored variables are shown in relation to the monitoring program, ONLINE report, and SM2R1 report group.

Monitored variable	Monitoring program	ONLINE report	SM2R1 report group
Cache			
Accesses and hit rates for DAB caches	DAB	DAB	DAB
Accesses to ISAM pools	ISAM	ISAM	ISAM
Accesses and hit rates for hiperfiles	PFA	PFA CONTROLLER	PFA
Accesses and hit rates for controllers (3419/342)1 with cache	PCA	PCA CONTROLLER/ CACHE/ DEVICE	PCA- CONTROLLER/ CACHE/ DEVICE
Accesses and hit rates for SYMMETRIX controllers	PFA	SYMMETRIX CONTROLLER/ DEVICE	SYMMETRIX- CONTROLLER/ DEVICE
CPU			
CPU utilization	1)	ACTIVITY, CPU	CPU
Number of system calls	1), SVC	ACTIVITY, SVC	CPU, SVC
Files			
Catalog accesses	CMS	CMS	CATALOG- MANAGEMENT
File accesses	FILE	FILE	FILE
File access times	FILE	FILE	FILE
File accesses for selected disks	DISK-FILE	DISK FILE	

Monitored variable	Monitoring program	ONLINE report	SM2R1 report group
IOs			
Number of I/O operations	1), DISK	ACTIVITY, DEVICE	DISK, IO, DEVICE
Number of paging I/O operations	1)	ACTIVITY, MEMORY	IO
Channel utilization and channel data transfer rates	CHANNEL-IO	CHANNEL	CHANNEL
Device utilization and data transfer rates	1)	DEVICE	DISK
Length of device queues	1)	DEVICE	DISK
Duration of I/O operations	DISK	_____	(DISK-STATISTICS) ²⁾
Hardware service times	SERVICETIME	_____	DEVICE
Access distribution to cylinder by disks	DISK	_____	(DISK-STATISTICS) ²⁾
Communication			
Response times, transaction times, think times, transaction rates, message lengths of transactions	RESPONSE-TIME	RESPONSE-TIME	RESPONSE-TIME
Number of I/Os by network devices	NET-DEVICE	NET DEVICE	NET-DEVICE
Network data transfer rates	BCAM-CONNECTION	BCAM CONNECTION	BCAM-CONNECTION
Data transfer rates for TCP-IP connection	TCP-IP	TCP/IP	TCP-IP
Memory			
Allocation of main memory	1)	ACTIVITY, MEMORY	MEMORY
Allocation of paging area	1)	ACTIVITY, MEMORY	MEMORY
Allocation of virtual address space	1)	ACTIVITY, MEMORY	MEMORY
Page fault rate	1)	MEMORY	MEMORY
Accesses to global memory	GS, GSVOL	GS, GSVOL	GS, GSVOL

Monitored variable	Monitoring program	ONLINE report	SM2R1 report group
Subsystems			
PCS data	1)	PCS	PCS
UTM response times and transaction rates	UTM	UTM/ APPLICATION	UTM
Number and duration of send requests via MSCF	MSCF	MSCF	MSCF
Data to POSIX	POSIX	POSIX	POSIX
Lock requests to the DLM	DLM	DLM	DLM
Data to synchronization functions in HIPLEX	NSM	NSM	NSM
Data to HSMS	HSMS	—————	(HSMS-STATISTICS) ²⁾
Task			
Number of tasks	1)	ACTIVITY	TASK
Length of task queues	1), SYSSTAT	CATEGORY- QUEUE	CATEGORY- QUEUE
Delay times in task queues	SYSSTAT	—————	(QUEUE TRANSITION) ²⁾
Frequency of task activation and deactivation	1)	ACF	PRIOR-ACF
Task-specific resource utilization	PERIODIC- TASK	PERIODIC TASK	PERIODIC- TASK- JOBNAME/ TSN/USERID
Allocation and queues of task locks	TLM	TLM	TLM
VM2000			
Hypervisor activities, guest system activities	VM2000	VM2000	VM2000

¹⁾ The monitored values are recorded permanently (default monitoring method).

²⁾ The items in brackets refer to SM2R1 statistics, not report groups.

8 Messages

NPC0050 ERROR IN COSMOS-PARAMS

Meaning

Invalid values in COSMOS-params.
The statement has been rejected.

NPC0051 NO MEMORY SPACE ALLOCATED FOR FILE: (&00)

Meaning

Possible reasons:

- No memory space has been allocated for the file.
- The value of the primary allocation is smaller than the block size.

Response

Allocate the memory space by means of the command /MODIFY-FILE-ATTRIBUTES

NPC0052 REQUESTED FILE '(&00)' NOT CATALOGED IN PUBSET

Meaning

The requested file is not cataloged in the requested pubset.

Response

Create the file by means of the command /CREATE-FILE.

NPC0053 ERROR IN IC-LIST OF EIA-EVENT

Meaning

Invalid values in interruptcode-list of EIA-event.
The statement has been rejected.

NPC0054 ERROR IN STATEMENT '//ADD-/REMOVE-COSMOS-EVENT'

Meaning

Invalid values in eventlist of command ADD-/REMOVE-COSMOS-EVENT.
The statement has been rejected.

NPC0055 ' //SET-COSMOS-PARAMETER' STATEMENT NOT SPECIFIED

Meaning

The statement //ADD-COSMOS-EVENT, //REMOVE-COSMOS-EVENT, //MODIFY-COSMOS-PARAMETER, //INIT-COSMOS or //START-MEASUREMENT-PROGRAM COSMOS cannot be specified unless //SET-COSMOS-PARAMETER statement is specified.
The statement has been rejected.

Response

Enter the statement //SET-COSMOS-PARAMETER and repeat your original entry.

NPC0056 STATEMENT '(&00)' NOT ALLOWED

Meaning

The statement //SET-COSMOS-PARAMETER, //MODIFY-COSMOS-PARAMETER, //ADD-COSMOS-EVENT or //REMOVE-COSMOS-EVENT are not allowed between the statements //INIT-COSMOS and //START-MEASUREMENT-PROGRAM COSMOS.
The statement has been rejected.

NPC0057 SYSTEM ERROR DURING CREATE OF SUBSYSTEM COSMOS.

Meaning

Error in starting of the subsystem COSMOS during //INIT-COSMOS or //START-MEASUREMENT-PROGRAM COSMOS.
You can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

NPC0058 SYSTEM ERROR IN COSMOS-MODULES

Meaning

A system error has occurred in COSMOS during program execution.
You can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

NPC0059 WARNING : '(&00)' NOT FOUND IN SYSTEM

Meaning

When defining the monitoring program COSMOS, an value (JOBNAME,CATEGORY, TSN,USERID) for the parameter TASK-SELECTION was specified that could not be found in the system at the time of the measurement initialization or the measurement start.

NPC0060 WARNING : MACRO-ERROR DURING COSMOS EXECUTION

Meaning

During COSMOS-execution a macro returned an error.
For more infos you can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

NPC0061 ERROR IN COSMOS-WRITETASK

Meaning

The buffer task for the file with linkname '(&00)' returns an error.

You can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

NPC0062 MONITORING PROGRAM COSMOS ALREADY INITIALIZE. STATEMENT REJECTED

Meaning

An attempt was made to initialize the monitoring program COSMOS that has already been initialize or start.

NPC0063 ERROR DURING START OF UTM MEASUREMENT. MEASUREMENT PROGRAM COSMOS NOT STARTED.

Meaning

Event UTM cannot be opened, because the subsystem UTM is not created.

Statement //INIT-COSMOS or //START-MEASUREMENT-PROGRAM COSMOS rejected.

Response

Create subsystem UTM first and then start the COSMOS measurement.

NPC0064 ERROR DURING PROCESSING OF COSMOS MEASUREMENT FILE: '(&00)'

Meaning

You can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

NPC0065 INVALID FCBTYP OF COSMOS MEASUREMENTFILE

Meaning

The indicated file exists already and does not have the FCBTYP PAM.

Response

Create a new file or access a file with correct FCBTYP PAM.

NPC0066 DMS-ERROR IN COSMOS-MEASUREMENTFILE '(&01)'. DMS-CODE '(&00)'. /HELP-MSG
DMS(&00).

Meaning

For more detailed information about the DMS error code enter /HELP-MSG or see the BS2000 manual 'System messages'.

NPC0067 ERROR DURING MACROPROCESSING 'DCAMPNSM'.

NPC0068 FILE WITH LINKNAME 'COSFIL' NOT FOUND.

Meaning

Possible reasons:

- The COSMOS measurement file assigned by LINK=COSFIL is not in the COSMOS parameter list.
- The COSMOS measurement file assigned by LINK=COSFIL does not exist.

Response

Enter the statement //SET-COSMOS-PARAMETER with the COSMOS measurement file assigned by LINK=COSFIL as parameter or create a COSMOS measurement file with LINK=COSFIL.

NPC0069 ERROR DURING RDTFT-MACROPROCESSING.

NPC0070 SUBSYSTEM COSMOS NOT FOUND.

NPC0071 TOO MANY MEASUREMENT FILES SPECIFIED.

Meaning

More than one measurement file for OUTPUT=*WRAP-AROUND(...) was specified.

Response

Enter the statement //SET-COSMOS-PARAMETER with only one measurement file for WRAP-AROUND.

NPC0072 WRONG MEASUREMENT FILE SPECIFIED

Meaning

For VM2000- and COSMOS-Events the same measurement file was specified.

Response

Correct the statement and try again.

NPC0073 MEASUREMENT FILE FOR VM2000-EVENTS NOT SPECIFIED

Meaning

Measurement file for VM2000-Events was not specified in statement //SET-/MODIFY-COSMOS-PARAMETER.

Response

Correct statement and try again or close the VM2000-Events.

NPC0074 ERROR DURING START OF SUBSYSTEM BCAM-COS. MEASUREMENT PROGRAM COSMOS NOT STARTED.

Meaning

The event BCAM resp. BCPT cannot be opened, because the subsystem BCAM-COS could not be loaded.

The instruction //INIT-COSMOS resp. //START-MEASUENT-PROGRAM COSMOS was rejected.

BCAM-COS is not installed or has wrong version.

Response

Install subsystem BCAM-COS first and then start the COSMOS measurement.

NPC0075 ERROR DURING START OF SUBSYSTEM DCAM-COS. MEASUREMENT PROGRAM COSMOS NOT STARTED.

Meaning

The event DCAM cannot be opened, because the subsystem DCAM-COS could not be loaded. Statement //INIT-COSMOS or //START-MEASUREMENT-PROGRAM COSMOS rejected.

DCAM-COS is not installed or has wrong version.

Response

Install subsystem DCAM-COS first and then start the COSMOS measurement.

NPECOPY Copyright (C) '(&00)' '(&01)' All Rights Reserved

NPELOAD Program '(&00)', Version '(&01)' of '(&02)' loaded from file '(&03)'

NPESTRT Procedure '(&00)', Version '(&01)' of '(&02)' started from file '(&03)'

NPSCOPY Copyright (C) '(&00)' '(&01)' All Rights Reserved

NPSLOAD Program '(&00)', Version '(&01)' of '(&02)' loaded from file '(&03)'

NPSSTRT Procedure '(&00)', Version '(&01)' of '(&02)' started from file '(&03)'

NPS0001 PRIVILEGE ERROR. STATEMENT REJECTED

(B) Routing code: R Weight: 99

Meaning

Possible reasons:

- A user without privilege "Software Monitor Administration" tried to enter a privileged SM2 statement.
- A user who is not the primary SM2 administrator tried to enter a privileged SM2 statement, which is reserved to the primary administrator.
- A privileged user, who is not SM2 administrator tried to enter a SM2 statement, which is reserved to the administrators.

NPS0002 NO MORE FILES PERMITTED FOR FILE MONITORING
(B) Routing code: R Weight: 99

Meaning

SM2 is already monitoring 16 files.

NPS0003 USER NOT AUTHORIZED TO MONITOR FILES. STATEMENT REJECTED
(B) Routing code: R Weight: 99

Meaning

The SM2 administrator has not (yet) permitted file monitoring for this user.

NPS0005 SM2 SYSTEM CODE LOCKED. SM2 RUN ABORTED. TRY AGAIN LATER
(B) Routing code: R Weight: 99

Meaning

A serialization lock in the SM2 system code was not released after a certain time.

NPS0006 MEASUREMENT DATA MAY BE INCONSISTENT. no data for output
(B) Routing code: R Weight: 99

Meaning

The data collected during the last monitoring cycle may be inconsistent because of bottlenecks.

NPS0009 USER NOT AUTHORIZED TO SUBMIT OR WITHDRAW SPECIFIED FILE
(B) Routing code: R Weight: 99

NPS0010 FILE NOT SUBMITTED
(B) Routing code: R Weight: 50

Meaning

A user tried to withdraw a file from monitoring which had not been submitted in the first place.

NPS0011 SYNTAX ERROR. STATEMENT CONTAINS INVALID OPERAND(S)
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0012 SYNTAX ERROR. OUTPUT CYCLE NOT IN PERMITTED RANGE
(B) Routing code: R Weight: 99

Meaning

The specified output cycle is not in the permitted range from 10 to 3600 seconds.
The statement has been rejected.

NPS0014 STATEMENT UNKNOWN
(B) Routing code: R Weight: 99

NPS0015 SYNTAX ERROR. STATEMENT CONTAINS INVALID OPERAND(S) '(&00)'
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0016 NO REPORTS SELECTED FOR OUTPUT
(B) Routing code: R Weight: 99

Meaning

Report output cannot be started until the appropriate reports have been selected.

NPS0018 SYNTAX ERROR. OPERAND MISSING
(B) Routing code: R Weight: 99

Meaning

A statement has been entered without an essential operand.
The statement has been rejected.

NPS0020 SYNTAX ERROR. INVALID LIST FORMAT
(B) Routing code: R Weight: 99

Meaning

A list was specified in a statement which does not have the expected format
(e.g. ')' missing).
The statement has been rejected.

NPS0021 SYNTAX ERROR. PERMITTED NUMBER OF LIST ELEMENTS EXCEEDED FROM '(&00)' OPERAND
ONWARDS
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0022 SYNTAX ERROR IN '(&00)' OPERAND
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0023 SYNTAX ERROR. '(&00)' OPERAND TOO LONG
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0024 SYNTAX ERROR. TOO MANY LIST ELEMENTS
(B) Routing code: R Weight: 99

Meaning

Too many list elements were specified in a statement.
The statement has been rejected.

NPS0025 SYNTAX ERROR. '(&00)' OPERAND TERMINATED INCORRECTLY
(B) Routing code: R Weight: 99

Meaning

An improperly terminated operand (e.g. comment) was entered in a statement.
The statement has been rejected.

NPS0026 SYNTAX ERROR. INVALID KEYWORD '(&00)'
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0027 DUPLICATE OR INCOMPATIBLE KEYWORD(S) '(&00)'
(B) Routing code: R Weight: 99

Meaning

Possible reasons:

- a keyword was entered several times in the same statement,
- mutually exclusive keywords were specified.

The statement has been rejected.

NPS0028 MAXIMUM WAITTIME IS REACHED. TRY AGAIN LATER.

Meaning

Because of bottlenecks some instructions couldn't be executed within timelimit.

NPS0031 SYNTAX ERROR. STATEMENT TOO LONG
(B) Routing code: R Weight: 99

Meaning

A statement is not allowed to have more than 1536 characters inclusive all continuation lines.

Strings of blanks are counted as one character.

The statement has been rejected.

NPS0032 SYNTAX ERROR. INPUT LINE LONGER THAN 256 CHARACTERS
(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0033 UNEXPECTED END OF INPUT FILE
(B) Routing code: R Weight: 99

Meaning

Possible reasons:

- An end-of-file condition was encountered in batch mode.
- In interactive mode with statement input from a file, an end-of-file condition was encountered when attempting to read a continuation line.

If the end-of-file condition is encountered while reading the first line of a statement, SYSDTA is set to (PRIMARY) without this message being displayed.

NPS0035 INVALID BS2000 COMMAND
(B) Routing code: R Weight: 99

Meaning

An invalid BS2000 command has been issued as an SM2 statement in batch mode.

NPS0036 '(&00)' MACRO ERROR. RETURN CODE '(&01)'
(B) Routing code: R Weight: 99

Meaning

An error has occurred during execution of the specified macro.

Depending on the error, SM2 either continues program execution, i.e. requests a corrected statement via ENTER COMMAND, or terminates.

(&01): return code of the macro (cf. the 'Executive Macros' manual).

NPS0037 SM2 TERMINATED NORMALLY
(B) Routing code: R Weight: 50

NPS0038 SM2 TERMINATED ABNORMALLY
(B) Routing code: R Weight: 99

Meaning

A serious program error has occurred, leading to immediate program termination.

NPS0039 FORMATTED OUTPUT ONLY POSSIBLE TO SYSLST
(B) Routing code: R Weight: 99

Meaning

Terminal output is not possible because:

- SM2 is running in batch mode, or
- the terminal has less than 80 columns, or
- the terminal has less than 24 lines.

Screen and status diagrams are put out to SYSLST.

NPS0040 SM2 STXIT: CLASS=(&00), CODE=(&01), LOCATION=(&02). PROGRAM RUN ABORTED
(B) Routing code: R Weight: 99

Meaning

An error has occurred in the unprivileged program part of SM2.

CLASS: event class.

CODE: error weight.

LOCATION: program counter of the location at which the error occurred.

For further information on the STXIT routine see the 'Executive Macros' manual.

NPS0041 TOO MUCH USERS WANT TO MONITOR THE SAME FILE

Meaning

Maximal 64 users can monitor the same file at the same time.

NPS0044 USER NOT AUTHORIZED TO MONITOR TASK. COMMAND REJECTED
(B) Routing code: R Weight: 99

Meaning

The SM2 administrator has not permitted task monitoring. As a result, monitoring of the user task either cannot be started or can no longer be stopped by the user.

If the user himself started the monitoring of his task by means of a /START-TASK-MEASUREMENT command, monitoring has already been terminated by the SM2 administrator.

NPS0045 TASK ALREADY BEING MONITORED BY SM2
(B) Routing code: R Weight: 50

Meaning

Monitoring of the task has already been started either by the user via the /START-TASK-MEASUREMENT command or by the SM2 administrator.

NPS0046 TASK MONITORING NOT INITIATED BY '/START-TASK-MEASUREMENT'. COMMAND REJECTED
(B) Routing code: R Weight: 99

Meaning

Task monitoring cannot be terminated, either because it was not started by the /START-TASK-MEASUREMENT command or because it has already been terminated in the meantime (e.g. due to withdrawal of permission to monitor the task or to SM2 shutdown).

NPS0047 SPECIFIED TASK DOES NOT EXIST

Meaning

A TSN was specified for which no task exists.

NPS0048 COMMAND EXECUTED. TASK MONITORING STARTED ON (&00)
(B) Routing code: R Weight: 50

Meaning

(&00): time stamp for the start of monitoring, in the format
 YYYY-MM-DD HH:MM:SS.

Note:

Precisely this time stamp will be put out in the task analysis conducted by the SM2-PA analysis routine.

NPS0049 COMMAND EXECUTED. TASK MONITORING TERMINATED ON (&00)
(B) Routing code: R Weight: 50

Meaning

(&00): time stamp for the end of monitoring, in the format
 YYYY-MM-DD HH:MM:SS.

Note:

Precisely this time stamp will be put out in the task analysis conducted by the SM2R1 analysis routine.

NPS0050 SYSTEM ERROR IN SM2 MODULES. COMMAND REJECTED
(B) Routing code: R Weight: 99

Meaning

A system error has occurred in SM2 during program execution. As a result, task monitoring cannot be started after the /START-TASK-MEASUREMENT command or no task record 27 can be written to the userspecific SM2 logging file after the /STOP-TASK-MEASUREMENT command.

Response

Contact the SM2 administrator. He can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

In that case he is able to clear away the difficulties or he can produce detailed diagnostic material.

NPS0051 SPECIFIED TASK MUST NOT BE MONITORED BY USER

Meaning

The specified TSN belongs to a task under a foreign user id.

Start and termination of monitoring foreign tasks is only permitted for users with privilege SW-MONITOR-ADMINISTRATION.

NPS0052 TOO MANY OBJECTS SPECIFIED FOR MONITORING. STATEMENT REJECTED
(B) Routing code: R Weight: 99

Meaning

An ADD statement with an object list has been specified. Together with the preceding ADD statements of the same kind the total number of objects is greater than the maximum number of objects that may be specified.

NPS0053 TOO MANY POOLS SUBMITTED FOR ISAM POOL MONITORING. STATEMENT REJECTED
(B) Routing code: R Weight: 99

Meaning

ISAM monitoring is limited to a total of 16 ISAM pools.

NPS0054 ISAM POOL NOT SUBMITTED. STATEMENT REJECTED
(B) Routing code: R Weight: 50

Meaning

A user tried to withdraw an ISAM POOL from monitoring which had not been submitted before.

NPS0055 USER NOT AUTHORIZED TO MONITOR ISAM BUFFERS. STATEMENT REJECTED
(B) Routing code: R Weight: 99

Meaning

The SM2 administrator has not permitted ISAM buffer monitoring. As a result, monitoring of the ISAM buffers either cannot be started or can no longer be terminated by the user.

NPS0056 SYNTAX ERROR. LIST CONTAINS DOUBLE ELEMENTS. STATEMENT REJECTED

Response

Correct the statement and try again.

NPS0057 SYNTAX ERROR. LIST ELEMENTS NOT DEFINED IN ASCENDING ORDER. STATEMENT REJECTED

Response

Correct the statement and try again.

NPS0058 SYNTAX ERROR. AT LEAST ONE OPERAND MUST BE SPECIFIED. STATEMENT REJECTED

Response

Correct the statement and try again.

NPS0059 ONLY '*' AT END OF EXPRESSION PERMITTED AS WILDCARD HERE. STATEMENT REJECTED

Response

Correct the statement and try again.

NPS0060 SYSTEM ERROR DURING PROCESSING OF SDF STATEMENTS. SDF RETURN CODE '(&00)'

NPS0061 SDF SYNTAX FILE DEFECTIVE OR INCORRECTLY ACCESSED. CONTACT SYSTEM ADMINISTRATOR

Meaning

Either no SDF syntax file has been assigned or the one assigned is invalid or cannot be accessed.

NPS0065 NO MORE TASKS CAN BE MONITORED

Meaning

The maximum possible number of tasks which can be monitored by SM2 has been exceeded.

Response

Either withdraw other tasks from monitoring or wait until some have terminated, and then try the command again.

NPS0066 INVALID FILE ATTRIBUTES SPECIFIED FOR USERSPECIFIC SM2 LOGGING FILE

Meaning

Invalid file attributes have been specified for the userspecific SM2 logging file regarding the block size, record format, FCB type or open type.

NPS0067 DMS CODE '(&00)' WITH MACRO CALL '(&01)' FOR USERSPECIFIC SM2 LOGGING FILE

Meaning

The userspecific SM2 logging file assigned either by LINK=PALINK or by default (SM2.TASKSTATISTIK.<tsn>) cannot be processed correctly.

For more detailed information about the DMS error code enter /HELP-MSG or see the BS2000 manual 'System Messages'.

Response

Check the SM2 logging file, and assign another one if necessary.

NPS0400 WARNING: ERROR DURING RESTART OF MONITORING PROGRAMS '(&00)'

Meaning

The monitoring programs '(&00)' couldn't be restarted after reopen of measurement file.

Response

Check monitoring program definitions and start monitoring programs with //START-MEASUREMENT-PROGRAM statement.

NPS0501 ERROR DURING PROCESSING OF SM2 LOGGING FILE: DMS CODE '(&00)'

(B) Routing code: R Weight: 99

Meaning

For more detailed information about the DMS error code enter /HELP-MSG in system mode or see the BS2000 manual 'System Messages'.

NPS0502 SYSTEM ERROR ON CALLING SM2
(B) Routing code: R Weight: 99

Meaning

A serious error has occurred when calling SM2

Possible reasons:

- an unexpected return code was delivered when calling an internal BS2000 system function.
- SM2 itself detected an inconsistency in its own logic.

The statement has been rejected.

Response

Contact the SM2 administrator. He can determine the detailed error cause using the trace entries of the //SHOW-SM2-STATUS function.

In that case he is able to clear away the difficulties or he can produce detailed diagnostic material.

NPS0504 SYSTEM ERROR DURING SM2 RUN: CODE=(&00), SUBCODE=(&01)
(B) Routing code: R Weight: 99

Meaning

This message is only put out during test phase of SM2.

NPS0507 SYNTAX ERROR. CYCLE NOT IN PERMITTED RANGE
(B) Routing code: R Weight: 99

Meaning

Possible reasons:

- The specified monitoring cycle is not in the permitted range from 10 to 3600 seconds.
- The specified sampling cycle is not in the permitted range from 200 to 10000 milliseconds.

The statement has been rejected.

NPS0514 SM2 LOGGING FILE SPECIFIED VIA LINK NAME AND NO CORRESPONDING /SET-FILE-LINK
COMMAND ENTERED
(B) Routing code: R Weight: 99

Meaning

The SM2 administrator has failed to define a /SET-FILE-LINK command for the file attributes of the SM2 logging file.

Response

Enter a /SET-FILE-LINK command with LINK-NAME=SMLINK and try again.

NPS0515 SM2 SUBSYSTEM NOT AVAILABLE
(B) Routing code: R Weight: 99

Meaning

A non-privileged user has tried to start SM2 before the system administrator or a SM2 administrator had started the subsystem SM2 or subsystem SM2 was terminated during connection of user.

NPS0516 REQUIRED MODULES COULD NOT BE LOADED
(B) Routing code: R Weight: 99

Meaning

Certain monitoring program modules could not be loaded.

The return code of the loader function can be obtained by the SM2 administrator using the trace entries of the //SHOW-SM2-STATUS statement.

NPS0517 VERSION OF SM2 TU PART NOT SUPPORTED BY THE VERSION OF SM2 MODULE LIBRARY. SM2 TERMINATES ABNORMALLY.

Meaning

It was tried to start a newer SM2 TU part with an older version of SM2 module library, which doesn't support the version of SM2 TU part.

Response

Check the version number, if necessary unload subsystem SM2 and start it new.

NPS0518 CONFIGURATION RECORD COULD NOT BE WRITTEN
(B) Routing code: R Weight: 99

Meaning

This message is for diagnostic purposes only.

The configuration record could not be written either because certain resources were missing or because of a system error.

NPS0520 ONLY 'RECORD-FORMAT=VARIABLE' PERMITTED FOR SM2 LOGGING FILE. STATEMENT REJECTED

Meaning

The value of the RECORD-FORMAT operand in the /SET-FILE-LINK command for a non-standard SM2 logging file is invalid.

NPS0521 ONLY 'BUFFER-LENGTH=*STD(SIZE=16)' PERMITTED FOR SM2 LOGGING FILE. STATEMENT REJECTED

Meaning

SM2 logging files are only permitted with 'BUFFER-LENGTH=*STD(16)'. The value of the BUFFER-LENGTH operand in the /ADD-FILE-LINK command for a non-standard SM2 logging file is invalid or the existing non-standard SM2 logging file has wrong BUFFER-LENGTH.

Response

Retry the /ADD-FILE-LIND command without the BUFFER-LENGTH operand and then retry OPEN-LOG-FILE statement.

If you want to open extend a non-standard SM2 logging file of an older SM2 version, you first have to convert the file with SM2U1.

NPS0522 SM2 LOGGING FILE NOT OPENED. STATEMENT REJECTED

(B) Routing code: R Weight: 99

Meaning

An attempt was made to start a monitoring program while the SM2 logging file was not opened.

NPS0523 MONITORING PROGRAM '(&00)' NOT DEFINED. STATEMENT REJECTED

(B) Routing code: R Weight: 99

Meaning

An attempt was made to start a non-defined monitoring program.

NPS0524 MONITORING PROGRAM '(&00)' ALREADY ACTIVE. STATEMENT REJECTED

(B) Routing code: R Weight: 50

Meaning

An attempt was made to start a monitoring program that has already been started.

NPS0526 TSN '(&00)' NOT IN SYSTEM. STATEMENT REJECTED

(B) Routing code: R Weight: 99

Meaning

An attempt was made to start a monitoring program for task statistics by specifying a TSN, but the corresponding task could not be found in the system at the time.

NPS0527 SYNTAX ERROR. UNKNOWN MONITORING PROGRAM SPECIFIED

(B) Routing code: R Weight: 99

Meaning

The statement has been rejected.

NPS0528 INVALID DEVICE DEFINITION SPECIFIED FOR DEVICE '(&00)'
(B) Routing code: R Weight: 99

Meaning

When defining a monitoring program, an attempt was made to specify a device that is not valid for this program.

The statement has been rejected.

Possible reasons:

- device is unknown
- device is not a disk
- device is not attached
- device is a GS volume

NPS0529 INVALID CHANNEL DEFINITION SPECIFIED FOR CHANNEL NUMBER '(&00)'
(B) Routing code: R Weight: 99

Meaning

When defining a monitoring program, an attempt was made to specify an invalid channel number.

The statement has been rejected.

NPS0530 MONITORING PROGRAM '(&00)' INVALID DEFINED. STATEMENT REJECTED

Meaning

It was attempted to start a monitoring program with invalid devices.

Invalid devices are:

- Devices, which are not any more in the configuration
- Devices, which are not in the status 'ATTACHED' (only for measurement program DISK)
- GS-Volumes

Response

Check and correct monitoring program definition.

NPS0531 WARNING: MONITORING PROGRAM '(&00)' PARTLY INVALIDLY DEFINED. INVALID DEVICES
 IGNORED

Meaning

While starting a monitoring program, it was found that some invalid devices were selected. The monitoring program is only started with the valid devices; the invalid devices are not monitored.

Invalid devices are:

- Devices, which are not any more in the configuration
- Devices, which are not in the status 'ATTACHED' (only for measurement program DISK)
- GS-Volumes

NPS0533 SYSTEM ERROR IN '/START-TASK-MEASUREMENT' OR '/STOP-TASK-MEASUREMENT' COMMAND:
CODE=(&00)

Meaning

This message is for diagnostic purposes only.

NPS0534 MONITORING PROGRAM '(&00)' NOT COMPLETELY DEFINED. STATEMENT REJECTED.

Meaning

An attempt was made to start a not completely defined monitoring program.

Response

Define monitoring program completely and repeat statement.

NPS0535 '//SET-BCAM-CONNECTION-PARAMETERS' STATEMENT NOT SPECIFIED. STATEMENT REJECTED.

Meaning

The //ADD-BCAM-CONNECTION-SET statement cannot be specified unless //SET-BCAM-CONNECTION-PARAMETERS statement is specified first.

Response

Enter the //SET-BCAM-CONNECTION-SET-PARAMETERS statement and repeat your original entry.

NPS0536 MORE THAN 32 CONNECTION SETS DEFINED. STATEMENT REJECTED.

Meaning

Maximal 32 connection sets can be monitored by measurement program BCAM-CONNECTION. Statement rejected.

Response

Use the //REMOVE-BCAM-CONNECTION-SET statement to terminate monitoring of superfluous connection sets and repeat your original entry.

NPS0537 NAME OF CONNECTION SET INVALID. STATEMENT REJECTED.

Meaning

Possible reasons:

- The specified name in the //ADD-BCAM-CONNECTION-SET statement is already defined.
- The specified name in the //REMOVE-BCAM-CONNECTION-SET statement does not exist.

NPS0538 CONNECTION SET DEFINITION IS ALREADY EXISTING. STATEMENT REJECTED.

Meaning

There is already a connection set defined that monitors the same connections.

NPS0539 WARNING: NO CONNECTION SET REMOVED

Meaning

The specified connection set does not exist.

NPS0540 VERSIONS OF SM2 AND VM2000 ARE INCOMPATIBLE. STATEMENT REJECTED

Meaning

The measurement program VM cannot fetch any VM data.

NPS0541 INVALID TASK DEFINITION SPECIFIED FOR TSN '(&00)'

(B) Routing code: R Weight: 99

Meaning

When defining a monitoring program, an attempt was made to specify a task that is not valid for this program.

The statement has been rejected.

NPS0542 WRONG BUCKET VALUES. STATEMENT REJECTED.

Meaning

Only 1-4 buckets values may be specified in a list.

The values must be in ascending order.

Permissible value range: 1 to 999999.

The statement has been rejected.

NPS0543 SM2 MONITORING TASK NOT WORKING CORRECTLY

(B) Routing code: R Weight: 99

Meaning

Possible reasons:

- The SM2 monitoring task failed to answer a user request within a given time.
- The SM2 monitoring task has already been terminated due to an unrecoverable internal error.

Response

A non-privileged user can check the SM2 status using the SM2 STATUS statement, and should then contact the SM2 administrator if this is necessary.

The SM2 administrator can check the status of the SM2 using the //SHOW-SM2-STATUS statement, and can then terminate and restart the subsystem if this is necessary.

NPS0544 SM2 VERSION (&00) AND BS2000 VERSION (&01) ARE INCOMPATIBLE. SM2 CANNOT BE LOADED

(B) Routing code: R Weight: 99

Meaning

The version number (&00) of modules in the SM2 module library and the version number (&01) of the operating system do not match.

NPS0545 VERSIONS OF SM2 TU PART (&00) AND SM2 MODULE LIBRARY (&01) ARE INCOMPATIBLE.
SM2 TERMINATED ABNORMALLY
(B) Routing code: R Weight: 99

Meaning

The version number (&00) of the TU part of SM2 and the version number (&01) of modules in the SM2 module library do not match.

NPS0546 WRONG BCAM-VERSION. STATEMENT REJECTED.

Meaning

The measurement program BCAM-CONNECTION cannot fetch any data by this BCAM-Version.

NPS0547 MONITORING PROGRAM '(&00)' WAS NOT ACTIVE
(B) Routing code: R Weight: 50

Meaning

The SM2 administrator has tried to deactivate or modify a monitoring program that has not been activated.

The statement has been rejected.

NPS0548 WARNING: MONITORING PROGRAM '(&00)' STARTED, BUT ACCORDING SUBSYSTEM NOT LOADED
IN SYSTEM

Meaning

SM2 gets not the measurement data from the specified subsystem. As far as this is not available, SM2 cannot deliver any measurement data.

Response

Contact the system administrator, so that he can start the required subsystem, or stop the monitoring program to save resources.

NPS0549 START OF SERVICE TIME STATISTICS NOT POSSIBLE. TRY START STATEMENT AGAIN LATER
(B) Routing code: R Weight: 99

Meaning

It is not possible to start collection of service time statistics at the moment as the previous service time statistics run has not yet been completed.

Response

The statement //START-MEASUREMENT-PROGRAM TYPE=SERVICETIME may be repeated later.

NPS0550 WARNING: TASK STATISTICS STARTED WITHOUT RESPONSE TIME VALUES
(B) Routing code: R Weight: 50

Meaning

No response time values can be recorded for task statistics as subsystem BCAM-SM2 could not be loaded or initiated.

NPS0551 WARNING: 64 DEVICES SELECTED FOR TASK STATISTICS. SURPLUS DEVICES IGNORED
(B) Routing code: R Weight: 50

Meaning

More than 64 devices were selected by the DEVICE definition in the //SET-TASK-PARAMETER statement. As the number of devices that can be monitored is limited to 64, collection of task statistics begins with exactly 64 devices and any surplus devices are not monitored.

The criteria for selecting these 64 devices are described in the BS2000 manual 'SM2'.

NPS0552 '/HOLD-SUBSYSTEM' NOT SUPPORTED BY SM2. REASON FOR FOLLOWING DSSM MESSAGES

Response

Instead of /HOLD-SUBSYSTEM command use /STOP-SUBSYSTEM command.

NPS0553 START OF SM2 SUBSYSTEM NOT POSSIBLE

(B) Routing code: R Weight: 50

Meaning

Possible reasons:

- SM2 has not been declared in the subsystem catalog.
- The installed SM2 version is not compatible with the BS2000 version.
- A required file (e.g. the SM2 module library) is missing.

NPS0554 FUNCTION NOT EXECUTED BECAUSE SUBSYSTEM SM2 IN STATE 'IN HOLD', 'IN DELETE' OR ALREADY DELETED

Meaning

The system administrator has held or stopped the SM2 subsystem. As a result, a number of SM2 functions can no longer be executed.

Response

Repeat the function as soon as SM2 is available again.

NPS0555 VERSION OF SM2 MODULE LIBRARY IS (&00)

(B) Routing code: R Weight: 50

NPS0558 SM2 LOGGING FILE ALREADY OPEN. STATEMENT REJECTED

Meaning

A non-standard SM2 logging file with the specified name has already been opened.

NPS0559 WARNING: 256 DEVICES SELECTED AND INVALID DEVICES IN WILDCARD LIST. SURPLUS AND INVALID DEVICES IGNORED

Meaning

- More than 256 devices were selected by the DEVICE definition in the
- //SET-DISK-PARAMETER or //SET-SERVICETIME-PARAMETER statement.
- As the number of devices that can be monitored is limited to 256, collection of
- corresponding statistics begins with exactly 256 devices and
- any surplus devices are not monitored.
- The criteria for selecting these 256 devices are described in the BS2000 manual 'SM2'.
- Moreover there were invalid devices in the wildcard list.
- Invalid devices are:
 - devices which are not attached
 - GS volumes
- Invalid devices are not monitored.

NPS0560 MONITORING PROGRAM RECORD COULD NOT BE WRITTEN. TRY AGAIN LATER

Meaning

Collection of statistics has not been activated.

NPS0561 WARNING: 256 DEVICES SELECTED. SURPLUS DEVICES IGNORED

Meaning

- More than 256 devices were selected by the DEVICE definition in the
- //SET-DISK-PARAMETER or //SET-SERVICETIME-PARAMETER statement.
- As the number of devices that can be monitored is limited to 256, collection of
- corresponding statistics begins with exactly 256 devices and any surplus devices are
- not monitored.
- The criteria for selecting these 256 devices are described in the BS2000 manual 'SM2'.

NPS0562 OPERATING SYSTEM RUNNING IN NATIVE MODE. VM STATISTICS NOT AVAILABLE. STATEMENT REJECTED

Meaning

Collection of VM statistics cannot be activated as no VM2000 system is currently being used.

NPS0563 OPERATING SYSTEM EMBEDDED IN VM2000 SYSTEM AS NON-PRIVILEGED GUEST SYSTEM. VM STATISTICS NOT PERMITTED. STATEMENT REJECTED

Meaning

Collection of VM statistics can only be activated on the privileged machine VM1 of a VM2000 system.

NPS0564 WARNING: INVALID DEVICES IN WILDCARD LIST. INVALID DEVICES IGNORED.

Meaning

In the specified wildcard list some invalid devices were found.

Invalid devices are:

- devices which are not attached
- GS volumes

The invalid devices are not monitored.

NPS0565 SYNTAX ERROR. INVALID BUCKET VALUES

Meaning

Only 1-5 bucket values may be specified in a list.

The values must be in ascending order.

Permissible value range: 1 to 99999.

The statement has been rejected.

NPS0566 NAME OF CONNECTION SET INVALID

Meaning

Possible reasons:

- The specified name has not been defined in the statement
//REMOVE-CONNECTION-SET.
- The specified name has already been defined in the statement
//ADD-CONNECTION-SET.

The statement has been rejected.

NPS0567 ' //SET-RESPONSETIME-PARAMETER ' STATEMENT NOT SPECIFIED. STATEMENT REJECTED

Meaning

The //MODIFY-RESPONSETIME-PARAMETER or //ADD-CONNECTION-SET statement cannot be specified unless //SET-RESPONSETIME-PARAMETER statement is specified first.

The statement has been rejected.

Response

Enter the //SET-RESPONSETIME-PARAMETER statement and repeat your original entry.

NPS0568 MORE THAN 15 CONNECTION SETS DEFINED

Meaning

The connection set '*GLOBAL=(*ALL, *ALL, *ALL)' is always defined additionally.

The statement has been rejected.

Response

Use the //REMOVE-CONNECTION-SET statement to terminate monitoring of superfluous connection sets and repeat your original entry.

NPS0569 MORE THAN 15 CONNECTION GROUPS DEFINED

Meaning

'(*ALL, *ALL, *ALL)' is always defined additionally as a connection group. The statement has been rejected.

Response

Use the //REMOVE-CONNECTION-SET statement to terminate monitoring of superfluous connection groups and repeat your original entry.

NPS0570 SYSTEM ERROR WHEN STARTING MONITORING PROGRAM FOR DISK STATISTICS. DISK STATISTICS NOT STARTED

Meaning

The number of cylinders per volume could not be determined.

NPS0571 SYNTAX ERROR. INVALID SORT CRITERION IN '//SET-PERIODIC-TASK-PARAMETER STATEMENT'

Meaning

The statement has been rejected.

NPS0572 WARNING: USER TASK STATISTICS STARTED WITHOUT MEASUREMENT OF RESPONSE TIME VALUES

Meaning

No response time values can be recorded for the user task statistics as the subsystem BCAM-SM2 could not be loaded or initiated.

NPS0573 INCONSISTENT OPERAND VALUES FOR ISAM POOL DEFINITION

Meaning

The statement has been rejected.

NPS0574 FILE ALREADY SUBMITTED FOR MONITORING

Meaning

The statement has been rejected.

NPS0575 SM2 TERMINATED BY '/STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2, FORCED=YES'

Meaning

The system administrator has deleted the SM2 subsystem, thereby automatically terminating all tasks still connected to SM2.

NPS0576 ISAM POOL ALREADY BEING MONITORED. STATEMENT REJECTED

Meaning

The ISAM pool submitted by the user for ISAM pool monitoring is already being monitored.

NPS0577 TOO MUCH USERS MONITOR THE SAME ISAM POOL

Meaning

Maximal 64 users can monitor the same ISAM POOL at the same time.
Statement rejected.

NPS0578 INVALID CACHE-ID. PERMISSIBLE VALUE RANGE: 0 TO 62

Meaning

The statement has been rejected.

NPS0579 INVALID OBJECT SPECIFICATION IN '///SET-PERIODIC-TASK-PARAMETER' STATEMENT

Meaning

The statement has been rejected.

NPS0580 INVALID FILENAME

Meaning

Possible reasons: The filename is invalid, because

- the specified USER ID doesn't exist,
- the filename is too long,
- the complete filename with CAT ID and USER ID is too long,
- the filename with relative FGG is not cataloged.

NPS0581 USER ID(S) '(&00)' DO NOT EXIST.

Meaning

An attempt was made to enable a user monitoring run for not existing USER ID(S). The statement has been rejected.

NPS0590 MONITORING PROGRAM '(&00)' INVALID DEFINED. STATEMENT REJECTED

Meaning

It was attempted to start a monitoring program with invalid channels.

Invalid channels are:

- Channels, which are not any more in the configuration

Response

Check and correct monitoring program definition.

NPS0591 WARNING: MONITORING PROGRAM '(&00)' PARTLY INVALIDLY DEFINED. INVALID CHANNELS IGNORED

Meaning

While starting a monitoring program, it was found that some invalid channels were selected. The monitoring program is only started with the valid channels; the invalid channels are not monitored.

Invalid channels are:

- Channels, which are not any more in the configuration

NPS0600 UNRECOVERABLE ERROR IN SM2 MODULES
(B) Routing code: R Weight: 99

Meaning

With this message number a SERSLOG record is written.

NPS0603 UNKNOWN DATA PASSED THROUGH BOURSE

Meaning

The contents of bourse parameter RDATA is unknown to the gatherer task.
A SERSLOG record is written.

NPS0700 Host: '(&00)'

Meaning

This host sends the following SM2 message.

NPS0701 SELECTED HOST NOT AVAILABLE. STATEMENT REJECTED

Meaning

The selected host is not available.

Possible reasons are:

- host name syntactically incorrect
- host not connected
- subsystem MSCF not available
- no host information in MSCF configuration
- SM2 version of remote host does not match
- parameters of //SELECT-HOST compete with one another
- connection to remote host interrupted
- subsystem SM2 on remote host not available

NPS0710 '(&01)' MACRO ERROR: '(&00)'

Meaning

(&01) macro returns (&00).

NPS3003 TIME STAMP '(&00)' OF INPUT FILE '(&02)' IS EARLIER THAN LAST TIME STAMP '(&01)'
OF OUTPUT FILE
(B) Routing code: R Weight: 99

Meaning

The time stamps of a SM2 logging file must be in ascending order.
The statement has been rejected.

NPS3004 INVALID INPUT FILE '(&00)'
(B) Routing code: R Weight: 99

Meaning

The specified input file is not

- a SM2 logging file although SM2 logging files are assumed to be handled
- a user logging file although user logging files are assumed to be handled.

The statement has been rejected.

NPS3006 /SET-FILE-LINK COMMAND WITH 'LINK-NAME=SM2UI1' MISSING FOR INPUT FILE
(B) Routing code: R Weight: 99

NPS3007 'SM2U1' UTILITY ROUTINE TERMINATED NORMALLY
(B) Routing code: R Weight: 50

Meaning

The SM2U1 utility routine has terminated without errors.

NPS3008 'SM2U1' UTILITY ROUTINE TERMINATED ABNORMALLY
(B) Routing code: R Weight: 99

Meaning

A previously reported error caused the SM2U1 utility routine to be terminated abnormally (TERMJ).

NPS3009 WARNING: CLOSE RECORD ADDED TO FILE '(&00)'
(B) Routing code: R Weight: 50

Meaning

The last record in the specified file is not a CLOSE record (record 22 with CLOSE indicator).

Possible reason:

system crash during creation of the SM2 logging file.

To ensure that the monitored data are consistent, the last (possibly incomplete) monitoring cycle of the input file is not written to the output file. Instead, a CLOSE record with the indicator 'system crash' is written.

NPS3010 FILE '(&00)' ADDED
(B) Routing code: R Weight: 50

Meaning

The file with the specified name (&00) has been added to the output file.

NPS3011 START TIME=(&00), END TIME=(&01)
(B) Routing code: R Weight: 50

NPS3012 NUMBER OF RECORDS WRITTEN = (&00)
(B) Routing code: R Weight: 50

Meaning

The last input file has been processed. Before the program terminates, the user is informed of how many records have been written to the output file.

NPS3013 NUMBER OF MISSING RECORDS = (&00)
(B) Routing code: R Weight: 50

Meaning

During processing of the input file, the total number of records which SM2 could not put out is added up. This number is put out when processing has been completed, unless it is zero.

NPS3014 NAME OF OUTPUT FILE: '(&00)'
(B) Routing code: R Weight: 50

NPS3015 INTERNAL SYSTEM ERROR DURING PROCESSING OF BS2000 MACRO '(&00)', RETURN CODE '(&01)'
(B) Routing code: R Weight: 99

Meaning

This message is for diagnostic purposes only.

NPS3016 /SET-FILE-LINK COMMAND WITH 'LINK-NAME=SM2U0' MISSING FOR OUTPUT FILE
(B) Routing code: R Weight: 99

NPS3017 OUTPUT FILE '(&00)' IS NOT SM2 LOGGING FILE
(B) Routing code: R Weight: 99

Meaning

This message can occur only when an existing output file is to be extended (OPEN-MODE=EXTEND).

NPS3018 DMS ERROR IN OUTPUT FILE. DMS CODE '(&00)'. /HELP-MSG DMS(&00)
(B) Routing code: R Weight: 99

Meaning

For more detailed information about the DMS error code enter /HELP-MSG or see the BS2000 manual 'System Messages'.

NPS3019 DMS ERROR IN INPUT FILE '(&01)'. DMS CODE '(&00)'. /HELP-MSG DMS(&00)
(B) Routing code: R Weight: 99

Meaning

For more detailed information about the DMS error code enter /HELP-MSG or see the BS2000 manual 'System Messages'.

NPS3020 INVALID RECORD IN INPUT FILE '(&00)'
(B) Routing code: R Weight: 99

Meaning

The specified input file contains an incorrect record, e.g. a record with record length 0.

NPS3021 SM2U1 HANDLES SM2 LOGGING FILES
NPS3022 FILE(S) '(&00)' TRANSFERED TO OUTPUT FILE
NPS3023 SM2U1 HANDLES USER LOGGING FILES
NPS3024 SPECIFIED 'LAST-INDEX=(&00)' GREATER THAN HIGHEST FILE INDEX '(&01)'. OPERAND '*LAST' ASSUMED

Meaning

The specified LAST-INDEX value in the //SEPARATE-FILES statement is greater than the highest file index (&01) in the input file. All the data up to the end of the input file will be transferred to the output file.

NPS3025 SPECIFIED 'FIRST-INDEX=(&00)' GREATER THAN HIGHEST FILE INDEX '(&01)' IN INPUT FILE

Meaning

The specified FIRST-INDEX value in the //SEPARATE-FILES statement is greater than the highest file index (&01) in the input file.

No files have been transferred to the output file.

NPS3026 OUTPUT FILE '(&00)' IS NOT USER LOGGING FILE

Meaning

This message can occur only when an existing output file is to be extended (OPEN-MODE=EXTEND).

NPS3027 /SET-FILE-LINK COMMAND WITH 'LINK-NAME=(&00)' MISSING FOR OUTPUT FILE

NPS3028 /SET-FILE-LINK COMMAND WITH 'LINK=(&00)' MISSING FOR INPUT FILE

NPS3029 VALUE FOR 'LAST-INDEX' SMALLER THAN VALUE FOR 'FIRST-INDEX'

NPS3030 FILE INDEX VALUES OF BLOCKS ARE NOT IN ASCENDING ORDER

NPS3031 ONLY 'BUFFER-LENGTH=*STD(SIZE=16)' PERMITTED FOR OUTPUT FILE '(&00)'.

Meaning

Output files are only permitted with 'BUFFER-LENGTH=*STD(SIZE=16)'.

The value of the BUFFER-LENGTH operand in the /ADD-FILE-LINK command for the output file is invalid or the existing output file (OPEN-MODE=EXTEND) has a wrong BUFFER-LENGTH.

Response

Retry the /ADD-FILE-LINK command without operand BUFFER-LENGTH or convert the existing output file with SM2U1.

NPS4102 SPECIFIED TIMES IN DEFINITION OF ANALYSIS INTERVAL NOT IN ASCENDING ORDER
(B) Routing code: R Weight: 99

Meaning

The start time output for the analysis interval is greater than the corresponding end time.

NPS4139 SPECIFIED TIMES IN DEFINITION OF TIME WINDOW NOT IN ASCENDING ORDER
(B) Routing code: R Weight: 99

Meaning

The specified start time of a time window is greater than the corresponding end time.

NPS4140 TIME WINDOWS OVERLAPPING OR NOT IN ASCENDING ORDER
(B) Routing code: R Weight: 99

NPS4145 '24:00' NOT PERMITTED AS START TIME FOR TIME WINDOW
(B) Routing code: R Weight: 99

NPS4146 ILLEGAL TIME SPECIFICATION (LATER THAN 24:00)
(B) Routing code: R Weight: 99

NPS4147 INVALID YEAR SPECIFIED

Meaning

Year-specifications are only allowed from 0-99 and 1960-2059.

NPS4154 '*SUMMARY' ONLY PERMITTED AS FIRST ELEMENT IN LIST
(B) Routing code: R Weight: 99

Meaning

Possible reasons:

- *SUMMARY was specified more than once for disk analysis.
- *SUMMARY was not specified as the first element in a list.

NPS4162 INCONSISTENT VALUES WHEN SELECTING CYLINDER AREA
(B) Routing code: R Weight: 99

Meaning

When selecting a cylinder area either the number selected for the last cylinder is smaller than the number of the first cylinder, or the subinterval specified by *BY is larger than the selected cylinder area.

NPS4163 NUMBER OF LINES GREATER THAN 32766. NO ANALYSIS IS POSSIBLE

Meaning

The number of table lines requested implicitly via the *BY operand is greater than 32766.

NPS4200 BLOCK SIZE OF TRANSFER FILE TOO SHORT. PROCESSING ABORTED.

Meaning

The buffer length of the transfer file is too short for the DATA record.

Response

- create the transfer file without specifying a buffer length.
BUFFER-LENGTH=STD(SIZE=16) will be defined automatically.
- reduce the number of analysis subintervals.

NPS4310 STATEMENT REJECTED
(B) Routing code: R Weight: 99

Meaning

The statement is invalid and must be reentered corrected.

NPS4311 ERROR DURING STATEMENT ENTRY. SM2R1 TERMINATED ABNORMALLY
(B) Routing code: R Weight: 99

Meaning

Errors in statement input could not be recovered in procedure or in batch mode.
No analysis is possible.

NPS4312 'CONNECTION-SET (&00)' NOT DEFINED
(B) Routing code: R Weight: 99

Meaning

The name of the connection set is invalid or has not been defined.

NPS4313 'USERID-SET (&00)' NOT DEFINED
(B) Routing code: R Weight: 99

Meaning

The name of the USER ID set is invalid or has not been defined.
USER ID sets must be defined by means of the //CREATE-USERID-SET statement.

NPS4314 'TSN-SET (&00)' NOT DEFINED
(B) Routing code: R Weight: 99

Meaning

The name of the task set is invalid or has not been defined.
Task sets must be defined by means of the //CREATE-TSN-SET statement.

NPS4315 'JOBNAME-SET (&00)' NOT DEFINED

Meaning

The name of the job name set is invalid or has not been defined.
Job name sets must be defined by means of the //CREATE-JOBNAME-SET statement.

NPS4316 'JOBCLASS-SET (&00)' NOT DEFINED

Meaning

The name of the job class set is invalid or has not been defined.
Job class sets must be defined by means of the //CREATE JOBCLASS-SET statement.

NPS4317 MORE THAN MAXIMUM PERMITTED NUMBER OF '(&00)' DEFINED

NPS4318 SDF SYNTAX FILE DEFECTIVE OR INCORRECTLY ACCESSED. CONTACT THE SYSTEM ADMINISTRATOR

Meaning

Either no SDF syntax file has been assigned or the one assigned is invalid or cannot be accessed.

NPS4319 SYSTEM ERROR WHEN PROCESSING SDF STATEMENTS. SDF RETURN CODE '(&00)'

Response

Contact the system administrator.

NPS4320 NUMBER OF ANALYSIS PART-INTERVALS TOO HIGH

Meaning

The analysis interval is divided in too many part-intervals. The maximal number of intervals is 8000.

Response

Choose longer part-intervals.

NPS4321 WRONG ITEM NUMBER (&01) FOR REPORT (&00)

Meaning

An item number (&01) which does not exist for report (&00) was given.

NPS4322 SYNTAX ERROR. 'LOWER-LIMIT' GREATER THAN 'UPPER-LIMIT'. STATEMENT REJECTED

Response

Correct the statement and try again.

NPS4350 SM2 LOGGING FILE INCORRECTLY. ANALYSIS NOT POSSIBLE.

Meaning

Possible reasons:

- the assigned SM2 logging file is empty
- the assigned file is not a SM2 logging file
- the assigned file does not have SAM format
- the version of SM2 logging file is lower than V9.5A

NPS4351 SM2 LOGGING FILE CONTAINS NO VALID TIME STAMP RECORD. ANALYSIS NOT POSSIBLE
(B) Routing code: R Weight: 99

NPS4354 SM2 LOGGING FILE CONTAINS NO CLOSE RECORD. ANALYSIS NOT COMPLETELY

Meaning

The SM2 logging file was not correctly closed.

Possible reasons are

- SM2 system task has abnormally terminated
- system crash

during creation of SM2 logging file.

Response

The file can be repaired by issuing the command

//REPAIR-DISK-FILES FILE-STATUS=*ANY (FILE-NAME=dateiname).

Subsequently, a CLOSE record should be attached with SM2U1.

NPS4451 TIME STAMP OF CURRENT RECORD '(&00)' EARLIER THAN LAST TIME STAMP '(&01)'
(B) Routing code: R Weight: 99

Meaning

The time stamps in the SM2 logging file are not in ascending order.

NPS4452 SPECIFIED END TIME OF ANALYSIS INTERVAL SMALLER THAN FIRST TIME STAMP OF SM2 LOGGING FILE '(&00)'
(B) Routing code: R Weight: 99

NPS4453 SPECIFIED START TIME OF ANALYSIS INTERVAL GREATER THAN LAST TIME STAMP OF SM2 LOGGING FILE '(&00)'

NPS4503 (&00) ACCESSES TO CYLINDER NUMBERS WITH UNKNOWN ADDRESS
(B) Routing code: R Weight: 99

Meaning

(&00): Number of disk accesses for which SM2 could not determine the cylinder number.

NPS4504 (&00) ACCESSES TO BLOCK NUMBERS WITH UNKNOWN ADDRESS

Meaning

(&00): Number of disk accesses for which SM2 could not determine the block number.

NPS4551 NO MEASUREMENTS FOUND FOR TASK ANALYSIS
(B) Routing code: R Weight: 50

Meaning

Task analysis was requested but the SM2 logging file does not contain any task records in the specified analysis interval.

NPS4552 NO MEASUREMENTS FOUND FOR SPECIFIED 'TSN-SET (&00)'
(B) Routing code: R Weight: 50

Meaning

The SM2 logging file contains no TSNs of the specified TSN set in the given analysis period.

NPS4553 NO MEASUREMENTS FOUND FOR SPECIFIED 'USERID-SET (&00)'
(B) Routing code: R Weight: 50

Meaning

The SM2 logging file contains no USER IDs of the specified USER ID set in the given analysis period.

NPS4555 NO MEASUREMENTS FOUND FOR QUEUE TRANSITION
(B) Routing code: R Weight: 50

Meaning

Task queue analysis was requested but the SM2 logging file does not contain any queue records in the given analysis interval.

NPS4556 NO MEASUREMENTS FOUND FOR DISK STATISTICS
(B) Routing code: R Weight: 50

Meaning

Disk statistics were requested but the SM2 logging file contains no disk access records in the given analysis interval.

NPS4557 NO MEASUREMENTS FOUND FOR SPECIFIED 'JOBNAME-SET (&00)'

Meaning

The SM2 logging file contains no job names of the specified job name set in the given analysis period.

NPS4558 NO MEASUREMENTS FOUND FOR SPECIFIED 'JOBCLASS-SET (&00)'

Meaning

The SM2 logging file contains no job classes of the specified job class set in the given analysis period.

NPS4559 NO MEASUREMENTS FOUND FOR HSMS STATISTICS

Meaning

Hsms statistics were requested but the SM2 logging file contains no hsms records in the given analysis interval.

NPS4601 INTERNAL EAM MACRO ERROR. CODE=(&00)
(B) Routing code: R Weight: 99

Meaning

An EAM call returns the specified error information.

NPS4651 NO MEASUREMENTS FOUND FOR DISTRIBUTION OF HEAD MOVEMENTS FOR '(&00)'
(B) Routing code: R Weight: 50

Meaning

The disk (&00) for which analysis was requested was not active in the analysis period or was not monitored.

NPS4652 NO MEASUREMENTS FOUND FOR DISTRIBUTION OF SERVICE TIMES FOR '(&00)'
(B) Routing code: R Weight: 50

Meaning

The disk (&00) for which analysis was requested was not active in the analysis period or was not monitored.

NPS4653 NO MEASUREMENTS FOUND FOR DISTRIBUTION OF I/O REQUESTS FOR '(&00)'
(B) Routing code: R Weight: 50

Meaning

The disk (&00) for which analysis was requested was not active in the analysis period or was not monitored.

NPS4654 NO MEASUREMENTS FOUND FOR SUMMARY OF I/O REQUESTS
(B) Routing code: R Weight: 50

Meaning

In the analysis period either no disk was monitored by SM2 or none of the monitored disks was active.

NPS4655 NO MEASUREMENTS FOUND FOR SUMMARY OF HEAD MOVEMENTS
(B) Routing code: R Weight: 50

Meaning

In the analysis period either no disk was monitored by SM2 or none of the monitored disks was active.

NPS4656 NO MEASUREMENTS FOUND FOR SUMMARY OF SERVICE TIMES
(B) Routing code: R Weight: 50

Meaning

In the analysis period either no disk was monitored by SM2 or none of the monitored disks was active.

NPS4657 NO DATA FOUND FOR OUTPUT OF CONFIGURATION

Meaning

The SM2 logging file contains no configuration data for the selected analysis period.

NPS4658 DATA FOR OUTPUT OF CONFIGURATION IS INCOMPLETE

Meaning

The SM2 logging file does not contain all configuration data.
No output of configuration data.

NPS4751 INPUT CONTROL FILE 'MTFILE' HAS VERSION (&00)
(B) Routing code: R Weight: 50

NPS4801 INSUFFICIENT VIRTUAL ADDRESS SPACE FOR ANALYSIS
(B) Routing code: R Weight: 99

Meaning

The storage space requested by the program could not be made available.
The analysis run can be restarted using fewer reports.

NPS4853 NO MEASUREMENTS FOUND DURING ANALYSIS INTERVAL FOR '(&00)'

Meaning

SM2 did not monitor the variable (&00) in the specified analysis interval.

NPS4854 (&00) SUPPRESSED DUE TO REPORT CONDITION

Meaning

Report (&00) suppressed because measurements are in given range.

NPS4901 VERSIONS OF 'SM2R1' AND 'MTFILE' INCOMPATIBLE
(B) Routing code: R Weight: 99

NPS4951 NO PERFORMANCE DATA AVAILABLE FOR CPU TYPE '(&00)'. CONTACT SYSTEM ADMINISTRATOR
(B) Routing code: R Weight: 99

Meaning

Automatic analysis is not possible without limit values for the specified CPU type.

NPS4953 MONITORED DATA FOR '(&00)' REQUIRED TO COMPLETE AUTOMATIC ANALYSIS
(B) Routing code: R Weight: 99

Meaning

Automatic analysis should be conducted using all the required data (cf. the BS2000 manual 'SM2'), otherwise it is possible that bottlenecks will remain undetected.

NPS4954 NO VM2000 RECORD FOUND. NO RELATIVATION OF PERFORMANCE DATA

Meaning

Automatic analysis needs the CPU QUOTA of VM2000 record for relativation of performance data.

NPS5000 UNKNOWN ERROR CODE '(&00)' OR SUBCODE '(&01)' DELIVERED FROM SM2
(B) Routing code: R Weight: 99

Meaning

SM2 delivered an error code (&00) or a subcode (&01) referring to a non-existent message.

NPUCOPY Copyright (C) '(&00)' '(&01)' All Rights Reserved

NPULOAD Program '(&00)', Version '(&01)' of '(&02)' loaded from file '(&03)'

NPUSTRT Procedure '(&00)', Version '(&01)' of '(&02)' started from file '(&03)'

9 Installation

The SM2 software monitor system is supplied on a product tape with the files required for the SM2 monitoring program and the SM2R1 and SM2U1 utility routines. The following individual files are included:

SM2	Prephases for loading and starting the corresponding
SM2U1	phases from the libraries listed below
SM2R1	
SYSLNK.SM2.130	Loadable parts of SM2 (for /390 systems only)
SRMLNK.SM2.130	Loadable parts of SM2 (for SR2000 systems only)
SYSLNK.SM2.130.SM2	Loadable parts of SM2
SYSLNK.SM2.130.SM2U1	Loadable parts of SM2U1
SYSLNK.SM2.130.SM2R1	Loadable parts of SM2R1
SYSRMS.SM2.130	Loader package for SM2
SYSNRF.SM2.130	Auxiliary file for REP processing
SYSSII.SM2.130	Declaration file for IMON
SYSLIB.SM2.130	C header files for program interface, sample procedures
SYSDAT.SM2.130.MTFILE	Control file for SM2R1
SYSMSP.SM2.130.D	PLI1 text file for SM2R1 (German)
SYSMSP.SM2.130.E	PLI1 text file for SM2R1 (English)
SYSSPR.SM2.130.SM2R1	Procedure for the START-SM2R1 command
SYSSDF.SM2.130	Syntax file with all statements and commands (SM2, SM2U1, SM2R1)
SYSMES.SM2.130	Message file for SM2,SM2U1,SM2R1
SYSSSC.SM2.130	DSSM declarations for SM2 (for /390 systems only)
SIPLIB.SM2.130	Contains the "restricted macros" of SM2
SYSFGM.SM2.130.D	Release notice (German)
SYSFGM.SM2.130.E	Release notice (English)

Installation procedure

Standard installation of the SM2 monitoring program is via the product IMON. The following basic steps must be performed when installing without IMON:

1. Read in the product tape. It is recommended that the default user ID (defined using the system parameter DEFLUID) be used as the installation ID for SM2. Alternatively, you can use an ID which has been assigned the monitoring privilege SW-MONITOR-ADMINISTRATION (TSOS has been assigned this privilege by default).

The SYSREP.SM2.130 file must be created from the loader package SYSRMS.SM2.130 using the product RMS.

The system expects to find the following files in the default user ID. They are specified in the supplied subsystem declaration. If they are installed under a different ID, the subsystem declaration must be modified accordingly.

- SYSLNK.SM2.130
 - SYSREP.SM2.130
 - SYSNRF.SM2.130
2. The SYSMES.SM2.130 message file is activated with the aid of the BS2000 command MODIFY-MSG-FILE-ASSIGNMENT.
 3. No changes can be made in the SM2 subsystem declaration except for the ID under which the objects to be loaded dynamically are stored.
 4. For the monitoring programs RESPONSETIME and UTM, SM2 requires the subsystems BCAM-SM2 and UTM-SM2. The files belonging to these subsystems are supplied with DCM and UTM themselves.

Activating the syntax file

All statements (START-SM2, START-SM2U1, START-SM2R1) together with the BS2000 commands START-/STOP-TASK-MEASUREMENT are contained in the SYSSDF.SM2.130 syntax file. In order to make these statements available to each user, this syntax file must be activated.

The following command is used to activate the syntax file:

```
/MODIFY-SDF-PARAMETER SCOPE=*PERMANENT,  
SYNTAX-FILE-TYPE=*SUBSYSTEM(NAME=SYSSDF.SM2.130,SUBSYSTEM-NAME=SM2)
```

Creating a new DSSM catalog

The SM2 monitoring program is loaded and unloaded by the DSSM subsystem management facility. This requires the SM2 declarations in the valid DSSM catalog. These declarations are contained in the file SYSSSC.SM2.130, which is supplied along with the SM2 product tape.

The SM2 declarations of file SYSSSC.SM2.130 **must not** be modified, with the exception of the user ID under which the objects to be dynamically loaded are stored. Also, the address space specification CLASS=3/4 must not be modified. SM2 itself handles the relocation of modules to class 5 memory, so that the load on the system address space is kept as low as possible.

To create a new subsystem catalog, it is advisable to update the DSSM configuration file (sample name SYSSSC.KONF.130) with the following SSCM statements:

Example

Writing to the DSSM configuration file

```
/START-SSCM
//START-CATALOG-MODIFICATION CATALOG-NAME=SYSSSC.KONF.130
:
:
//MODIFY-SUBSYSTEM-ATTRIBUTES } Statements for other subsystems
:
:
//ADD-CATALOG-ENTRY FROM-FILE=SYSSSC.SM2.130
//CHECK-CATALOG
//SAVE-CATALOG
//END
```

The new subsystem catalog is automatically generated or modified using the SSCM statement SAVE-CATALOG. However, this catalog does not become valid until the system is restarted, in which case it must be explicitly specified. Alternatively, the catalog can be added during the system run using the command /ADD-SUBSYSTEM CATALOG=SYSSSC.KONF.130, TYPE=EXTENDED-ACTIVE-CONFIGURATION. For notes and further information see the manuals “System Installation” [7] and “Introductory Guide to Systems Support” [6].

Loading and unloading the subsystem

The SM2 subsystem is generated and started for the first time under an ID which has been assigned the privilege SW-MONITOR-ADMINISTRATION. This loads the SM2 modules. The BCAM-SM2 subsystem required for the RESPONSETIME monitoring program is only loaded when it is required. The required subsystem UTM-SM2 is not started by SM2 (see the UTM manual “Generating and Administering Applications” [10] and “UTM Monitored data on UTM applications” on page 53 in the present manual).

The SM2 subsystem can also be loaded via the DSSM command `/START-SUBSYSTEM SUBSYSTEM-NAME=SM2`. SM2 can then be started (`/START-SM2`) under any user ID.

The SM2 subsystem exists until it is unloaded via the DSSM command `/STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2`. The SM2 output file is implicitly closed when `/STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2` is specified. Likewise, permission for task monitoring by the user is retracted. Authorization beyond that granted by the monitoring privilege SW-MONITOR-ADMINISTRATION is required to execute the DSSM commands (SUBSYSTEM-MANAGEMENT). Unconditional unloading with `/STOP-SUBSYSTEM SUBSYSTEM-NAME=SM2,FORCED=*YES` is possible, but it should only be applied in the event of problems.

The system administrator can obtain information on the current status of the SM2 subsystem by issuing the command `/SHOW-SUBSYSTEM-STATUS SUBSYSTEM-NAME=SM2`.

10 Appendix

10.1 SDF syntax description

This syntax description is based on SDF Version 4.1A. The syntax of the SDF command/statement language is explained below in three tables.

Table 9: Metasyntax

Command and statement formats use certain characters and forms of representation; their meanings are described in Table 9.

Table 10: Data types

Variable operand values are represented in SDF by means of data types. Each data type represents a certain set of values. The number of data types is limited to the data types described in Table 10.

The description of data types is valid for all commands and statements, and operand descriptions describe only the deviations from Table 10.

Table 11: Suffixes for data types

Data type suffixes define additional rules for data type input. They contain a length or interval specification and can be used to limit the set of values (suffix begins with *without*), extend it (suffix begins with *with*), or declare a particular task mandatory (suffix begins with *mandatory*). The following short forms are used in this manual for data type suffixes:

cat-id	cat
completion	compl
correction-state	corr
generation	gen
lower-case	low
manual-release	man
odd-possible	odd
path-completion	path-compl
separators	sep
temporary-file	temp-file
under-score	under
user-id	user
version	vers
wildcard-constr	wild-constr
wildcards	wild

For the data type “integer”, Table 11 also contains units in italics; they are not part of the syntax and serve simply to make it easier to read.

For special data types that are checked by the implementation, Table 11 contains suffixes in italics (see suffix *special*), which are not part of the syntax.

The description of data type suffixes is valid for all commands and statements, and operand descriptions describe only the deviations from Table 11.

Metasyntax

Representation	Meaning	Examples
UPPERCASE LETTERS	Uppercase letters denote keywords (command, statement and operand names, keyword values) and constant operand values. Keywords begin with *	HELP-SDF
UPPERCASE LETTERS in boldface	Uppercase letters printed in boldface denote guaranteed or suggested abbreviations of keywords.	SCREEN-STEPS = *NO
=	The equals sign connects an operand name with the associated operand values.	GUIDANCE-MODE = *YES
< >	Angle brackets denote variables whose range of values is described by data types and suffixes (see Tables 10 and 11).	GUIDANCE-MODE = *NO
<u>Underscoring</u>	Underscoring denotes the default value of an operand.	SYNTAX-FILE = <filename 1..54>
/	A slash serves to separate alternative operand values.	GUIDANCE-MODE = *NO
(...)	Parentheses denote operand values that initiate a structure.	NEXT-FIELD = *NO / *YES
[]	Square brackets denote operand values which introduce a structure and are optional. The subsequent structure can be specified without the initiating operand value.	,UNGUIDED-DIALOG = *YES (...)/ *NO
Indentation	Indentation indicates that the operand is dependent on a higher-ranking operand.	SELECT = [*BY-ATTRIBUTES](...)
		,GUIDED-DIALOG = *YES (...) *YES(...) SCREEN-STEPS = *NO / *YES

Table 9: Metasyntax (part 1 of 2)

Representation	Meaning	Examples
<p style="text-align: center;"> </p> <p>list-poss(n):</p> <p>Alias:</p>	<p>A vertical bar identifies related operands within a structure. Its length marks the beginning and end of a structure. A structure may contain further structures. The number of vertical bars preceding an operand corresponds to the depth of the structure.</p> <p>A comma precedes further operands at the same structure level.</p> <p>The entry “list-poss” signifies that a list of operand values can be given at this point. If (n) is present, it means that the list must not have more than n elements. A list of more than one element must be enclosed in parentheses.</p> <p>The name that follows represents a guaranteed alias for the command or statement name.</p>	<p>SUPPORT = *TAPE(...)</p> <pre> *TAPE(...) VOLUME = *ANY(...) *ANY(...) ... </pre> <p>GUIDANCE-MODE = *NO / *YES</p> <p>,SDF-COMMANDS = *NO / *YES</p> <p>list-poss: *SAM / *ISAM</p> <p>list-poss(40): <structured-name 1..30></p> <p>list-poss(256): *OMF / *SYSLST(...) / <filename 1..54></p> <p>HELP-SDF Alias: HPSDF</p>

Table 9: Metasyntax (part 2 of 2)

Data types

Data type	Character set	Special rules
alphanum-name	A...Z 0...9 \$, #, @	
cat-id	A...Z 0...9	Not more than 4 characters; must not begin with the string PUB
command-rest	freely selectable	
composed-name	A...Z 0...9 \$, #, @ hyphen period catalog ID	Alphanumeric string that can be split into multiple substrings by means of a period or hyphen. If a file name can also be specified, the string may begin with a catalog ID in the form :cat: (see data type filename).
c-string	EBCDIC character	Must be enclosed within single quotes; the letter C may be prefixed; any single quotes occurring within the string must be entered twice.
date	0...9 Structure identifier: hyphen	Input format: yyyy-mm-dd yyyy: year; optionally 2 or 4 digits mm: month dd: day
device	A...Z 0...9 hyphen	Character string, max. 8 characters in length, corresponding to a device available in the system. In interactive prompting, SDF displays the valid operand values. For notes on possible devices, see the relevant operand description.
fixed	+, - 0...9 period	Input format: [sign][digits].[digits] [sign]: + or - [digits]: 0...9 must contain at least one digit, but may contain up to 10 characters (0...9, period) apart from the sign.

Table 10: Data types (part 1 of 6)

Data type	Character set	Special rules
filename	A...Z 0...9 \$, #, @ hyphen period	<p>Input format:</p> $[:cat:][\$user.] \left\{ \begin{array}{l} \text{file} \\ \text{file(no)} \\ \text{group} \\ \text{group} \left\{ \begin{array}{l} (*abs) \\ (+rel) \\ (-rel) \end{array} \right\} \end{array} \right\}$ <p>:cat: optional entry of the catalog identifier; character set limited to A...Z and 0...9; maximum of 4 characters; must be enclosed in colons; default value is the catalog identifier assigned to the user ID, as specified in the user catalog.</p> <p>\$user. optional entry of the user ID; character set is A...Z, 0...9, \$, #, @; maximum of 8 characters; first character cannot be a digit; \$ and period are mandatory; default value is the user's own ID.</p> <p>\$. (special case) system default ID</p> <p>file file or job variable name; may be split into a number of partial names using a period as a delimiter: name₁[.name₂[...]] name_i does not contain a period and must not begin or end with a hyphen; file can have a max. length of 41 characters; it must not begin with a \$ and must include at least one character from the range A...Z.</p>

Table 10: Data types (part 2 of 6)

Data type	Character set	Special rules
filename (continued)		<p>#file (special case) @file (special case) # or @ used as the first character indicates temporary files or job variables, depending on the system parameter.</p> <p>file(no) tape file name no: version number; character set is A...Z, 0...9, \$, #, @. Parentheses must be specified.</p> <p>group name of a file generation group (character set: as for "file")</p> <p>group { (*abs) (+rel) (-rel) }</p> <p>(*abs) absolute generation number (1-9999); * and parentheses must be specified.</p> <p>(+rel) (-rel) relative generation number (0-99); sign and parentheses must be specified.</p>
integer	0...9, +, -	+ or -, if specified, must be the first character.
name	A...Z 0...9 \$, #, @	Must not begin with 0...9.

Table 10: Data types (part 3 of 6)

Data type	Character set	Special rules
partial-filename	A...Z 0...9 \$, #, @ hyphen period	<p>Input format: [:cat:][\$user.][partname.]</p> <p>:cat: see filename \$user. see filename</p> <p>partname optional entry of the initial part of a name common to a number of files or file generation groups in the form: name₁. [name₂. [...]] name_i (see filename). The final character of "partname" must be a period. At least one of the parts :cat:, \$user. or partname must be specified.</p>
posix-filename	A...Z 0...9 special characters	<p>String with a length of up to 255 characters; consists of either one or two periods or of alphanumeric characters and special characters. The special characters must be escaped with a preceding \ (backslash); the / is not allowed. Must be enclosed within single quotes if alternative data types are permitted, separators are used, or the first character is a ? or ! A distinction is made between uppercase and lowercase.</p>
posix-pathname	A...Z 0...9 special characters structure identifier: slash	<p>Input format: [/]part₁/.../part_n where part_i is a posix-filename; max. 1023 characters; must be enclosed within single quotes if alternative data types are permitted, separators are used, or the first character is a ? or !</p>

Table 10: Data types (part 4 of 6)

Data type	Character set	Special rules
product-version	A...Z 0...9 period single quote	Input format: $[[C]'][V][n].nann[']$ <div style="margin-left: 200px;"> $\begin{array}{c} \\ \text{correction status} \\ \text{release status} \end{array}$ </div> <p>where n is a digit and a is a letter. Whether the release and/or correction status may/must be specified depends on the suffixes to the data type (see suffixes without-corr, without-man, mandatory-man and mandatory-corr in Table 11). product-version may be enclosed within single quotes (possibly with a preceding C). The specification of the version may begin with the letter V.</p>
structured-name	A...Z 0...9 \$, #, @ hyphen	Alphanumeric string which may comprise a number of substrings separated by a hyphen. First character: A...Z or \$, #, @
text	freely selectable	For the input format, see the relevant operand descriptions.
time	0...9 structure identifier: colon	Time-of-day entry: Input format: $\left. \begin{array}{l} hh:mm:ss \\ hh:mm \\ hh \end{array} \right\}$ hh: hours mm: minutes ss: seconds $\left. \right\}$ Leading zeros may be omitted
vsn	a) A...Z 0...9 b) A...Z 0...9 \$, #, @	a) Input format: pvsid.sequence-no max. 6 characters pvsid: 2-4 characters; PUB must not be entered sequence-no: 1-3 characters b) Max. 6 characters; PUB may be prefixed, but must not be followed by \$, # or @.

Table 10: Data types (part 5 of 6)

Data type	Character set	Special rules
x-string	Hexadecimal: 00...FF	Must be enclosed in single quotes; must be prefixed by the letter X. There may be an odd number of characters.
x-text	Hexadecimal: 00...FF	Must not be enclosed in single quotes; the letter X must not be prefixed. There may be an odd number of characters.

Table 10: Data types (part 6 of 6)

Suffixes for data types

Suffix	Meaning								
<i>x..y unit</i>	<p>a) with data type integer: interval specification</p> <p><i>x</i> minimum value permitted for “integer”. <i>x</i> is an (optionally signed) integer.</p> <p><i>y</i> maximum value permitted for “integer”. <i>y</i> is an (optionally signed) integer.</p> <p><i>unit</i> with “integer” only: additional units. The following units may be specified:</p> <table style="margin-left: 40px;"> <tr> <td><i>days</i></td> <td><i>byte</i></td> </tr> <tr> <td><i>hours</i></td> <td><i>2Kbyte</i></td> </tr> <tr> <td><i>minutes</i></td> <td><i>4Kbyte</i></td> </tr> <tr> <td><i>seconds</i></td> <td><i>Mbyte</i></td> </tr> </table> <p>b) with the other data types: length specification</p> <p><i>x</i> minimum length for the operand value; <i>x</i> is an integer.</p> <p><i>y</i> maximum length for the operand value; <i>y</i> is an integer.</p> <p><i>x=y</i> the length of the operand value must be precisely <i>x</i>. Exception: for data types <i>catid</i>, <i>date</i>, <i>device</i>, <i>product-version</i>, <i>time</i> and <i>vs</i>n the length specification is not displayed.</p>	<i>days</i>	<i>byte</i>	<i>hours</i>	<i>2Kbyte</i>	<i>minutes</i>	<i>4Kbyte</i>	<i>seconds</i>	<i>Mbyte</i>
<i>days</i>	<i>byte</i>								
<i>hours</i>	<i>2Kbyte</i>								
<i>minutes</i>	<i>4Kbyte</i>								
<i>seconds</i>	<i>Mbyte</i>								
with	Extends the specification options for a data type.								
-compl	When specifying the data type “date”, SDF expands two-digit year specifications in the form <i>yy-mm-dd</i> to:								
	<i>20yy-mm-dd</i> if <i>yy</i> < 60								
	<i>19yy-mm-dd</i> if <i>yy</i> ≥ 60								
-low	Uppercase and lowercase letters are differentiated.								
-path-compl	For specifications for the data type “filename”, SDF adds the catalog and/or user ID if these have not been specified.								
-under	Permits underscores “_” for the data type “name”.								

Table 11: Data type suffixes (part 1 of 7)

Suffix	Meaning												
with (contd.) -wild(n)	<p>Parts of names may be replaced by the following wildcards. n denotes the maximum input length when using wildcards. Due to the introduction of the data types posix-filename and posix-pathname, SDF now accepts wildcards from the UNIX world (referred to below as POSIX wildcards) in addition to the usual BS2000 wildcards. However, as not all commands support POSIX wildcards, their use for data types other than posix-filename and posix-pathname can lead to semantic errors. Only POSIX wildcards or only BS2000 wildcards should be used within a search pattern. Only POSIX wildcards are allowed for the data types posix-filename and posix-pathname. If a pattern can be matched more than once in a string, the first match is used.</p> <table border="1"> <thead> <tr> <th>BS2000 wildcards</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>*</td> <td>Replaces an arbitrary (even empty) character string. If the string concerned starts with *, then the * must be entered twice in succession if it is followed by other characters and if the character string entered does not contain at least one other wildcard.</td> </tr> <tr> <td>Terminating period</td> <td>Partially-qualified entry of a name. Corresponds implicitly to the string “.*”, i.e. at least one other character follows the period.</td> </tr> <tr> <td>/</td> <td>Replaces any single character.</td> </tr> <tr> <td><s_x:s_y></td> <td> Replaces a string that meets the following conditions: <ul style="list-style-type: none"> – It is at least as long as the shortest string (s_x or s_y) – It is not longer than the longest string (s_x or s_y) – It lies between s_x and s_y in the alphabetic collating sequence; numbers are sorted after letters (A...Z 0...9) – s_x can also be an empty string (which is in the first position in the alphabetic collating sequence) – s_y can also be an empty string, which in this position stands for the string with the highest possible code (contains only the characters X'FF') </td> </tr> <tr> <td><s₁,...></td> <td>Replaces all strings that match any of the character combinations specified by s. s may also be an empty string. Any such string may also be a range specification “s_x:s_y” (see above).</td> </tr> </tbody> </table>	BS2000 wildcards	Meaning	*	Replaces an arbitrary (even empty) character string. If the string concerned starts with *, then the * must be entered twice in succession if it is followed by other characters and if the character string entered does not contain at least one other wildcard.	Terminating period	Partially-qualified entry of a name. Corresponds implicitly to the string “.*”, i.e. at least one other character follows the period.	/	Replaces any single character.	<s _x :s _y >	Replaces a string that meets the following conditions: <ul style="list-style-type: none"> – It is at least as long as the shortest string (s_x or s_y) – It is not longer than the longest string (s_x or s_y) – It lies between s_x and s_y in the alphabetic collating sequence; numbers are sorted after letters (A...Z 0...9) – s_x can also be an empty string (which is in the first position in the alphabetic collating sequence) – s_y can also be an empty string, which in this position stands for the string with the highest possible code (contains only the characters X'FF') 	<s ₁ ,...>	Replaces all strings that match any of the character combinations specified by s. s may also be an empty string. Any such string may also be a range specification “s _x :s _y ” (see above).
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<s ₁ ,...>	Replaces all strings that match any of the character combinations specified by s. s may also be an empty string. Any such string may also be a range specification “s _x :s _y ” (see above).												

Table 11: Data type suffixes (part 2 of 7)

Suffix	Meaning														
with-wild(n) (continued)	<p><s₁,...> Replaces all strings that match any of the character combinations specified by s. s may also be an empty string. Any such string may also be a range specification "s_x:s_y" (see above).</p> <p>-s Replaces all strings that do not match the specified string s. The minus sign may only appear at the beginning of string s. Within the data types filename or partial-filename the negated string -s can be used exactly once, i.e. -s can replace one of the three name components: cat, user or file.</p> <p>Wildcards are not permitted in generation and version specifications for file names. Only the system administration may use wildcards in user IDs. Wildcards cannot be used to replace the delimiters in name components cat (colon) and user (\$ and period).</p> <table border="1"> <thead> <tr> <th>POSIX wildcards</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>*</td> <td>Replaces any single string (including an empty string). An * appearing at the first position must be duplicated if it is followed by other characters and if the entered string does not include at least one further wildcard.</td> </tr> <tr> <td>?</td> <td>Replaces any single character; not permitted as the first character outside single quotes.</td> </tr> <tr> <td>[c_x-c_y]</td> <td>Replaces any single character from the range defined by c_x and c_y, including the limits of the range. c_x and c_y must be normal characters.</td> </tr> <tr> <td>[s]</td> <td>Replaces exactly one character from string s. The expressions [c_x-c_y] and [s] can be combined into [s₁c_x-c_ys₂]</td> </tr> <tr> <td>[!c_x-c_y]</td> <td>Replaces exactly one character not in the range defined by c_x and c_y, including the limits of the range. c_x and c_y must be normal characters. The expressions [!c_x-c_y] and [!s] can be combined into [!s₁c_x-c_ys₂]</td> </tr> <tr> <td>[!s]</td> <td>Replaces exactly one character not contained in string s. The expressions [!s] and [!c_x-c_y] can be combined into [!s₁c_x-c_ys₂]</td> </tr> </tbody> </table>	POSIX wildcards	Meaning	*	Replaces any single string (including an empty string). An * appearing at the first position must be duplicated if it is followed by other characters and if the entered string does not include at least one further wildcard.	?	Replaces any single character; not permitted as the first character outside single quotes.	[c _x -c _y]	Replaces any single character from the range defined by c _x and c _y , including the limits of the range. c _x and c _y must be normal characters.	[s]	Replaces exactly one character from string s. The expressions [c _x -c _y] and [s] can be combined into [s ₁ c _x -c _y s ₂]	[!c _x -c _y]	Replaces exactly one character not in the range defined by c _x and c _y , including the limits of the range. c _x and c _y must be normal characters. The expressions [!c _x -c _y] and [!s] can be combined into [!s ₁ c _x -c _y s ₂]	[!s]	Replaces exactly one character not contained in string s. The expressions [!s] and [!c _x -c _y] can be combined into [!s ₁ c _x -c _y s ₂]
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[s]	Replaces exactly one character from string s. The expressions [c _x -c _y] and [s] can be combined into [s ₁ c _x -c _y s ₂]														
[!c _x -c _y]	Replaces exactly one character not in the range defined by c _x and c _y , including the limits of the range. c _x and c _y must be normal characters. The expressions [!c _x -c _y] and [!s] can be combined into [!s ₁ c _x -c _y s ₂]														
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Table 11: Data type suffixes (part 3 of 7)

Suffix	Meaning										
with (contd.)											
-wild-constr(n)	<p>Specification of a constructor (string) that defines how new names are to be constructed from a previously specified selector (i.e. a selection string with wildcards). See also with-wild. n denotes the maximum input length when using wildcards.</p> <p>The constructor may consist of constant strings and patterns. A pattern (character) is replaced by the string that was selected by the corresponding pattern in the selector.</p> <p>The following wildcards may be used in constructors:</p> <table border="1"> <thead> <tr> <th>Wildcard</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>*</td> <td>Corresponds to the string selected by the wildcard * in the selector.</td> </tr> <tr> <td>Terminating period</td> <td>Corresponds to the partially-qualified specification of a name in the selector; corresponds to the string selected by the terminating period in the selector.</td> </tr> <tr> <td>/ or ?</td> <td>Corresponds to the character selected by the / or ? wildcard in the selector.</td> </tr> <tr> <td><n></td> <td>Corresponds to the string selected by the n-th wildcard in the selector, where n is an integer.</td> </tr> </tbody> </table>	Wildcard	Meaning	*	Corresponds to the string selected by the wildcard * in the selector.	Terminating period	Corresponds to the partially-qualified specification of a name in the selector; corresponds to the string selected by the terminating period in the selector.	/ or ?	Corresponds to the character selected by the / or ? wildcard in the selector.	<n>	Corresponds to the string selected by the n-th wildcard in the selector, where n is an integer.
Wildcard	Meaning										
*	Corresponds to the string selected by the wildcard * in the selector.										
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/ or ?	Corresponds to the character selected by the / or ? wildcard in the selector.										
<n>	Corresponds to the string selected by the n-th wildcard in the selector, where n is an integer.										
	<p>Allocation of wildcards to corresponding wildcards in the selector: All wildcards in the selector are numbered from left to right in ascending order (global index). Identical wildcards in the selector are additionally numbered from left to right in ascending order (wildcard-specific index). Wildcards can be specified in the constructor by one of two mutually exclusive methods:</p> <ol style="list-style-type: none"> 1. Wildcards can be specified via the global index: <n> 2. The same wildcard may be specified as in the selector; substitution occurs on the basis of the wildcard-specific index. For example: the second “/” corresponds to the string selected by the second “/” in the selector 										

Table 11: Data type suffixes (part 4 of 7)

Suffix	Meaning
with-wild-constr (continued)	<p>The following rules must be observed when specifying a constructor:</p> <ul style="list-style-type: none"> – The constructor must include at least one wildcard of the selector. – If the number of identical wildcards exceeds those in the selector, the index notation must be used. – If the string selected by the wildcard <...> or [...] is to be used in the constructor, the index notation must be selected. – The index notation must be selected if the string identified by the wildcard “*” is to be duplicated. For example: “<n><n>” must be specified instead of “**”. – The wildcard * can also be an empty string. Note that if multiple asterisks appear in sequence (even with further wildcards), only the last asterisk can be a non-empty string, e.g. for “*****” or “**//*”. – Valid names must be produced by the constructor. This must be taken into account when specifying both the constructor and the selector. – Depending on the constructor, identical names may be constructed from different names selected by the selector. For example: “A/*” selects the names “A1” and “A2”; the constructor “B*” generates the same new name “B” in both cases. To prevent this from occurring, all wildcards of the selector should be used at least once in the constructor. – If the selector ends with a period, the constructor must also end with a period (and vice versa).

Table 11: Data type suffixes (part 5 of 7)

Suffix	Meaning																				
with-wild-constr (continued)	Examples:																				
	<table border="1"> <thead> <tr> <th>Selector</th> <th>Selection</th> <th>Constructor</th> <th>New name</th> </tr> </thead> <tbody> <tr> <td>A/*</td> <td>AB1 AB2 A.B.C</td> <td>D<3><2></td> <td>D1 D2 D.CB</td> </tr> <tr> <td>C.<A:C>/<D,F></td> <td>C.AAD C.ABD C.BAF C.BBF</td> <td>G.<1>.<3>.XY<2></td> <td>G.A.D.XYA G.A.D.XYB G.B.F.XYA G.B.F.XYB</td> </tr> <tr> <td>C.<A:C>/<D,F></td> <td>C.AAD C.ABD C.BAF C.BBF</td> <td>G.<1>.<2>.XY<2></td> <td>G.A.A.XYA G.A.B.XYB G.B.A.XYA G.B.B.XYB</td> </tr> <tr> <td>A/B</td> <td>ACDB ACEB AC.B A.CB</td> <td>G/XY/</td> <td>GCXYD GCXYE GCXY. G.XYC</td> </tr> </tbody> </table>	Selector	Selection	Constructor	New name	A/*	AB1 AB2 A.B.C	D<3><2>	D1 D2 D.CB	C.<A:C>/<D,F>	C.AAD C.ABD C.BAF C.BBF	G.<1>.<3>.XY<2>	G.A.D.XYA G.A.D.XYB G.B.F.XYA G.B.F.XYB	C.<A:C>/<D,F>	C.AAD C.ABD C.BAF C.BBF	G.<1>.<2>.XY<2>	G.A.A.XYA G.A.B.XYB G.B.A.XYA G.B.B.XYB	A/B	ACDB ACEB AC.B A.CB	G/XY/	GCXYD GCXYE GCXY. G.XYC
	Selector	Selection	Constructor	New name																	
	A/*	AB1 AB2 A.B.C	D<3><2>	D1 D2 D.CB																	
	C.<A:C>/<D,F>	C.AAD C.ABD C.BAF C.BBF	G.<1>.<3>.XY<2>	G.A.D.XYA G.A.D.XYB G.B.F.XYA G.B.F.XYB																	
C.<A:C>/<D,F>	C.AAD C.ABD C.BAF C.BBF	G.<1>.<2>.XY<2>	G.A.A.XYA G.A.B.XYB G.B.A.XYA G.B.B.XYB																		
A/B	ACDB ACEB AC.B A.CB	G/XY/	GCXYD GCXYE GCXY. G.XYC																		
1) The period at the end of the name may violate naming conventions (e.g. for fully-qualified file names).																					
without	Restricts the specification options for a data type.																				
-cat	Specification of a catalog ID is not permitted.																				
-corr	Input format: [[C]'][V][n]n.na[] Specifications for the data type product-version must not include the correction status.																				
-gen	Specification of a file generation or file generation group is not permitted.																				
-man	Input format: [[C]'][V][n]n.n[] Specifications for the data type product-version must not include either release or correction status.																				
-odd	The data type x-text permits only an even number of characters.																				
-sep	With the data type "text", specification of the following separators is not permitted: ; = () < > ? (i.e. semicolon, equals sign, left and right parentheses, greater than, less than, and blank).																				
-temp-file	Specification of a temporary file is not permitted (see #file or @file under filename).																				

Table 11: Data type suffixes (part 6 of 7)

Suffix	Meaning
without (contd.) -user -vers	Specification of a user ID is not permitted. Specification of the version (see “file(no)”) is not permitted for tape files.
-wild	The file types posix-filename and posix-pathname must not contain a pattern (character).
mandatory -corr -man -quotes	Certain specifications are necessary for a data type. Input format: [[C]'][V][n].nann[] Specifications for the data type product-version must include the correction status and therefore also the release status. Input format: [[C]'][V][n].na[nn][] Specifications for the data type product-version must include the release status. Specification of the correction status is optional if this is not prohibited by the use of the suffix without-corr. Specifications for the data types posix-filename and posix-pathname must be enclosed in single quotes.

Table 11: Data type suffixes (part 7 of 7)

10.2 ISP syntax description

Format description

The statements issued to SM2 by nonprivileged users comprise the statement names and, in some statements, additional operands. The statement names and operands must be separated by at least one blank. Depending on the statement concerned, either positional or keyword operands can be used. Keyword operands can be entered in any order. If a statement only contains keyword operands, the comma shown in front of the first operand in the syntax is omitted. In the statement descriptions, certain metacharacters are used. These are described in the table below:

Format notation	Meaning	Example
UPPERCASE	Uppercase letters indicate constants which must be entered by the user in precisely this form.	NAME=
lowercase	Lowercase letters indicate variables for which the user must substitute appropriate values upon input, i.e. their contents can vary from case to case.	NAME=filename
{ }	Braces are used to indicate alternatives, i.e. one entry can or must be selected from the enclosed values.	$\left\{ \begin{array}{l} \text{TERMINAL} \\ \text{TER} \end{array} \right\}$
[]	Square brackets indicate that the enclosed entries are optional, i.e. may be omitted. (Parentheses must be entered.)	$[,STATS=\left\{ \begin{array}{l} \text{ON} \\ \text{OFF} \end{array} \right\}]$
<u>Underscoring</u>	Underscoring (underlining) indicates the default value, i.e. the value used by the system when none has been explicitly specified.	$DISP=\left\{ \begin{array}{l} \underline{\text{ON}} \\ \underline{\text{OFF}} \\ \text{NO} \end{array} \right\}$
...	Dots indicate repetition, i.e. the preceding syntactical unit may be repeated several times in succession.	$\left[\left\{ \begin{array}{l} + \\ - \end{array} \right\} \text{chn-no} \right] \dots$

Length of the statements

A statement issued to SM2 can extend over more than one line. Continuation lines must be indicated as such by means of a hyphen (continuation character).

When statements are entered via a data display terminal, the continuation character must be the last character in the line, i.e. the character immediately preceding the ETX character. When SM2 recognizes a continuation character during interactive data input, it requests the next input line using the ENTER command.

When statements are entered from a file, the continuation character must be in column 72 of the input line. Characters in column 73 and beyond are ignored in all lines.

The maximum permissible length of an input line is 256 characters. The maximum permissible length of a statement is 512 characters, a string of blanks being counted as a single blank. SM2 acknowledges the entry of a line or statement that is too long with the message LINE TRUNCATED or COMMAND OVERLENGTH.

10.3 Overview of SM2 statements

The overview is split up in the same way as the descriptions of the statements, separating the statements for the SM2 administrator and those for the nonprivileged user.

Overview of statements for the SM2 administrator

ADD-BCAM-CONNECTION-SET -

Add connection set for BCAM-CONNECTION monitoring

```

SET-NAME = <alphanum-name 1..16>
,CONNECTION-SELECTION = *BY-NEA-NAME(...) / *BY-PORT-NUMBER(...)
  *BY-NEA-NAME(...)
    |
    | CONNECTION-NAME = list-poss(16): *SPECIFIED(...)
    |   *SPECIFIED(...)
    |     LOCAL-APPLICATION = *ANY / <alphanum-name 1..16 with wild>
    |     ,PARTNER-APPLICATION = *ANY / <alphanum-name 1..16 with wild>
  *BY-PORT-NUMBER(...)
    |
    | PORT-NUMBER = list-poss(16): *SPECIFIED(...)
    |   *SPECIFIED(...)
    |     LOCAL-PORT-NUMBER = *ANY / <integer 1..65535>
    |     ,PARTNER-PORT-NUMBER = *ANY / <integer 1..65535>
,CONNECTION-TYPE = *REMOTE / *LOCAL / *BOTH
,HOST-SELECTION = *ANY / *SPECIFIED(...)
  *SPECIFIED(...)
    |
    | LOCAL-HOST-NAME = *LOCAL / <alphanum-name 1..8 with-wild>
    | ,PARTNER-HOST-NAME = *ANY / <alphanum-name 1..8 with-wild>

```


ADD-CONNECTION-SET - Add connection set for RESPONSETIME monitoring

```

SET-NAME = <alphanum-name 1..16>
,SET-DEFINITION = *BY-CONNECTION / *EXCEPT-CONNECTION
,CONNECTION-SET = list-poss(5): *CONNECTION(...)
  *CONNECTION(...)
    APPLICATION = *ALL / <alphanum-name 1..8 with-wild>
    ,PARTNER = *ALL / <alphanum-name 1..8 with-wild>
    ,PROCESSOR = *ALL / <alphanum-name 1..8 with-wild>
,CONNECTION-TYPE = *REMOTE / *LOCAL / *BOTH

```

ADD-COSMOS-EVENT - Define events for monitored data acquisition

```

EVENT-NAME = *STANDARD-EVENTS / list-poss(67): *STANDARD-EVENTS / *ACF / *BCAM / *BCPT /
  *BLS / *BOUR / *CHTM / *CMD / *CMS / *DAB / *DCAM / *DLM / *EIA / *EIA2 / *EIA3 /
  *FITC / *GSAC / *HAL / *IDLE / *INTR / *IONQ / *ISEV / *ISPL / *KAI / *LOCK / *MSG / *NSM / *PAGE /
  *PAM / *PCCC / *PCTC / *PDEA / *PEND / *PIO / *PMIO / *PRGS / *PRGT / *PRTY / *RELM /
  *REQM / *SDV / *SLOT / *SNAP / *STD1 / *STDI / *STDN / *SVC / *TGMA / *TGMP / *TGMT /
  *TIC / *TINF / *TLM / *TLT / *TSKI / *TSVC / *UTM / *VMCH / *VMH / *VMI / *VMLK / *VMPD /
  *VMPR / *VMS / *VM2 / *WSCT / *XEIA

```

ADD-FILE - Define file to be monitored

```

FILE-NAME = <filename 1..54>

```

ADD-ISAM-POOL - Define ISAM pool to be monitored

```

POOL-NAME = <alphanum-name 1..8>
,SCOPE = *HOST-SYSTEM / *TASK(...) / *USER(...)
  *TASK(...)
    | TSN = <alphanum-name 1..4>
  *USER(...)
    | USER-ID = <alphanum-name 1..8>
,CAT-ID = *HOME-PVS / <catid 1..4>

```

CALL-ADMINISTRATION-PART - Switch from evaluation part to administration facility**CALL-EVALUATION-PART - Switch from administration facility to evaluation part****CHANGE-MEASUREMENT-PROGRAM - Stop current monitoring program run and restart it with new monitored objects/monitoring parameters**

```

TYPE = list-poss(12): *BCAM-CONNECTION / *CHANNEL-IO / *COSMOS / *DISK / *DISK-FILE / *FILE /
  *ISAM / *PERIODIC-TASK / *RESPONSETIME / *SERVICETIME / *SYSSTAT / *TASK

```

CLOSE-LOG-FILE - Close SM2 output file

END - Terminate SM2 run

INITIATE-COSMOS - Prepare COSMOS monitoring program

MODIFY-ADMINISTRATOR-ADMISSION - Admit additional SM2 administrators

CONCURRENCY = *NO / *YES

(part 1 of 2)

MODIFY-COSMOS-PARAMETER - Modify parameters for COSMOS monitoring

```
TITLE = *UNCHANGED / <c-string 1..80>
,BUFFER-SIZE = *UNCHANGED / <integer 1..7>
,NUMBER-OF-BUFFERS = *UNCHANGED / <integer 2..128>
,ADDITIONAL-INFO = *UNCHANGED / *NONE / list-poss(2): *CONFIGURATION / *VM2000(...)
  *VM2000(...)
    | FILE-NAME = <filename 1..54 without-gen-vers>
,OUTPUT = *UNCHANGED / *DISK(...) / *WRAP-AROUND(...) / *TAPE(...) / *STREAM-TAPE(...)
  *DISK(...)
    | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
  *WRAP-AROUND(...)
    | FILE-NAME = <filename 1..54 without-gen-vers>
  *TAPE(...)
    | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
```

Continued ➔

```

*STREAM-TAPE(...)
  | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
,TASK-SELECTION = *UNCHANGED / *ALL / *SPECIFIED(...)
  *SPECIFIED(...)
    | ,JOB-NAME = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
    | ,CATEGORY = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..7 with-wild>
    | ,USER-ID = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
    | TSN = *NOT-SPECIFIED / list-poss(16): <alphanum-name 1..4 with-wild>
    | ,TYPE = *NOT-SPECIFIED / list-poss(4): *SYSTEM / *DIALOG / *BATCH / *TP
,EVENT-SELECTION = *UNCHANGED / *ALL-BY-ADD-COSMOS-EVENT / *SPECIFIED(...)
  *SPECIFIED(...)
    | EIA-INTERRUPT-CLASS = *UNCHANGED / *ANY / list-poss(5): *SVC / *PROGRAM /
    |                               *MACHINE-CHECK / *IO / *EXTERNAL
    | ,EIA-SVC-NUMBER = *UNCHANGED / *ANY / list-poss(8): <integer 1..255>
    | ,IO-DEVICE = *UNCHANGED / *ANY / list-poss(8): <alphanum-name 2..4>
    | ,DAB-CACHE-ID = *UNCHANGED / *ANY / list-poss(8): <alphanum-name 1..32>
    | ,MEMORY-CLASS = *UNCHANGED / *ANY / list-poss(4): *3 / *4 / *5 / *6
    | ,SLOT-MEMORY-CLASS = *UNCHANGED / *ANY / list-poss(4): *3 / *4 / *5 / *6
    | ,PEND-CODE = *UNCHANGED / *ANY / list-poss(16): <integer 1..22>
    | ,LOCK-ID = *UNCHANGED / *ANY / list-poss(4): <alphanum-name 1..2>
    | ,TLT-DESCRIPTOR = *UNCHANGED / *ANY / list-poss(8): <alphanum-name 1..3>
    | ,TSKI-SWITCH = *UNCHANGED / *ANY / *TASK
    | ,TSVC-SVC-NUMBER = *UNCHANGED / *ANY / list-poss(8): <integer 1..255>
,UNLOAD = *UNCHANGED / *AT-MEASUREMENT-PROGRAM-STOP / *AT-SM2-STOP
,MEASUREMENT-TIME = *UNCHANGED / *NOT-SPECIFIED / <integer 1..60>

```

MODIFY-MEASUREMENT-PERIODS - Modify SM2 monitoring cycle

```

OFFLINE-PERIOD = *UNCHANGED / <integer 10..3600>
,ONLINE-PERIOD = *UNCHANGED / *SAME-AS-OFFLINE / <integer 10..3600>
,SAMPLING-PERIOD = *UNCHANGED / <integer 200..10000>

```

**MODIFY-RESPONSETIME-PARAMETER -
Modify parameters for RESPONSETIME monitoring**

```

SCOPE = *UNCHANGED / list-poss(2): *BUCKET / *CATEGORY
,DEFINITION = *UNCHANGED / *1 / *2
,CONNECTION-NUMBER = *UNCHANGED / <integer 1..8187>
,RESPONSETIME-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
,THINKTIME-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
,TRANSACTION-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>
,WAITTIME-BUCKETS = *UNCHANGED / *STD-LIMITS / list-poss(5): <integer 1..99999>

```

MODIFY-USER-ADMISSION - Define authorizations for nonprivileged users

```

TASK = *UNCHANGED / *ALLOW(...) / *INHIBIT
    *ALLOW(...)
        | USER-ID = *ALL / list-poss(16): <alphanum-name 1..8>
,FILE = *UNCHANGED / *ALLOW(...) / *INHIBIT
    *ALLOW(...)
        | USER-ID = *ALL / list-poss(16): <alphanum-name 1..8>
,ISAM = *UNCHANGED / *ALLOW(...) / *INHIBIT
    *ALLOW(...)
        | USER-ID = *ALL / list-poss(16): <alphanum-name 1..8>

```

OPEN-LOG-FILE - Open SM2 output file

FILE = *STD / *BY-LINK-NAME
 ,BUFFER-OUTPUT = *NORMAL / *IMMEDIATE

REMOVE-BCAM-CONNECTION-SET -

Exclude connection set from BCAM-CONNECTION monitoring

SET-NAME = *ALL / <alphanum-name 1..16>

REMOVE-CONNECTION-SET -

Exclude connection set from RESPONSETIME monitoring

SET-NAME = *ALL / <alphanum-name 1..16>

REMOVE-COSMOS-EVENT -

Remove events from COSMOS monitoring parameters

EVENT-NAME = *STANDARD-EVENTS / *ALL / list-poss(67): *STANDARD-EVENTS / *ACF / *BCAM /
 *BCPT / *BLS / *BOUR / *CHTM / *CMD / *CMS / *DAB / *DCAM / *DLM / *EIA / *EIA2 /
 *EIA3 / *FITC / *GSAC / *HAL / *IDLE / *INTR / *IONQ / *ISEV / *ISPL / *KAI / *LOCK / *MSG / *NSM /
 *PAGE / *PAM / *PCCC / *PCTC / *PDEA / *PEND / *PIO / *PMIO / *PRGS / *PRGT /
 *PRTY / *RELM / *REQM / *SDV / *SLOT / *SNAP / *STD1 / *STDI / *STDN / *SVC /
 *TGMA / *TGMP / *TGMT / *TIC / *TINF / *TLM / *TLT / *TSKI / *TSVC / *UTM / *VMCH / *VMH /
 *VMI / *VMLK / *VMPD / *VMPR / *VMS / *VM2 / *WSCT / *XEIA

REMOVE-FILE - Remove file(s) from FILE monitoring parameters

FILE-NAME = *ALL / <filename 1..54>

REMOVE-ISAM-POOL- Remove ISAM pool(s) from ISAM monitoring parameters

```

POOL-NAME = *ALL / <alphanum-name 1..8>
,SCOPE = *ANY / *HOST-SYSTEM / *TASK(...) / *USER(...)
    *TASK(...)
        |   TSN = <alphanum-name 1..4>
    *USER(...)
        |   USER-ID = <alphanum-name 1..8>
,CAT-ID = *ANY / *HOME-PVS / <catid 1..4>

```

SELECT-HOSTS - Define hosts for SM2 statements and screen output

```

HOST-NAME = *ALL / *LOCAL / list-poss(16): <alphanum-name 1..8>
,PARTNER-TYPE = *XCS / *CCS

```

SET-BCAM-CONNECTION-PARAMETER - Define BCAM-CONNECTION monitoring parameters

```

INWAIT-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
,REACT-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
,INPROC-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>
,OUTPROC-BUCKETS = *STD-LIMITS / *UNCHANGED / list-poss(4):<integer 1..999999>

```

SET-CHANNEL-IO-PARAMETER - Define CHANNEL-IO monitoring parameters

```

CHANNELS = *ALL / list-poss(64): <x-string 1..4>

```

(part 1 of 2)

SET-COSMOS-PARAMETER - Define COSMOS monitoring parameters

```

TITLE = C 'COSMOS' / <c-string 1..80>
,BUFFER-SIZE = 2 / <integer 1..7>
,NUMBER-OF-BUFFERS = 2 / <integer 2..128>
,ADDITIONAL-INFO = *CONFIGURATION / *NONE / list-poss(2): *CONFIGURATION / *VM2000(...)
    *VM2000(...)
        | FILE-NAME = <filename 1..54 without-gen-vers>
,OUTPUT = *DISK (...) / *WRAP-AROUND(...) / *TAPE(...) / *STREAM-TAPE(...)
    *DISK(...)
        | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
    *WRAP-AROUND(...)
        | FILE-NAME = <filename 1..54 without-gen-vers>
    *TAPE(...)
        | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
    *STREAM-TAPE(...)
        | FILE-NAME = list-poss(16): <filename 1..54 without-gen-vers>
,TASK-SELECTION = *ALL / *SPECIFIED(...)
    *SPECIFIED(...)
        | JOB-NAME = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
        | ,CATEGORY = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..7 with-wild>
        | ,USER-ID = *NOT-SPECIFIED / list-poss(8): <alphanum-name 1..8 with-wild>
        | ,TSN = *NOT-SPECIFIED / list-poss(16): <alphanum-name 1..4 with-wild>
        | ,TYPE = *NOT-SPECIFIED / list-poss(4): *SYSTEM / *BATCH / *DIALOG / *TP

```

Continued ➔


```

,EVENT-SELECTION = *ALL-BY-ADD-COSMOS-EVENT / *SPECIFIED(...)
    *SPECIFIED(...)
        EIA-INTERRUPT-CLASS = *ANY / list-poss(5): *SVC / *PROGRAM / *MACHINE-CHECK /
            *IO / *EXTERNAL
        ,EIA-SVC-NUMBER = *ANY / list-poss(8): <integer 1..255>
        ,IO-DEVICE = *ANY / list-poss(8): <alphanum-name 2..4>
        ,DAB-CACHE-ID = *ANY / list-poss(8): <alphanum-name 1..32>
        ,MEMORY-CLASS = *ANY / list-poss(4): *3 / *4 / *5 / *6
        ,SLOT-MEMORY-CLASS = *ANY / list-poss(4): *3 / *4 / *5 / *6
        ,PEND-CODE = *ANY / list-poss(16): <integer 1..22>
        ,LOCK-ID = *ANY / list-poss(4): <alphanum-name 1..2>
        ,TLT-DESCRIPTOR = *ANY / list-poss(8): <alphanum-name 1..3>
        ,TSKI-SWITCH = *ANY / *TASK
        ,TSVC-SVC-NUMBER = *ANY / list-poss(8): <integer 1..255>
,UNLOAD = *AT-MEASUREMENT-PROGRAM-STOP / *AT-SM2-STOP
,MEASUREMENT-TIME = *NOT-SPECIFIED / <integer 1..60>

```

SET-DISK-PARAMETER - Define DISK monitoring parameters

```
DEVICES = list-poss(256): <alphanum-name 2..4 with-wild>
```

SET-DISK-FILE-PARAMETER - Define DISK-FILE monitoring parameters

```
DEVICES = list-poss(8): <alphanum-name 2..4>
```

SET-PERIODIC-TASK-PARAMETER - Define PERIODIC-TASK monitoring parameters

LOG-TASKS = *NONE / *ALL / *SPECIFIED(...)

*SPECIFIED(...)

 | USER-ID = *NOT-SPECIFIED / list-poss(64): <alphanum-name 1..8>

 | ,JOB-NAME = *NOT-SPECIFIED / list-poss(64): <alphanum-name 1..8>

SET-RESPONSETIME-PARAMETER - Define RESPONSETIME monitoring parameters

SCOPE = *BUCKET / list-poss(2): *BUCKET / *CATEGORY

,DEFINITION = *1 / *2

,CONNECTION-NUMBER = 1024 / <integer 1..8187>

,RESPONSETIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>

,THINKTIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>

,TRANSACTION-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>

,WAITTIME-BUCKETS = *STD-LIMITS / list-poss(5): <integer 1..99999>

SET-SERVICETIME-PARAMETER - Define SERVICETIME monitoring parameters

DEVICES = list-poss(256): <alphanum-name 2..4 with-wild>

SET-SYSSTAT-PARAMETER - Define SYSSTAT monitoring parameters

USED-DEVICES = *NONE / *ALL / list-poss(64): *DISK / *TAPE / <alphanum-name 2..4 with-wild>

SET-TASK-PARAMETER - Define TASK monitoring parameters

TASK-SELECTION = *ALL / *SPECIFIED(...)

*SPECIFIED(...)

TSN = *NOT-SPECIFIED / list-poss(64): <alphanum-name 1..4>

,USER-ID = *NOT-SPECIFIED / list-poss(32): <alphanum-name 1..8 with-wild>

,JOB-NAME = *NOT-SPECIFIED / list-poss(32): <alphanum-name 1..8 with-wild>

,JOB-CLASS = *NOT-SPECIFIED / list-poss(32): <alphanum-name 1..8 with-wild>

,TYPE = *NOT-SPECIFIED / list-poss(4): *SYSTEM / *BATCH / *DIALOG / *TP

,DEVICES = *NONE / *ALL / list-poss(64): *DISK / <alphanum-name 2..4 with-wild>

SHOW-ACTIVE-PARAMETER - Output active monitoring parameters

TYPE = *ALL / list-poss(12): *BCAM-CONNECTION / *CHANNEL-IO / *COSMOS / *DISK / *DISK-FILE /
*FILE / *ISAM / *PERIODIC-TASK / *RESPONSETIME / *SERVICETIME / *SYSSTAT / *TASK

SHOW-DEFINED-PARAMETER - Output defined monitoring parameters

TYPE = *ALL / list-poss(12): *BCAM-CONNECTION / *CHANNEL-IO / *COSMOS / *DISK / *DISK-FILE /
*FILE / *ISAM / *PERIODIC-TASK / *RESPONSETIME / *SERVICETIME / *SYSSTAT / *TASK

SHOW-MEASUREMENT-STATUS - Output monitoring status**SHOW-SELECTED-HOSTS - Output selected hosts**

SHOW-SM2-STATUS - Output status of SM2 system tasks

```
INFORMATION = *STD / *TASK / *EVENT-TRACE(...)
*EVENT-TRACE(...)
| FROM = *ACTUAL / <integer 1..32767>
```

SHOW-USER-MEASURED-OBJECTS - Output monitored objects and associated users

```
TYPE = *ALL / list-poss(3): *FILE / *ISAM / *TASK
```

START-MEASUREMENT-PROGRAM - Start monitoring program run

```
TYPE = list-poss(31): *BCAM-CONNECTION / *CHANNEL-IO / *CMS / *COSMOS / *DAB / *DISK /
*DISK-FILE / *DLM / *FILE / *GS / *GSVOL / *HSMS / *ISAM / *MSCF / *NET-DEVICE /
*NSM / *PCA / *PERIODIC-TASK / *PFA / *POSIX / *RESPONSETIME / *SERVICETIME /
*SVC / *SYSSTAT / *TASK / *TCP-IP / *TLM / *UTM / *VM
```

STOP-MEASUREMENT-PROGRAM - Terminate monitoring program run

```
TYPE = *ALL / list-poss(31): *BCAM-CONNECTION / *CHANNEL-IO / *CMS / *COSMOS / *DAB / *DISK /
*DISK-FILE / *DLM / *FILE / *GS / *GSVOL / *HSMS / *ISAM / *MSCF / *NET-DEVICE /
*NSM / *PCA / *PERIODIC-TASK / *PFA / *POSIX / *RESPONSETIME / *SERVICETIME /
*SVC / *SYSSTAT / *TASK / *TCP-IP / *TLM / *UTM / *VM
```

Overview of statements for the nonprivileged user

Switch to system mode

Operation	Operands
BREAK	

Activate and deactivate ISAM pools

Operation	Operands
CHANGE-ISAM-STATISTICS	$\left[\begin{array}{l} \text{ADD-POOL} = \left\{ \begin{array}{l} \text{*NONE} \\ \left[\text{POOL-NAME} = \text{poolname1} \right] \\ \left[\text{SCOPE} = \left\{ \begin{array}{l} \text{*HOST-SYSTEM} \\ \text{*TASK(TSN=tsn)} \\ \text{*USER} \end{array} \right\} \right] \\ \left[\text{CAT-ID} = \left\{ \begin{array}{l} \text{*HOME-PVS} \\ \text{catid} \end{array} \right\} \right] \end{array} \right\} \left[\text{,*POOL()} \dots \right] \end{array} \right. \\ \\ \left. \begin{array}{l} \text{,REMOVE-POOL} = \left\{ \begin{array}{l} \text{*NONE} \\ \left[\text{POOL-NAME} = \text{poolname1} \right] \\ \left[\text{SCOPE} = \left\{ \begin{array}{l} \text{*HOST-SYSTEM} \\ \text{*TASK(TSN=tsn)} \\ \text{*USER} \end{array} \right\} \right] \\ \left[\text{CAT-ID} = \left\{ \begin{array}{l} \text{*HOME-PVS} \\ \text{catid} \end{array} \right\} \right] \\ \text{*OWN} \end{array} \right\} \left[\text{,*POOL()} \dots \right] \end{array} \right. \end{array} \right]$

Select devices with monitored data

Operation	Operands
DEVICE	$\left\{ \begin{array}{l} \text{*DISK} \\ \text{*ALL} \\ \left[\left\{ \begin{array}{l} \text{+} \\ \text{-} \end{array} \right\} \right] \text{dev-name} \end{array} \right\} \left[\left\{ \begin{array}{l} \text{+} \\ \text{-} \end{array} \right\} \right] \text{dev-name}$

Terminate monitoring

Operation	Operands
END	

Monitor files

Operation	Operands
FILE	NAME=filename [{ [,STATS = ON] } { ,STATS = OFF }]

Call user help functions

Operation	Operands
HELP	

Define output mode

Operation	Operands
OUTPUT	$\left\{ \begin{array}{l} \text{TERMINAL} \\ \text{TER} \end{array} \right\} = \left\{ \begin{array}{l} \text{Y[ES]} \\ \text{N[O]} \end{array} \right\}$ $\left[\left\{ \begin{array}{l} \text{HARDCOPY} \\ \text{HC} \end{array} \right\} = \left\{ \begin{array}{l} \text{Y[ES]} \\ \text{N[O]} \end{array} \right\} \right]$ $\left[\left\{ \begin{array}{l} \text{INTERVAL} \\ \text{INT} \end{array} \right\} = \left\{ \begin{array}{l} \text{[number]} \\ \text{C[ONTROLLED]} \end{array} \right\} \right]$

Insert remarks

Operation	Operands
REMARK	[any text]

Select reports

Operation	Operands
REPORT	$\left\{ \begin{array}{l} \text{STD} \\ \text{ALL} \\ \left[\left\{ \begin{array}{l} + \\ - \end{array} \right\} \text{report-type} \right] \end{array} \right\} \left\{ \left\{ \begin{array}{l} + \\ - \end{array} \right\} \text{report-type} \right\}$

Start output of selected reports

Operation	Operands
RESTART	

Select DAB cache area

Operation	Operands
SELECT-DAB-CACHE	$\left[\text{ADD-CACHE-ID} = \left\{ \begin{array}{l} \text{cache-id} \\ (\text{cache-id1}[\text{,cache-id2}]...) \end{array} \right\} \right]$ $\left[\text{REMOVE-CACHE-ID} = \left\{ \begin{array}{l} \text{cache-id} \\ (\text{cache-id1}[\text{,cache-id2}]...) \\ \underline{*ALL} \end{array} \right\} \right]$

Select cache area for PCA DEVICE report

Operation	Operands
SELECT-PCA-CACHE	$\text{CACHE} = \left\{ \begin{array}{l} \underline{*NONE} \\ \underline{*ALL} \\ ((\text{CONTROLLER}=\text{cont1}, \text{CACHE-ID} = \left\{ \begin{array}{l} \text{number1} \\ \underline{*ALL} \end{array} \right\}) [\dots]) \end{array} \right\}$

Select controllers for PCA CACHE report

Operation	Operands
SELECT-PCA-CONTROLLER	$\text{CONTROLLER} = \left\{ \begin{array}{l} \text{*NONE} \\ \text{*ALL} \\ \text{controller} \\ \text{(controller1[,controller2]...)} \end{array} \right\}$

Select sort criteria and output information of PERIODIC TASK report

Operation	Operands
SELECT-PERIODIC-TASK-PARAMETER	$\left[\begin{array}{l} \text{OUTPUT-INFORMATION} = \left\{ \begin{array}{l} \text{USER-ID} \left(\left\{ \begin{array}{l} \text{*ALL} \\ \text{(userid1[,userid2]...)} \end{array} \right\} \right) \\ \text{JOB-NAME} \left(\left\{ \begin{array}{l} \text{*ALL} \\ \text{(jobname1[,jobname2]...)} \end{array} \right\} \right) \end{array} \right\} \\ \text{[,SORT} = \text{[SERVICE-UNITS][,CPU][,IO][,UPG][,PAGING-READ]} \end{array} \right]$

Select PFA cache area

Operation	Operands
SELECT-PFA-CACHE	$\left[\begin{array}{l} \text{[ADD-CACHE-ID} = \left\{ \begin{array}{l} \text{cache-id} \\ \text{cache-id1[,cache-id2]...} \end{array} \right\} \\ \text{[,REMOVE-CACHE-ID} = \left\{ \begin{array}{l} \left\{ \begin{array}{l} \text{cache-id} \\ \text{(cache-id1[,cache-id2]...)} \end{array} \right\} \\ \text{*ALL} \end{array} \right\} \end{array} \right]$

Select SYMMETRIX controllers

Operation	Operands
SELECT-SYMMETRIX-CONTROLLER	$[\text{ADD-CONTROLLER-MN} = \left\{ \begin{array}{l} \text{controller-mn} \\ (\text{controller-mn1}[\text{,controller-mn2}]...) \end{array} \right\}]$ $[\text{,REMOVE-CONTROLLER-MN} = \left\{ \begin{array}{l} \text{controller-mn} \\ (\text{controller-mn1}[\text{,controller-mn2}]...) \\ \underline{*ALL} \end{array} \right\}]$

Select UTM applications

Operation	Operands
SELECT-UTM-APPLICATION	$[\text{ADD-APPLICATION} = \left\{ \begin{array}{l} \text{name} \\ (\text{name1}[\text{,name2}]...) \end{array} \right\}]$ $[\text{,REMOVE-APPLICATION} = \left\{ \begin{array}{l} \text{name} \\ (\text{name1}[\text{,name2}]...) \\ \underline{*ALL} \end{array} \right\}]$

Output monitored objects

Operation	Operands
SHOW-USER-MEASURED-OBJECTS	TYPE = TASK

Start report output

Operation	Operands
START	

Monitor ISAM pools

Operation	Operands
START-ISAM-STATISTICS	$ \text{POOL}=\left\{ \begin{array}{l} * \text{POOL} \left\{ \begin{array}{l} \text{POOL-NAME}=\text{poolname1} \\ \left[\text{SCOPE}=\left\{ \begin{array}{l} * \text{HOST-SYSTEM} \\ * \text{TASK(TSN=tsn)} \\ * \text{USER} \end{array} \right\} \right] \\ \left[\text{CAT-ID}=\left\{ \begin{array}{l} * \text{HOME-PVS} \\ \text{catid} \end{array} \right\} \right] \end{array} \right\} \left[* \text{POOL}() \dots \right] \end{array} \right. $

Determine monitoring status

Operation	Operands
STATUS	

Deactivate all activated ISAM pools

Operation	Operands
STOP-ISAM-STATISTICS	

Glossary

The following terms have been used frequently in this manual. They are explained below:

/390 mode

Runtime environment of the /390 processor (processor used in the SIEMENS 7.500 system (CISC)).

Program execution in /390 mode on SR2000 systems under OSD-SVP takes place under the control of the /390 firmware.

The /390 firmware is the firmware component of SINIX-2000 on SR2000 systems under OSD-SVP which is used to map /390 code to RISC code. It extends RISC mode and allows for the object-compatible execution (in /390 mode) of /390 code on RISC hardware.

activation

Whenever a task issues a request to the system after a period of inactivity (e.g. think time at a terminal), the system must take two decisions before processing can be continued:

1. The activation decision
2. The initiation decision

activation decision

This decision gives the task the right to use the CPU and to perform I/O operations. At activation time, the task is allocated as many main memory pages as it is likely to need.

Activation delays are possible in cases of resources overloading.

assignment of paging activities to the initiating task

The system initiates all paging I/O operations directly in the SIH state. However, SM2 does not assign all paging I/O operations to the SYSTEM category, but sometimes to the initiating task.

For SM2, the initiating task is that task which caused a page fault during page access.

Two chains have to be distinguished:

1. Only one page is read.

The full firmware duration of the input operation is assigned to the initiating task and its category.

The full software duration of the input operation is assigned to the category of the initiating task.

The task and category counters for the number of paging operations are incremented by 1.

2. Only page output occurs.

The full firmware duration of the output operation is assigned to the PGE task, but not to the SYSTEM category (although it is registered system-globally for SUM).

The PGE task counter for the number of paging operations is incremented by 1.

background storage

Storage area on peripheral devices which can be accessed by means of virtual addressing. Programs and data are transferred in pages from background storage to main memory before processing and returned (if required) to background storage after processing.

caching

Caching is understood to be the process of buffering data in a fast data medium (the cache) in an attempt to accelerate subsequent inputs and outputs to the same data areas.

Data to be written to or read from disk is buffered in the cache to avoid the longer input/output times involved in accessing the disk.

If the data to be accessed is in the cache at the time of access, this is referred to as a cache hit, otherwise as a cache miss.

The proportion of hits in the total number of accesses is known as the cache hit rate.

The higher the hit rate, the greater the advantage of using the cache. The hit rate which can be achieved depends on a range of factors, such as the locality of the accesses, the size of the cache, the caching method selected (read cache, write cache, read/write cache) and the appropriate selection of files. Monitoring systems such as SM2 can be used to identify files and disks suitable for caching.

channels

Channels are used for data interchange between the CPU, main memory and the peripheral devices.

Multiplexer channel (generic term):
can handle several I/O operations simultaneously.

Byte multiplexer channel (BYMUX):
data is transferred in byte-interleaved fashion between main memory and several simultaneously active I/O devices. This type of channel is used to connect slow devices.

Block multiplexer channel (BLMUX):
data is transferred in block-interleaved fashion between main memory and several simultaneously active I/O devices. This type of channel is used to connect fast devices such as disk controllers.

counting of I/O operations and their duration

For SM2, an I/O operation is

- any version of EXCP (EXCP, EXCPW, \$EXCP, \$EXCPW) or
- an I/O request from the memory management system for paging (no SVC call) addressed to the I/O control module. The I/O control module is the central system component for handling physical I/O operations.

The I/O control module normally processes the I/O request with one privileged instruction (Start Device or Start Subchannel). For each instruction a termination message is issued, upon which the I/O operation is counted.

In rare cases (e.g. disk connected to a channel operated in selector mode), two SDV instructions are issued. This is called "offline seek". The first SDV prepares the I/O device and the second initiates the I/O operation proper. Only one I/O operation is counted in this case too.

The following particularities should be noted:

I/O requests which could not be started properly (SDV with condition code differing from 0) are ignored.

So-called SENSE SDVs, which are generally issued after an I/O request that resulted in an error and serve to fetch additional diagnostic information, are only included in report 100.

In SDV fast release mode supported in some systems, a properly initiated I/O operation can be rejected at a later time by a channel. The rejected SDVs are not counted.

In determining the duration of the I/O operation, the time between the SDV and the termination message is always counted.

An SDV rejected because of an error is ignored; this results in an increase in waiting time for the device.

An SDV rejected in SDV fast release mode is ignored; this also results in an increase in waiting time for the device.

In "offline seek" mode, the time between the first SDV and the termination message for the second SDV is counted.

CPU time and CPU service units on SR2000

On SR2000 systems, the CPU time consumed depends on whether the code is executed in /390 mode (compatibility mode) under the /390 firmware or in RISC mode directly on the RISC CPU. The higher the proportion of code in /390 mode compared to the proportion of code in RISC mode, the greater the consumption of (native) CPU time.

The following values describe the CPU time and CPU service units on SR2000 systems:

(Native) task CPU time	As before, this represents the RISC CPU time consumed by the task. This consists of the /390 CPU time and the time during which the task is executed directly on the CPU in RISC mode.
/390 CPU time	This is the time during which a task is executed on the RISC CPU under the control of the /390 firmware (in /390 mode). This arises only in the TU state. The /390 CPU time of a task is a subset of the native task CPU time.
(Native) CPU service units	As before, this specifies the weighted load of the CPU.
Standardized CPU time	This maps the (native) CPU time consumed on the RISC system to the task CPU time of a /390 system with the same capacity. The standardized CPU time is not recorded by SM2.
Standardized CPU service units	This maps the CPU time consumed on the RISC system to the CPU service units of a /390 system with the same capacity. The standardized CPU service units are not recorded by SM2.

deactivation, forced deactivation

When a task is deactivated, it is no longer authorized to use the CPU. In the case of forced deactivation, the system withdraws the task's right to use the CPU.

Forced deactivation can occur when resources are extremely overloaded.

dilation factor

Dilation factors can be determined for individual tasks, for specific task classes and on a system-global basis.

$$\text{Dilation factor} = \frac{\text{Dwell time}}{\text{Productive RST}}$$

Productive RST = productive CPU RST + productive I/O RST

For further information on productive RST, see “time equivalent for the productive performance” on page 458.

A dilation factor smaller than 1 can occur when a task uses asynchronous I/O. In this case, the task uses 2 or more resources simultaneously.

The dilation factor output in SM2R1 report 57 is not comparable with the value "REQUEST DELAY" in the SM2 PCS report and in SM2R1 report 74. This quantity is designed for optimum response time control by PCS.

DMS I/O operations

All accesses to peripheral devices not performed for paging.

dwelt time

The time spent by a task in the system comprises the service times of the physical resources and all non-voluntary wait times of the task.

It is not always possible to distinguish between voluntary and non-voluntary wait times without unreasonable outlay.

Example

The BS2000 boursing mechanism can be used to determine both the voluntary wait times (e.g. wait for user input) and the non-voluntary wait times (wait for a busy resource).

For simplicity's sake, SM2 considers all waits times for boursing, for the PASS and VPASS macros, and for responses to a console message (/PAUSE command or TYPIO macro with response) as voluntary wait times.

SM2 includes the following times in the dwelt time:

1. Time spent in the queue for the CPU(s).
This includes the CPU RST and the time spent in Q1.
2. Wait for paging page transfer (time spent in Q3).
3. Wait for execution of DMS I/O operations (time spent in Q4 and Q12 for I/O).

4. Further time spent in Q4 except for boursing, ITC, PASS/VPASS and waiting for response to console message.
5. Wait for activation (time spent in Q5).
6. Wait for admission (time spent in queue Q6).
7. Wait in Q7 for hardware error recovery (HERS).
8. Further time spent in Q12 except for boursing and waiting for response to console message.
9. Hardware duration of I/O operations for paging page transfers.

EXCP

Macro on the physical I/O level which initiates a channel program (see “counting of I/O operations and their duration” on page 445).

expanded storage (ES)

In BS2000/OSD V3.0 or earlier, expanded storage was a volatile, semiconductor-based expanded memory which could only be activated on systems of type H120. Support for this system type is discontinued in versions of BS2000/OSD later than V3.0.

In future extensions, main memory over 2 GBytes must be available for caching on SR2000 systems. This additional memory will be used in the same way as the previous expanded storage space. As a result, the definition of expanded storage has been changed as of BS2000/OSD V4.0:

Expanded storage (ES) is a volatile memory that can be used by DAB as a cache.

As with main memory, the data in expanded storage is lost following a system crash. Expanded storage is therefore primarily intended for read caching. If it is to be used as a write or read/write cache, the following files are recommended:

- files that require enhanced failsafe performance (temporary work files, SYSEAM)
- files whose write data is backed up by some additional mechanism (e.g. logging)
- files that can be restored after a system crash with relative ease without loss of data

firmware service time (DCS)

This comprises both the hardware service time and the I/O housekeeping time. It is caused not only while waiting for I/O initiation at the device (FPT = Function Pending Time) but also after channel activities have been terminated until the I/O interrupt has been accepted by the CPU (RST = Remaining Service Time). For DCS systems, this is therefore the time between "Start subchannel" and "Interrupt accept" (see “service times definition (DCS, I/O operations)” on page 455).

global storage (GS)

Global storage is a form of semiconductor-based expansion memory which has been made non-volatile by a number of measures. It has an access granularity of 4K and can be expanded up to 2x4 Gbyte depending on the system. As with expanded storage, transfers between global storage and main memory are initiated using machine instructions. This means that an I/O request is processed synchronously if handled from the cache. There is thus no change of task.

Global storage is not only used as a cache, but can also be used as a paging device as required.

hardware service time (DCS)

See "service times definition (DCS, I/O operations)" on page 455.

hardware service time (non-DCS)

Time for which devices are busy with I/O operations, also called hardware duration. The hardware duration is defined as the time between I/O initiation (SDV instruction) and I/O termination (channel interrupt).

hiperfile concept

Hiperfiles (high-performance file) in BS2000 are a means of accelerating file processing. This concept is based on the use of particularly fast storage media when processing a file in order to avoid I/O bottlenecks and thus increase the performance of the entire system.

These storage media are used to buffer data to be written to or read from disk. This avoids the longer I/O times associated with disk accesses.

Extended memory (ES, GS) or disk controllers with integrated caches can be used as storage media.

In this manual, hiperfiles are files with the attribute PERFORMANCE=*HIGH or *VERY-HIGH.

initiation

After a task has been activated, the system must reach a decision on initiation. When it is initiated, the task can use a CPU, i.e. compute.

input/output, logical level

On the logical level, the user uses macro calls (e.g. GET, PUT) to initiate system functions which control data interchange with the peripheral devices, block and unblock data, and handle any errors that may occur.

interaction

Generic term for wait, response, think, and transaction processes (RESPONSETIME monitoring program).

main memory

Memory area which can be addressed directly by the CPU. The program instructions are read and processed in this area.

overall performance

The productive performance and the dilation, i.e. the relation between the time spent in the system (dwell time) and the time required for providing the productive performance, are important criteria for accessing the suitability of a DP system for a given load.

The following definition is used:

Overall performance = productive performance + housekeeping performance

Productive performance is the load handling capacity.

Housekeeping (or overhead) performance is the performance required for system control by the operating system.

Overall performance is the sum of these two quantities.

The performance is provided by the various system components, e.g. the CPU(s) and the peripheral devices.

Performance = work done per unit of time. A precise definition of "work done" is not attempted here. Only the time required for productive or housekeeping performance is considered.

The time equivalent of the productive performance or of the housekeeping performance is the (service) time for which resources are being used for productive work or for housekeeping.

It is also called Resources Service Time (RST).

The dwell time of a task is the sum of the physical resources service times plus all non-voluntary wait times of the task. The non-voluntary wait time of a task is thus a criteria for task obstruction by other tasks in the system.

page fault

BS2000 is an operating system with virtual addressing, i.e. it supports several address spaces simultaneously. The virtual address spaces and the real main memory are managed in units of 4-Kb pages. The DEMAND PAGING method is used for mapping virtual pages onto real memory page frames:

When an attempt is made to access a page that is not in main memory, the hardware detects this condition and uses a page fault interrupt to notify the operating system. If the addressed page is on disk (paging device), the page is read in (page transfer).

If free page frames are required, the system tries to return modified main memory pages to disk.

SM2 counts the number of paging I/O operations (number of I/O requests to the central I/O control module of the system, which corresponds to the EXCP calls). This number is supplied in the ACTIVITY and DEVICE reports, in the I/O record and in SM2R1 reports 3 and 4.

For each I/O request, SM2 increments this number by 1 when

- a page is read in,
- one or more pages are written (the system tries to group up to 8 pages for one I/O operation).

The number of pages written is also given in the MEMORY report and in report 55, and the number of pages read is given in report 56.

SM2 supplies the following additional data:

1. Total number of page fault interrupts. "Real" page faults are not included in this number.
2. Number of page fault interrupts for which the addressed page was still in main memory (PAGE RECLAIMS).
3. Number of page fault interrupts for which a page transfer is required. This count is also incremented when 2 or more tasks try simultaneously to access the same virtual page and the page is not in main memory.
4. Number of page fault interrupts for the first access to a new page.

paging in BS2000

The number of addressable virtual pages is usually greater than the number of page frames available in main memory.

For the removal of pages which can no longer be kept in main memory, see “page fault” on page 451.

The main memory management strategies are based on the assumption that the programs (or tasks) will only address a limited set of the total number of virtual pages within a specific period of time, i.e. that the programs are more or less local. This set of pages, whose size varies dynamically, is called the working set.

The PPC (planned page count) indicates how local a program or task is. This value is provided by the memory management system before task activation and - because it is a measure of the intensity of memory utilization by the task - is used as a task activation criterion.

The PPC value for the next activation phase depends on program behavior during the preceding activation phase.

While the task is active, the PPC value can be modified in accordance with program behavior.

The number of pages used by a task is called UPG (USED PAGE COUNT).

There are three main memory (real memory) management methods:

1. Task-local management

This means that, when there is a shortage of free page frames, the task's pages are checked first and pages used by other tasks are removed from main memory only in exceptional cases.

In determining the pages to be removed, the LRU (LEAST RECENTLY USED) principle is used, i.e. those task pages are removed first which have not been used longest.

With this method the UPG is always less than or equal to the PPC because the number of main memory pages assigned to a task depends on the size of its working set (PPC). Pages not included in the working set are always removed. These checks are made very often to ensure high PPC computation precision.

2. System-global management

This means that, when determining the pages which should be removed because of a shortage of free real-memory page frames, all main memory pages are checked - in contrast to task-local management (see above).

As in task-local management, the LRU principle is used for determining the pages to be removed from main memory:

To this end the main memory pages are sorted according to their access times.

The PPC value is again supplied as a measure of how local a task is, but it is less precise here than with task-local management.

The check is made and working set pages are removed only if free page frames are required. This is why UPG may become greater than the working set, especially if the main memory is large. The UPG/PPC relationship which exists in task-local management thus does not apply to global management.

3. Selective management

A combination of both methods is provided by the selective management method for main memory pages. In this case all pages of the tasks are globally managed using the attributes SYSTEM and TP, and all pages of the tasks are managed locally using the attributes DIALOG and BATCH.

A common feature of both methods is that unassigned page frames are kept in a free page pool.

The optimum main memory management algorithm is set automatically, after which it can no longer be influenced by generation parameters or the startup parameter service. The replacement procedure valid at the start of a BS2000 session is SYS-WS.

paging I/O operations

All I/O operations performed in response to paging requests.

paging memory

The whole main memory area available to all users for paging.

paging rate

Number of required paging I/O operations per second (calls to the I/O control module).

path info

A 3-byte address comprising the channel address (2 bytes) and the device address of a complete data path between main memory and the device.

PGE task

System task required for restarting after hardware errors during paging I/O.

processor states

Program interrupts are caused by

- input/output requests
- calls to the Control System
- timers
- errors
- paging requests

The system distinguishes between the following processor states when handling programs and interrupts:

TU	TPR	SIH	MEH
Processor state for user programs	Processor state for program interrupts	Recognition state for program interrupts	Recognition state for machine errors
Interruptible	Interruptible; in part non-interruptible	Interruptible by MER only	Non-interruptible
Nonprivileged	Privileged processor states		

If the CPU is in none of the above states, it is in the IDLE state.

response time

Time required by the system for processing a request. For the user, this is the time between an input operation and the corresponding system response (see “RESPONSETIME Monitored data on the BCAM pool” on page 45 and “BCAM-CONNECTION Monitored data on connection sets” on page 35).

RISC mode

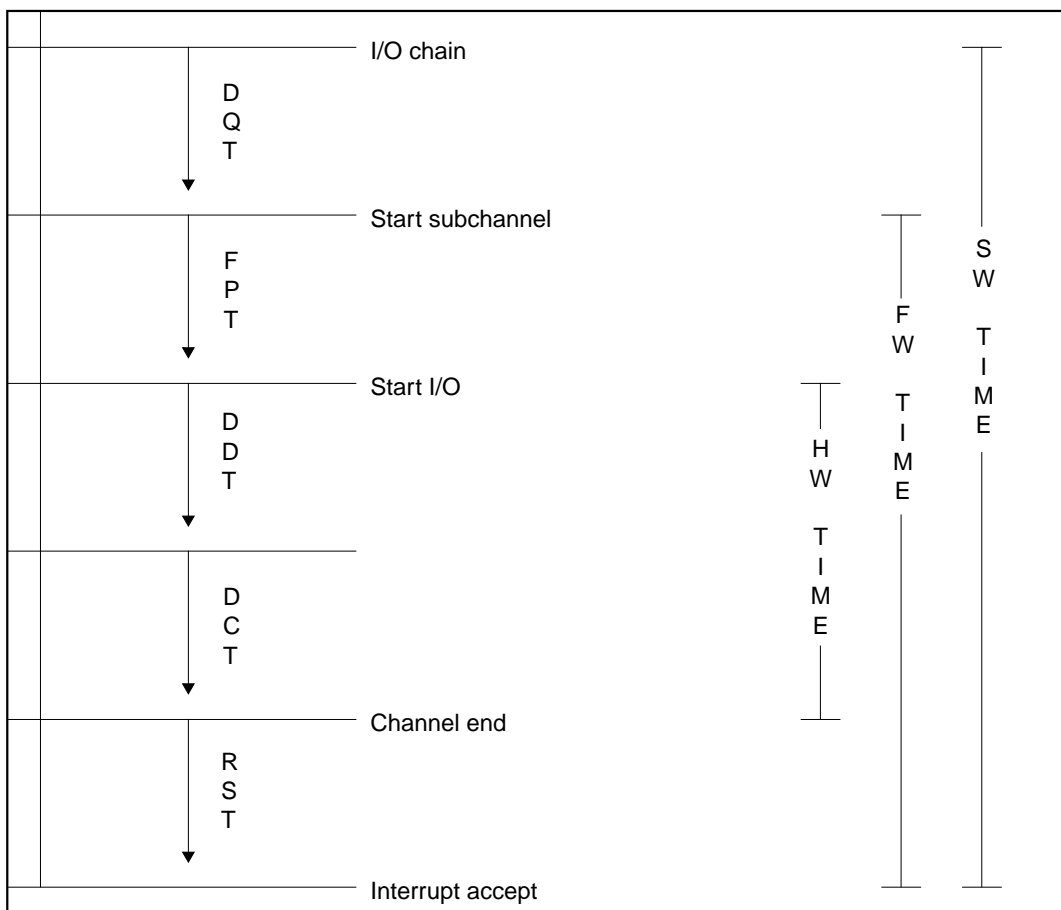
Runtime environment of a RISC processor.

SDV (Start Device)

Instruction which initiates an input/output operation.

service times definition (DCS, I/O operations)

Detailed monitoring of service times is possible on XS systems with DCS, the interface between the operating system, the I/O processor and the physical devices.



DQT	Device Queue Time	HW TIME	Hardware service time
FPT	Function Pending Time	FW TIME	Firmware service time
DDT	Device Disconnect Time	SW TIME	Software service time
DCT	Device Connect Time		
RST	Remaining Service Time		

software service time (DCS)

See “service times definition (DCS, I/O operations)” on page 455.

software service time (non-DCS)

The software service time (also called software duration) is obtained by adding the waiting time of an input/output request in the device queue of the system to the hardware duration (see “hardware service time (non-DCS)” on page 449).

task queues

- Q0 A task is in this queue when it is using the CPU.
- Q1 Tasks in this queue are waiting to use the CPU.
- Q2 This is the queue for the SM2 write task.
- Q3 Tasks waiting for end of paging.
- Q4 Tasks waiting for peripheral I/O termination (disk, tape), for task communication events (boursing, ITC), or for VPASS where msec is specified.
- Q5 Ready tasks waiting to become active again.
- Q6 .Ready tasks waiting to be admitted (PCS).

The task queues described in the following contain tasks waiting for an event that is very remote in time before they become ready. These tasks are deactivated, i.e. they have lost the right to use main memory.

Q7 Not used

Q8 Not used

Q9 Not used

Q10 Hold queue for tasks placed in the hold state by the system or the operator in an emergency or overload situation. Tasks in the device queue or the WHEN queue. Tasks which cannot be terminated under normal conditions but have not yet been completed (error).
Newly generated tasks.

Q11 System tasks which are not called on a time basis.

Q12 Tasks waiting for an event remote in time, e.g. time-consuming inter-task communication events (boursing, especially waiting for terminal input in interactive mode).

Q13 Tasks waiting for VPASS or PASS end.

The task queues are implemented by chaining the TCBs (task control blocks). In the system, a separate entry refers to the first TCB of each queue. Task queues Q0 to Q4 exist once for each central processor. Queues Q5 to Q13 are system-global.

time equivalent for the housekeeping performance

The housekeeping performance of the system is a measure of the operating system overhead caused by the workload to be processed. Its definition encompasses the following factors:

1. CPU service time (SIH time) for processing paging requests.
2. Further SIH times for the operating system.
This is for simplification only, because various operations performed in the SIH state constitute productive work. Part of the productive performance for I/O execution occurs in the SIH state. System activities for processing SVC calls (SVC frame processing) are also handled in the SIH state. As far as monitoring is concerned, it would be very complicated to assign the SIH part of the productive performance to the individual tasks.
3. Hardware duration of the I/O operation for paging page transfers.

time equivalent for the productive performance

In determining the RST (resources service time), a distinction is made between the CPU and the peripheral devices as follows:

1. For the CPU the RST is the time in which instructions are processed in the TU and TPR states. This time is called productive CPU RST (the SIH share of the productive performance is not counted; see above).
2. For the peripheral equipment, the RST is the firmware service time of the devices for performing an I/O operation.

The firmware duration is defined as the time from I/O initiation (START-DEVICE or START-SUBCHANNEL instruction) to I/O termination (channel interrupt). Only I/O operations initiated by DMS are counted. This share is called productive I/O RST.

In practical operation, the firmware duration is affected by other tasks in the system. The positioning time during disk access, for example, depends on prior events, i.e. the current arm position, and on operating system strategies. In BS2000, arm movement optimization is used, i.e. the operating system tries to start I/O accesses in such a way that arm movements are minimized.

By adding the waiting time of an I/O request in the device queue of the system to the firmware duration, the software service time (also called software duration) is obtained.

transaction

Total number of system responses to a user request.

(Please refer to the normal usage in the UTM manuals for the meaning of the term "transaction" in the UTM reports).

virtual address space subdivision

The virtual address space is subdivided as follows:

1. Class 1 memory

Resident memory for system module code.

The size of this memory segment is specified at system generation time and remains constant for the session.

2. Class 2 memory

Paging memory for system module code.

The size of this memory segment depends on generation specifications and remains constant for the session.

3. Class 3 memory

Resident memory requested dynamically for tables, control blocks and overlay modules.

The size of this memory segment varies during the session.

4. Class 4 memory

Paging memory requested dynamically for tables, control blocks and overlay modules (also shared modules).

The size of this memory segment varies during the session.

List of Figures

Figure 1: SM2 configuration	10
Figure 2: Collecting monitored data	16
Figure 3: Relationship between the sampling cycle and the monitoring cycle	18

List of Tables

Table 1: Authorization table	13
Table 2: SM2 monitored variables	20
Table 3: Monitoring programs used to locate overloaded resources	28
Table 4: Overview of the SM2 monitoring programs	34
Table 5: Report identifiers, abbreviations and names	170
Table 6: Possible attributes of the SM2 output file	196
Table 7: Output sequence	207
Table 8: Abbreviations for monitoring programs	331
Table 9: Metasyntax	407
Table 10: Data types	409
Table 11: Data type suffixes	415

Related publications

Please apply to your local office for ordering the manuals.

- [1] **DAB V6.1A** (BS2000/OSD)
Disk Access Buffer
User Guide

Target group

This manual is addressed to systems support.

Contents

The manual begins with some introductory chapters dealing with DAB caching, the DAB cache media and the DAB functions, and continues with detailed descriptions of the DAB commands.

Overview of contents:

- DAB caching, DAB media, DAB functions
- DAB application notes, performance behavior, installation, starting and terminating DAB
- DAB commands and messages
- DAB error recovery

Order number

U2431-J-Z125-11-76

- [2] **BS2000/OSD-BC V3.0**
DMS Macros
User Guide

Target group

The manual addresses assembly language programmers.

Contents

The manual describes the DMS macro interface for the BS2000/OSD basic configuration. There is a brief description of the access method-specific features relevant to programming, followed by a description of the macros in alphabetical order.

Order number

U4250-J-Z125-6-76

New functionality about BS2000/OSD V4.0 is included in the manual Functional Extensions and Supplementary Documentation [23].

[3] **BS2000/OSD-BC V2.0A**

Executive Macros
User Guide

Target group

The manual addresses all BS2000/OSD assembly language programmers.

Contents

The manual contains a summary of all Executive macros, detailed descriptions of each macro with notes and examples, including job variable macros, and a comprehensive general training section.

Order Number

U3291-J-Z125-8-76

New functionality about BS2000/OSD V4.0 is included in the manual Functional Extensions and Supplementary Documentation [23].

[4] **HIPLEX MSCF V2.0A (BS2000/OSD)**

Multiprocessor System
User Guide

Target group

This manual is addressed to systems support, operators and nonprivileged users.

Contents

HIPLEX MSCF (BS2000) makes it possible to combine two or more BS2000/OSD mainframes to form an LCS, CCS, SPVS or XCS computer network. The manual describes HIPLEX MSCF (BS2000), possible applications, prerequisites for use, and commands.

Order number

U3615-J-Z125-7-76

[5] **BS2000/OSD-BC V3.0**

Performance Handbook

Target group

Computer center and system support staff

Contents

The manual helps system users to evaluate the performance of their dp system and points out how to use hardware and software cost-effectively and how to improve system performance. Diagrams, formulas and examples explain the processes in the system and their influence on overall performance.

Order number

U1794-J-Z125-8-76

- [6] **BS2000/OSD-BC V4.0**
Introductory Guide to Systems Support
User Guide

Target group

This manual is addressed to BS2000/OSD systems support staff and operators.

Contents

The manual covers the following topics relating to the management and monitoring of the BS2000/OSD basic configuration: system initialization, parameter service, job and task control, memory/device/user/file/pubset management, assignment of privileges, accounting and operator functions.

Order number

U2417-J-Z125-13-76

- [7] **BS2000/OSD-BC**
System Installation
User Guide

Target group

This manual is intended for BS2000/OSD system administration.

Contents

The manual describes the generation of the hardware configuration with UGEN and the following installation services: disk organization with MPVS, the installation of volumes using the SIR utility routine, and the IOFCOPY subsystem.

- [8] **SM2-PA V2.0A (BS2000/OSD)**
SM2 Program Analyzer
User Guide

Target group

This manual is intended for applications programmers, system programmers and systems support.

Contents

The manual describes the SM2-PA program analyzer for user-specific output files of the SM2 software monitor. It covers the SM2-PA scope of functions, prerequisites for use, operation, and sample outputs. SM2-PA supplies information on resource utilization by tasks and on the performance behavior of user programs.

- [9] **VM2000** (BS2000/OSD)
Virtual Machine System
User Guide

Target group

System administrators and operators in BS2000, VM2000 and VM administrators

Contents

The manual describes the VM2000 Virtual Machine System for BS2000 guest systems.

It contains:

- an introduction to VM2000
- installation, system initialization and termination
- operation, management and error diagnosis
- a description of the VM2000 commands

- [10] **openUTM** (BS2000/OSD)
Generating and Handling Applications
User Guide

Target group

This manual is intended for application planners, technical programmers, administrators and users of UTM applications.

Contents

The manual describes the generation of UTM applications with distributed processing, the tools available with *openUTM* for this purpose, and the UTM objects created in the course of generation. It also contains all the information necessary for structuring, operating and monitoring a productive UTM application.

- [11] **openUTM**
Concepts and Functions
User Guide

Target group

Anyone who wants information about the functionality and performance capability of *openUTM*.

Contents

The manual contains a general description of all the functions and features of *openUTM*, plus introductory information designed to help first-time users of *openUTM*.

- [12] **PDN-GA**
(PDN)
Generating a Data Communication System
User Guide

Target group

Generators of data communication systems, network and system administrators

Contents

This manual describes network generation from the DCAM and PDN viewpoints, as well as the structure and use of KOGS sources, e.g. for ISDN and LAN accesses. It also provides a detailed description of the KOGS macros and illustrates important implementations by means of tailor-made generation examples.

- [13] **BS2000/OSD-BC V4.0**
Commands, Volume 1, A – C
User Guide

Target group

This manual is addressed to nonprivileged users and systems support staff.

Contents

Volume 1 contains the BS2000/OSD commands ADD-... to CREATE-... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5.

The Appendix includes information on command input, conditional job variable expressions, system files, job switches, and device and volume types.

There is a comprehensive index covering all entries for Volumes 1 through 5.

Order number

U2338-J-Z125-14-76

- [14] **BS2000/OSD-BC V4.0**
Commands, Volume 2, D – MOD-I
User Guide

Target group

This manual is addressed to nonprivileged users and systems support staff.

Contents

Volume 2 contains the BS2000/OSD commands DECLARE-... to MODIFY-I... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5.

There is a comprehensive index covering all entries for Volumes 1 through 5.

Order number

U41074-J-Z125-1-76

- [15] **BS2000/OSD-BC V4.0**
Commands, Volume 3, MOD-J – R
User Guide

Target group

This manual is addressed to nonprivileged users and systems support staff.

Contents

Volume 3 contains the BS2000/OSD commands MODIFY-J... to RUN (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5. There is a comprehensive index covering all entries for Volumes 1 through 5.

Order number

U21070-J-Z125-4-76

- [16] **BS2000/OSD-BC V4.0**
Commands, Volume 4, S – SH-O
User Guide

Target group

This manual is addressed to nonprivileged users and systems support staff.

Contents

Volume 4 contains the BS2000/OSD commands SAVE... to SHOW-O... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5. The Appendix contains an overview of the output columns of the SHOW commands of the component NDM.

There is a comprehensive index covering all entries for Volumes 1 through 5.

Order number

U41075-J-Z125-1-76

- [17] **BS2000/OSD-BC V4.0**
Commands, Volume 5, SH-P – Z
User Guide

Target group

This manual is addressed to nonprivileged users and systems support staff.

Contents

Volume 5 contains the BS2000/OSD commands SHOW-P... to WRITE-... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5.

The Appendix contains an overview of the output columns of the SHOW commands of the component NDM and an overview of all START commands.

There is a comprehensive index covering all entries for Volumes 1 through 5.

Order number

U23164-J-Z125-3-76

[18] **BS2000/OSD-BC V4.0**

Commands, Volume 6, Output in S Variables and SDF-P-BASYS
User Guide

Target group

This manual is addressed to programmers and users who write procedures.

Contents

Volume 6 contains tables of all S variables that are supplied with values by the SHOW commands in conjunction with structured output. Further chapters deal with:

- introduction to working with S variables
- SDF-P-BASYS V2.1A

Order number

U23165-J-Z125-3-76

[19] **Commands (Reliant UNIX)**

User Reference Manual

Target group

Reliant UNIX users and system administrators

Contents

This manual describes the Reliant UNIX user commands in alphabetical order. The descriptions are based on the manual pages. In the event of there being discrepancies between the information in the User Reference Manual and the manual pages, use the description in the manual pages as in case of doubt this is more up to date.

Order number

U25628-J-Z915-1-76

[20] **OSD-SVP V2.0**

SR2000 - Operation and Administration

User Guide

Target group

This manual is addressed to DP managers, systems support staff and end users.

Contents

The manual describes and explains the functional differences between the operating systems OSD-SVP V3.0 and BS2000/OSD V4.0.

It also offers notes on where to find detailed descriptions of the RISC-specific changes to the user interfaces in the documentation for BS2000/OSD V4.0.

Order number

U25001-J-Z125-3-76

- [21] **SM2 V13.0A** (BS2000/OSD)
Software Monitor
Volume 2: Analysis and Display of SM2 Monitored Data

Target group

This manual is addressed to users and systems support staff.

Contents

The monitoring system SM2 supplies users with statistical data on the performance of their DP systems and on resource utilization. Volume 2 of the manual describes the SM2U1 utility routine for editing and administering the SM2 output files, and the analysis routines SM2R1, SM2R1-PC, SM2ONLINE-PC and SM2-PA.

Administration and operation of SM2 are described in Volume 1.

Order number

U41078-J-Z125-1-76

- [22] **SHC-OSD V2.0A** (BS2000/OSD)
Symmetrix Host Component
User Guide

Target group

This manual is intended for systems support staff and service technicians.

Contents

The SHC-OSD subsystem is the BS2000 host component for Symmetrix systems. It provides information services and commands for controlling the Symmetrix functions SRDF (Symmetrix Remote Data Facility) and TimeFinder (Symmetrix Multi Mirror Facility).

Brief overview of contents:

- Symmetrix in BS2000
- SRDF
downtime scenarios and measures for ensuring continued operation
- TimeFinder
creating, separating and restoring multi-mirror pairs
- commands (listed in alphabetical order)
- Assembler and C program interface

Order number

U41000-J-Z125-2-76

- [23] **BS2000/OSD V4.0**
Functional Extensions and Supplementary Documentation
User Guide

Target group

This manual is addressed to systems support staff, Assembler programmers and BS2000 users.

Contents

The manual contains supplementary information for the following manuals, for which there will be no new edition for BS2000/OSD-BC V4.0:

- “Introductory Guide to DMS“
- “DMS Macros“
- “Executive Macros“
- “Dynamic Binder Loader / Starter“
- “Subsystem Management“
- “Introductory Guide to the SDF Dialog Interface“
- “PCA“
- “ADAM“
- “System Exits“
- “Job Variables“
- “SDF-P“
- “SPOOL“

The manual incorporates the new functionalities for BS2000/OSD V4.0, all relevant README files, and supplementary information relating to support for SR2000 systems. Together with the various manuals named above, the supplementary information in this manual constitutes complete, up-to-date documentation.

Order number

U41077-J-Z125-1-76

Index

/390 CPU time 446

A

ACF report 209
activation 443
activation decision 443
ACTIVE PARAMETER screen 319
ACTIVITY report 211
ADD-CONNECTION-SET statement 69
ADD-COSMOS-EVENT statement 72
ADD-FILE statement 73
ADD-ISAM-POOL statement 74
administration facility 76
 switch to 76
admit additional SM2 administrators 83
alias 408
alphanum-name (data type) 409
attributes category 222
attributes of the SM2 output file 195
 freely selected 196
 preset 195
authorization table 14

B

background monitoring 11
background storage 444
basic load 340
basic resources 339
batch processing (criteria) 26
BCAM Application Name 46
BCAM CONNECTION report 218
BCAM-CONNECTION
 exclude connection sets 103
BCAM-CONNECTION (monitoring program) 35
BLMUX channel 445

bottleneck analysis 28
boursing mechanism 447
BREAK function 153
BREAK statement 157
BUCKET parameters 35
BYMUX channel 445
byte multiplexer channels 228

C

cache for PCA DEVICE report, select 174
cache utilization 43
caching 444
CALL-ADMINISTRATION-PART statement 76
CALL-EVALUATION-PART statement 77
cat (suffix for data type) 420
category 222
CATEGORY QUEUE report 222
CATEGORY report 220
CATEGORY WSET report 225
cat-id (data type) 409
CHANGE-ISAM-STATISTICS statement 158
CHANGE-MEASUREMENT-PROGRAM statement 78
channel
 define for monitoring 114
 output 228
channel load 38
CHANNEL report 227
channel types 445
channel utilization 345
CHANNEL-IO (monitoring program) 38
clock resetting, uninterruptible 19
CLOSE-LOG-FILE statement 80
CMS (monitoring program) 38
CMS report 229
command return codes 192
command-rest (data type) 409
compl (suffix for data type) 415
composed-name (data type) 409
connection group 36, 48
connection set 35, 48, 69
 define for monitoring 69
 excluded, define 103, 104
constructor (string) 418
continuation character 423

control output 152
controlled mode 152, 167
controller
 select 176
 with caches 272
corr (suffix for data type) 420, 421
COSMOS (monitoring program) 39
 define monitoring program definition 115
 modify monitoring program definition 84
 prepare 82
CPU report 235
CPU service units 446
CPU time 446
CPU utilization 345
c-string (data type) 409

D

DAB (monitoring program) 39
DAB CACHE report 240
DAB cache, select 173
DAB report 237
data records 18
data types in SDF 409
date (data type) 409
deactivation 446
define
 authorizations for nonprivileged users 98
 ISAM pool for monitoring 74
DEFINED PARAMETER screen 327
demand paging method 451
description of SDF syntax 405
device (data type) 409
DEVICE report 244
DEVICE statement 160
device utilization 345
devices
 define 160
 for extended system statistics, define 131
 for service time statistics, define 130
dilation factor 447
DISK (monitoring program) 39
disk access 39
disk controllers with cache 43

- disk devices
 - define for monitoring 123, 124
- DISK FILE report 248
- disk statistics 39
- DISK-FILE (monitoring program) 40
- DLM (monitoring program) 40
- DLM report 250
- DMS I/O operations 447
- DRV implementation 351
- dwel time 26, 447
- dynamic IO reconfiguration 32

E

- efficient DP system usage 29
- efficient use of SM2 27
- END statement 81, 163
- event-driven monitoring method 344
- events
 - define for monitored data acquisition (COSMOS) 72
 - remove from monitoring program definition (COSMOS) 105
- examples
 - SM2 monitoring program 199
- EXCP 448
- EXCP call 213
- expanded storage (ES) 448
- external storage utilization 339

F

- FILE
 - nonprivileged (monitoring program) 55
 - privileged (monitoring program) 41
- file
 - define for monitoring 73
 - excluded, define 107
- file access 40, 41
- file migration 41
- file names 164
- FILE reports 252
 - output monitored data 252
- FILE statement 164
- file statistics 73
 - privileged 73, 107
- filename (data type) 410
- firmware service time (DCS) 448

fixed (data type) 409
forced deactivation 446
format description (SM2) 422
free pool 453
function states 212, 454

G

gen (suffix for data type) 420
global index 418
GLOBAL report 255
global storage (GS) 41, 449
GS (monitoring program) 41
GS report 256
GSVOL (monitoring program) 41
GSVOL report 257

H

hardware duration 449
hardware service time
 DCS 449
 non-DCS 449
HELP statement 165
hiperfile concept 449
HIPLEX MSCF® 42
host
 define for SM2 statements and screen output 110
host communication 42
HSMS (monitoring program) 41
HYPERVISOR-IDLE value 348

I

I/O control module 445
I/O operations (SM2) 445
IDLE state 454
index 418
information screens 205
INITIATE-COSMOS statement 82
initiating task 444
initiation 449
INPROC time 35
input during monitoring 153
input/output 449

- inquiry-and-transaction mode 25
- insert remarks 168
- installation 401
 - with IMON 402
- integer (data type) 411
- interaction 45, 450
- interactive mode 25
 - criteria 25
- interactive processing 25
- internal program name 65
- INWAIT time 35
- IO reconfiguration 32
- ISAM
 - nonprivileged (monitoring program) 55
 - privileged (monitoring program) 42
- ISAM buffer management 42
- ISAM pools 42, 56, 158
 - exclude from the monitoring process (nonprivileged user) 188
 - excluded, define 108
 - include and exclude in the monitoring process (nonprivileged user) 158
 - include in the monitoring process (nonprivileged user) 185
- ISAM reports 258
 - output monitored data 258
- ISAM statistics 74
 - privileged 74
- ISP syntax 422

J

- job 26

K

- keyword operands 422

L

- logical level 449
- low (suffix for data type) 415
- LRU principle 452

M

- main memory 450
 - management 261
 - utilization 342
- man (suffix for data type) 420, 421
- management
 - selective 453
 - system-global 452
 - task-local 452
- mandatory (suffix for data type) 421
- MAX MPL 222
- mean values 19
- MEASUREMENT STATUS screen 139, 328
 - request 139
- memory classes 459
- MEMORY report 261
- messages 365
- metacharacters 422
- MIN MPL 222
- minimize arm movements 458
- MISSED RECORDS 197
- MODIFY-ADMINISTRATOR-ADMISSION statement 83
- MODIFY-COSMOS-PARAMETER statement 84
- MODIFY-MEASUREMENT-PERIODS statement 93
- MODIFY-RESPONSE-TIME-PARAMETER statement 95
- MODIFY-USER-ADMISSION statement 98
- module information 193
- module loading information 191
- modules (SM2) 342
- monitor files (nonprivileged user) 164
- monitored data reports 201
- monitored objects and associated users, output 143
- monitored objects, output 183
- monitoring
 - terminate (nonprivileged user) 163
- monitoring cycle 17
 - modify 93
 - relationship with output cycle 153
- monitoring data
 - output of 18
- monitoring interval 93

- monitoring method 15, 344
 - based on monitoring cycle 15
 - based on sampling cycle 15
 - event-driven 15, 340, 344
 - sample-driven 344
- monitoring program run
 - start 144
 - terminate 147
- monitoring programs 33, 78
 - stop and restart with new monitored objects 78
- monitoring status, output 187
- monitoring task, activate 14
- MSCF (monitoring program) 42
- MSCF report 266
- multiprocessor system 229
- multiprogramming level 222
- multi-step transaction 25

N

- name (data type) 411
- NET DEVICE report 269
- NET-DEVICE (monitoring program) 42
- networks 30
 - prerequisites for using SM2 in 30
 - restrictions 32
 - screen output 31
 - selecting hosts with SM2 30
 - standard SM2 output file 31
 - users 31
- notational conventions 422
- NSM (monitoring program) 42
- NSM report 270

O

- objects and monitoring parameters
 - output active 135
 - output defined 137
- odd (suffix for data type) 420
- offline seek 445
- online analysis 77
 - switch to 77
- online monitoring cycle 17
- online output 33
- open mode 198

OPEN-LOG-FILE statement 101
operand
 keyword 422
 positional 422
operation 26
OUTPROC time 35
output cycle 151, 153
output mode
 automatic 151
 define 166
output priority (devices) 160
OUTPUT statement 166
overall performance 450
overhead 450
overview
 of statements for nonprivileged users 437
 of statements for SM2 administrators 424

P

page fault 451
 real 451
page reclaims 451
paging 452
paging activities, assign 444
paging I/O operations 453
paging memory 453
paging rate 453
PAM output file 197
partial-filename (data type) 412
path info (ICVV) 453
path-compl (suffix for data type) 415
PCA (monitoring program) 43
PCA CACHE report 176, 274
PCA CONTROLLER report 276
PCA DEVICE report 174, 278
PCA reports 272
PCA subsystem 272
PCS report 280
percentage frequency 19
performance expectations
 system-oriented 28
 user-oriented 28
performance of DP system 26

PERIODIC TASK report 282
 define sort criterion and output information 177
PERIODIC-TASK (monitoring program) 43
PFA (monitoring program) 44
PFA CACHE report 286
PFA cache, select 179
PFA CONTROLLER report 288
PFA reports 285
PGE task 453
positional operands 422
POSIX (monitoring program) 44
POSIX report 290
posix-filename (data type) 412
posix-pathname (data type) 412
PPC 216, 452
primary administrator 12, 83
PRIOR task scheduler 222
privileged user 12
processor states 454
productive CPU RST 458
productive I/O RST 458
productive performance 450
product-version (data type) 413
program
 start 57
 terminate 58
program counter statistics 189, 342

Q

queues 456
quotes (suffix for data type) 421

R

REACT time 35
real-time monitoring 11
reconfiguration 32
reducing error sources
 measures for 346
REMARK statement 168
REMOVE-BCAM-CONNECTION-SET statement 103
REMOVE-CONNECTION-SET statement 104
REMOVE-COSMOS-EVENT statement 105
REMOVE-FILE statement 107
REMOVE-ISAM-POOL statement 108

- report identifiers 171
- REPORT statement 169
- reports 153, 201
 - select 169
- request queue 232
- request user help information 165
- resource service time 450
- resource utilization
 - CPU 340
 - external storage 339
- response time 26, 45, 96, 128
- response time statistics 49, 95
 - bucket-specific 95, 127
 - category-specific 95, 127
 - define settings 127
 - examples 49
 - modify settings 95
- RESPONSETIME (monitoring program) 45
- RESPONSETIME report 292
- RESTART statement 172
- RISC mode 454
- RST (Resource Service Time) 450

S

- SAM output file 198
- sample procedures 352
- sample-driven monitoring method 344
- samples, number of 346
- sampling cycle 17
- screen output 201
- scroll commands 152
- SDV (Start Device) 455
- SDV fast release mode 445
- secondary administrator 12, 83
- select report 169
- SELECT-DAB-CACHE statement 173
- SELECTED HOSTS screen 332
- SELECT-HOSTS statement 110
- SELECT-PCA-CACHE statement 174
- SELECT-PCA-CONTROLLER statement 176
- SELECT-PERIODIC-TASK-PARAMETER statement 177
- SELECT-PFA-CACHE statement 179
- SELECT-SYMMETRIX-CONTROLLER statement 180
- SELECT-UTM-APPLICATION statement 182

- SENSE-SDV 445
- sep (suffix for data type) 420
- service time 450
- service time statistics 50
- service times definition (DCS) 455
- SERVICETIME (monitoring program) 50
- SERVICETIME monitoring values 351
- SET-BCAM-CONNECTION-PARAMETER statement 112
- SET-CHANNEL-IO-PARAMETER statement 114
- SET-COSMOS-PARAMETER statement 115
- SET-DISK-FILE-PARAMETER statement 124
- SET-DISK-PARAMETER statement 123
- SET-PERIODIC-TASK-PARAMETER statement 125
- SET-RESPONSE-TIME-PARAMETER statement 127
- SET-SERVICETIME-PARAMETER statement 130
- SET-SYSSTAT-PARAMETER statement 131
- SET-TASK-PARAMETER statement 132
- SHARED PVS report 299
- short-term monitoring
 - start 352
 - terminate and resume former monitoring operations 355
- SHOW-ACTIVE-PARAMETER statement 135
- SHOW-DEFINED-PARAMETER statement 137
- SHOW-MEASUREMENT-STATUS statement 139
- SHOW-SELECTED-HOSTS statement 140
- SHOW-SM2-STATUS statement 141
- SHOW-USER-MEASURED-OBJECTS statement 143, 183
- SM2
 - use in networks 30
- SM2 administrator 61
- SM2 counters 19
- SM2 data
 - accuracy 343
- SM2 monitoring routine (overview) 9
- SM2 output file 11, 80, 195
 - analyze 359
 - attributes 195
 - close 80, 198
 - manage 197
 - open 101, 198
 - specify 190
 - user-specific 189
 - write task 341
 - write to 195

SM2 reports 152, 201, 202
SM2 screen output 201
 representation of values 206
SM2-PA (analysis program) 189
SM2R1 analysis, prepare 357
software duration 456
software service time
 DCS 456
 non-DCS 456
standard categories 222
standard installation 402
standardized CPU service units 446
standardized CPU time 446
Start Device (SDV) 455
start program 57
start report output 153, 184
 for selected reports 172
start SM2 57
START statement 184
START-ISAM-STATISTICS statement 185
START-MEASUREMENT-PROGRAM statement 144
START-SM2 (BS2000 command) 57
START-TASK-MEASUREMENT (BS2000 command) 189
statements 61
 for nonprivileged users (overview) 437
 for SM2 administrators 61, 424
 length 423
 overview 424
status of SM2 system tasks, output 141
STATUS statement 187
STATUS TABLE 333
STOP time 212
STOP-ISAM-STATISTICS statement 188
STOP-MEASUREMENT-PROGRAM statement 147
STOP-TASK-MEASUREMENT(BS2000 command) 189
storage allocation 197
structured-name (data type) 413
suffixes for data types 415
SVC (monitoring program) 51
SVC report 301
SVC statistics 189
SYMMETRIX control 351
SYMMETRIX CONTROLLER report 303
SYMMETRIX DEVICE report 305

- SYMMETRIX report 302
- syntax description 405
- SYSSTAT (monitoring program) 51
- system capacity planning 27
- system counters 19
- system mode, change to 157
- system privilege SWMONADM 12
- system resource utilization (SM2) 339

T

- TASK (monitoring program) 52
- task CPU time 446
- TASK LOCK MANAGER (monitoring program) 53
- task monitoring
 - activating 189
- task queues 456
- TASK user-specific (monitoring program) 56
- tasks
 - and devices for task statistics, define 132
 - deactivated 457
 - monitored data acquisition, define 125
- TCP/IP report 307
- TCP-IP (monitoring program) 52
- temp-file (suffix for data type) 420
- terminals for report output 206
- terminate SM2 57
- terminate SM2 run 81
- text (data type) 413
- think time 45, 96, 128
- throughput rate 26
- time (data type) 413
- time equivalent for the housekeeping performance 457
- time equivalent for the productive performance 458
- timesharing mode 25
- TLM (monitoring program) 53
- TLM report 309
- transaction 25, 458
- transaction rate 26
- transaction time 25, 45, 97, 129
- trend monitoring 27

U

under (suffix for data type) 415
UPG 452
user
 nonprivileged 12
 SM2 12
user (suffix for data type) 421
USER MEASURED OBJECTS screen 336
user monitoring programs 55
user task statistics 342
UTC time 19
UTM (monitoring program) 53
UTM APPLICATION report 313
UTM report 310

V

variables
 relevant 345
vers (suffix for data type) 421
virtual address space
 subdivision 459
VM (monitoring program) 54
VM2000 operation 347
VM2000 report 316
VM2000 system 54, 316
VOLUME load 351
vsn (data type) 413

W

wait time 45
 in the BCAM pool 97, 129
 non-voluntary 447
 voluntary 447
WEIGHT 222
wild(n) (suffix for data type) 416
wildcard syntax 65
wild-constr (suffix for data type) 418
with (suffix for data type) 415
with-compl (suffix for data type) 415
with-constr (suffix for data type) 418
with-low (suffix for data type) 415
without (suffix for data type) 420
without-cat (suffix for data type) 420
without-corr (suffix for data type) 420

without-gen (suffix for data type) 420
without-man (suffix for data type) 420
without-odd (suffix for data type) 420
without-sep (suffix for data type) 420
without-user (suffix for data type) 421
without-vers (suffix for data type) 421
with-under (suffix for data type) 415
with-wild(n) (suffix for data type) 416
working set 452

X

x-string (data type) 414
x-text (data type) 414

Contents

1	Preface	1
1.1	Brief description of the SM2 monitoring system	1
1.2	Target group	2
1.3	Summary of contents	2
1.4	Changes made since the last version of the manual	4
1.5	Notational conventions	7
1.6	README file	8
2	The SM2 monitoring program	9
2.1	Overview	9
2.2	SM2 operating modes	11
2.3	Users	12
2.4	Table of authorizations	13
2.5	Activating a monitoring task	14
2.6	Acquisition of monitored data	15
2.7	Monitoring cycle	17
2.8	Outputting and saving monitored data	18
2.9	SM2 monitored variables	20
2.10	Analyzing monitored data	24
2.11	Performance expectations of the user	25
2.12	Using SM2 for system monitoring	27
2.13	Basic procedure for ensuring efficient DP system usage	29
2.14	SM2 in computer networks	30
3	SM2 monitoring programs	33
3.1	Overview	33
3.2	Privileged SM2 monitoring programs	35
	BCAM-CONNECTION Monitored data on connection sets	35
	CHANNEL-IO Monitored data on the channel load	38
	CMS Monitored data on the catalog management system	38
	COSMOS Monitored data on the system for bottleneck analysis	39
	DAB Monitored data on DAB activities	39
	DISK Monitored data on disk access	39
	DISK-FILE Monitored data on file access for selected disks	40
	DLM Monitored data on lock requests	40
	FILE Monitored data on file access for selected files	41

	HSMS	Monitored data on file migration	41
	GS	Monitored data on access to global storage	41
	GSVOL	Monitored data on volumes in global storage	41
	ISAM	Monitored data on ISAM pools	42
	MSCF	Monitored data on communication between hosts	42
	NET-DEVICE	Monitored data on network devices	42
	NSM	Monitored data on HIPLEX MSCF®	42
	PCA	Monitored data on 3419/21 disk controllers under PCA	43
	PERIODIC-TASK	Monitored data on tasks	43
	PFA	Monitored data on caches under User PFA	44
	POSIX	Monitored data on POSIX	44
	RESPONSETIME	Monitored data on the BCAM pool	45
	SERVICETIME	Monitored data on the service time	50
	SVC	Monitored data on SVC calls	51
	SYSSTAT	Global system and category-specific monitored data	51
	TASK	Task-specific monitored data	52
	TCP-IP	Monitored data on TCP/IP connections	52
	TLM	Monitored data on locks	53
	UTM	Monitored data on UTM applications	53
	VM	CPU shares of virtual machines	54
3.3	Nonprivileged SM2 monitoring programs		55
	FILE	Monitored data on file access	55
	ISAM	Monitored data on ISAM pools	55
	TASK	Task-specific monitored data	56
4	SM2 operation		57
4.1	Starting and terminating SM2		57
4.1.1	Starting the program		57
	START-SM2		57
4.1.2	Terminating the program		58
4.2	Overview of SM2 operation		59
4.3	Statements for SM2 administrators		61
	ADD-BCAM-CONNECTION-SET		
	Add connection set for BCAM-CONNECTION monitoring		66
	ADD-CONNECTION-SET		
	Add connection set for RESPONSETIME monitoring		69
	ADD-COSMOS-EVENT		
	Define events for monitored-data acquisition		72
	ADD-FILE		
	Define file to be monitored		73
	ADD-ISAM-POOL		
	Define ISAM pool to be monitored		74
	CALL-ADMINISTRATION-PART		
	Switch from evaluation part to administration facility		76

CALL-EVALUATION-PART	
Switch from administration facility to evaluation part	77
CHANGE-MEASUREMENT-PROGRAM	
Stop current monitoring program run and restart it with new monitored objects	78
CLOSE-LOG-FILE	
Close SM2 output file	80
END	
Terminate SM2 run	81
INITIATE-COSMOS	
Prepare COSMOS monitoring program	82
MODIFY-ADMINISTRATOR-ADMISSION	
Admit additional SM2 administrators	83
MODIFY-COSMOS-PARAMETER	
Modify parameters for COSMOS monitoring	84
MODIFY-MEASUREMENT-PERIODS	
Modify SM2 monitoring cycle	93
MODIFY-RESPONSETIME-PARAMETER	
Modify parameters for RESPONSETIME monitoring	95
MODIFY-USER-ADMISSION	
Define authorizations for nonprivileged users	98
OPEN-LOG-FILE	
Open SM2 output file	101
REMOVE-BCAM-CONNECTION-SET	
Exclude connection set(s) from BCAM-CONNECTION monitoring	103
REMOVE-CONNECTION-SET	
Exclude connection set(s) from RESPONSETIME monitoring	104
REMOVE-COSMOS-EVENT	
Remove events from COSMOS monitoring parameters	105
REMOVE-FILE	
Remove file(s) from FILE monitoring parameters	107
REMOVE-ISAM-POOL	
Remove ISAM pool(s) from ISAM monitoring parameters	108
SELECT-HOSTS	
Define hosts for SM2 statements and screen output	110
SET-BCAM-CONNECTION-PARAMETER	
Define BCAM-CONNECTION monitoring parameters	112
SET-CHANNEL-IO-PARAMETER	
Define CHANNEL-IO monitoring parameters	114
SET-COSMOS-PARAMETER	
Define COSMOS monitoring parameters	115
SET-DISK-PARAMETER	
Define DISK monitoring parameters	123
SET-DISK-FILE-PARAMETER	
Define DISK-FILE monitoring parameters	124

SET-PERIODIC-TASK-PARAMETER	
Define PERIODIC-TASK monitoring parameters	125
SET-RESPONSE-TIME-PARAMETER	
Define RESPONSE-TIME monitoring parameters	127
SET-SERVICETIME-PARAMETER	
Define SERVICETIME monitoring parameters	130
SET-SYSSTAT-PARAMETER	
Define SYSSTAT monitoring parameters	131
SET-TASK-PARAMETER	
Define TASK monitoring parameters	132
SHOW-ACTIVE-PARAMETER	
Output active monitoring parameters	135
SHOW-DEFINED-PARAMETER	
Output defined monitoring parameters	137
SHOW-MEASUREMENT-STATUS	
Output monitoring status	139
SHOW-SELECTED-HOSTS	
Output selected hosts	140
SHOW-SM2-STATUS	
Output status of SM2 system tasks	141
SHOW-USER-MEASURED-OBJECTS	
Output monitored objects and associated users	143
START-MEASUREMENT-PROGRAM	
Start monitoring program run	144
STOP-MEASUREMENT-PROGRAM	
Terminate monitoring program run	147
4.4 Statements for nonprivileged users	150
BREAK	
Switch to system mode	157
CHANGE-ISAM-STATISTICS	
Include and exclude ISAM pools	158
DEVICE	
Select devices with monitored data	160
END	
Terminate monitoring	163
FILE	
Monitor files	164
HELP	
Request user help information	165
OUTPUT	
Define output mode	166
REMARK	
Insert remarks	168

REPORT	
Select reports	169
RESTART	
Start output of selected reports	172
SELECT-DAB-CACHE	
Select DAB cache	173
SELECT-PCA-CACHE	
Select cache for PCA DEVICE report	174
SELECT-PCA-CONTROLLER	
Select controllers for PCA CACHE report	176
SELECT-PERIODIC-TASK-PARAMETER	
Select sort criterion and output information for	
PERIODIC TASK report	177
SELECT-PFA-CACHE	
Select PFA cache	179
SELECT-SYMMETRIX-CONTROLLER	
Select SYMMETRIX controllers	180
SELECT-UTM-APPLICATION	
Select UTM applications	182
SHOW-USER-MEASURED-OBJECTS	
Output monitored objects	183
START	
Start report output	184
START-ISAM-STATISTICS	
Monitor ISAM pools	185
STATUS	
Output monitoring status	187
STOP-ISAM-STATISTICS	
Terminate monitoring of ISAM pools	188
4.5	BS2000 commands for activating user task monitoring
4.6	Writing to the SM2 output file
4.7	SM2 monitoring program: examples
5	SM2 screen output
5.1	SM2 reports
	ACF report
	ACTIVITY report
	BCAM CONNECTION report
	CATEGORY report
	CATEGORY QUEUE report
	CATEGORY WSET-Report
	CHANNEL report
	CMS report
	CPU report

DAB reports	237
DAB report	238
DAB CACHE report	240
DEVICE report	244
DISK FILE report	248
DLM report	250
FILE reports	252
GLOBAL report	255
GS report	256
GSVOL report	257
ISAM reports	258
MEMORY report	261
MSCF report	266
NET DEVICE report	269
NSM report	270
PCA reports	272
PCA CACHE report	274
PCA CONTROLLER report	276
PCA DEVICE report	278
PCS report	280
PERIODIC TASK report	282
PFA reports	285
PFA CACHE report	286
PFA CONTROLLER report	288
POSIX report	290
RESPONSETIME report	292
SHARED PVS report	299
SVC report	301
SYMMETRIX reports	302
SYMMETRIX CONTROLLER report	303
SYMMETRIX DEVICE report	305
TCP/IP report	307
TLM report	309
UTM reports	310
UTM REPORT	311
UTM APPLICATION report	313
VM2000 report	316
5.2 SM2 information screens	319
ACTIVE PARAMETER	319
DEFINED PARAMETER	327
MEASUREMENT STATUS	328
SELECTED HOSTS	332
STATUS TABLE	333
USER MEASURED OBJECTS	336

6	Notes on SM2 operation	339
6.1	System resource utilization by SM2	339
6.1.1	External storage utilization	339
6.1.2	CPU utilization	340
6.1.3	Main memory utilization	342
6.2	Accuracy of the SM2 data	343
6.2.1	Causes of inaccuracies	343
6.2.2	Notes on particular variables	345
6.2.3	Measures for reducing the error sources	346
6.3	Special applications	347
6.3.1	SM2 together with VM2000	347
6.3.2	VOLUME load with installed DRV	351
6.3.3	Channel load with BUS peripherals	351
6.3.4	SERVICETIME monitoring values with SYMMETRIX control	351
6.4	Sample procedures	352
7	Variables reports	361
7.1	Table of monitored variables	361
8	Messages	365
9	Installation	401
	Installation procedure	402
	Activating the syntax file	402
	Creating a new DSSM catalog	403
	Loading and unloading the subsystem	404
10	Appendix	405
10.1	SDF syntax description	405
10.2	ISP syntax description	422
10.3	Overview of SM2 statements	424
	Overview of statements for the SM2 administrator	424
	Overview of statements for the nonprivileged user	437
	Glossary	443
	List of Figures	461
	List of Tables	463
	Related publications	465
	Index	475

SM2 V13.0A (BS2000/OSD)

Software Monitor Volume 1: Administration and Operation

Target group

This manual is addressed to users and systems support staff.

Contents

The monitoring system SM2 supplies users with statistical data on the performance of their DP systems and on resource utilization. Volume 1 of the manual describes operation of the SM2 monitor, the SM2 monitoring programs and the SM2 screen reports. Analysis and display of the SM2 monitored data are dealt with in Volume 2.

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Comments
Suggestions
Corrections

Submitted by

Comments on SM2 V13.0A
Software Monitor