

**MAINVIEW<sup>®</sup> SRM**  
**SG-Auto**  
**User Guide and Reference**

**Version 7.2**

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  - messages from related software

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# About This Book

This book contains detailed information about MAINVIEW® Storage Resource Manager SG-Auto by BMC Software and is intended for storage administrators.

To use this book, you should be familiar with the following items:

- OS/390 operating system
- job control language (JCL)
- Interactive System Productivity Facility (ISPF)

Throughout this book, references to OS/390 support also include support for MVS and z/OS.

## How This Book Is Organized

This book is organized as follows. In addition, an index appears at the end of the book.

<b>Chapter/Appendix</b>	<b>Description</b>
Chapter 1, "SG-Auto Overview"	provides an overview of SG-Auto
Chapter 2, "Monitoring Storage Conditions"	describes how to establish storage monitoring
Chapter 3, "Responding to Storage Events"	describes how to establish automated responses to threshold violations
Chapter 4, "Printing Reports"	describes how to print reports
Chapter 5, "Communicating With SG-Auto"	describes console commands used to communicate with SG-Auto
Chapter 6, "Scan and Simulate Mode Processing"	describes how to use the scan and simulate modes

Chapter/Appendix	Description
Appendix A, "Command Syntax and Processing"	provides a reference for command syntax
Appendix B, "DD Statements Reference"	description of each DD statement and its associated data set
Appendix C, "Start, Cycle, and Stop Time Processing"	provides a reference for how SG-Auto time parameters can be used
Appendix D, "Parameter and Column Reference"	provides a reference for command parameter descriptions and matrix column descriptions
Appendix E, "Skeleton Tailoring Facility"	provides a reference for the use of the skeleton tailoring facility, which is used to create automation procedures
Appendix F, "Trace Facility"	provides a method of diagnosing a problem in conjunction with technical support

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MAINVIEW SRM customization documents	<i>MAINVIEW SRM Customization Guide</i>	provides instructions for configuring and customizing MAINVIEW SRM for OS/390 including SG-Auto

Category	Document	Description
core documents	<i>MAINVIEW SRM User Guide and Reference</i>	provides information common to all MAINVIEW SRM products and high-level navigation
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## Conventions

This section provides examples of the conventions used in this book and explains how to read ISPF panel-flow diagrams and syntax statements.

### General Conventions

This book uses the following general conventions:

Item	Example
information that you are instructed to type	Type <b>SEARCH DB</b> in the designated field.
specific (standard) keyboard key names	Press <b>Enter</b> .
field names, text on a panel	Type <b>the appropriate entry</b> in the <b>Command</b> field.
directories, file names, Web addresses	The BMC Software home page is at <b>www.bmc.com</b> .
nonspecific key names, option names	Use the HELP function key.  KEEPDICTIONARY option
calls, commands, control statements, keywords, parameters, reserved words	Use the SEARCH command to find a particular object.  The product generates the SQL TABLE statement next.
code examples, syntax statements, system messages, screen text	//STEPLIB DD  The table <i>table_name</i> is not available.

Item	Example
emphasized words, new terms, variables	The instructions that you give to the software are called <i>commands</i> .  In this message, the variable <i>file_name</i> represents the file that caused the error.
single-step procedures	»» To enable incremental backups, type <b>y</b> and press <b>Enter</b> at the next prompt.

This book uses the following types of special text:

**Note:** Notes contain important information that you should consider.

**Warning!** Warnings alert you to situations that could cause problems, such as loss of data, if you do not follow instructions carefully.

**Tip:** Tips contain useful information that may improve product performance or that may make procedures easier to follow.

## Syntax Statements

Syntax statements appear in Courier. The following example shows a sample syntax statement:

```
COMMAND KEYWORD1 [KEYWORD2|KEYWORD3] KEYWORD4={YES|NO}
      file_name...
```

The following table explains conventions for syntax statements and provides examples:

Item	Example
Items in italic type represent variables that you must replace with a name or value. Use an underscore for variables with more than one word.	dtsbackup <i>control_directory</i>
Brackets indicate a group of options. You can choose at least one of the items in the group, but none of them is required. Do not type the brackets when you enter the option. A comma means that you can choose one or more of the listed options. You must use a comma to separate the options if you choose more than one option.	[ <i>table_name, column_name, field</i> ]
Braces enclose a list of required items. You must enter at least one of the items. Do not type the braces when you enter the item.	{ <i>DBD_name   table_name</i> }

---

Item	Example
A vertical bar means that you can choose only one of the listed items. In the example, you would choose either <i>commit</i> or <i>cancel</i> .	{commit   cancel}
An ellipsis indicates that you can repeat the previous item or items as many times as necessary.	<i>column_name</i> . . .

---

# Chapter 1 SG-Auto Overview

SG-Auto is a storage manager that provides the capability of

- **early warning notification** of storage anomalies
- **automated responses** to those anomalies based on conditions in the storage subsystem

## Early Warning Notification

Using your specifications, SG-Auto monitors the storage subsystem for the following conditions:

- Inadequate free space availability
- VTOCs running out of room
- VTOC indexes running out of room
- VTOC indexes disabled
- Excessive free space fragmentation

If the critical threshold specified for a given condition is exceeded, alarm messages are issued to allow corrective actions to be taken before problems occur.

## Automation Management

The SG-Auto automation manager enables you to execute

- batch jobs
- TSO CLISTs
- REXX programs
- system commands

based on the

- current utilization of a volume or pool of volumes
- amount of free space on a volume or in a pool of volumes

- number of free data set control blocks
- number of free VTOC index records
- VTOC status
- fragmentation of available free space

When automation is established, SG-Auto executes storage management procedures automatically, as needed, to ensure sufficient free space.

**Note:** SG-Auto itself, does *not* migrate data sets, release idle space, or defragment free space directly. These functions are performed using your existing storage management tools. The SG-Auto automation manager, coupled with the skeleton tailoring facility, enables you to implement storage management techniques using the tools you already have.

With SG-Auto, you construct action groups and specify action triggers to cause these jobs to be prioritized for execution based on specific conditions or events in the storage subsystem.

## How Does SG-Auto Work?

SVOS handles starting, stopping and all console communications to SG-Auto, therefore SVOS must be running to run SG-Auto (even if SG-Auto is executed in batch). Job control statements in a new cataloged procedure, SGAPROC, are used to operate SG-Auto. SGAPROC is a *?prefix.BBPSAMP* member.

SG-Auto uses a command member or a combination of a command member and matrices to perform the functions of monitoring system utilization and automating procedures for corrective action.

### **MONITOR Command**

The example in the following figure shows the command and parameters used to monitor a designated pool for various alarm criteria.

**Figure 1-1      MONITOR Command Example**


---

```

MONITOR POOL (TEST) -
        CYCLE (60) -
        START (07:00) -
        STOP (19:00) -
        DAYS (NMTWTFN) -
        UTILIZATION (TARGET (30) THRESHOLD (90) LEVEL (POOL) -
        FRAG_INDEX (THRESHOLD (450)) -
        FREE_DSCBS (MINIMUM (100)) -
        FREE_VIRS (MINIMUM (50)) -
        VTOC_STATUS (DISABLED) -
        CONSOLE (NO) -
        USERID (TSOUSR1)

```

---

A separate set of MONITOR commands can be developed for each storage pool, DFSMS storage group, or volume and stored in one command member. By using multiple MONITOR commands like the one shown in the previous figure, any number of pools, groups, or volumes can be monitored simultaneously. This allows you to specify unique criteria for each pool, group, or volume, including different start, cycle, and stop times.

When SG-Auto runs under DFSMS Version 1.1 or later, the IBM® LSPACE service is no longer used. In this environment, volume RESERVE requests are not issued, directly or indirectly.

### Monitor Matrix

Another way to monitor the storage thresholds shown in Figure 1-1 on page 1-3 is to create a monitor matrix as shown in Figure 1-2 on page 1-4. Matrices provide three primary advantages:

- Information from a matrix can be referenced by multiple commands.
- A matrix groups related data in a single location, which eliminates redundant and cumbersome parameter specifications.
- The contents of a matrix can be changed during execution, eliminating the need to stop and restart the system to make simple changes.

Notice in Figure 1-2 on page 1-4, the TEST pool contains the alarm and time criteria specified in the Figure 1-1 on page 1-3 command for TEST pool.



**Figure 1-4 Message Recipient Matrix (SMAMTGxx)**

MESSAGE RECIPIENT MATRIX									
	TYPES			ID'S		MESSAGE CONTROL			USER'S NAME
U									
S	S	W	E	I	E	TIME			
E	T	A	R	N	X	WINDOW		D	
R	A	R	V	C	C	-----			A
	T	N	O	L	L	F		Y	
I	U	I	R	U	U	R	T	S	
D	S	N	E	D	D	O	O		
	G			E	E	M		SMTWTFS	
<hr/>									
TSOUSR1	Y	Y	Y	SGA002I				SMTWTFS	JANE OPERATOR
				SGA006I				SMTWTFS	
	F	-	-	SGA002I				SMTWTFS	
TSOUSR2	O	O	O					SNNNNNS	WEEKEND OPER
TSOUSR3	Y	N	N	SGA004W				NMTWTFN	JOHN USER

The following figure contains an example of how the MONITOR command would look using the message recipient matrix to issue alarms.

**Figure 1-5 MONITOR Command Using Message Recipient Matrix Parameter**

```
MONITOR MATRIX (SMAMTMxx) -
          CONSOLE (NO) -
          MSGLIST (SMAMTGxx)
```

### Responding to Alarms

When you first begin using SG-Auto to monitor your storage components, you should consider all of the following:

- Respond to alarm messages manually until you are comfortable with thresholds you have set.
- Modify the alarm thresholds as needed.
- Determine the procedures you use most frequently to correct storage conditions and which ones can be automated.
- Determine the order in which those corrective procedures are used.

- Use the skeleton tailoring facility to create jobs to be included in an automation matrix to automate the process of managing storage pools. See Appendix E, “Skeleton Tailoring Facility” for details.

After formulating jobs using the skeleton tailoring facility, you are ready to establish an automation matrix to automate appropriate responses for alarms.

### Automation Matrix

An automation matrix, as shown in the following figure, is used to implement storage administration procedures for pools, storage groups, and volumes. Multiple procedures can be set up to process on the same pool, storage group, or volume, depending on the criteria. See “How to Modify the Automation Matrix” on page 3-2 for details.

Figure 1-6 Automation Matrix (SMAMTAxx)

A U T O M A T I O N M A T R I X														
P	C	ACTION TRIGGERS						TIME WINDOW		EXECUTION CONTROL				
		FREE MB	%UTIL	F	R	VOLUME	VTOC	B	E	W	M	A	P	D
R	O													
O	N							E	N	A	A	F	R	A
C	T							G	D	I	X	T	O	Y
E	R													
D	O	M	M	L	I	S	I	T	N			E	R	P
U	L	I	A	E	N	C	R	A				T	X	T
R		N	X	V	D	B	S	T				I	E	
E	I			E	E	S	U					M	C	
	D			L	X		S					E		SMTWTFS

PROC05C	J01		90%	P									1		
PROC05D	J02		90%	P									1	J01	
CMD001A	S01		90%	P									1	J02	
CLIST1A	C01		90%	P									1	S01	
REXX01A	R01		90%	P									1	C01	
PROC06A	J03		90%	V	450				18:00	24:00			1		

For each procedure listed in the automation matrix, you can select a beginning and end time to assure that the job does not run during a peak period. By using the AFTER column, you can stage procedures to make sure that only one job at a time is running on the volume, that is, that job 2 processes after job1, that job 3 processes after job 2, and so on.

To activate the automation matrix, you can add the command in the MONITOR command as shown in the following figure, or you can add the matrix name in the AUTOMATION column of the monitor matrix as shown in Figure 1-8.

**Figure 1-7 MONITOR Command Example with Automation Matrix**

```

MONITOR POOL (TEST) -
CYCLE (60) -
START (07:00) -
STOP (19:00) -
DAYS (NMTWTFN) -
UTILIZATION (TARGET (30) THRESHOLD (90) LEVEL (POOL) -
FRAG_INDEX (THRESHOLD (450)) -
FREE_DSCBS (MINIMUM (100)) -
FREE_VIRS (MINIMUM (50)) -
VTOC_STATUS (DISABLED) -
AUTOMATION_MATRIX (SMAMTAxx) -
CONSOLE (NO) -
USERID (TSOUSR1)
    
```

**Figure 1-8 Monitor Matrix with Inclusion of Automation Matrix**

MONITOR MATRIX												
O	C	A	ALARM CRITERIA					TIME SPECIFICATIONS				
			FREE MB	%UTIL	R	A	VOLUME	VTOC	S	C	S	D
B	J	E	C	T	O	M	I	A	N	C	R	A
N	A	M	E	X	S	I	S	U	X	S	S	SMTWTFN
TEST	P01	SMAMTAxx	30%	90%	450	100	50	07:00	60	19:00	NMTWTFN	
WORK	P02	SMAMTAxx	30%	80%	450	100	50		30		SMTWTFN	
SMSGRP1	S01		30%	90%	450	100	50	07:00	60	10:00	NMTWTFN	
SMSGRP2	S02		30%	80%	450	100	50		30		SMTWTFN	
VOL001	V01	SMAMTAxx	30%	80%	450	100	50		30		SMTWTFN	

## Member Naming Conventions

SG-Auto matrix and command members can be found in *?prefix*.UBBPARM using the naming conventions shown in the following table.

**Table 1-1 Naming Conventions for SG-Auto Members**

Member type	Member name
Commands	SMACMD $xx$
Automation Matrix	SMAMTA $xx$
Monitor Matrix	SMAMTM $xx$
Print Matrix	SMAMTP $xx$
Message Recipient Matrix	SMAMTG $xx$

### Summary

The following summarizes the relationship between commands and matrices.

- A MONITOR command is *always* used to execute the early warning notification function of SG-Auto. It can include parameters for alarm criteria or it can call a monitor matrix containing that information.
- Automated responses to alarms can be done *only* by creating an automation matrix, which can be called in the MONITOR command or in a monitor matrix.
- In the MONITOR command, messages can be issued to the console, to an individual user, and/or, by using the message recipient matrix, to any number of specified users.
- The PRINT command and print matrix work similarly to the MONITOR command and matrix (see “Printing Reports” on page 4-1 for details).

---

## Chapter 2 Monitoring Storage Conditions

The primary function of SG-Auto is to monitor storage conditions to provide early warning notification of storage anomalies so that corrective action can be taken. This sections describes how to use the MONITOR command and matrix to establish criteria for early warning notification.

To help in describing the various parameters used in the MONITOR command and matrix, the parameters are grouped into the following general categories:

Category	Definition
Object Parameters	specify the name of a storage pool, storage group, volume, or the name of a monitor matrix Only one object parameter can be specified in a command or in a single matrix entry.
Time Specification Parameters	control when and how often monitor processing takes place All parameters are optional. If none are specified, processing takes place only once, immediately after initialization is completed. Table C-1 in Appendix C, "Start, Cycle, and Stop Time Processing" shows the valid combinations of the time specification parameters.
Automation Parameters	specify the name of an automation matrix, which is used to automate the storage administration procedures This parameter is optional; if it is not specified, no automation processing takes place.
Alarm Criteria	determine when alarm messages are sent to warn of a target or threshold violation Any combination of the parameters can be specified. If all of the parameters are omitted, information messages that show the current utilization and amount of free space are issued. Alarm criteria can be entered as part of individual monitor commands or can be included in a monitor matrix.

Category	Definition
Message Recipient Parameters	identify storage administrators designated to receive alarm and/or error messages All of the parameters are optional—messages are always written to the SG-Auto message data set. A message recipient matrix can be used to identify multiple users and criteria for message distribution.
DFSMS Storage Group Filter Options	filter volume space information based on the volume's DFSMS status This parameter can be entered only as a command.

The complete syntax of the MONITOR command is shown in Table A-1 on page A-3.

## How to Modify the Monitor Command

Step	Action
1.	Choose <b>Parmlib Members=&gt;SG-Auto</b> . A list of members displays.
2.	Find and open (edit) member SMACMDxx.
3.	Add values for object parameters, time specification parameters, an automation parameter, alarm criteria parameters, message recipient parameters, DFSMS storage group filter options,
4.	Save the member.
5.	Choose <b>Parmlib Members=&gt; System</b> .
6.	Choose the active SMMSYS in the edit mode. Make sure the SMACMD is pointed to the suffix of the member created. Refresh the system to make it the active member.
7.	If the SG-Auto started task is running, stop and restart it to active the commands.
8.	If SG-Auto has not been activated, uncomment SVSGA in the SVSTART parameter so that SG-Auto starts automatically the next time the system restarts.
9.	To manually start SG-Auto, issue the command: F SVOS,START SVSGA

## How to Modify the Monitor Matrix

Step	Action
1.	Choose <b>Parmlib Members=&gt;SG-Auto</b> . A list of members displays.
2.	Find and open (edit) member SMAMTMxx.

Step	Action
3.	Add values for object parameters, time specification parameters, and alarm criteria parameters.
4.	Save the member.
5.	Add the member name to the MONITOR command.

## How to Enter Object Parameters

In the SMACMD $_{xx}$  member, you can enter multiple MONITOR commands but only one object parameter per command.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 2-1 Object Parameters for the MONITOR Command and Matrix**

Parameter	If using a...	Then add the...
MATRIX	Command	MATRIX parameter using the following syntax: <b>MATRIX</b> (member name)
	Matrix	not applicable
POOL	Command	POOL parameter using the following syntax: <b>POOL</b> (pool name)
	Matrix	pool name in the OBJECT NAME column and a Control ID with a <b>P</b> prefix in the CONTROL ID column of the monitor matrix
VOLUME	Command	VOLUME parameter using the following syntax: <b>VOLUME</b> (volser)
	Matrix	volume name in the OBJECT NAME column and a Control ID with a <b>V</b> prefix in the CONTROL ID column of the monitor matrix
GROUP	Command	GROUP parameter using the following syntax: <b>GROUP</b> (group name)
	Matrix	DFSMS storage group name in the OBJECT NAME column and a Control ID with an <b>S</b> prefix in the CONTROL ID column of the monitor matrix

## How to Set Up Time Specification Parameters

The MONITOR command has five time specification parameters, as shown in Table 2-2, that control when and how often monitor processing takes place.

## Processing Considerations

- The start and stop times define a time interval called a *session*. The cycle time sets the frequency at which processing occurs. The WAIT parameter is inspected right after SG-Auto initialization is completed. If the start time has already passed, it controls whether the session begins immediately or is postponed until the next day at the specified time. The DAYS parameter determines which days of the week monitor processing takes place.
- If a cycle time is specified and no stop time is given, processing takes place continuously at the specified frequency. This is called a never-ending session.
- All five parameters are optional. If none are specified, processing takes place only once, immediately after initialization is completed.
- If a stop time is specified, the start time can be later than the stop time. This allows a session to span midnight (for example, START(18:00) STOP(5:00)).
- When both a start time and a stop time are specified, the subsystem performs the session daily at the given start and stop times. Monitor processing takes place at the beginning and end of the session and, if the CYCLE parameter is specified, at regular intervals throughout the session.
- If only a start time is specified, the subsystem executes the command once each day at the specified time.
- If only a stop time is specified (no start time), the subsystem terminates processing of the command at the specified stop time (that is, the command is *not* processed daily).

Refer to Appendix C, “Start, Cycle, and Stop Time Processing” for more information and examples of how combinations of parameters affect processing.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 2-2 Time Specifications Parameters for the MONITOR Command and Matrix**

Parameter	If using a...	Then add the...
START	Command	START parameter using the following syntax: <b>START</b> (hh:mm)
	Matrix	Start time in <i>hh:mm</i> format in the START column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).

**Table 2-2 Time Specifications Parameters for the MONITOR Command and Matrix (continued)**

Parameter	If using a...	Then add the...
CYCLE	Command	CYCLE parameter using the following syntax: <b>CYCLE</b> (mmm)
	Matrix	Cycle value in minutes in the CYCLE column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).
STOP	Command	STOP parameter using the following syntax: <b>STOP</b> (hh:mm)
	Matrix	Stop time in <i>hh:mm</i> format in the STOP column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).
WAIT	Command	WAIT parameter using the following syntax: <b>WAIT</b> (truth value)
	Matrix	Not available.
DAYS	Command	DAYS parameter using the following syntax: <b>DAYS</b> (SMTWTFS)
	Matrix	The string indicating the days active and days inactive in the DAYS column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).

## How to Automate Storage Management Procedures

An automation matrix serves as the link between the SG-Auto monitor processor and automation manager. See “How to Modify the Automation Matrix” on page 3-2.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 2-3 Automation Parameter for the MONITOR Command and Matrix**

Parameter	If using a...	Then add the...
AUTOMATION_MATRIX	Command	AUTOMATION_MATRIX parameter using the following syntax: <b>AUTOMATION_MATRIX</b> (matrix name)
	Matrix	Automation matrix member name in the AUTOMATION column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume) to be automated.

## How to Set Up Alarm Criteria

The alarm criteria determine when alarm messages are issued to warn of a target or threshold violation. The alarm criteria parameters allow you to monitor space usage, free space fragmentation, VTOC usage, and VTOC index usage. Each of the parameters used in the MONITOR command has two (2) subparameters that are used to specify a target and threshold level for the resource that is monitored.

### Processing Considerations

- If usage of the resource falls below the target or exceeds the threshold, an alarm message is sent automatically to the users designated by the message recipient parameters.
- All of the parameters and subparameters are optional; however, with the exception that if a parameter is specified, at least one of its subparameters must be specified.
- If all of the parameters are omitted, information messages that show the current utilization and amount of free space are issued each time monitor processing takes place.
- There are restrictions on using certain monitor parameters if DFSMS is not installed on your system. Without DFSMS, the following parameters are not supported:

```
FRAG_INDEX  
FREE_DSCBS  
FREE_VIRS  
VTOC_STATUS
```

You may code tests for these parameters, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with these parameters.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 2-4 Alarm Criteria Parameters for MONITOR Command and Matrix**

Parameter	If using a...	Then add the...
UTILIZATION	Command	UTILIZATION parameter using the following syntax: UTILIZATION ( TARGET ( nn ) THRESHOLD ( nn ) LEVEL ( POOL   GROUP   VOLUME ) )
	Matrix	Minimum utilization percentage in the %UTIL MIN column and the maximum or free megabytes in the %UTIL MAX column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume)
FREE_SPACE	Command	FREE_SPACE parameter using the following syntax: FREE_SPACE ( MINIMUM ( nnnnn ) MAXIMUM ( nnnnn ) LEVEL ( POOL   GROUP   VOLUME ) )
	Matrix	Minimum free megabytes in the FREE MB MIN column and the maximum free megabytes in the FREE MB MAX column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).
FRAG_INDEX	Command	FRAG_INDEX parameter using the following syntax: FRAG_INDEX ( TARGET ( nnn ) THRESHOLD ( nnn ) )
	Matrix	The fragmentation index value (same as THRESHOLD above) in the FRAG INDEX column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).
FREE_DSCBS	Command	FREE_DSCBS parameter using the following syntax: FREE_DSCBS ( MINIMUM ( nnnnn ) MAXIMUM ( nnnnn ) )
	Matrix	Minimum number of free DSCBs to be maintained in a volume's VTOC in the DSCBS column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).
FREE_VIRS	Command	FREE_VIRS parameter using the following syntax: FREE_VIRS ( MINIMUM ( nnnnn ) MAXIMUM ( nnnnn ) )
	Matrix	Minimum number of free index records to be maintained in the index to a volume's VTOC in the VIRS column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).
VTOC_STATUS	Command	VTOC_STATUS parameter using the following syntax: VTOC_STATUS ( NON-INDEXED   DISABLED )
	Matrix	D for disabled or leave blank for non-indexed in the STATUS column of the monitor matrix on the line that corresponds to the object (pool, storage group, or volume).

## How to Set Up Message Recipient Parameters

The message recipient parameters identify the storage administrators designated to receive alarm and/or error messages. Any combination of the parameters shown in Table 2-5 can be specified.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 2-5 Message Recipient Parameters for the MONITOR Command and Matrix**

Parameter	If using a...	Then add the...
USERID	Command	USERID parameter using the following syntax: <b>USERID</b> (userid)
	Matrix	Not applicable.
MSGLIST	Command	MSGLIST parameter using the following syntax: <b>MSGLIST</b> (member name)
	Matrix	Not applicable.
CONSOLE	Command	CONSOLE parameter using the following syntax: <b>CONSOLE</b> (truth value)
	Matrix	Not applicable.

## How to Set Up Storage Group Filter Options

Storage group filter options are used to filter the MONITOR command by subsetting a DFSMS-controlled volume's space calculations based on the volume's DFSMS status. Storage group filter options can be used only with the GROUP parameter in a command statement.

For parameter and matrix column descriptions, see Appendix D, "Parameter and Column Reference."

**Table 2-6 DFSMS Storage Group Filter Options for the MONITOR Command and Matrix**

Parameter	If using a...	Then add the...
SMS_OPTIONS	Command	SMS_OPTIONS parameter using the following syntax: SMS_OPTIONS (DS (xx) DN (xx) QA (xx) QN (xx) )
	Matrix	Not applicable.

## How to Modify the Message Recipient Matrix

Message recipient criteria that can designate multiple users to receive messages by message type, include or exclude specific messages, designate a specific time window, or designate specific days on which messages should be sent or suppressed can only be specified through the message recipient matrix. There is no corresponding command.

Use the procedure below to set up a message recipient matrix.

Step	Action
1.	Choose <b>Parmlib Members=&gt;SG-Auto</b> . A list of members displays.
2.	Find and open (edit) member <b>SMAMTGxx</b> .
3.	Add values for user IDs, warning types, included/excluded messages, time windows, and days parameters.
4.	Save the member.
5.	Add the member name to the MONITOR command. For usage information see "How to Set Up Message Recipient Parameters" on page 2-7.

## How to Enter Message Recipient Parameters

In the **SMAMTGxx** member, add values for the message recipient parameters.

For parameter and matrix column descriptions, see Appendix D, "Parameter and Column Reference."

**Table 2-7 Message Recipient Matrix Parameters (Part 1 of 2)**

In the column...	Add the...
USER ID	user's TSO user ID or ROSCOE prefix of a storage administrator designated to receive messages
TYPES	types of messages the user should receive, and optionally for each type, whether the user must be logged on or logged off. For each message type, STATUS, WARNING, ERROR, and SEVERE, the following values are valid: <b>Y</b> –the user should receive messages of this type <b>N</b> –the user should not receive messages of this type <b>O</b> –the user should receive messages of this type only if logged on <b>F</b> – the user should receive messages of this type only if logged off – a dash can be specified in a continuation row to indicate that the message type indicator should not be tested
INCLUDE	message IDs of specific messages the user should receive when not eligible to receive all messages of the same type
EXCLUDE	message IDs of specific messages the user should <i>not</i> receive when eligible to receive all messages of the same type
TIME WINDOW	beginning and ending times, based on the 24-hour clock, during which the message criteria specified by this row apply

**Table 2-7 Message Recipient Matrix Parameters (Part 2 of 2)**

<b>In the column...</b>	<b>Add the...</b>
DAYS	days of the week, Sunday through Saturday, that the message criteria specified by this row should be ignored The default for this column is SMTWTFS. To prevent messages from being sent on a given day, substitute an N in the position for that day.
USER'S NAME	user's name This column is for documentation purposes only.

---

## Chapter 3 Responding to Storage Events

When you begin monitoring storage components using SG-Auto, you should

- Respond to alarms manually until you are comfortable with thresholds you have set.
- Modify the thresholds as needed.
- Determine the procedures you use most frequently to correct storage conditions and which ones can be automated.

### How to Build Storage Automation Procedures

When you are ready to automate responses to storage events, use the skeleton tailoring facility to create automation jobs. Each storage management function is implemented using the best tool available for that function. The skeleton tailoring facility drives other vendors' disk management systems, standard IBM utilities, and in-house utilities. Skeleton tailoring output can be a batch job, TSO CLIST, REXX program, or a set of system commands.

For example, consider the job stream in Figure 3-1 that executes the IBM DFDSS utility to defragment volume free space.

**Figure 3-1 Job Stream for Executing IBM DFDSS**

---

```
//P4890016 JOB, 'SYSTEMS', CLASS=A, MSGCLASS=X, MSGLEVEL=(1,1)
//STEP01 EXEC PGM=ADRDSSU, REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DEFRAG DYNAM( PROD03 ) -
EXCLUDE( LIST( SYS1.**, **.PROCLIB*.**) ) -
WAIT( 2, 60 )
/*
```

---

Like most storage management tools, DFDSS is volume-oriented: it requires a volume serial to be specified. By including skeleton tailoring control statements and the real-time %VOLSER variable symbol, the job stream in Figure 3-2 automatically repeats the defragmentation process for each volume serial.

**Figure 3-2 Skeleton Tailoring Control Statements**

---

```
)PROCESS VOLUMES
//P4890016 JOB, 'SYSTEMS', CLASS=A, MSGCLASS=X, MSGLEVEL=(1,1)
//STEP01 EXEC PGM=ADRDSSU, REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
)REPEAT
DEFRAG DYNAM(%VOLSER) -
EXCLUDE( LIST( SYS1.**, **.PROCLIB*.**) ) -
WAIT( 2, 60 )
)END REPEAT
)END PROCESS
/*
```

---

SG-Auto enables this tool to be used to manage storage pools. When the job is included in an SG-Auto storage automation matrix, the use of the tool is fully automated. This means, in the example in Figure 3-2, that the free space on your volumes is consolidated when needed, but only when needed. See Appendix E, “Skeleton Tailoring Facility” for specifics.

After formulating jobs using the skeleton tailoring facility, you are ready to establish an automation matrix to automate appropriate responses for alarms.

## How to Modify the Automation Matrix

An automation matrix is used to implement storage administration automation procedures for a pool, storage group, or volume.

Step	Action
1.	Choose <b>Parmlib Members=&gt;SG-Auto</b> . A list of members displays.
2.	Find and open (edit) member <b>SMAMTAxx</b> .
3.	Fill in the rows of the matrix, which specify the name of a storage management procedure, the action triggers used to execute the procedure automatically, the time window in which the procedure is allowed to execute, and execution control criteria which govern execution of the procedure.
4.	Save the member.
5.	Add the member name to the <b>MONITOR</b> command or monitor matrix. For usage information see "How to Automate Storage Management Procedures" on page 2-5.

## How to Enter Automation Parameters

In the SMAMT<sub>xx</sub> member, add values for the automation parameters. For automation matrix column descriptions, see Table D-5 on page D-20.

**Table 3-1 Automation Matrix Parameters (Part 1 of 2)**

In the column...	Add the...
PROCEDURE	Name of a storage management procedure.
CONTROL ID	Unique, three-character control ID assigned to the procedure. The first letter of the control ID indicates the procedure type, as follows: J - Job procedure C - TSO CLIST R - REXX program S - System command list
<b>ACTION TRIGGERS</b>	
<b>FREE MB</b>	
MIN	Number that represents a minimum amount of free space, in megabytes. The number must be right-justified in the column and be in the range from 0 to 9,999.
MAX	Number that represents a maximum amount of free space, in megabytes. The number must be right-justified in the column and be in the range from 0 to 9,999.
<b>%UTIL</b>	
MIN	A percentage from 1 to 100 percent. The number must be right-justified in the column and must include a percent (%) sign in the right-most position.
MAX	percentage from 0 to 99 percent. The number must be right-justified in the column and must include a percent (%) sign in the right-most position
LEVEL	level indicator can be set to: P for pool, S for storage group, or V for volume
FRAG INDEX	number between 0 and 999 that indicates the degree of free space fragmentation
<b>VOLUME VTOC</b>	
DSCBS	number of free data set control blocks in a volume's VTOC
VIRS	number of free index records in a volume's VTOC index
STATUS	VTOC status indicator can be set to N (none) or D (disabled)
TIME WINDOW BEGIN/END	time window in which the procedure is allowed to execute The time window defined by the begin and end times must fall within the time period during which the storage pool or volume is monitored.
<b>EXECUTION CONTROL</b>	
WAIT TIME	minimum amount of time in minutes that must elapse between successive executions of the procedure
MAX EXEC	maximum number of times the procedure can be executed in a given session
AFTER	control ID assigned to a previously specified procedure

**Table 3-1 Automation Matrix Parameters (Part 2 of 2)**

In the column...	Add the...
PROMPT	PROMPT indicator: N (no) or Y (yes)
DAYS	days of the week, Sunday through Saturday, that the procedure cannot be executed



# Chapter 4 Printing Reports

The PRINT command is used to print reports that provide a high-level summarization of your storage subsystem usage. The PRINT command can be used in conjunction with a print matrix to specify parameters for multiple PRINT commands. Names of print matrices begin with the prefix SMAMTP.

Each row of the matrix contains a set of parameters for which the PRINT command is executed. A matrix with four rows, for example, causes the command to be executed four times using four different sets of parameters. The following figure shows a print matrix.

Figure 4-1 Print Matrix (SMAMTPxx)

P R I N T M A T R I X														
R	C	VOLUME SELECTION						TIME SPECIFICATIONS						
		REPORT		FREE MB	F	VOLUME			S		C		S	
E	O	FORMAT		%UTIL	R	VTOC			S	C	S	D		
P	N	-----		-----	A	-----			T	Y	T	A		
O	T	V	L	F	G	-----			A	C	O	Y		
R	R	O								R	L	P	S	
T	O	U		O	E	L	M	M	D	V	S	-----		
N	L	T	D	L	G	A	I	A	I	S	I	T	-----	
A	I	P	D	U	E	G	N	X	N	C	R	A	-----	
M	D	U	M	N	S	-----			D	B	S	T	-----	
E	T	E	D	-----			E	S	U	-----				
		S	-----			X	-----			SMTWTFSS				
PAR	R01	RPTFM1	Y	Y		92%	750	35	20	D	14:00			NNNNNTNN
PAR	R02	RPTFM1	Y	Y	75%						09:00			NNNNTFN
PAR	R03	RPTFM1	Y	Y		90%	500			D	17:00	180	05:00	NNNNTFN
PAR	R04	RPTFM2	N	Y							09:00			NMTWTFN

In the following command, the MATRIX specification refers to the print matrix shown in the previous figure, which contains the functional equivalent to four PRINT commands. The USER and CONSOLE parameters designate the user and console are both to receive messages as the jobs are printed.

---

```
PRINT  MATRIX ( SMAMTPxx )
      USER ( TSOUSR1 )
      CONSOLE ( YES )
```

---

**Note:** The CYCLE parameter used in a PRINT command overrides the matrix.

The two reports available are the Pool Analysis Report and the Storage Group Analysis Report, which are described below.

## Pool Analysis Report

On the Pool Analysis Report, one summary line is printed by default for each storage pool defined in MAINVIEW SRM Global Administration. The following figure shows the Pool Analysis Report.

**Figure 4-2** Pool Analysis Report

---

```
92.358          P O O L   A N A L Y S I S   R E P O R T          SGA 6.1
WEDNESDAY                                           12:38 PM
```

POOL NAME	-----TOTAL-----		-----FREE SPACE-----			-- UTILIZATION --	
	VOLUMES	CAPACITY	PERCENT	AMOUNT	FRAGI	PERCENT	AMOUNT
ONLINE	1	34.9 MB	23.1	8.1 MB	000	76.9	26.8 MB
TEST	3	1.1 GB	19.3	205.9 MB	283	80.7	862.5 MB
USER	7	659.9 MB	26.2	173.0 MB	103	73.8	487.0 MB
SYSTEM	5	2.5 GB	35.1	889.3 MB	170	64.9	1.6 GB
-----							
SUMMARY:	16	4.3 GB	29.7	1.3 GB	151	70.3	3.0 GB

---

Parameters are also provided to include the volumes in each pool or only those volumes that meet certain selection criteria.

The report shown in the following figure includes only those volumes with utilization greater than 85 percent.

**Note:** The information on the Pool Analysis Report is device-independent. All space amounts are given in kilobytes, megabytes, or gigabytes, rather than tracks or cylinders.

**Figure 4-3 Pool Analysis Report with Restricted Selection Criteria**

92.358 WEDNESDAY		P O O L A N A L Y S I S R E P O R T				SGA 6.1 12:38 PM	
POOL NAME	-----TOTAL-----		-----FREE SPACE-----			-- UTILIZATION --	
	VOLUMES	CAPACITY	PERCENT	AMOUNT	FRAGI	PERCENT	AMOUNT
ONLINE	1	34.9 MB	23.1	8.1 MB	000	76.9	26.8 MB
TEST	3	1.1 GB	19.3	205.9 MB	283	80.7	862.5 MB
	VTMVS	679.1 MB	10.4	70.5 MB	<< 151	89.6	608.6 MB
USER	7	659.9 MB	26.2	173.0 MB	103	73.8	487.0 MB
	VPMVS	141.7 MB	6.1	8.6 MB	>> 483	93.9	133.1 MB
	<< VPPAG	84.1 MB	0.0	0.0 MB	<< 000	100.0	84.1 MB
	<< VPPAG	71.4 MB	0.0	0.0 MB	<< 000	100.0	71.4 MB
	<< VPSPOL	130.9 MB	0.0	0.0 MB	<< 000	100.0	130.9 MB
SYSTEM	5	2.5 GB	35.1	889.3 MB	170	64.9	1.6 GB
	<< VDBKMA	71.4 MB	0.2	170.0 MB	<< 001	99.8	71.2 MB
	VDCOM	402.9 MB	10.6	42.6 MB	179	89.4	360.3 MB
	VDMVS	1.1 MB	6.6	73.2 MB	>> 461	93.4	1.0 MB
-----							
SUMMARY:	16	4.3 GB	29.7	1.3 GB	151	70.3	3.0 GB
	<< LEAST FREE SPACE/FRAGMENTATION			>> MOST FREE SPACE/FRAGMENTATION			
	KB = KILOBYTES = 1,000 BYTES			MB = MEGABYTES = 1,000,000 BYTES			
	GB = GIGABYTES = 1,000,000,000 BYTES			TB = TERABYTES = 1,000 GIGABYTES			

The restricted report was printed using the following PRINT command:

```
PRINT REPORT(PPOOL_ANALYSIS) -
      UTILIZATION(THRESHOLD(85)) -
      LEGEND(YES)
```

The PRINT command can be processed by the SG-Auto subsystem or by a batch job that executes SG-Auto.

The Pool Analysis Report can be printed based on conditions in the storage subsystem (for example, when the utilization exceeds a given level) by using the SG-Auto automation manager to trigger the batch report.

# Storage Group Analysis Report

In the Storage Group Analysis Report shown in the following figure, one summary line is printed by default for each storage group defined.

**Figure 4-4 Group Analysis Report**

```

96.278          G R O U P   A N A L Y S I S   R E P O R T          SGA 6.1
FRIDAY                                               11:25 AM

-----TOTAL-----  -----FREE SPACE-----  -- UTILIZATION --
  GROUP  VOLUMES  CAPACITY  PERCENT  AMOUNT  FRAGI  PERCENT  AMOUNT
-----
STG1      3      3.8 GB   22.1    834.1 MB   092  77.9    2.9 GB
-----
SUMMARY:  3      3.8 GB   22.1    834.1 MB   092  77.9    2.9 GB

```

Parameters are also provided to include the volumes in each group or only those volumes that meet certain selection criteria.

The report shown in the following figure includes only those volumes with utilization greater than 75 percent.

**Figure 4-5 Group Analysis Report with Restricted Selection Criteria**

```

96.278          G R O U P   A N A L Y S I S   R E P O R T          SGA 6.1
FRIDAY                                               11:42 AM

-----TOTAL-----  -----FREE SPACE-----  -- UTILIZATION --
  GROUP  VOLUMES  CAPACITY  PERCENT  AMOUNT  FRAGI  PERCENT  AMOUNT
-----
STG1      3      3.8 GB   22.1    834.1 MB   092  77.9    2.9 GB
      >> SMS002    1.3 GB   23.4    294.9 MB   091  76.6    965.6 MB
      << SMS004    1.3 GB   21.3    268.5 MB   >> 122  78.7    992.0 MB
      SMS005    1.3 GB   21.5    270.7 MB   << 063  78.5    989.8 MB
-----
SUMMARY:  3      3.8 GB   22.1    834.1 MB   092  77.9    2.9 GB

```

The restricted report was printed using the following PRINT command:

```

PRINT  REPORT(SGAR) -
      UTILIZATION(THRESHOLD(75)) -
      LIST_VOLUMES(YES)

```

## Print Parameters

To help in describing the various parameters used in the PRINT command and matrix, the parameters are grouped into the following general categories:

Category	Definition
Object Parameters	Specify the name of the report or the name of a print matrix. Only one report or matrix name can be specified in a command.
Time Specification Parameters	Control when and how often report processing takes place. Table C-1 in Appendix D, "Parameter and Column Reference" shows the valid combinations of the time specification parameters.
Format Parameters	Specify report format options. All of the parameters are optional.
Selection Criteria	Determine which volumes are included on the report when requested by the LIST_VOLUMES parameter in the PRINT command or the VOLUMES column in the print matrix. Any combination of the selection parameters can be specified, or all can be omitted.
Message Recipient Parameters	Identify storage administrators designated to receive alarm and/or error messages. All of the parameters are optional—messages are always written to the SG-Auto message data set. A message recipient matrix can be used to identify multiple users and criteria for message distribution.
DFSMS Storage Group Filter Options	Filter volume space information based on the volume's DFSMS status. This parameter can be entered only as a command.

Time specification, message recipient, and SMS storage group filter parameters for the PRINT command are used in exactly the same way as the corresponding parameters for the MONITOR command.

The complete syntax of the PRINT command is shown in Table A-2 on page A-4.

## How to Modify the PRINT Command

Step	Action
1.	Choose <b>Parmlib Members=&gt;SG-Auto</b> . A list of members displays.
2.	Find and open (edit) member SMACMDxx.
3.	Add values for object parameters, time specification parameters, format parameters, selection criteria, message recipient parameters, DFSMS storage group filter options,

Step	Action
4.	Save the member.
5.	Choose <b>Parmlib Members=&gt; System</b> .
6.	Choose the active SMMSYS in the edit mode. Make sure the SMACMD is pointed to the suffix of the member created. Refresh the system to make it the active member.
7.	If the SG-Auto started task is running, stop and restart it to active the commands.
8.	If SG-Auto has not been activated, uncomment SVSGA in the SVSTART parameter so that SG-Auto starts automatically the next time the system restarts.
9.	To manually start SG-Auto, issue the command: F SVOS,START SVSGA

## How to Modify the Print Matrix

Step	Action
1.	Choose <b>Parmlib Members=&gt;SG-Auto</b> . A list of members displays.
2.	Find and open (edit) member SMAMTPxx.
3.	Add values for object parameters, time specification parameters, format parameters, and selection criteria.
4.	Save the member.
5.	Add the member name to the PRINT command.

## How to Enter the Object Parameters

In the SMACMDxx member, enter only one object parameter per command. For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 4-1 Object Parameters for the PRINT Command and Matrix**

Parameter	If using a...	Then add the...
MATRIX	Command	MATRIX parameter using the following syntax: <b>MATRIX</b> (member name)
	Matrix	Not applicable.
REPORT	Command	REPORT parameter using the following syntax: <b>REPORT</b> (report name)
	Matrix	PAR or SGAR in the REPORT NAME column and a Control ID with a R prefix in the CONTROL ID column of the print matrix

## How to Set Up Time Specification Parameters

The PRINT command and matrix provide time specification parameters that control when and how often monitor processing takes place.

Refer to Appendix C, “Start, Cycle, and Stop Time Processing,” for more information and examples of how combinations of parameters affect processing.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 4-2 Time Specifications Parameters for the PRINT Command and Matrix**

Parameter	If using a...	Then add the...
START	Command	START parameter using the following syntax: <b>START</b> (hh:mm)
	Matrix	start time in <i>hh:mm</i> format in the START column of the print matrix on the line that corresponds to the report name and control ID
CYCLE	Command	CYCLE parameter using the following syntax: <b>CYCLE</b> (mmm)
	Matrix	cycle value in minutes in the CYCLE column of the print matrix on the line that corresponds to the report name and control ID
STOP	Command	STOP parameter using the following syntax: <b>STOP</b> (hh:mm)
	Matrix	stop time in <i>hh:mm</i> format in the STOP column of the print matrix on the line that corresponds to the report name and control ID
WAIT	Command	WAIT parameter using the following syntax: <b>WAIT</b> (truth value)
	Matrix	not available
DAYS	Command	DAYS parameter using the following syntax: <b>DAYS</b> (SMTWTFS)
	Matrix	the string indicating the days active and days inactive in the DAYS column of the print matrix on the line that corresponds to the report name and control ID

## How to Format the Report

The format parameters are used to specify various report options. The parameters allow you to request volume summary information, control flagging options to help you quickly spot certain conditions, and print a report using special forms or overlays.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 4-3 Format Parameters for the PRINT Command and Matrix**

Parameter	If using a...	Then add the...
OUTPUT_DD	Command	OUTPUT_DD parameter in the following syntax: <b>OUTPUT_DD</b> ( <i>ddname</i> )
	Matrix	ddname of an output JCL statement in the OUTPUT_DD column of the print matrix on the line that corresponds to the report name and control ID
LINES_PER_PAGE	Command	LINES_PER_PAGE parameter using the following syntax: <b>LINES_PER_PAGE</b> ( <i>nnn</i> )
	Matrix	not available
LEGEND	Command	LEGEND parameter using the following syntax: <b>LEGEND</b> ( <i>truth value</i> )
	Matrix	Legend indicator ( <b>Y</b> or <b>N</b> ) in the LEGEND column of the print matrix on the line that corresponds to the report name and control ID.
FLAG	Command	FLAG parameter using the following syntax: <b>FLAG</b> ( <i>HFS (truth value) LFS (truth value) HFI (truth value) LFI (truth value)</i> )
	Matrix	flag indicator in the FLAG column of the print matrix on the line that corresponds to the report name and control ID to indicate whether <b>all</b> flags are on (Y) or off (N)
LIST_VOLUMES	Command	LIST_VOLUMES parameter using the following syntax: <b>LIST_VOLUMES</b> ( <i>truth value</i> )
	Matrix	volume indicator (Y) or (N) in the VOLUMNS column of the print matrix on the line that corresponds to the report name and control ID

## How to Set Up Selection Criteria

The selection criteria select the volumes for which volume summary information is printed when requested by the LIST\_VOLUMES parameter in the PRINT command or the VOLUMES column in the print matrix.

### Processing Considerations

- Each parameter has two subparameters that are used to specify a target and/or threshold for a given resource.
- If the resource usage is less than the target or greater than the threshold, a report summary line is printed for the volume. This enables you, for example, to include just those volumes for which utilization is less than a given percentage or just those volumes for which the fragmentation index is higher than a given value.

- All of the parameters and subparameters are optional; however, if a parameter is specified, at least one of its subparameters must be specified.
- If all of the parameters are omitted, volume summary information is printed for each volume in each storage pool.

For parameter and matrix column descriptions, see Appendix D, “Parameter and Column Reference.”

**Table 4-4 Selection Criteria Parameters for the PRINT Command and Matrix**

Parameter	If using a...	Then add the...
UTILIZATION	Command	UTILIZATION parameter using the following syntax: UTILIZATION (TARGET (nn) THRESHOLD (nn))
	Matrix	Minimum utilization percentage in the MIN column and the maximum or free megabytes in the MAX column of the print matrix on the line that corresponds to the report name and control ID.
FREE_SPACE	Command	FREE_SPACE parameter using the following syntax: FREE_SPACE (MINIMUM (nnnnn) MAXIMUM (nnnnn))
	Matrix	Minimum free megabytes in the MIN column and the maximum free megabytes in the MAX column of the print matrix on the line that corresponds to the report name and control ID.
FRAG_INDEX	Command	FRAG_INDEX parameter using the following syntax: FRAG_INDEX (TARGET (nnn) THRESHOLD (nnn))
	Matrix	The fragmentation index value (same as TARGET above) in the FRAG INDEX column of the print matrix on the line that corresponds to the report name and control ID.
FREE_DSCBS	Command	FREE_DSCBS parameter using the following syntax: FREE_DSCBS (MINIMUM (nnnnn) MAXIMUM (nnnnn))
	Matrix	Minimum number of free DSCBs to be maintained in a volume's VTOC in the FREE_DSCBS column of the print matrix on the line that corresponds to the report name and control ID.
FREE_VIRS	Command	FREE_VIRS parameter using the following syntax: FREE_VIRS (MINIMUM (nnnnn) MAXIMUM (nnnnn))
	Matrix	Minimum number of free index records to be maintained in the index to a volume's VTOC in the FREE_VIRS column of the print matrix on the line that corresponds to the report name and control ID
VTOC_STATUS	Command	VTOC_STATUS parameter using the following syntax: VTOC_STATUS (NON-INDEXED DISABLED)
	Matrix	D for disabled or leave blank for non-indexed in the VTOC_STATUS column of the print matrix on the line that corresponds to the report name and control ID

## How to Set Up Message Recipient Parameters

The message recipient parameters identify the storage administrators designated to receive alarm and/or error messages. Any combination of the following three parameters can be specified:

USERID  
MSGLIST  
CONSOLE

See “How to Set Up Message Recipient Parameters” on page 2-7 and “How to Enter Message Recipient Parameters” on page 2-9 for details.

## How to Set Up Storage Group Filter Options

Storage group filter options are used to filter the PRINT command by subsetting a DFSMS-controlled volume’s space calculations based on the volume’s DFSMS status. Storage group filter options can be used only with the Group Analysis Report.

See MAINVIEW SRM for details.

---

# Chapter 5    Communicating With SG-Auto

The RESTART, REFRESH, and DISPLAY commands and a complete command line interface are accessible through the master console.

## **RESTART**

The RESTART command terminates the current SG-Auto address space and restarts the subsystem in a new address space.

When the RESTART command is issued, all command processors are signaled to terminate. Execution job tracking is terminated for any batch procedure currently executing. After all command processors have terminated, SG-Auto restarts in a new address space using the same parameters as specified on the original start command. This causes the command input stream to be reread from the definition library and all matrices to be refreshed.

## **REFRESH**

The REFRESH command refreshes all definition matrices, or a specific definition matrix, based on the current contents of the definition library.

```
F SVOS,SVSGA,REFRESH [MATRIX=matrix-name]
```

If the MATRIX parameter is *not* specified, all definition matrices referenced by all commands are refreshed automatically. The messages in Figure 5-1 indicating the result of the refresh are sent to the master console and written to the SG-Auto message log.

---

**Figure 5-1 Messages Generated Following a Refresh without the MATRIX Parameter**

---

```
F SVOS ,SVSGA ,REFRESH
SPM021I: REFRESH COMMAND ACCEPTED
SPM022I: REFRESH SCHEDULED FOR 6 MATRICES
SPM022I: REFRESH OF MATRIX SMAMTAxx IN PROGRESS
SPM022I: REFRESH OF MATRIX SMAMTAxx COMPLETE
SPM022I: REFRESH OF MATRIX SMAMTGAxx IN PROGRESS
SPM022I: REFRESH OF MATRIX SMAMTGAxx COMPLETE
SPM022I: REFRESH OF MATRIX PDM IN PROGRESS
SPM022I: REFRESH OF MATRIX PDM COMPLETE
SPM022I: REFRESH OF MATRIX SMAMTAxx IN PROGRESS
SPM022I: REFRESH OF MATRIX SMAMTAxx COMPLETE
SPM022I: REFRESH OF MATRIX SMAMTGxx IN PROGRESS
SPM022I: REFRESH OF MATRIX SMAMTGxx COMPLETE
SPM022I: REFRESH OF MATRIX SMAMTAxx IN PROGRESS
SPM022I: REFRESH OF MATRIX SMAMTAxx COMPLETE
SPM022I: REFRESH SUCCESSFUL FOR 6 OF 6 MATRICES
SPM022I: REFRESH COMMAND COMPLETE
```

---

If the MATRIX parameter is present, only the specified matrix is refreshed:

**Figure 5-2 Messages Generated Following a Refresh with the MATRIX Parameter**

---

```
F SVOS ,SVSGA ,REFRESH MATRIX(PDM)
SPM021I: REFRESH COMMAND ACCEPTED
SPM022I: REFRESH OF MATRIX PDM IN PROGRESS
SPM022I: REFRESH OF MATRIX PDM COMPLETE -- 5 ROW(S) IN
MATRIX
SPM022I: REFRESH COMMAND COMPLETE
```

---

If the matrix specified is being processed by a task, the refresh is bypassed and the appropriate information message is issued.

## DISPLAY

The DISPLAY command reports on the status of all command processors, automation procedures, and definition matrices.

```
F SVOS ,SVSGA ,DISPLAY [MATRICES | COMMANDS]
```

Status messages are sent to the master console and the SG-Auto message log.

---

## Command Line Interface

The command line interface allows you to enter any SG-Auto command at the console.

The following command is used to display trace status:

---

```
F SVOS ,SVSGA ,TRACE
SGA010I: EVENT TRACE DEACTIVE
SGA011I: MODULE TRACE DEACTIVE
```

---

The following command is used to display environmental variables:

---

```
F SVOS ,SVSGA ,SET
SGA010I: SIMULATION MODE IS OFF
SGA011I: SCAN MODE IS OFF
```

---

The following command is used to display environmental variables:

---

```
F SVOS ,SVSGA ,TRACE EVENTS(YES)
SGA010I: EVENT TRACE ACTIVE
```

---

The following command is used to enable simulation mode:

---

```
F SVOS ,SVSGA ,SET SIMULATION(ON)
SGA010I: SIMULATION MODE IS ON
```

---

The command line interface allows you to add monitors dynamically and to print the reports at any time.

The complete SG-Auto command syntax is fully supported. This means that the TSO-like command abbreviation, continuation lines, and uppercase/lowercase may be used when typing console commands. For example, if the following is entered:

```
F SVOS ,SVSGA ,PRINT REPORT(PAR) -
```

SG-Auto waits for the additional parameters to be typed. If the continuation line is not received within 30 seconds, the operator is prompted for the continuation:

```
SGA230I: ENTER ADDITIONAL COMMAND PARAMETER(S)
```

The operator is prompted every 30 seconds until one of the following occurs:

- 
- the continuation line is received
  - the operator cancels the command<sup>1</sup>
  - two minutes have elapsed; that is, a maximum of four prompts

---

1. The operator can cancel a command by entering a "/" or RESET (for example, F SVOS,SVSGA,/\* or F SVOS,SVSGA,RESET).

---

---

# Chapter 6 Scan and Simulate Mode Processing

SG-Auto processing is controlled by the subsystem with the exception of scan and simulate mode processing, which are processed in batch. Scan and simulate modes are used for diagnostic purposes and do not update any records.

- Scan mode is used to check syntax
- Simulate mode is used to check parameters

## Scan Mode Processing

In scan mode, command specifications (which include all matrix specifications) are checked, but command execution is suppressed. This includes simulated execution if requested.

Scan mode processing is similar to JCL TYPRUN=SCAN processing. In addition to verifying command syntax, several other verifications are performed. This ensures, for example, that the necessary matrices exist, are properly specified, and that all required parameters are present.

Scan mode is activated by one of the following:

- Cataloged procedure EMODE parameter
- SET command
- SGASCAN global parameter

Scan mode processing is terminated with a return code of 4. One of the following messages is displayed in the message data set:

SGA309I: SCAN PROCESSING COMPLETE

SGA309I: NO ERRORS IN COMMAND SPECIFICATIONS

OR

SGA310I: SCAN PROCESSING COMPLETE

SGA310I: ONE OR MORE ERRORS IN COMMAND SPECIFICATIONS

The second message indicates an error was encountered. A message describing the error is printed immediately following the echo print of the command that caused the error.

To ensure command specification errors are not encountered when the subsystem is initialized, subsystem commands can be checked for specification errors by executing SG-Auto as a batch job using the JCL shown in the following figure.

**Figure 6-1 Scan Mode Activated by the EMODE Parameter**

---

```
//jobname JOB.....
//stepname EXEC SGAPROC, MEMBER=member-name, EMODE=SCAN
//SYSIN DD DSN=*.STCSYSIN, DISP=SHR
```

---

The following figure shows the SET SCAN(YES) command used to check for command specification errors.

**Figure 6-2 Scan Mode Activated by the SET Command**

---

```
//jobname JOB.....
//STEP01 EXEC SGAPROC
//SYSIN DD *
        SET SCAN(YES)
//      DD DSN=*.STCSYSIN, DISP=SHR
```

---

The control data set is read and all commands are validated. If an error in the syntax or specification of a command is detected, a message indicating the nature of the error is printed immediately following the echo-print of the control record containing the error.

Once activated, scan mode *cannot* be deactivated. If SCAN(NO) is specified on a subsequent SET command, an information message is printed and scan mode remains in effect.

Subsystem commands should be checked for specification errors immediately after changes are made.

The SET SCAN(YES) command can appear anywhere in the control data set, either before, after, or in between the commands to be validated.

Subsystem commands can be validated by inserting a SET SCAN(YES) command in the control data set.

## Simulation Mode Processing

Simulation mode allows command execution to be simulated. Simulation is performed as though all operations are carried out in their entirety and then undone or reversed. This makes it appear as though all processing actually took place.

Simulation is an option that applies to the overall execution mode, rather than to individual commands by way of a command parameter. This simplifies use of simulation, since no changes in command specifications are required.

Execute commands in simulation mode initially so you can review the results before actual execution takes place.

Simulation mode is activated by one of the following:

- Cataloged procedure EMODE parameter
- SET command
- SGASIM global parameter

The following figure shows the EMODE parameter.

**Figure 6-3**      **Simulation Mode Activated by the EMODE Parameter**

---

```
//jobname  JOB.....
//stepname EXEC SGAPROC,EMODE=SIMULATE
//SYSIN    DD  *
           (one or more commands)
/*
```

---

The following figure shows the SET command.

**Figure 6-4      Simulation Mode Activated by the SET Command**

---

```
//jobname  JOB.....  
//stepname EXEC SGAPROC  
//SYSIN    DD  *  
    SET SIMULATION(ON)  
    (one or more commands)  
/*
```

---

The SET SIMULATION(ON) command can appear anywhere in the command input stream.

The following message, which appears in the message data set, is the only direct indication that command execution has been simulated:

SGA011I: SIMULATION MODE IN EFFECT

Once activated, simulation mode cannot be deactivated. If SIMULATION(NO) is specified on a subsequent SET command, an information message is issued and simulation mode remains in effect.

---

---

# Appendix A Command Syntax and Processing

This appendix provides a reference for command syntax. See the tables listed below for specific commands.

Command	Table number and page
MONITOR	Table A-1 on page A-3
PRINT	Table A-2 on page A-4
SET	Table A-3 on page A-5

## Syntax Rules

A command consists of a command name followed by one or more parameters:

```
command_name parameters... [;]
```

The command name identifies the function to be performed. The parameters request specific processing aspects of the function, and provide information required for execution.

All command parameters are keyword parameters. A keyword parameter consists of a keyword (the parameter name), followed by one or more values enclosed in parentheses. The following illustrates a complete parameter specification:

```
parameter_name (value,value,...)
```

For many parameters, only a single value can be specified. Some parameters can require or allow multiple values to be specified.

- A command name must begin on a new control record. At least one blank must separate a command name from its first parameter.
- Parameter specification is free-form. One or more blanks can appear before or after a parenthesis; multiple values can be separated by either a comma and/or one or more blanks.
- Parameters can be specified in any order for a given command. Either a comma and/or one or more blanks can separate parameter specifications.
- Parameters can be specified on subsequent control records. Continuation must be indicated by a dash (-) following the command name or a complete parameter specification.
- The last parameter specification for a command must be indicated by either a semicolon, or omission of the continuation character and comments field (that is, all remaining characters in the control record, up to position 73, must be blank).

In the following command, MONITOR is the command name, followed by three parameter specifications:

```
MONITOR POOL(TEST) FREE_SPACE(MINIMUM(300))USER(USER01)
```

The same command can be specified as follows:

```
MONITOR POOL(TEST) - comment number one
        FREE_SPACE(MINIMUM(300)) -
        USER(USER01) comment number two
```

**Note:** The command is continued on two additional control records. Comments follow the first and last parameter specifications. The command is terminated by a semicolon, which is required since the last parameter specification is followed by a comment.

### Abbreviations

Command and parameter names can be abbreviated. A command name can be shortened to as few characters as is desired as long as the abbreviation is unique with respect to other command names. A parameter name can be shortened to as few characters as is desired as long as the abbreviation is unique with respect to other parameter names valid for the same command.

Only reasonable abbreviations should be used, and only where convenient. SG-Auto command and parameter names have been chosen to be as meaningful as possible. Excessive abbreviation should be avoided.

### Comments

A control record containing only comments can appear anywhere in the control data set, provided an asterisk is specified in position 1 of the record.

The following table is a reference for MONITOR command syntax, Table A-2 on page A-4 is a reference for PRINT command syntax, and Table A-3 on page A-5 is a reference for SET command syntax.

**Table A-1 MONITOR Command Syntax Reference (Part 1 of 2)**

Verb	Parameter	General Category
MONITOR	MATRIX (member name) - POOL (pool name) - VOLUME (volser) - GROUP (group name) -	Object Parameters <sup>1</sup>
	START (hh:mm) - CYCLE (mmmm) - STOP (hh:mm) - WAIT (truth value) - DAYS (SMTWTFS) -	Time Specifications Parameters <sup>2 3 4</sup>
	AUTOMATION_MATRIX (member name) -	Management Parameters
	UTILIZATION( TARGET (nn) THRESHOLD (nn) - LEVEL (POOL  VOLUME) ) - FREE_SPACE ( MINIMUM (nnnnn) MAXIMUM (nnnnn) - LEVEL (POOL  VOLUME) ) - FRAG_INDEX ( TARGET (nnn) THRESHOLD (nnn) ) - FREE_DSCBS ( MINIMUM (nnnnn) MAXIMUM (nnnnn) ) - FREE_VIRS ( MINIMUM (nnnnn) MAXIMUM (nnnnn) ) - VTOC_STATUS (NON-INDEXED DISABLED) -	Alarm Criteria
	USERID (userid) - MSGLIST (member name) - CONSOLE (truth value) -	Message Recipient Parameters
	SMS_OPTIONS - (DA(truth value) - DN(truth value) - QA(truth value) - QN(truth value))	Storage Group Filter Options <sup>5</sup>
<sup>1</sup> One object parameter must be specified, and only one. All other parameters are optional.		
<sup>2</sup> If both the START and STOP parameters are specified, the start time cannot equal the stop time.		
<sup>3</sup> If the CYCLE parameter is specified with both the START and STOP parameters, the cycle time must not be greater than the interval defined by the start and stop times.		

**Table A-1 MONITOR Command Syntax Reference (Part 2 of 2)**

Verb	Parameter	General Category
<sup>4</sup> The WAIT parameter can be specified only if the START parameter is specified.		
<sup>5</sup> The storage group filter options parameters are valid only with the GROUP parameter.		

The following table is a reference for the PRINT command.

**Table A-2 PRINT Command Syntax Reference (Part 1 of 2)**

Verb	Parameter	General Category
PRINT	MATRIX (member name) - REPORT (report name) -	Object Parameters <sup>1 2</sup>
	START (hh:mm) - CYCLE (mmmm) - STOP (hh:mm) - WAIT (truth value) - DAYS (SMTWTFS) -	Time Specifications Parameters
	OUTPUT_DD (ddname) - LINES_PER_PAGE (nnn) - LEGEND (truth value) - FLAG (HFS(truth value) LFS(truth value) - HFI(truth value) LFI(truth value) - LIST_VOLUMES ( truth value ) -	Format Parameters <sup>3</sup>
	UTILIZATION ( TARGET (nn) THRESHOLD (nn) - LEVEL (POOL   VOLUME) ) - FREE_SPACE (MINIMUM (nnnnn) MAXIMUM (nnnnn) - LEVEL (POOL   VOLUME) ) - FRAG_INDEX ( TARGET (nnn) THRESHOLD (nnn) ) - FREE_DSCBS ( MINIMUM (nnnnn) MAXIMUM (nnnnn) ) - FREE_VIRS ( MINIMUM (nnnnn) MAXIMUM (nnnnn) ) - VTOC_STATUS (NON-INDEXED   DISABLED) -	Selection Criteria <sup>4</sup>
	USERID (userid) - MSGLIST (member name) - CONSOLE (truth value) -	Message Recipient Parameters
	SMS_OPTIONS - (DA(truth value) - DN(truth value) - QA(truth value) - QN(truth value))	Storage Group Filter Options <sup>5</sup>
<sup>1</sup> One object parameter must be specified. All other parameters are optional.		
<sup>2</sup> PRINT REPORT(PPOOL_ANALYSIS) prints the Pool Analysis Report.		
<sup>3</sup> By default, the volumes with the highest/lowest amount of free space and the volumes with the highest/lowest fragmentation are flagged.		

**Table A-2 PRINT Command Syntax Reference (Part 2 of 2)**

Verb	Parameter	General Category
<sup>4</sup> The selection criteria select the volumes to be listed (LIST_VOLUMES parameter).		
<sup>5</sup> Storage group filter options parameters are valid only with the Group Analysis Report.		

The following table is a reference for SET command syntax

**Table A-3 SET Command Syntax Reference**

Verb	Parameters	Optional
SET	SCAN ( <i>truth value</i> ) - SIMULATION ( <i>truth value</i> ) - SYSTEM_ID ( <i>system name   asterisk</i> )	yes <sup>1 2</sup> yes yes <sup>2</sup>
<sup>1</sup> One, and only one, parameter must be specified on a given command. As many commands can be specified as required.		
<sup>2</sup> The system name is a four-character operating system SMF ID.		



---

# Appendix B DD Statements Reference

DD statements appear in the procedure in ascending order by DD name, with the exception of the STEPLIB DD statement, which immediately follows the EXEC statement. Listing the DD statements in ascending order makes it easier to override DD statements because they must be overridden in the order in which they appear in a procedure. A description of each DD statement and its associated data set follows.

Statement	Use
STEPLIB DD	Defines the <i>?prefix</i> .BBLINK library, which contains the SG-Auto load modules.
CMDPRINT DD	<p>Defines the sequential data set used for echo printing the control data set and listing messages associated with command interpretation. This data set is normally assigned to a system output device, but can define any sequential data set with fixed or fixed-blocked records. The record length must be 133, and the block size must be a multiple of the record length.</p> <p>If the CMDPRINT DD statement is not included in the SGA catalog procedure, all commands in the control data set are listed in the message data set defined by the RSIPRINT DD statement.</p> <p>If the CMDPRINT DD statement is allocated to a dummy data set, no echo print of the commands is provided. In this case, if a command has a syntax or specification error, the associated error message is redirected to the message data set.</p>
DEFNLIB DD	Defines the partitioned data set referred to as the definition library. The definition library contains the information that controls SG-Auto processing. Each member is made up of one or more eighty (80) byte logical records in either fixed or fixed-block format. <i>For the started task, the definition library must be the MAINVIEW SRM parmlib.</i> To create a test environment in batch, the user may override the DEFNLIB DD statement. In batch, the definition library can be any partitioned data set. If the DEFNLIB DD statement is overridden, all commands, matrices, CLISTS, and REXX EXECs must be contained in the partitioned data set specified.
JOBRPTS OUTPUT JCL	The JOBRPTS OUTPUT JCL statement specifies the sysout format options used by the PRINT command when the command is processed in batch. You can specify options such as FORMS, CHARS, FLASH, and FCB on this statement.

Statement	Use
JOBSYSIN DD	<p>The JOBSYSIN DD statement identifies the control data set read during batch execution. The DDNAME parameter postpones the definition of the data set until a DD statement with a DD name of SYSIN is encountered.</p> <p>The control data set can, therefore, reside in the input stream, but can be any sequential data set with fixed or fixed-block records. The record length must be 80 bytes, and the block size must be a multiple of the record length.</p> <p>The data set defined by this DD statement is not referenced during started task execution; therefore, there is no requirement to include a SYSIN DD statement for the started task.</p>
RSIPRINT DD	<p>Defines the sequential data set used for listing runtime messages. This data set is normally assigned to a system output device, but can define any sequential data set with fixed or fixed-blocked records. The logical record length must be 133, and the block size must be a multiple of the record length.</p>
STCRPTS OUTPUT JCL	<p>The STCRPTS OUTPUT JCL statement specifies the sysout format options used by the PRINT command when the command is processed by the SG-Auto started task. You can specify options such as FORMS, CHARS, FLASH, and FCB on this statement.</p>
STCSYSIN OUTPUT JCL	<p>The STCSYSIN DD statement identifies the control data set read by the SG-Auto started task. This data set must be in the MAINVIEW SRM parmlib.</p>

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## Appendix C Start, Cycle, and Stop Time Processing

The time period during which a pool, storage group, or volume is monitored is called a session. Monitor processing takes place at the beginning and at the end of a session. If the CYCLE parameter is specified, monitor processing also takes place at regular intervals throughout the session.

For example, the following command defines a session that is 12 hours long. The session begins at 6:00pm in the evening and ends the next morning at 6:00am. Monitor processing takes place every 2 hours: the first time at 6:00pm and the last time at 6:00am, for a total of 7 times.

```
MONITOR POOL(PRIMARY)-  
START(18:00)CYCLE(120)STOP(6:00)
```

If the START parameter is specified, a session begins at the specified start time. Otherwise, it begins at the next logical cycle after SG-Auto initialization is completed.

In the above command, if the START parameter was not specified and SG-Auto, itself, was started at 7:00pm, monitor processing for the PRIMARY pool would not begin until 8:00pm.

A session ends at the time specified by the STOP parameter. If the STOP parameter is omitted and the CYCLE parameter is specified, monitor processing takes place continuously at the frequency specified by the CYCLE parameter. This is called a never-ending session.

If the CYCLE parameter is omitted, monitor processing takes place just two times during the session: once at the beginning of the session, and once at the end of the session.

```
MONITOR POOL(PRIMARY)-  
START(18:00)STOP(6:00)
```

If both the **START** and **STOP** parameters are omitted, monitor processing takes place every 2 hours. This is another example of a never-ending session.

MONITOR POOL(PRIMARY)-  
CYCLE(120)

The **MONITOR** command *activates* a command processor for the specified storage pool; when it is deactivated depends upon the operating environment (subsystem or batch) and the combination of the **START**, **CYCLE**, and **STOP** parameters that is specified.

If the first command above is processed in batch, the command processor is deactivated immediately at the end of the session (6:00am), at which point the batch job step terminates.

However, if the command is processed by the subsystem, the command processor is *not* deactivated at the end of the session. Instead, the **START** parameter causes the command processor to perform the session daily, at the specified start and stop times.

The following table summarizes subsystem processing for different combinations of the **START**, **CYCLE**, and **STOP** parameters.

**Table C-1 Start, Cycle, and Stop Time Processing**

<b>Start</b>	<b>Cycle</b>	<b>Stop</b>	<b>Subsystem processing</b>
YES	YES	YES	The command is executed daily at the specified start time and remains active until the specified stop time. Its function is performed at the end of each cycle.
YES	YES	NO	The command is executed at the specified start time and never ends. Its function is performed at the end of each cycle. This combination is valid only for the subsystem.
YES	NO	YES	The command is executed daily at the specified start time and remains active until the specified stop time.
YES	NO	NO	The command is executed daily at the specified start time.
NO	YES	YES	The command is executed immediately and remains active until the specified stop time. Its function is performed at the end of each cycle.
NO	YES	NO	The command is executed immediately and never ends. Its function is performed at the end of each cycle. This combination is valid only for the subsystem.
NO	NO	YES	The command is executed immediately and remains active until the specified stop time.
NO	NO	NO	The command executes and terminates immediately.

---

Batch processing is similar, except commands are not executed daily. In addition, a stop time must be specified if a cycle time is specified. These differences prevent a batch job from permanently tying up an initiator.

The cycle time should be chosen carefully. The overhead incurred by the monitor function is directly related to how often monitor processing takes place.

An appropriate cycle time should be determined by noting the status messages printed at the end of each cycle. If usage of the resource being monitored is relatively constant, a larger cycle time should be specified. If the usage varies significantly, a smaller cycle time should be specified.

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# Appendix D Parameter and Column Reference

This appendix contains parameter reference for commands and matrices. Command parameter descriptions and matrix column descriptions can be found in the tables listed below.

Reference type	Table and page
MONITOR Command Parameter Descriptions	Table D-1 on page D-1
PRINT Command Parameter Descriptions	Table D-2 on page D-9
Monitor Matrix Column Descriptions	Table D-3 on page D-15
Message Recipient Matrix Column Descriptions	Table D-4 on page D-18
Automation Matrix Column Descriptions	Table D-5 on page D-20
Print Matrix Column Descriptions	Table D-6 on page D-24

## MONITOR Command Parameter Reference

The following table provides parameter descriptions for the MONITOR command. Table D-2 on page D-9 provides parameter descriptions for the PRINT command.

**Table D-1 MONITOR Command Parameter Descriptions (Part 1 of 8)**

Parameter	Description
<b>Object Parameters</b>	
MATRIX	Identifies a member of the SG-Auto parmlib that contains a monitor matrix. Each row of the matrix contains a set of parameter values for which the MONITOR command is executed.

Table D-1 MONITOR Command Parameter Descriptions (Part 2 of 8)

Parameter	Description
POOL	Specifies the name of a system storage pool or a user storage pool. User storage pools are defined in MAINVIEW SRM Global Administration. System storage pools are implicitly defined. Refer to the MAINVIEW SRM <i>StorageGUARD User Guide and Reference</i> for a detailed description of system and user storage pools.
VOLUME	Designates a specific volume in the storage subsystem. The volume must be online and accessible by the operating system under which SG-Auto is running. This parameter is especially useful when it is necessary to monitor or manage a specific volume (for example, dual-copy volume).
GROUP	Specifies the name of a DFSMS storage group. The group must be defined to the DFSMS subsystem.
<b>Time Specification Parameters</b>	
START	Specifies the time at which monitor session begins. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59. Examples of valid start times are 12:00 (noon) 0:00 (midnight) 8:00 (8:00am) 20:00 (8:00pm) 5:30 (5:30am) 17:30 (5:30pm)
CYCLE	Specifies the frequency at which monitor processing takes place. The time is specified in minutes. The range of values is from 1 to 720. Examples of valid cycle times are 1 (every minute) 20 (every 20 minutes) 60 (every hour) 720 (every 12 hours) The CYCLE parameter used in a MONITOR command overrides a monitor matrix.
STOP	Specifies the time at which a monitor session ends. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59. Examples of valid stop times are 12:00 (noon) 0:00 (midnight) 8:00 (8:00am) 20:00 (8:00pm) 5:30 (5:30am) 17:30 (5:30pm)

Table D-1 MONITOR Command Parameter Descriptions (Part 3 of 8)

Parameter	Description
WAIT	<p>Controls whether monitor processing begins immediately or is postponed until the next day if the start time has already passed. The WAIT parameter can be specified only if a start time is specified. It is inspected right after initialization is completed.</p> <p>If WAIT(YES) is specified, processing of the command does not begin until the next day at the specified start time. WAIT(YES) can, therefore, only be specified on a subsystem command. If WAIT(NO) is specified or the parameter is omitted, processing is <i>not</i> postponed until the next day. In this case, if a cycle time is specified, monitor processing does not take place until the <i>next</i> cycle.</p> <p>Example of WAIT parameter:</p> <pre>MONITOR POOL(TEST)-         START(6:00)CYCLE(60) STOP(18:00)-         WAIT(NO)</pre> <p>In this example, if SG-Auto is started at 6:05am, monitor processing for the TEST pool would not begin until 7:00am.</p> <p>Note, however, that if WAIT(YES) was specified, monitor processing would not begin until the next day at 6:00am.</p> <p>There is no corresponding column in the monitor matrix for the WAIT parameter.</p>
DAYS	<p>Specifies the days of the week, Sunday through Saturday, that the command is not processed. To skip processing on a given day, substitute an N in the position for that day.</p> <p>Example of DAYS parameter:</p> <pre>MONITOR POOL(TEST)-         START(6:00)CYCLE(60) STOP(18:00)-         DAYS(NMTWTFS)</pre> <p>In this example, processing would not occur on Sunday.</p>
<b>Automation Parameter</b>	
AUTOMATION_MATRIX	Specifies the name of the member that contains an automation matrix.
<b>Alarm Criteria Parameters</b>	

Table D-1 MONITOR Command Parameter Descriptions (Part 4 of 8)

Parameter	Description
UTILIZATION	<p>Monitors the percentage of total space that is allocated in a storage pool, storage group, or on a volume.</p> <p>The current utilization is calculated by dividing the total space allocated by the total capacity of the pool, group, or volume. All calculations are performed in bytes in order to provide device independence.</p> <p><b>TARGET (nn)</b> The TARGET subparameter specifies percentage of space allocated. The value range is from 1 to 100 percent.</p> <p>An alarm message warning of excessive free space is issued if the percentage of space allocated is less than the target percentage.</p> <p><b>THRESHOLD (nn)</b> The THRESHOLD subparameter specifies percentage of space allocated. The value range is from 0 to 99 percent.</p> <p>An alarm message warning of inadequate free space is issued if the percentage of space allocated is greater than the threshold percentage.</p> <p><b>LEVEL (POOL GROUP VOLUME)</b> The LEVEL subparameter determines whether the target and threshold percentages are applied at the pool, group, or volume level.</p> <p>The default is LEVEL(POOL). If LEVEL(VOLUME) is specified, alarm messages are issued if any volume in a pool violates the target or threshold percentage.</p> <p>The UTILIZATION TARGET parameter corresponds to the %UTIL MIN column in the monitor matrix; UTILIZATION THRESHOLD parameter corresponds to the %UTIL MAX column in the monitor matrix. There is no corresponding column in the monitor matrix for the LEVEL parameter.</p>
FREE_SPACE	<p>Monitors the amount of free space in a storage pool, storage group, or on a volume.</p> <p>In contrast to the UTILIZATION parameter, the FREE_SPACE parameter provides a way to monitor free space availability that is independent of the size of a pool, group, or volume.</p> <p><b>MINIMUM (nnnnn)</b> The MINIMUM subparameter specifies amount of free space in megabytes. The value range is from 1 to 99,999 megabytes.</p> <p>An alarm message warning of inadequate free space is issued if the amount of free space is less than the specified amount.</p> <p><b>MAXIMUM (nnnnn)</b> The MAXIMUM subparameter specifies amount of free space in megabytes. The value range is from 0 to 99,999 megabytes.</p> <p>An alarm message warning of excessive free space is issued if the amount of free space is greater than the specified amount.</p> <p><b>LEVEL (POOL GROUP VOLUME)</b> The LEVEL subparameter determines whether the free space amounts are applied at the pool, group, or volume level.</p> <p>The default is LEVEL(POOL). If LEVEL(VOLUME) is specified, alarm messages are issued if any volume in a pool violates the minimum or maximum free space.</p> <p>The FREE SPACE MINIMUM parameter corresponds to the FREE MB MIN column in the monitor matrix; FREE SPACE MAXIMUM parameter corresponds to the FREE MB MAX column in the monitor matrix. There is no corresponding column in the monitor matrix for the LEVEL parameter.</p>

Table D-1 MONITOR Command Parameter Descriptions (Part 5 of 8)

Parameter	Description
FRAG_INDEX	<p>Monitors the disk fragmentation. The fragmentation index is a number between 0 and 999 that indicates the degree of fragmentation. The larger the number, the more fragmented the free space.</p> <p>The fragmentation index is calculated based on the available free space, number of free space extents, and total device capacity. The calculated fragmentation index is compared to the values specified by the TARGET and THRESHOLD subparameters.</p> <p>If the POOL or GROUP parameter is specified, the free space fragmentation of each volume in the pool or group is monitored automatically.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p> <p><b>TARGET (nnn)</b></p> <p>The TARGET subparameter specifies a fragmentation index. The value range is from 0 to 999.</p> <p>An alarm message is issued if a volume's fragmentation index is less than the specified index.</p> <p>This subparameter is useful if you need to locate volumes with large free space extents quickly.</p> <p><b>THRESHOLD (nnn)</b></p> <p>The THRESHOLD subparameter specifies a fragmentation index. The value range is from 1 to 1000.</p> <p>An alarm message warning of potential space allocation failures is issued if a volume's fragmentation index is greater than the specified index.</p> <p>The FRAG_INDEX THRESHOLD parameter corresponds to the FRAG INDEX column in the monitor matrix. There is no corresponding column in the monitor matrix for the TARGET subparameter.</p>
FREE_DSCBS	<p>Monitors the number of free data set control blocks in a volume's VTOC.</p> <p>A free data set control block (format 0 DSCB) is required for each new data set allocated on a volume and for an existing data set that is allocated a fourth secondary extent. If all the data set control blocks in a VTOC are used (that is, the VTOC is full), no new data sets can be allocated on the volume, regardless of how much free space exists.</p> <p>If a pool or group is monitored, this parameter applies to each volume in the pool.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p> <p><b>MINIMUM (nnnn)</b></p> <p>The MINIMUM subparameter specifies the minimum number of free DSCBs to be maintained in a volume's VTOC.</p> <p>An alarm message warning of insufficient VTOC space is issued if the number of free DSCBs is less than the number specified.</p> <p><b>MAXIMUM (nnnn)</b></p> <p>The MAXIMUM subparameter specifies the maximum number of free DSCBs to be maintained in a volume's VTOC.</p> <p>An alarm message warning of excessive VTOC space is issued if the number of free DSCBs is greater than the number specified.</p> <p>The FREE_DSCBS MINIMUM parameter corresponds to the VOLUME VTOC DSCBS column in the monitor matrix. There is no corresponding column in the monitor matrix for the MAXIMUM subparameter.</p>

Table D-1 MONITOR Command Parameter Descriptions (Part 6 of 8)

Parameter	Description
FREE_VIRS	<p>Monitors the number of free index records in a volume's VTOC index.</p> <p>If a pool or group is monitored, this parameter applies to each volume in the pool.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p> <p><b>MINIMUM (nnnnn)</b></p> <p>The MINIMUM subparameter specifies the minimum number of free index records to be maintained in the index to a volume's VTOC.</p> <p>An alarm message warning of insufficient space in the VTOC index is issued if the number of free index records is less than the number specified.</p> <p><b>MAXIMUM (nnnnn)</b></p> <p>The MAXIMUM subparameter specifies the maximum number of free index records to be maintained in the index to a volume's VTOC.</p> <p>An alarm message warning of excessive space in the VTOC index is issued if the number of free index records is greater than the number specified.</p> <p>The FREE_VIRS MINIMUM parameter corresponds to the VOLUME VTOC VIRS column in the monitor matrix. There is no corresponding column in the monitor matrix for the MAXIMUM subparameter.</p>
VTOC_STATUS	<p>Monitors the status of a volume's VTOC.</p> <p>If NON-INDEXED is specified, an alarm message is issued if a volume does not have an indexed VTOC or its index is disabled.</p> <p>If DISABLED is specified, an alarm message is issued if the index to a volume's VTOC is disabled.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p> <p>A system-managed volume must have an indexed VTOC. If the index is disabled, DFSMS does not maintain utilization statistics for the volume. Therefore, it is very important to specify this parameter for a system-managed volume.</p> <p>The VTOC_STATUS parameter corresponds to the VOLUME VTOC STATUS column in the monitor matrix.</p>
<b>Message Recipient Parameters</b>	
USERID	<p>Specifies the TSO user ID or ROSCOE prefix of a storage administrator designated to receive messages.</p> <p>If the storage administrator is logged on and is accepting messages, a message is received at the terminal the next time the Enter key is pressed after the message has been sent.</p> <p>If the storage administrator is logged on but not receiving messages, messages are queued and not received until messages are being accepted.</p> <p>If the storage administrator is not logged on, messages are queued and not received until the next time the administrator logs on.</p> <p>There is no corresponding column in the monitor matrix for the USERID parameter. Multiple user IDs can be entered in a message recipient matrix.</p>

Table D-1 MONITOR Command Parameter Descriptions (Part 7 of 8)

Parameter	Description
MSGLIST	<p>Identifies a member of the SG-Auto parmlib that contains a message recipient matrix.</p> <p>Each row of the matrix specifies the user ID of a storage administrator designated to receive messages, the types of messages the administrator should receive, and optionally, the identification of specific messages to be included or excluded, the time period during which messages should be received, and the days of the week that messages should be received.</p> <p>See “How to Modify the Message Recipient Matrix” on page 2-8 for a description of how a message recipient matrix is processed and an example matrix.</p> <p>There is no corresponding column in the monitor matrix for the MSGLIST parameter.</p>
CONSOLE	<p>Controls the sending of alarm messages to the master console:</p> <p>CONSOLE (YES) alarm messages are sent to the console</p> <p>CONSOLE (NO) alarm messages are not sent to the console (default)</p> <p>The CONSOLE parameter does <i>not</i> affect the disposition of warning or error messages. If SG-Auto is running as a subsystem, these types of messages are always sent to the master console and written to the message data set.</p> <p>There is no corresponding column in the monitor matrix for the CONSOLE parameter.</p>

**Table D-1 MONITOR Command Parameter Descriptions (Part 8 of 8)**

Parameter	Description
SMS_OPTIONS	<p>Filters the MONITOR command by subsetting an SMS-controlled volume's space calculations based on the volume's SMS status. Storage group filter options can be used only with the GROUP parameter.</p> <p><b>DA</b>(<i>truth value</i>)                      The DA parameter controls filtering for volumes that have a DFSMS status of Disabled All, that is, the volume is disabled for allocations. The system cannot extend a data set that is on the volume and cannot allocate a new data set on it.</p> <p>DA(YES) Includes all volumes in the storage group that have a DFSMS status of Disabled All.</p> <p>DA(NO) Excludes all volumes in the storage group that have a DFSMS status of Disabled All</p> <p><b>DN</b>(<i>truth value</i>)                      The DN parameter controls the filtering for volumes that have a DFSMS status of Disabled New, that is, the system can extend a data set that is on the volume, but the system cannot create a new data set on that volume.</p> <p>DN(YES)Includes all volumes in the storage group that have a DFSMS status of Disabled New</p> <p>DN(NO)Excludes all volumes in the storage group that have a DFSMS status of Disabled New</p> <p><b>QA</b>(<i>truth value</i>)                      The QA parameter controls filtering for volumes that have a DFSMS status of Quiesed All, that is, disabled for allocations. The system cannot extend a data set that is on the volume and cannot allocate a new data set on it unless it is the only volume available.</p> <p>QA(YES) Includes all volumes in the storage group that have a DFSMS status of Quiesed All</p> <p>QA(NO) Excludes all volumes in the storage group that have a DFSMS status of Quiesed All</p> <p><b>QN</b>(<i>truth value</i>)                      The QN parameter controls filtering for volumes that have a DFSMS status of Quiesed New, that is, the system can extend a data set that is on the volume, but the system cannot allocate a new data set on that volume unless it is the only volume available.</p> <p>QN(YES) Includes all volumes in the storage group that have a DFSMS status of Quiesed New</p> <p>QN(NO) Excludes all volumes in the storage group that have a DFSMS status of Quiesed New</p> <p>There is no corresponding column in the monitor matrix for the SMS_OPTIONS parameter.</p>

## PRINT Command Parameter Reference

The following table provides parameter descriptions for the PRINT command.

Table D-2 PRINT Command Parameter Descriptions (Part 1 of 6)

Parameter	Description
<b>Object Parameters</b>	
MATRIX	Identifies a member of the SG-Auto parmlib that contains a print matrix. Each row of the matrix contains a set of parameter values for which the PRINT command is executed.
REPORT	Specifies the name of the report to be printed. There are two valid report names: Pool Analysis Report and Group Analysis Report. The Pool Analysis Report can be abbreviated PAR and the Group Analysis Report can be abbreviated SGAR. The Pool Analysis and the Group Analysis reports have several reports in each. By using the report format parameters and selection criteria, you can produce reports with just the information you need, and you can ensure this information is timely by triggering the report job by way of an automation matrix.
<b>Time Specification Parameters</b>	
START	Specifies the time at which the report is printed. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59. (The WAIT parameter controls whether print job begins immediately or is postponed until the next day if the start time has already passed. See the WAIT parameter for more details.) Examples of valid start times are: 12:00 (noon) 0:00 (midnight) 8:00 (8:00am) 20:00 (8:00pm) 5:30 (5:30am) 17:30 (5:30pm)
CYCLE	Specifies the frequency at which the job is printed. The time is specified in minutes. The range of values is from 1 to 720. Examples of valid cycle times are 1 (every minute) 20 (every 20 minutes) 60 (every hour) 720 (every 12 hours) The CYCLE parameter used in a PRINT command overrides a print matrix.
STOP	Specifies the time at which a print job ends. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59. Examples of valid stop times are 12:00 (noon) 0:00 (midnight) 8:00 (8:00am) 20:00 (8:00pm) 5:30 (5:30am) 17:30 (5:30pm)

Table D-2 PRINT Command Parameter Descriptions (Part 2 of 6)

Parameter	Description
WAIT	<p>Controls whether print job begins immediately or is postponed until the next day if the start time has already passed. The WAIT parameter can be specified only if a start time is specified. It is inspected right after initialization is completed.</p> <p>If WAIT(YES) is specified, processing of the command does not begin until the next day at the specified start time. WAIT(YES) can, therefore, only be specified on a subsystem command. If WAIT(NO) is specified or the parameter is omitted, processing is <i>not</i> postponed until the next day. In this case, if a cycle time is specified, print processing does not take place until the <i>next</i> cycle.</p> <p>Example of WAIT parameter:</p> <pre>PRINT REPORT (POOL_ANALYSIS)-       START(6:00)CYCLE(60)STOP(18:00)-       WAIT(NO)</pre> <p>In this example, if SG-Auto is started at 6:05am, the first report would not be printed until 7:00am.</p> <p>Note, however, that if WAIT(YES) was specified, the first report would not be printed until the next day at 6:00am.</p> <p>There is no corresponding column in the print matrix for the WAIT parameter.</p>
DAYS	<p>Specifies the days of the week, Sunday through Saturday, that the command is not processed. To skip processing on a given day, substitute an N in the position for that day.</p>
<b>Format Parameters</b>	
OUTPUT_DD	<p>Specifies the ddname of an OUTPUT JCL statement.</p> <p>The OUTPUT JCL statement allows you to set a host of special processing options for any printer, including printers controlled by Print Services Facility or the 3800 Printing Subsystem. Format options such as COPIES, FORMS, CHARS, FLASH, and FCB can be specified easily through the OUTPUT JCL statement. Refer to IBM <i>JCL Reference</i> for a complete description of the OUTPUT JCL statement.</p> <p>You can supply an OUTPUT JCL statement and refer to it using the OUTPUT_DD parameter. However, if the OUTPUT_DD parameter is not specified on the PRINT command, default options are obtained from one of two OUTPUT JCL statements in the SG-Auto cataloged procedure, as follows:</p> <p>If the OUTPUT_DD parameter is not specified in batch processing, the report is printed using the processing options specified on the JOBRPTS statement.</p> <p>If the OUTPUT_DD parameter is not specified in subsystem processing, the report is printed using the processing options specified on the STCRPTS statement.</p>
LINES_PER_PAGE	<p>Specifies the number of report lines to be printed per page. The default is sixty (60) lines per page.</p> <p>There is no corresponding column in the print matrix for the LINES_PER_PAGE parameter.</p>
LEGEND	<p>Controls the printing of the report legend.</p> <p>The report legend is printed at the end of the report, following the report summary line. The report shown in Figure 4-2 on page 4-2 includes the report legend.</p> <p>By default, the report legend is not printed.</p>

Table D-2 PRINT Command Parameter Descriptions (Part 3 of 6)

Parameter	Description
FLAG	<p>Sets report flagging options.</p> <p>This parameter is applicable only if volume information is requested by the LIST_VOLUMES parameter.</p> <p>By default, the volumes with the highest/lowest amount of free space (HFS/LFS), and the volumes with the highest/lowest fragmentation index (HFI/LFI) are flagged on the report. This enables you to spot these volumes quickly when all volumes are listed. One or more of the flags can be turned off.</p> <p>For example, the following command turns off all report flagging:</p> <pre>PRINT REPORT(POOL_ANALYSIS) - LIST_VOLUMES(YES) - FLAG(HFS(NO) LFS(NO) HFI(NO) LFI(NO))</pre> <p>The corresponding column in the print matrix for the FLAG parameter sets <i>all flags on or off</i>; no combination can be used.</p>
LIST_VOLUMES	<p>Requests volume summary information.</p> <p>If LIST_VOLUMES(YES) is specified, volume summary information is printed following the pool summary line for each storage pool (see example report shown in Figure 4-2 on page 4-2).</p> <p>If no selection criteria parameters are specified, all the volumes in each storage pool are listed. Otherwise, summary information is listed only for the volumes that satisfied the specified selection criteria.</p> <p>The LIST_VOLUMES parameter corresponds to the VOLUMES column in the print matrix.</p>
<b>Selection Criteria</b>	
UTILIZATION	<p>Selects volumes based on the percentage of allocated space.</p> <p>The current utilization is calculated by dividing the space allocated by the volume capacity. All calculations are performed in bytes in order to provide device independence.</p> <p><b>TARGET (nn)</b></p> <p>The TARGET subparameter specifies percentage of space allocated. The value range is from 1 to 100 percent.</p> <p>Summary information is printed for a volume if the percentage of space allocated is less than the target percentage.</p> <p><b>THRESHOLD (nn)</b></p> <p>The THRESHOLD subparameter specifies percentage of space allocated. The value range is from 0 to 99 percent.</p> <p>Summary information is printed for a volume if the percent of space allocated is greater than the threshold percentage.</p> <p>The UTILIZATION TARGET parameter corresponds to the %UTIL MIN column in the print matrix; UTILIZATION THRESHOLD parameter corresponds to the %UTIL MAX column in the print matrix.</p>

Table D-2 PRINT Command Parameter Descriptions (Part 4 of 6)

Parameter	Description
FREE_SPACE	<p>Selects volumes based on the amount of free space.</p> <p>In contrast to the UTILIZATION parameter, the FREE_SPACE parameter provides a way to select volumes with a given amount of free space, regardless of the individual capacities of the volumes.</p> <p><b>MINIMUM</b> (<i>nnnnn</i>) The MINIMUM subparameter specifies amount of free space in megabytes. The value range is from 1 to 99,999 megabytes. Summary information is printed for a volume if the amount of free space is less than the specified amount.</p> <p><b>MAXIMUM</b> (<i>nnnnn</i>) The MAXIMUM subparameter specifies amount of free space in megabytes. The value range is from 0 to 99,999 megabytes. Summary information is printed for a volume if the amount of free space is greater than the specified amount.</p> <p>The FREE SPACE MINIMUM parameter corresponds to the FREE MB MIN column in the print matrix; FREE SPACE MAXIMUM parameter corresponds to the FREE MB MAX column in the print matrix.</p>
FRAG_INDEX	<p>Selects volumes based on the degree of free space fragmentation. The fragmentation index is a number between 0 and 999 that indicates the degree of fragmentation. The larger the number, the more fragmented the free space.</p> <p>The fragmentation index is calculated based on the available free space, number of free space extents, and total device capacity. The calculated fragmentation index is compared to the values specified by the TARGET and THRESHOLD subparameters.</p> <p><b>TARGET</b> (<i>nnn</i>) The TARGET subparameter specifies a fragmentation index. The value range is from 0 to 999. Summary information is printed for a volume if the volume's fragmentation index is less than the specified index. This subparameter is especially useful if you need to locate volumes with large free space extents quickly.</p> <p><b>THRESHOLD</b> (<i>nnn</i>) The THRESHOLD subparameter specifies a fragmentation index. The value range is from 1 to 1000. Summary information is printed for a volume if the volume's fragmentation index is greater than the specified index.</p> <p>The FRAG_INDEX THRESHOLD parameter corresponds to the FRAG INDEX column in the print matrix. There is no corresponding column in the print matrix for the TARGET subparameter.</p>
FREE_DSCBS	<p>Selects volumes based on the number of free VTOC data set control blocks.</p> <p><b>MINIMUM</b> (<i>nnnnn</i>) The MINIMUM subparameter specifies the minimum number of free DSCBs. Summary information is printed for a volume if the number of free DSCBs is less than the number specified.</p> <p><b>MAXIMUM</b> (<i>nnnnn</i>) The MAXIMUM subparameter specifies the maximum number of free DSCBs. Summary information is printed for a volume if the number of free DSCBs is greater than the number specified.</p> <p>The FREE_DSCBS MINIMUM parameter corresponds to the VOLUME VTOC DSCBS column in the print matrix. There is no corresponding column in the print matrix for the MAXIMUM subparameter.</p>

**Table D-2 PRINT Command Parameter Descriptions (Part 5 of 6)**

<b>Parameter</b>	<b>Description</b>
FREE_VIRS	<p>Selects volumes based on the number of free VTOC index records.</p> <p><b>MINIMUM</b> (<i>nnnnn</i>) The MINIMUM subparameter specifies the minimum number of free index records in a volume's VTOC index. Summary information is printed for a volume if the number of free index records is less than the number specified.</p> <p><b>MAXIMUM</b> (<i>nnnnn</i>) The MAXIMUM subparameter specifies the maximum number of free index records in a volume's VTOC index. Summary information is printed for a volume if the number of free index records is greater than the number specified. The FREE_VIRS MINIMUM parameter corresponds to the VOLUME VTOC VIRS column in the print matrix.</p>
VTOC_STATUS	<p>Selects volumes based on VTOC status.</p> <p>If NON-INDEXED is specified, summary information is printed if a volume does not have an indexed VTOC or its index is disabled.</p> <p>If DISABLED is specified, summary information is printed if the index to a volume's VTOC is disabled.</p> <p>The VTOC_STATUS parameter corresponds to the VOLUME VTOC STATUS column in the print matrix.</p>
<b>Message Recipient Parameters</b>	
USERID	<p>Specifies the TSO user ID or ROSCOE prefix of a storage administrator designated to receive the print job.</p> <p>There is no corresponding column in the print matrix for the USERID parameter. Multiple user IDs can be entered in a message recipient matrix.</p>
MSGLIST	<p>Identifies a member of the SG-Auto parmlib that contains a message recipient matrix.</p> <p>There is no corresponding column in the print matrix for the MSGLIST parameter.</p>
CONSOLE	<p>Controls the sending of print jobs to the master console:</p> <p>CONSOLE (YES) messages regarding print status are sent to the console CONSOLE (NO) no messages are sent to the console (default)</p> <p>There is no corresponding column in the print matrix for the CONSOLE parameter.</p>

**Table D-2 PRINT Command Parameter Descriptions (Part 6 of 6)**

<b>Parameter</b>	<b>Description</b>
SMS_OPTIONS	<p>Filters the PRINT command by subsetting an SMS-controlled volume's space calculations based on the volume's SMS status. Storage group filter options can be used only with the storage Group Analysis report.</p> <p><b>DA</b>(<i>truth value</i>) The DA parameter controls filtering for volumes that have a DFSMS status of Disabled All. DA(YES) Includes all volumes in the storage group that have a DFSMS status of Disabled All. DA(NO) Excludes all volumes in the storage group that have a DFSMS status of Disabled All</p> <p><b>DN</b>(<i>truth value</i>) The DN parameter controls the filtering for volumes that have a DFSMS status of Disabled New. DN(YES) Includes all volumes in the storage group that have a DFSMS status of Disabled New DN(NO) Excludes all volumes in the storage group that have a DFSMS status of Disabled New</p> <p><b>QA</b>(<i>truth value</i>) The QA parameter controls filtering for volumes that have a DFSMS status of Quiesced All. QA(YES) Includes all volumes in the storage group that have a DFSMS status of Quiesced All QA(NO) Excludes all volumes in the storage group that have a DFSMS status of Quiesced All</p> <p><b>QN</b>(<i>truth value</i>) The QN parameter controls filtering for volumes that have a DFSMS status of Quiesced New. QN(YES) Includes all volumes in the storage group that have a DFSMS status of Quiesced New QN(NO) Excludes all volumes in the storage group that have a DFSMS status of Quiesced New</p> <p>There is no corresponding column in the print matrix for the SMS_OPTIONS parameter.</p>

## Monitor Matrix Column Reference

Table D-3 provides column descriptions for the monitor matrix shown in the following figure.

Figure D-1 Monitor Matrix

MONITOR MATRIX											
O B J E C T N A M E	C O N T R O L I D	A U T O M A T I O N	ALARM CRITERIA					TIME SPECIFICATIONS			
			FREE MB %UTIL	R A	VOLUME VTOC	S T	C Y	S T	D A		
TEST	P01	SMAMTAxx	30%	90%	450	100	50	07:00	60	19:00	NMTWTFN
WORK	P02	SMAMTAxx	30%	80%	450	100	50		30		SMTWTFN
SMSGRP1	S01		30%	90%	450	100	50	07:00	60	10:00	NMTWTFN
SMSGRP2	S02		30%	80%	450	100	50		30		SMTWTFN
VOL001	V01	SMAMTAxx	30%	80%	450	100	50		30		SMTWTFN

Table D-3 Monitor Matrix Column Descriptions (Part 1 of 3)

Column	Description
OBJECT NAME	Specifies the names of pools, storage groups, and volumes to be monitored. The OBJECT NAME column corresponds to the POOL, GROUP, and VOLUME parameters in the MONITOR command.
CONTROL ID	Specifies a unique, three-character control ID assigned to each pool, group, and volume. The first letter of the control ID indicates the object type: P for pool, S for storage group, and V for volume. A monitor matrix can specify any number of pools, groups, or volumes. There is no corresponding parameter in the MONITOR command for the CONTROL ID.
AUTOMATION	Specifies the name of the automation matrix member used for each pool, storage group, and volume. The AUTOMATION column corresponds to the AUTOMATION_MATRIX parameter in the MONITOR command.
<b>ALARM CRITERIA</b>	

**Table D-3 Monitor Matrix Column Descriptions (Part 2 of 3)**

Column	Description
FREE MB %UTIL	<p>Specifies free space in megabytes or percentage utilized.</p> <p>If the number specified in either column does not end with a percent sign, the number corresponds to the MINIMUM or MAXIMUM subparameter for the FREE SPACE parameter.</p> <p>If the number ends with a percent sign (%), it corresponds to the TARGET or THRESHOLD subparameter of the UTILIZATION parameter.</p> <p>The FREE MB MIN column corresponds to the FREE SPACE MINIMUM parameter in the MONITOR command; FREE MB MAX column corresponds to the FREE SPACE MAXIMUM parameter in the MONITOR command.</p> <p>The %UTIL MIN column corresponds to the UTILIZATION TARGET parameter in the MONITOR command; %UTIL MAX column corresponds to the UTILIZATION THRESHOLD parameter in the MONITOR command.</p>
FRAG INDEX	<p>Specifies the degree of fragmentation at which an alarm messages is to be issued. The fragmentation index is a number between 0 and 999 that indicates the degree of fragmentation, which is calculated based on the available free space, number of free space extents, and total device capacity. The larger the number, the more fragmented the free space.</p> <p>The FRAG INDEX column corresponds to the FRAG_INDEX THRESHOLD parameter in the MOINTOR command. There is no corresponding column in the monitor matrix for the TARGET subparameter in the MONITOR command.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>
<b>VOLUME VTOC</b>	
DSCBS	<p>Specifies the minimum number of free data set control blocks to be maintained in a volume's VTOC.</p> <p>A free data set control block (format 0 DSCB) is required for each new data set allocated on a volume and for an existing data set that is allocated a fourth secondary extent. If all the data set control blocks in a VTOC are used (that is, the VTOC is full), no new data sets can be allocated on the volume, regardless of how much free space exists.</p> <p>If a pool or group is monitored, this parameter applies to each volume in the pool.</p> <p>An alarm message warning of insufficient VTOC space is issued if the number of free DSCBs is less than the number specified.</p> <p>The VOLUME VTOC DSCBS column corresponds to the FREE_DSCBS MINIMUM parameter in the MONITOR command. There is no corresponding column in the monitor matrix for the MAXIMUM subparameter.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>
VIRS	<p>Specifies the minimum number of free index records to be maintained in the index to a volume's VTOC.</p> <p>An alarm message warning of insufficient space in the VTOC index is issued if the number of free index records is less than the number specified.</p> <p>The VOLUME VTOC VIRS column corresponds to the FREE_VIRS MINIMUM parameter in the MONITOR command. There is no corresponding column in the monitor matrix for the MAXIMUM subparameter.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>

**Table D-3 Monitor Matrix Column Descriptions (Part 3 of 3)**

Column	Description
STATUS	<p>Specifies the status of a volume's VTOC.</p> <p>If non-indexed (N) is specified, an alarm message is issued if a volume does not have an indexed VTOC or its index is disabled.</p> <p>If <i>blank</i> is specified, no VTOC alarm messages are sent.</p> <p>If disabled (D) is specified, an alarm message is issued if the index to a volume's VTOC is disabled.</p> <p>A system-managed volume must have an indexed VTOC. If the index is disabled, DFSMS does not maintain utilization statistics for the volume. Therefore, it is very important to specify this parameter for a system-managed volume.</p> <p>The VOLUME VTOC STATUS column corresponds to the VTOC_STATUS parameter in the MONITOR command.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>
<b>TIME SPECIFICATIONS</b>	
START	<p>Specifies the time at which monitor session begins. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59.</p> <p>Examples of valid start times are</p> <p>12:00 (noon) 0:00 (midnight)</p> <p>8:00 (8:00am) 20:00 (8:00pm)</p> <p>5:30 (5:30am) 17:30 (5:30pm)</p>
CYCLE	<p>Specifies the frequency at which monitor processing takes place. The time is specified in minutes. The range of values is from 1 to 720.</p> <p>Examples of valid cycle times are</p> <p>1 (every minute) 20 (every 20 minutes)</p> <p>60 (every hour) 720 (every 12 hours)</p> <p>The CYCLE parameter used in a MONITOR command overrides a monitor matrix.</p>
STOP	<p>Specifies the time at which a monitor session ends. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59.</p> <p>Examples of valid stop times are</p> <p>12:00 (noon) 0:00 (midnight)</p> <p>8:00 (8:00am) 20:00 (8:00pm)</p> <p>5:30 (5:30am) 17:30 (5:30pm)</p>
DAYS	<p>Specifies the days of the week, Sunday through Saturday, that the command is not processed. To skip processing on a given day, substitute an N in the position for that day.</p>

## Message Recipient Matrix Column Reference

A message recipient matrix can

- Designate multiple users to receive messages by message type
- Include or exclude specific messages
- Specify a specific time window

- Designate specific days on which messages should be sent or suppressed

Message recipient criteria can only be specified through the message recipient matrix. There are no corresponding commands for establishing this criteria.

**Figure D-2 Message Recipient Matrix**

M E S S A G E R E C I P I E N T M A T R I X									
	T Y P E S			I D ' S		M E S S A G E C O N T R O L			U S E R ' S N A M E
U									
S	S	W	E	I	E	T I M E			
E	T	A	R	N	X	W I N D O W		D	
R	A	R	V	C	C	-----			A
I	T	N	O	L	L	F			Y
D	U	I	R	U	U	R	T	S	
	S	N	E	D	D	O	O		
	G			E	E	M		SMTWTFS	
TSOUSR1	Y	Y	Y	SGA002I				SMTWTFS	JANE OPERATOR
				SGA006I				SMTWTFS	
	F	-	-	SGA002I				SMTWTFS	
TSOUSR2	O	O	O					SNNNNNS	WEEKEND OPER
TSOUSR3	Y	N	N	SGA004W				NMTWTFN	JOHN USER

The following table provides column descriptions for the message recipient matrix shown in the previous figure.

**Table D-4 Message Recipient Matrix Column Descriptions (Part 1 of 2)**

Column	Description
USER ID	<p>Specifies TSO user IDs or ROSCOE prefix of a user designated to receive messages. If the user ID column is blank, the entry from the previous row is carried forward.</p> <p>The message processing facility does not require the user ID to actually be defined to the corresponding subsystem (TSO or ROSCOE).</p> <p>If the user ID is not defined, it is ignored (no error message is printed). This allows you to share a message recipient matrix between multiple operating systems without getting matrix specification errors.</p> <p>If the USERID parameter on a function command specifies the same user ID as one specified in a message recipient matrix (referred to by the command), the user ID specified in the matrix is ignored (no warning message is printed). This allows you to override the matrix specification.</p>

**Table D-4 Message Recipient Matrix Column Descriptions (Part 2 of 2)**

Column	Description
TYPES	<p>Specifies types of messages the user should receive, and optionally for each type, whether the user must be logged on or logged off. For each message type, STATUS, WARNING, ERROR, and SEVERE, the following values are valid:</p> <p>Y- the user should receive messages of this type  N- the user should not receive messages of this type  O- the user should receive messages of this type only if logged on  F- the user should receive messages of this type only if logged off  — a dash can be specified in a continuation row to indicate that the message type indicator should not be tested</p> <p>The message type indicators must be set on the first row for each user designated to receive messages. If the indicators are not specified on a continuation row, the indicators from the first row specified for the user are propagated.</p>
<b>IDs</b>	
INCLUDE	Specifies message IDs of specific messages the user should receive when not eligible to receive all messages of the same type.
EXCLUDE	Specifies message IDs of specific messages the user should <i>not</i> receive when eligible to receive all messages of the same type.
TIME WINDOW	Specifies beginning and ending times, based on the 24-hour clock, during which the message criteria specified by this row apply.
DAYS	<p>Specifies days of the week, Sunday through Saturday, that the message criteria specified by this row should be ignored.</p> <p>The default for this column is SMTWTFS. To prevent messages from being sent on a given day, substitute an N in the position for that day.</p>
USER'S NAME	Specifies the user's name. This column is for documentation purposes only.

## Automation Matrix Column Reference

The automation matrix stores procedures that are executed based on action trigger criteria, time of day, and execution control specifications. Each procedure performs a specific task designed to free storage space. Procedures can be staged to be executed in tandem depending on the status of the system after the preceding procedure. There are no corresponding commands for executing automated procedures.

Figure D-3 Automation Matrix

A U T O M A T I O N M A T R I X														
P R O C E D U R E	C O N T R O L I D	A C T I O N T R I G G E R S						T I M E W I N D O W		E X E C U T I O N C O N T R O L				
		F R E E M B % U T I L		F R A G M E N T	V O L U M E V T O C		B E G I N	E N D	W M A P D	A A F R A	I X T O Y	E M S		
PROC05C	J01	90%	P									1		
PROC05D	J02	90%	P									1	J01	
CMD001A	S01	90%	P									1	J02	
CLIST1A	C01	90%	P									1	S01	
REXX01A	R01	90%	P									1	C01	
PROC06A	J03	90%	V	450				18:00	24:00			1		

The following table provides column descriptions for the automation matrix shown in the previous figure.

Table D-5 Automation Matrix Column Descriptions (Part 1 of 4)

Column	Description
PROCEDURE	Specifies the name of a storage management procedure. The procedure must be stored in a member that has the same name as the procedure name. The member must reside in the SG-Auto definition library. There is no limit to the number of procedures that can be specified in an automation matrix. Storage management procedures are built using the skeleton tailoring facility (see Appendix E, "Skeleton Tailoring Facility" for details).
CONTROL ID	Unique, three-character control ID assigned to the procedure. The first letter of the control ID indicates the procedure type, as follows: J - Job procedure SG-Auto writes the job to the internal reader for processing by the job entry subsystem. JES2 and JES3 are both supported. C - TSO CLIST SG-Auto attaches the TMP (terminal monitor program), passing it the procedure name. R - REXX program SG-Auto calls the REXX interpreter to execute the program. S - System command list SG-Auto uses the OS/390 operator command facility to issue system commands (a system command list consists of one or more OS/390 commands). Each procedure must be assigned a unique control ID. An automation matrix can specify any number of procedures, of any type, in any combination.

Table D-5 Automation Matrix Column Descriptions (Part 2 of 4)

Column	Description
LEVEL	<p>Specifies the level indicator (P, S, or V).</p> <p>If V is specified, the utilization and/or free space tests are made at the volume level.</p> <p>If P is specified, the utilization and/or free space tests are made at the pool level.</p> <p>If S is specified, the utilization and/or free space tests are made at the DFSMS storage group level.</p>
MIN FREE MB	<p>Number that represents a minimum amount of free space, in megabytes. The number must be right-justified in the column and be in the range from 0 to 9,999.</p> <p>This action trigger tests true if the amount of free space is less than the specified amount.</p> <p>If the level indicator is set to V, the test is made at the volume level. Any volume in the pool that has less than the specified amount of free space causes the action trigger to test true. If the procedure is triggered for execution, only the volumes in the pool for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>If the level indicator is set to P, the test is made at the pool level. The action trigger tests true only if the amount of free space in the pool is less than the specified amount. If the procedure is triggered for execution, all of the volumes in the pool are passed to the skeleton tailoring facility.</p> <p>If the level indicator is set to S, the test is made at the DFSMS storage group level. The action trigger tests true only if the amount of free space in the storage group is less than the specified amount. If the procedure is triggered for execution, all of the volumes in the storage group are passed to the skeleton tailoring facility.</p>
MAX FREE MB	<p>Number that represents a maximum amount of free space, in megabytes. The number must be right-justified in the column and be in the range from 0 to 9,999.</p> <p>This action trigger tests true if the amount of free space is greater than the specified amount.</p> <p>If the level indicator is set to V, the test is made at the volume level. Any volume in the pool that has more than the specified amount of free space causes the action trigger to test true. If the procedure is triggered for execution, only the volumes in the pool for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>If the level indicator is set to P, the test is made at the pool level. The action trigger tests true only if the amount of free space in the pool is greater than the specified amount. If the procedure is triggered for execution, all of the volumes in the pool are passed to the skeleton tailoring facility.</p> <p>If the level indicator is set to S, the test is made at the DFSMS storage group level. The action trigger tests true only if the amount of free space in the storage group is greater than the specified amount. If the procedure is triggered for execution, all of the volumes in the storage group are passed to the skeleton tailoring facility.</p>
MIN %UTIL	<p>A percentage from 1 to 100 percent. The number must be right-justified in the column and must include a percent (%) sign in the right-most position.</p> <p>This action trigger tests true if the percent of allocated space is less than the specified percentage.</p> <p>If the level indicator is set to V, the test is made at the volume level. Any volume in the pool whose utilization is less than the specified percentage causes the action trigger to test true. If the procedure is triggered for execution, only the volumes in the pool for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>If the level indicator is blank or set to P, the test is made at the pool level. The action trigger tests true only if the utilization of the pool is less than the specified percentage. If the procedure is triggered for execution, all of the volumes in the pool are passed to the skeleton tailoring facility.</p> <p>If the level indicator is set to S, the test is made at the DFSMS storage group level. The action trigger tests true only if the utilization of the storage group is less than the specified amount. If the procedure is triggered for execution, all of the volumes in the storage group are passed to the skeleton tailoring facility.</p>

**Table D-5 Automation Matrix Column Descriptions (Part 3 of 4)**

Column	Description
MAX %UTIL	<p>Specifies a percentage from 0 to 99 percent. The number must be right-justified in the column and must include a percent (%) sign in the right-most position.</p> <p>This action trigger tests true if the percent of allocated space is greater than the specified percentage.</p> <p>If the level indicator is set to V, the test is made at the volume level. Any volume in the pool whose utilization is greater than the specified percentage causes the action trigger to test true. If the procedure is triggered for execution, only the volumes in the pool for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>If the level indicator is blank or set to P, the test is made at the pool level. The action trigger tests true only if the utilization of the pool is greater than the specified percentage. If the procedure is triggered for execution, all of the volumes in the pool are passed to the skeleton tailoring facility.</p> <p>If the level indicator is set to S, the test is made at the DFSMS storage group level. The action trigger tests true only if the utilization of the storage group is greater than the specified amount. If the procedure is triggered for execution, all of the volumes in the storage group are passed to the skeleton tailoring facility.</p>
FRAG INDEX	<p>Specifies a number between 0 and 999 that indicates the degree of free space fragmentation. SG-Auto calculates a fragmentation index based on the available free space, number of free space extents, and total device capacity. The larger the number, the more fragmented the free space.</p> <p>If the level indicator is set to V, P, or S the test is made at the volume level. Any volume in the pool or group whose fragmentation index is greater than the specified number causes the action trigger to test true. If the procedure is triggered for execution, only the volumes in the pool or storage group for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>
<b>VOLUME VTOC</b>	
DSCBS	<p>Specifies the number of free data set control blocks in a volume's VTOC.</p> <p>If the level indicator is set to V, P, or S the test is made at the volume level. This action trigger tests true if the number of free DSCBs in the VTOC of any volume in the pool or group is less than the number specified. If the procedure is triggered for execution, only the volumes in the pool or group for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>
VIRS	<p>Specifies the number of free index records in a volume's VTOC index.</p> <p>If the level indicator is set to V, P, or S the test is made at the volume level. This action trigger tests true if the number of free VIRSs in the VTOC index for any volume in the pool or group is less than the number specified. If the procedure is triggered for execution, only the volumes in the pool or group for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>

Table D-5 Automation Matrix Column Descriptions (Part 4 of 4)

Column	Description
STATUS	<p>Specifies the VTOC status indicator: N (none) or D (disabled).</p> <p>If N is specified, the action trigger tests true if any volume in the pool does not have a VTOC index.</p> <p>If D is specified, the action trigger tests true if any volume in the pool has a VTOC index that is disabled.</p> <p>If the procedure is triggered for execution, only the volumes in the pool or group for which the action trigger tested true are passed to the skeleton tailoring facility.</p> <p>This parameter is not supported without DFSMS. You may code tests for this parameter, but you will receive message SGA608W for each task that begins and processes a monitor matrix or monitor command with this parameter.</p>
TIME WINDOW BEGIN/END	<p>Specifies the time window in which the procedure is allowed to execute. The time window defined by the begin and end times must fall within the time period during which the pool, group, or volume is monitored.</p> <p>The begin and end times are specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59. The end time can be less than the begin time. This allows a time window to span midnight.</p> <p>The end time can also equal the begin time. This allows a procedure to be scheduled for execution at a given time.</p> <p>The time window is checked only on each cycle. Therefore, if the begin time is the same as the end time, the time chosen must fall on a cycle boundary.</p>
<b>EXECUTION CONTROL</b>	
WAIT TIME	<p>Specifies the minimum amount of time that must elapse between successive executions of the procedure.</p> <p>The wait time is specified in minutes. The value range is from 1 to 999.</p> <p>The amount of time that has elapsed since the last execution of the procedure is measured from the time the procedure completed, not the time at which execution began.</p> <p>If the specified wait time has not elapsed, an information message is printed and execution of the procedure is bypassed.</p>
MAX EXEC	<p>Specifies the maximum number of times the procedure can be executed in a given session.</p> <p>If the maximum execution count is reached, an information message is printed and execution of the procedure is suppressed.</p>
AFTER	<p>Specifies the control ID assigned to a previously specified procedure.</p> <p>Execution of the procedure is dependent upon the successful execution of the procedure with the assigned control ID.</p>
PROMPT	<p>Specifies whether a prompt message is issued (Y/N). If Y is specified, the following message is sent to the operator's console:</p> <p>SGA044I: <i>procname</i> READY FOR EXECUTION, REPLY 'GO' OR 'CANCEL'</p> <p>If the reply is CANCEL, an information message is printed and the procedure is not executed.</p>
DAYS	<p>Specifies the days of the week, Sunday through Saturday, that the procedure cannot be executed.</p> <p>The default for this column is SMTWTFS. To prevent a procedure from being executed on a given day, substitute an N in the position for that day.</p> <p>For example, to prevent a procedure from being executed on Sundays, enter NMTWTFS in the days column of the row corresponding to the procedure.</p>

# Print Matrix Column Reference

Table D-6 provides column descriptions for the print matrix shown in the following figure.

Figure D-4 Print Matrix

P R I N T M A T R I X													
R E P O R T	C O N T R O L	O U T P U T	R E P O R T F O R M A T	VOLUME SELECTION						TIME SPECIFICATIONS			
				FREE MB	%UTIL	F R A G M E N T S	V O L U M E	V O L U M E	V O L U M E	S T A R T	C O N D I T I O N S	S T O P	D U R A T I O N
PAR	R01	RPTFM1	Y Y	92%	750	35	20	D	14:00				NNNNTNN
PAR	R02	RPTFM1	Y Y	75%					09:00				NNNNTFN
PAR	R03	RPTFM1	Y Y	90%	500			D	17:00	180	05:00		NNNNTFN
PAR	R04	RPTFM2	N Y						09:00				NMTWTFN

Table D-6 Print Matrix Column Descriptions

Parameter	Description
REPORT NAME	Specifies the name of the report to be printed. There are two valid report names: PAR for Pool Analysis report SGAR for Storage Group Analysis report The Pool Analysis and the Group Analysis reports have several reports in each.
CONTROL ID	Specifies a unique, three-character control ID, beginning with an R, assigned to the report. There is no corresponding parameter in the PRINT command for the CONTROL ID.
<b>REPORT FORMAT</b>	
OUTPUT DD	Specifies the ddname of an OUTPUT JCL statement. The OUTPUT JCL statement allows you to set a host of special processing options for any printer, including printers controlled by Print Services Facility or the 3800 Printing Subsystem. Format options such as COPIES, FORMS, CHARS, FLASH, and FCB can be specified easily through the OUTPUT JCL statement. Refer to IBM <i>JCL Reference</i> for a complete description of the OUTPUT JCL statement.

Table D-6 Print Matrix Column Descriptions (continued)

Parameter	Description
OUTPUT DD (continued)	<p>You can supply an OUTPUT JCL statement and refer to it using the OUTPUT DD parameter. However, if the OUTPUT DD parameter is not specified on the PRINT command, default options are obtained from one of two OUTPUT JCL statements in the SG-Auto cataloged procedure, as follows:</p> <p>If the OUTPUT DD parameter is not specified in batch processing, the report is printed using the processing options specified on the JOBRPTS statement.</p> <p>If the OUTPUT DD parameter is not specified in subsystem processing, the report is printed using the processing options specified on the STCRPTS statement.</p>
VOLUMES	<p>Requests volume summary information.</p> <p>If Y is specified, volume summary information is printed following the pool summary line for each storage pool (see example report shown in Figure 4-2 on page 4-2).</p> <p>If no selection criteria parameters are specified, all the volumes in each storage pool are listed. Otherwise, summary information is listed only for the volumes that satisfied the specified selection criteria.</p> <p>The VOLUMES column corresponds to the LIST_VOLUMES parameter in the PRINT command.</p>
LEGEND	<p>Controls the printing of the report legend.</p> <p>The report legend is printed at the end of the report, following the report summary line. The report shown in Figure 4-2 on page 4-2 includes the report legend.</p> <p>By default, the report legend is not printed.</p>
FLAGS	<p>Sets report flagging options.</p> <p>If Y (default) is specified, the volumes with the highest/lowest amount of free space (HFS/LFS), and the volumes with the highest/lowest fragmentation index (HFI/LFI) are flagged on the report. If N is specified, all flags are off.</p> <p>This parameter is applicable only if volume information is requested in the VOLUMES column. Using the print matrix, <b>all</b> flags are either <b>on</b> or <b>off</b>.</p> <p>The corresponding FLAG parameter in the PRINT command allows you to set flags independently for each of four subparameters.</p>
<b>VOLUME SELECTION</b>	
FREE MB %UTIL	<p>Specifies free space in megabytes or percentage utilized.</p> <p>If the number specified in either column does not end with a percent sign, the number corresponds to the MINIMUM or MAXIMUM subparameter for the FREE SPACE parameter.</p> <p>If the number ends with a percent sign (%), it corresponds to the TARGET or THRESHOLD subparameter of the UTILIZATION parameter.</p> <p>The FREE MB MIN column corresponds to the FREE SPACE MINIMUM parameter in the PRINT command; FREE MB MAX column corresponds to the FREE SPACE MAXIMUM parameter in the PRINT command.</p> <p>The %UTIL MIN column corresponds to the UTILIZATION TARGET parameter in the PRINT command; %UTIL MAX column corresponds to the UTILIZATION THRESHOLD parameter in the PRINT command.</p>
FRAG INDEX	<p>Selects volumes based on the degree of free space fragmentation.</p> <p>The fragmentation index is a number between 0 and 999 that indicates the degree of fragmentation, which is calculated based on the available free space, number of free space extents, and total device capacity. The larger the number, the more fragmented the free space.</p> <p>The FRAG INDEX column corresponds to the FRAG_INDEX THRESHOLD parameter in the PRINT command. There is no corresponding column in the print matrix for the TARGET subparameter of the PRINT command.</p>

**Table D-6 Print Matrix Column Descriptions (continued)**

Parameter	Description
<b>VOLUME VTOC</b>	
DSCBS	Selects volumes based on the number of free VTOC index records.
VIRS	Selects volumes based on the number of free index records to be maintained in the index to a volume's VTOC.
STATUS	Selects volumes based on VTOC status. If non-indexed (N) is specified, summary information is printed if a volume does not have an indexed VTOC or its index is disabled. If disabled (D) is specified, summary information is printed if the index to a volume's VTOC is disabled. The VOLUME VTOC STATUS column in the print matrix corresponds to the VTOC_STATUS parameter in the PRINT command.
<b>TIME SPECIFICATIONS</b>	
START	Specifies the time at which the report is printed. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59.
CYCLE	Specifies the frequency at which the job is printed. The time is specified in minutes. The range of values is from 1 to 720. Examples of valid cycle times are 1 (every minute) 20 (every 20 minutes) 60 (every hour) 720 ( every 12 hours) The CYCLE parameter used in a PRINT command overrides a print matrix.
STOP	Specifies the time at which a print job ends. The time is specified in <i>hh:mm</i> format, where <i>hh</i> is the hour, based on the 24-hour clock, and <i>mm</i> is the minute. The range of values is from 00:00 to 23:59.
DAYS	Specifies the days of the week, Sunday through Saturday, that the command is not processed. To skip processing on a given day, substitute an N in the position for that day.

---

---

# Appendix E    **Skeleton Tailoring Facility**

The SG-Auto skeleton tailoring facility reads skeleton procedures from a library and produces output that is used to drive storage management functions. If you are familiar with ISPF skeleton tailoring, you will find the SG-Auto skeleton tailoring to be very similar in concept and function, but specialized for storage automation. When coupled with the automation manager, the skeleton tailoring facility enables you to automate storage management at the pool level using volume-oriented tools. It also enables you to use these tools based on conditions in the storage subsystem.

The skeleton tailoring facility is invoked automatically by the automation manager when a procedure named in an automation matrix is to be executed. Skeleton tailoring output can be a batch job, TSO CLIST, REXX program, or a set of system commands.

This section defines a skeleton procedure and the control statements, process groups, repeat groups, and substitution variables that can appear in a procedure.

## **Skeleton Procedures**

Skeleton procedures can be stored in the SG-Auto parmlib or any standard PDS or PDSE library. If the procedures are not stored in the parmlib, the library name that contains the procedures must be specified on the associated function command.

For example, given the MONITOR command shown in the following command statement, any job procedures referenced by the automation matrix must be stored in the SG-Auto parmlib (JOBLIB parameter not specified), and any CLIST procedures referenced by the matrix must be stored in SYS1.CLIST:

---

```
MONITOR POOL( PRIMARY ) -
        AUTOMATION_MATRIX( SMAMTAXX ) -
        CMDLIB( SYS1 . CLIST )
```

---

Skeleton procedures can be created by editing existing procedures to insert control statements and substitution variables. Skeletons are interpreted by the skeleton tailoring facility at the time they are processed—no compile or preprocessing step is required.

## Control Statements

In addition to the normal statements permissible for a given type of procedure, a skeleton procedure can contain special control statements that direct the tailoring process.

The general format of a control statement is

```
)control-verb parameter-name , parameter-name , ... parameter-name ]
```

The control verb must immediately follow the right parenthesis, which must be specified in column 1. The parameters must be separated by one or more blanks and/or commas and must be specified on the same line as the control verb.

The following table summarizes the skeleton tailoring control statements.

**Table E-1 Skeleton Tailoring Control Statements**

Control statement	Function
)SET SUBSTITUTION( <i>truth value</i> )	Set variable substitution on or off
)PROCESS VOLUMES	Begin Process Group
)REPEAT	Begin Repeat Group
)END REPEAT	End Repeat Group
)END PROCESS	End Process Group

The SET statement can appear anywhere in a skeleton procedure. The other control statements are used to form process groups and repeat groups. As implied by the order in which the statements are shown in Table E-1, a repeat group must be nested within a process group.

A process group can contain any number of nested repeat groups or process groups, and a skeleton can contain any number of process groups.

The following job skeleton contains one process group and two repeat groups.

**Figure E-1 Job Skeleton Example**

---

```

)PROCESS VOLUMES
//P4890015 JOB
, 'SYSTEMS', CLASS=A, MSGCLASS=X, MSGLEVEL=(1,1)
//STEP01 EXEC DMS
//SYSIN DD *
    SCAN REAL
)REPEAT
    SELECT VOL=%VOLSER, CRI=(TEMP, EQ, YES)
)END REPEAT
DELETE
//STEP02 EXEC PGM=ADDRSSU, REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
)REPEAT
    DEFRAg DYNAM(%VOLSER) -
        EXCLUDE(LIST(SYS1.**, **.PROCLIB**)) -
        WAIT(2,60)
)END REPEAT
)END PROCESS

```

---

## Volume Process Group

The skeleton tailoring facility interprets a skeleton in logical units called process groups.

A PROCESS VOLUMES statement begins a process group; an END PROCESS statement ends a process group.

The PROCESS VOLUMES statement processes volumes in a storage pool or a storage group. A repeat group nested in a volume process group causes the statements in the repeat group to be repeated for each volume.

A volume process group can contain an unlimited number of repeat groups. In the example shown in Figure E-1 on page E-3, two are nested within the volume process group.

## Repeat Groups

Repeat groups provide for iterative processing within process groups.

- A REPEAT statement begins a repeat group; an END REPEAT statement ends a repeat group.
- If a repeat group is nested in a volume process group, the skeleton records in the repeat group are iteratively processed, once for each volume.
- Any number of repeat groups can be nested within a volume process group. In the example in Figure E-1 on page E-3, two repeat groups are nested within a volume process group.

## Substitution Variables

In addition to process and repeat groups, a skeleton procedure can reference any number of substitution variables. A substitution variable begins with a percent sign (%), immediately followed by the variable name.

When a substitution variable is encountered during the tailoring process, a value is substituted for the variable name. The substitution algorithm is identical to that used by the ISPF/PDF editor. To determine if adjacent strings will be moved, change the substitution variable to an example value using the PDF CHANGE command while editing the skeleton.

### Variable Pools

Substitution variables are organized internally into two variable pools. A variable pool can be thought of as a list of variable names that enables the skeleton tailoring facility to access the associated values.

One variable pool corresponds to the process group. Substitution variables in this pool can be referenced anywhere in the skeleton procedure. Table E-2 lists the substitution variables in the variable pool for a volume process group.

The other variable pool corresponds to the repeat group. Substitution variables in this pool can be referenced only within a repeat group. Table E-3 on page E-7 lists the substitution variables in the variable pool for a repeat group nested in a volume process group.

### Null Substitution

If the value of a substitution variable is blank or an undefined variable is referenced, null substitution takes place. Null substitution is similar to changing a string to the null string (“”) in ISPF/PDF.

If null substitution takes place because a variable is blank, no error message is printed.

However, if an undefined variable is referenced, the following message is printed and tailoring of the skeleton is terminated:

SGA347E: NO ENTRY FOR %variable-name FOUND IN SYMBOL TABLE

The following table contains a list of names, descriptions, and examples of process group substitution variables.

**Table E-2 Process Group Substitution Variables (Part 1 of 3)**

Variable Name	Description	Example
%#	Global index counter, initialized to one and incremented by one after each reference; between 1 and 7 pound signs can be included to obtain, respectively, a 1- to 7-digit number (%# = 1, ### = 01, #### = 001, and so on)	000007
%BEGIN_TIME	Begin time (specified in the automation matrix) of the time window during which the procedure being processed is allowed to run (converted to 12-hour clock)	10:00 PM
%CYCLE_TIME	Cycle time, in minutes (specified by the CYCLE parameter)	60
%DAY	Current day of week	MONDAY
%DDNAME	DDNAME of library from which skeleton procedure was retrieved	DEFNLIB
%EC	execution count (that is, this is the <i>n</i> th execution of the procedure)	01
%ELIGIBLE_VOLUMES	number of volumes in storage pool to be processed	16
%END_TIME	end time (specified in the automation matrix) of the time window during which the procedure being processed is allowed to run (converted to 12-hour clock)	1:00 AM
%EXECUTION_COUNT	execution count (same as %EC)	01

**Table E-2 Process Group Substitution Variables (Part 2 of 3)**

<b>Variable Name</b>	<b>Description</b>	<b>Example</b>
%FRAG_INDEX_TRIGGER	fragmentation index action trigger (specified in the automation matrix) for the procedure being processed	450
%FREE_DSCBS_TRIGGER	free DSCBS action trigger (specified in the automation matrix) for the procedure being processed	120
%FREE_VIRS_TRIGGER	free VIRS action trigger (specified in the automation matrix) for the procedure being processed	75
%GROUP	SMS Storage Group	STG1
%JES	job entry subsystem	JES2
%JD	julian day	004
%LIBRARY	library name from which skeleton procedure was retrieved	SGA.DEFNLIB
%MAXIMUM_EXECUTION_COUNT	maximum execution count (specified in the automation matrix) for the procedure being processed	04
%MAXIMUM_FREE_DSCBS_ALARM	Maximum number of free DSCBS (specified by the MAXIMUM FREE_DSCBS subparameter)	1500
%MAXIMUM_FREE_SPACE_ALARM	maximum amount of free space (specified by the MAXIMUM FREE_SPACE subparameter)	1890
%MAXIMUM_FREE_SPACE_TRIGGER	maximum free space action trigger (specified in the automation matrix) for the procedure being processed	1500
%MAXIMUM_FREE_VIRS_ALARM	maximum number of free VIRS (specified by the MAXIMUM FREE_VIRS subparameter)	1000
%MAXIMUM_UTILIZATION	maximum utilization action trigger (specified in the automation matrix) for the procedure being processed	92
%MINIMUM_FREE_DSCBS_ALARM	minimum number of free DSCBS (specified by the MINIMUM FREE_DSCBS subparameter)	47
%MINIMUM_FREE_SPACE_ALARM	minimum amount of free space (specified by the MINIMUM FREE_SPACE subparameter)	630
%MINIMUM_FREE_SPACE_TRIGGER	minimum free space action trigger (specified in the automation matrix) for the procedure being processed	1000
%MINIMUM_FREE_VIRS_ALARM	minimum number of free VIRS (specified by the MINIMUM FREE_VIRS subparameter)	20
%MINIMUM_UTILIZATION	minimum utilization action trigger (specified in the automation matrix) for the procedure being processed	70
%PERCENT_POOL_FREE	percentage of space free in the storage pool	30
%PERCENT_POOL_USED	percentage of space used in the storage pool	70
%POOL_CAPACITY	pool capacity (in megabytes)	4298

**Table E-2 Process Group Substitution Variables (Part 3 of 3)**

Variable Name	Description	Example
%POOL_FREE_SPACE	amount of free space in pool (in megabytes). This is the sum total of the amount of free space on each volume in the pool.	1276
%POOL_NAME	pool name (specified by the POOL parameter)	PRIMARY
%POOL_USED_SPACE	amount of used space in pool (in megabytes); this is the sum total of the amount of allocated space on each volume in the pool	3022
%PROC_NAME	procedure name (specified in the automation matrix)	P4890010
%START_TIME	start time (specified by the START parameter)	5:00 PM
%STOP_TIME	stop time (specified by the STOP parameter)	4:00 AM
%SYSID	SMF identifier	MVSA
%TARGET	target utilization (specified by the TARGET UTILIZATION subparameter)	70
%TARGET_FRAG_INDEX	target fragmentation index (specified by the TARGET FRAG_INDEX subparameter)	250
%THRESHOLD	threshold utilization (specified by the THRESHOLD UTILIZATION subparameter)	92
%THRESHOLD_FRAG_INDEX	threshold fragmentation index (specified by the THRESHOLD FRAG_INDEX subparameter)	750
%TIME	current time	5:56 PM
%TOTAL_VOLUMES	total volumes in pool	24
%USERID	user ID (specified by the USERID parameter)	U91172
%WAIT_TIME	minimum amount of time (specified in the automation matrix) that must elapse between successive executions of the procedure being processed	60

The following table contains a list of names, descriptions, and examples of repeat group substitution variables:

**Table E-3 Repeat Group Substitution Variables (Part 1 of 2)**

Variable Name	Description	Example
%ADDRESS	Unit address	B20
%CPV	Total number of cylinders	1770
%EXTS	Total number of free space extents	47
%FI	Fragmentation index (same as %FRAG_INDEX)	461
%FRAG_INDEX	Fragmentation index	461
%FREE_CYLINDERS	Total number of free cylinders	0185
%FREE_DSCBS	Total number of VTOC format-1 DSCBs	0972

**Table E-3 Repeat Group Substitution Variables (Part 2 of 2)**

Variable Name	Description	Example
%FREE_EXTENTS	Total number of free space extents	0047
%FREE_VIRS	Total number of free VTOC index records	0263
%MOUNT	Mount attribute	RESIDENT
%PERCENT_VOLUME_FREE	Percentage of space free	30
%PERCENT_VOLUME_USED	Percentage of space allocated	70
%TPC	Number of tracks per cylinder	0015
%TRACK_SIZE	Track length (excluding overhead)	47476
%USE	Use attribute	PRIVATE
%VC	Volume capacity (same as %VOLUME_CAPACITY)	1260
%VF	Percentage of space free (same as %PERCENT_VOLUME_FREE)	30
%VFS	Amount of free space (same as %VOLUME_FREE_SPACE)	378
%VOLSER	Volume serial	PROD01
%VOLUME_CAPACITY	Volume capacity (in megabytes)	1260
%VOLUME_FREE_SPACE	Amount of free space (in megabytes)	378
%VOLUME_USED_SPACE	Amount of space allocated (in megabytes)	882
%VU	Percentage of space allocated (same as %PERCENT_VOLUME_USED)	70
%VUS	Amount of space allocated (same as %VOLUME_USED_SPACE)	882

A percent-blank combination is interpreted as an undefined variable name; null substitution takes place and the following error message is printed:

```
SGA346E: SPECIFY SINGLE "%" AS "%%"
```

This causes tailoring of the skeleton to be terminated.

**Note:** Two consecutive percent signs (%%) in a skeleton record are replaced by a single percent sign.

### Concatenation

A period (.) at the end of a substitution variable causes the value of the variable to be concatenated with the character string following the period.

For example, if the variable %POOL\_CAPACITY has the value 4298, then:

```
%POOL_CAPACITY.MB ? 4298MB
```

### Truncation

If the result of variable substitution causes a skeleton record to exceed its original length, tailoring of the skeleton is terminated and the following error message is printed:

```
SGA344E: SOURCE STRING TRUNCATED FOLLOWING SUBSTITUTION
```

## Procedure Processing

Prior to executing a procedure, the automation manager calls the skeleton tailoring facility to prepare the procedure for execution. The procedure can be a skeleton for a batch job, TSO CLIST, REXX program, or a set of system commands. Regardless of the procedure type, the tailoring process proceeds as follows:

1. The skeleton procedure is read record by record.
2. Each record (including a control statement) is scanned to find any substitution variables.
3. When a variable is found, its value is substituted from the PROCESS or REPEAT group variable pool.
4. If any errors occur during the substitution process, an error message is printed and the tailoring process is terminated.

## SET Statement Processing

If a SET SUBSTITUTION(OFF) statement is encountered, variable substitution is turned off—skeleton records following the SET statement are not scanned for substitution variables.

Variable substitution remains off until a subsequent SET SUBSTITUTION(ON) statement is encountered, at which point the substitution process resumes.

Any number of SET statements can be included in a skeleton procedure. This allows you to toggle variable substitution on and off as required.

## REPEAT Statement Processing

Iterative processing takes place when a REPEAT control statement is encountered.

The skeleton records between the REPEAT and END REPEAT statements are iteratively processed for each volume in a volume process group—the values of the variables in the repeat group variable pool are updated prior to each iteration to reflect the volume being processed.

When the skeleton tailoring facility is invoked by the automation manager, only the volumes for which one or more action triggers were satisfied are included in the volume process group.

## Skeleton Tailoring Examples

A sample skeleton procedure is shown in Figure E-2. It contains CLIST statements to release idle space using DFDSS.

**Figure E-2**      **Sample CLIST Skeleton**

---

```
)PROCESS VOLUMES
  PROC 0
  ALLOC FI(SYSIN) +
    RECFM(F) LRECL(80) BLKSIZE(80) +
    SPACE(1,1) TRACK REUSE
  ALLOC FI(SYSPRINT) SYSOUT
  OPENFILE SYSIN OUTPUT
)REPEAT
  SET SYSIN = +
  &STR( REL BY(DSORG EQ SAM) DYNAM(%VOLSER) MINTRKS(12) )
  PUTFILE SYSIN
)END REPEAT
  CLOSFILE SYSIN
  TSOEXEC CALL 'SYS1.LINKLIB(ADRDUSSU)' 'TYPRUN=NORUN'
  SET &RC = &LASTCC
  FREE FI(SYSIN,SYSPRINT)
  EXIT CODE(&RC)
)END PROCESS
```

---

The sample skeleton shown in Figure E-2 consists of one volume process group and one repeat group.

The repeat group causes one DFDSS RELease command to be generated for each volume in the process group. As noted above, only the volumes for which an action trigger (for example, minimum free space) was satisfied are included in the volume process group.

The tailored output from this skeleton could be executed by the SG-Auto subsystem to provide real-time, event-driven automation processing. The sample skeleton shown in the following figure contains JCL to execute a batch job step that deletes system-generated temporary data sets using the IEHPROGM utility:

**Figure E-3**      **Skeleton JCL to Delete System-Generated Temporary Data Sets**

---

```
)PROCESS VOLUMES
//STEP01 EXEC PGM=IEHPROGM
//SYSPRINT DD SYSOUT=*
)REPEAT
//DD%##.S1 DD UNIT=SYSALLDA,VOL=SER=%VOLSER,DISP=OLD
)END REPEAT
//SYSIN DD *
)REPEAT
  SCRATCH VTOC,VOL=SYSALLDA=%VOLSER,SYS
)END REPEAT
)END PROCESS
```

---

**Note:** Global index substitution variable and two nested repeat groups are used in this sample.



---

# Appendix F Trace Facility

The TRACE command is used to activate the SG-Auto internal trace facility.

The information presented is intended primarily for those responsible for technical support and development of the product. It is included in this user's guide, however, in the unlikely event that a program anomaly is encountered. In this case, it may be necessary for you to activate the trace facility to assist technical support in problem determination and resolution.

The trace facility consists of two principle components:

- Event trace component
- Module trace component

Each component provides detailed information about the product's execution.

The event trace component and/or module trace component can be activated for either the SG-Auto subsystem or for a batch job.

Due to the volume of output that is generated, it is recommended that you trace only batch execution. If trace information is needed for a problem known to be unique to the subsystem, the subsystem should be traced until the problem occurs, and then stopped and restarted with trace deactivated.

A brief overview of the trace components is presented first, then the parameters of the TRACE command are described.

## Event Trace Component

The event trace component captures information about key events, such as

- Initiation or termination of a subtask
- Creation or modification of a control block
- Fetch or deletion of a load module
- Suspension or resumption of a subtask
- Activation or deactivation of a command processor
- Creation or deletion of a private or shared table
- Allocation or unallocation of a data set
- Abnormal termination of a called module
- Creation, manipulation, and destruction of queues

When an event occurs, a trace message is formatted and written to the message data set defined by the RSIPRINT DD statement.

Event trace messages, thus, are ordered chronologically with respect to other SG-Auto messages.

## Module Trace Component

The module trace component traces the module flow throughout execution.

Whenever one module calls another, this component captures the:

- Task control block address of the active subtask
- Module call level
- Time at which the called module received control
- Time at which the called module returned control
- Called module's elapsed execution time
- Called module's return code

A trace record is then formatted and written to the data set defined by the RSITRACE DD statement. If this DD statement is not supplied, a sysout data set is dynamically allocated using RSITRACE as the ddname.

TCB Address	Module	Call Level	Invocation Time	Termination Time	Run Time	Return Code
007EA510	RSI040	1	3:56:28.09	3:56:28.09	0.00	0
007EA510	RSI041	2	3:56:28.09	3:56:28.09	0.00	0
007EA510	RSI042	2	3:56:28.09	3:56:28.09	0.00	0
007EA510	RSI044	1	3:56:28.09	3:56:28.09	0.00	0

TCB Address	Module	Call Level	Invocation Time	Termination Time	Run Time	Return Code
007EA510	RSI041	1	3:56:28.09	3:56:28.09	0.00	0
007EA510	RSI095	1	3:56:28.09	3:56:28.09	0.00	0
007EA510	RSI009	2	3:56:28.10	3:56:28.13	0.03	0
007EA510	RSI028	1	3:56:28.10	3:56:28.13	0.03	0
007EA510	RSI009	2	3:56:28.14	3:56:28.17	0.03	0
007EA510	RSI028	1	3:56:28.14	3:56:28.17	0.03	0
007EA390	RSI039	4	3:56:28.17	3:56:28.17	0.00	0
007EA390	RSI050	4	3:56:28.17	3:56:28.17	0.00	0
007EA390	RSI058	4	3:56:28.17	3:56:28.17	0.00	0
007EA390	RSI060	3	3:56:28.17	3:56:28.17	0.00	0
007EA510	RSI009	2	3:56:28.17	3:56:28.20	0.03	0
007EA510	RSI028	1	3:56:28.17	3:56:28.20	0.03	0
007EA390	RSI039	5	3:56:28.20	3:56:28.20	0.00	4
007EA390	RSI072	4	3:56:28.20	3:56:28.20	0.00	8
007EA390	RSI039	4	3:56:28.20	3:56:28.20	0.00	0
007EA390	RSI039	5	3:56:28.21	3:56:28.21	0.00	4
007EA390	RSI070	4	3:56:28.21	3:56:28.21	0.00	0
007EA390	RSI080	3	3:56:28.20	3:56:28.21	0.01	0
007EA390	RSI039	4	3:56:28.22	3:56:28.22	0.00	0
007EA390	RSI039	5	3:56:28.24	3:56:28.24	0.00	0

## Parameter Descriptions

The complete syntax of the TRACE command is shown in the following table.

**Table F-1 The TRACE Command**

Verb	Parameters	Optional
TRACE	EVENTS( <i>truth value</i> ) - MODULE_FLOW( <i>truth value</i> )	yes <sup>1</sup> yes
<sup>1</sup> One, and only one, parameter must be specified on a given command. To activate both event trace and module trace, use two commands.		

**EVENTS** (*truth value*)

EVENTS(YES) activates event trace. This causes a trace message to be written to the message data set whenever a key system event occurs.

As described in the SG-Auto message manual, a message's type is designated by the last character of the message identifier—all event trace messages have a message type of T.

For example, the following trace message is written to the message data set when the automation manager is notified that a storage management procedure has completed:

SGA222T: TASK task name NOTIFIED—EVENT CODE 0002, TOKEN 0C482100

### **MODULE\_FLOW** (*truth value*)

MODULE\_FLOW(YES) activates module trace. This causes a trace record to be written to the RSITRACE data set whenever one module calls another or a called module returns control to its caller.

Exercise caution when activating module trace. Due to the large number of trace records written in a short time, it is advisable to trace only the command with which an anomaly is associated.

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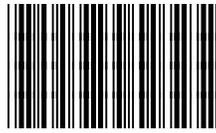
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