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This Update Package, UPD10324-11A, is Update 1 for the First Edition of the *Operator's Guide to Data Backup and Recovery* (DOC10324-1LA). This package updates the book to Master Disk Revision 23.1. Pages that have been changed or added are listed below. Changes made to these pages since the last printing are identified by vertical bars in the margins.



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<u>Replace pages</u>	<u>With Pages</u>
Title to xii	Title to xii
Chapter 1	Chapter 1
2-1 to 2-6	2-1 to 2-6
Chapter 3	Chapter 3
	add Part IV divider page
	add Chapter 11
Appendix A	Appendix A
Index	Index

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

First Edition

by Celia Bartlett

Updated for Rev. 23.1 by

UK Technical Publications Team

This manual documents the software operation of the PRIMOS operating system on 50 Series computers and their supporting systems and utilities as implemented at Master Disk Revision Level 23.1 (Rev. 23.1).

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CONTENTS

	ABOUT THIS BOOK	IX
	Chapter Contents	ix
	Superseded Products	x
	Related Documentation	x
	Prime Documentation Conventions	xii
	PART I	
	ENHANCED MAGSAV/RST	
1	OVERVIEW OF ENHANCED MAGSAV/RST	1-1
	Introduction	1-1
	Major Features	1-1
	Command Line Options	1-4
	Tape Labels and Block Structure	1-6
	Product Compatibility	1-7
2	LOGICAL SAVE TO TAPE: MAGSAV	2-1
	Introduction	2-1
	Overview	2-1
	Incremental Saves	2-2
	Command Line Options	2-3
	The MAGSAV Dialog	2-6
	Listing the Tape Contents	2-11
	Save Procedure for an Entire Partition	2-11
	Unattended Backup	2-13
3	LOGICAL RESTORE FROM TAPE: MAGRST	3-1
	Introduction	3-1

	Overview	3-1
	Restoring Files, Directories, and Partitions	3-1
	File Security	3-2
	Command Line Options	3-3
	The MAGRST Dialog	3-4
	Procedure for a Partial Restore	3-7
	Procedure for a Checkpoint Restore	3-8
	Restore Procedure for an Entire Partition	3-8
4	CREATING AND USING A BOOT TAPE	4-1
	Introduction	4-1
	Overview	4-1
	Creating a List File	4-2
	The BOOT_CREATE Command	4-3
	Creating a System Boot Tape	4-4
	Booting from Tape	4-6
5	TAPE INDEXING	5-1
	Introduction	5-1
	Overview	5-1
	Summary Index Format	5-1
	Extended Index Format	5-2
	Examples of Indexes	5-3
PART II		
PHYSICAL SAVE & RESTORE		
6	PHYSICAL SAVE TO TAPE: PSR	6-1
	Introduction	6-1
	Overview	6-1
	Invoking PSR	6-6
	Save Procedure for an Entire Partition	6-11
	Example Command Lines and Dialogs	6-12
	Unattended Backup	6-16
	Maximizing Performance	6-18
7	RESTORING A PHYSICAL SAVE: PSR	7-1
	Introduction	7-1
	Overview of PSR Restore	7-1
	Invoking PSR	7-5

	Restore Procedure for an Entire Partition	7-7
	Example Command Lines and Dialogs	7-9
	Maximizing Performance	7-10
8	PHYSICAL COPY BETWEEN DISKS	8-1
	Introduction	8-1
	Overview of PSR Copy	8-1
	Invoking PSR	8-4
	Copy Procedure for an Entire Partition	8-6
	Example Command Lines and Dialogs	8-7
	Maximizing Performance	8-8
	PART III	
	SYSTEM BACKUPS:	
	ADMINISTRATION	
9	DEFINING A BACKUP STRATEGY	9-1
	Introduction	9-1
	The Need for Backups	9-1
	Prime Backup Utilities	9-2
	Logical Backup Utility MAGSAV/RST	9-2
	Physical Backup Utility PSR	9-3
	Disk Mirroring	9-4
	Maximizing Backup Performance	9-5
	Retaining Backups	9-6
	Logging Backups	9-7
	Selecting a Backup Strategy	9-7
10	SYSTEM PREPARATION, SHUTDOWN, AND STARTUP	10-1
	Introduction	10-1
	Preliminary Preparations	10-1
	System Preparation	10-3
	Shutdown Procedures	10-3
	Startup Procedures	10-6
	PART IV	
	NEW FEATURES AT REV. 23.1	
11	INDEX LIBRARY MANAGEMENT	11-1
	The Extended Index Structure	11-1

The SEARCH_INDEX_LIB Command	11-2
The INDEX_LIB_MANAGER Command	11-4

APPENDIX

A	GLOSSARY	A-1
	INDEX	Index 1

ABOUT THIS BOOK

The *Operator's Guide to Data Backup and Recovery* describes the features of the products MAGSAV, MAGRST and PSR at PRIMOS Revisions 21.0, 22.0 and 23.0, and gives comprehensive guidance on their use.

Enhanced MAGSAV/RST is issued as an independent product release (IPR) which runs on PRIMOS Revs. 21.0 and 22.0, and as a standard product implemented at Master Disk Rev. 23.0. Although the enhanced product is not supported on earlier PRIMOS revisions, you can use it to transfer data between systems running on revisions later than and including PRIMOS Rev. 19.0.

PSR is issued as an independent product release (IPR) which runs on PRIMOS Rev. 22.0, and as a standard product implemented at Master Disk Revision Level 23.0.

This document has been updated at Rev. 23.1 to include information on creating and configuring extended index library files which contain index information created during a save to tape. It also describes two new commands, INDEX_LIB_MANAGER which allows you to manage these index files, and SEARCH_INDEX_LIB which allows you to search the indexes for a specific character string.

Chapter Contents

PART I	Enhanced MAGSAV/RST
Chapter 1	Describes the features of enhanced MAGSAV/RST. The advantages and capabilities of the product are discussed, as well as aspects that you should be aware of when using it.
Chapter 2	Describes how to perform a logical save to tape using enhanced MAGSAV.
Chapter 3	Describes how to restore a logical tape save using enhanced MAGRST.
Chapter 4	Describes how to create and use a boot tape.
Chapter 5	Gives details on indexing the contents of tapes saved using MAGSAV.

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

PART II Physical Save and Restore

Chapter 6 Describes how to perform a physical save to tape using PSR.

Chapter 7 Describes how to restore a physical tape save using PSR.

Chapter 8 Describes how to perform a physical copy between disks using PSR.

PART III System Backups: Administration

Chapter 9 Describes the factors you should consider when defining a backup strategy.

Chapter 10 Gives step-by-step procedures to shut down and restart either the entire system or particular partitions before and after running MAGSAV/RST and PSR.

PART IV New Features at Rev. 23.1

Chapter 11 Gives details of the enhanced MAGSAV/RST library management commands INDEX_LIB_MANAGER and SEARCH_INDEX_LIB.

Glossary of terms used in this guide

Superseded Products

Enhanced MAGSAV/RST supersedes the logical save and restore utilities available as standard products on PRIMOS Rev. 22.0 and earlier revisions.

PSR supersedes the physical save and restore utilities available as standard products on PRIMOS Rev. 22.0 and earlier revisions.

Manuals which refer to these earlier utilities are superseded by this guide.

Related Documentation

Listed below are the manuals that contain information that may be useful to users of save and restore utilities.

- The PRIME CPU Handbook for your machine
- *MAGNET User's Guide* DOC10156-1LA (Rev. 21.0) and its update package UPD10156-11A (Rev. 22.0)
- *Operator's Guide to File System Maintenance* DOC9300-5LA (Rev 22.1) and its update package UPD9300-51A (Rev 23.0)
- *Operator's Guide to System Commands* DOC9304-5LA (Rev. 23.0)

- *Operator's Master Index* DOC10110-4LA (Rev. 22.0)
- *PRIMOS User's Guide* DOC4130-5LA (Rev. 22.0)
- *PRIMOS Commands Reference Guide* DOC3108-7LA (Rev. 22.0) and its update package RLN3108-71A (Rev. 22.1).
- *System Administrator's Guide Vol. I: System Configuration* DOC10131-3LA (Rev. 23.0)
- *System Administrator's Guide Vol. II: Communication Lines and Controllers* DOC10132-2LA (Rev. 22.0), and RLN10132-21A (Rev. 22.1)
- *System Administrator's Guide Vol. III: System Access and Security* DOC10133-3LA (Rev. 23.0)
- *PRIMOS User's Release Document* DOC10316-1PA (Rev. 23.0)
- *Rev. 23.0 Software Release Document* DOC10001-7PA (Rev. 23.0)
- *Rev. 23.1 Software Release Document* DOC10001-8PA (Rev. 23.1)

Prime Documentation Conventions

The following conventions are used in command formats, statement formats, and in examples throughout this document. Command and statement formats show the syntax of commands, program language statements, and callable routines. Examples illustrate the uses of these commands, statements, and routines in typical applications. Terminal input may be entered in either upper case or lower case.

<i>Convention</i>	<i>Explanation</i>	<i>Example</i>
UPPERCASE	In command formats, words in uppercase indicate the actual names of commands, statements, and key words. They can be entered in either uppercase or lowercase.	MAGSAV
lowercase	In command formats, words in lowercase represent items for which you must substitute a value.	COPY pathname
Abbreviations in format statements	If an uppercase word in a command format has an abbreviation it is shown below.	{ ASSIGN } { AS }
<u>Underscore</u> in examples	In examples, user input is underscored but system prompts and output are not.	OK, <u>PROP -STATUS</u>
Brackets []	Brackets enclose a list of one or more optional items. Choose none, one or more of these.	INDEX [pathname]
Braces { }	Braces enclose a list of optional items. Choose only one of these.	SPEED { -25 } { -100 }
Ellipsis ...	An ellipsis indicates that the preceding item may be repeated.	item-x [, item-y] ...
Hyphen -	Wherever a hyphen appears in a command line option it is a required part of that option.	MAGSAV -INC
Angle Brackets < >	Angle brackets are used to separate the elements of a pathname.	< MFD > SPOOL* > DOC
Octal ´ or ^	The ´ or ^ symbol shows that the number is given as an octal value.	´ 240 or ^ 240 are equivalent to 160 (base 10)

OVERVIEW OF ENHANCED MAGSAV/RST

This chapter describes some of the more important features of Enhanced MAGSAV/RST. Enhanced MAGSAV/RST is available as an Independent Product Release (IPR) at PRIMOS Revs. 21.0 and 22.0, and as a standard product implemented at Master Disk Rev. 23.0.

Major Features

Major features of Enhanced MAGSAV/RST are listed below; they are described in the sections which follow:

- Tape handling
- Tape format
- Support of attributes DTA (date/time accessed) and DTC (date/time created)
- Use of DTB (date/time backed up) for incremental control
- Support of labeled tapes
- Handling of unrecoverable read and write errors
- Extended index files
- Index library management
- The DRB configuration file
- Unattended backup

Tape Handling

Enhanced MAGSAV/RST makes more efficient use of tape, and handles files faster than pre-Rev. 23.0 standard logical save/restore utilities. The increase in throughput when saving files depends on the size and type of file saved, and on the CPU type and disk devices that you are using.

Enhanced MAGSAV writes checkpoints to tape at intervals of 500 blocks, or, if you are using a 4595 helical scan tape drive, at intervals of 10,000 blocks. You can obtain information about the checkpoints on tape by generating an extended index of the save/restore operation; details on extended indexes are given in Chapter 5, Tape Indexing.

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

If an unrecoverable error occurs during a save operation, the system rewinds the tape to the last checkpoint and writes end-of-tape labels; the save then continues on a new reel from this point. Further details on this are given in the section, Handling of Unrecoverable Read and Write Errors, later in this chapter.

When you use enhanced MAGRST to restore specific file objects from tape, you can use checkpoint positioning to locate the required object on tape by specifying the number of the checkpoint which immediately precedes the object. The system then positions the tape to this checkpoint before searching for the object. Enable checkpoint positioning by entering the appropriate response during the MAGRST dialog, and then specify the checkpoint number associated with each file system object you wish to restore. Details of this are given in Chapter 3, Logical Restore from Tape: MAGRST.

Checkpoint positioning considerably speeds up tape operations if you are using the Model 4595 helical scan tape drive, where one tape can hold up to 2GBytes of data.

You can also use checkpoint positioning on standard half-inch reel to reel tape drive hardware, but the improvement in performance is not as great. In this case, the speed of tape movement during operations such as moving forward to the next checkpoint is similar to that during a read operation. However, tape movement is slightly faster using checkpoint positioning due to the the fact that no data transfer takes place during the tape positioning operation.

Tape Format

The tape format generated by enhanced MAGSAV provides the following benefits:

- An ANSI label is written at the start of each reel. This label conforms to ANSI standard X3.27-1987 and can be read on any system that supports this standard.
- You can use larger block sizes when saving to tape. This results in faster tape handling and reduces the amount of tape required. Enhanced MAGSAV writes 12K byte blocks by default. If you are using enhanced MAGSAV at PRIMOS Rev. 22.0 or at a later revision, you can select a tape block size of 12K bytes or 16K bytes.
- The block structure on tape saves time and tape when running save and restore operations.

Further details on tape format are given in the section, Tape Labels and Block Structure, later in this chapter.

Support of Attributes DTA and DTC

When you save files or directories to tape using enhanced MAGSAV, the attributes DTA (date/time accessed), DTC (date/time created) and DTM (date/time modified) are automatically saved to tape.

When you restore files or directories from tape using enhanced MAGRST, the option `-NO_ATTRIBUTES` allows you to choose whether or not to restore the saved values of DTA, DTC, and DTM from tape. Details on using this option are given in Chapter 4, Logical Restore from Tape: MAGRST.

You can use the enhanced MAGSAV option `-NO_DTA` to prevent the system from automatically updating the DTA of saved disk objects. Details on using this option are given in Chapter 2, Logical Save to Tape: MAGSAV.

Use of DTB for Incremental Control

During an incremental save, only those files are saved that have been modified since the last base or incremental save. The standard pre-Rev. 23.0 MAGSAV product used the dumped bit switch setting to determine whether or not the file had been modified or created since the last save. Enhanced MAGSAV makes use of the attributes DTB and DTM for incremental control. These attributes give the date and time that the object was last backed up or modified. MAGSAV compares the value of DTB and that of DTM, and saves the object if the DTM is later than the DTB. When you use the option `-UPDT`, enhanced MAGSAV sets the DTB of saved files to the current date and time, but does not set the file's dumped bit, except in the case of Recovery Based Files, which are described below. Details on incremental saves are given in Chapter 2, Logical Save to Tape: MAGSAV.

When saving Recovery Based Files (RBFs), MAGSAV calls Recovery Oriented Access Method (ROAM) subroutines. At PRIMOS Revs. 21.0 and 22.0, these subroutines rely on the setting of the dumped bit to determine whether or not to save these files during an incremental save. Therefore, if you are using enhanced MAGSAV at PRIMOS Rev. 21.0 or 22.0 to save RBFs with the `-UPDT` option, the system updates the DTB and also sets the dumped bit of saved RBFs.

Support of Labeled Tapes

When you save a tape using enhanced MAGSAV, the system automatically writes an ANSI label at the start of the reel of tape. You can specify the volume serial ID for the ANSI label using the enhanced MAGSAV option `-LABEL`. This means that each reel of tape contains an identifier on tape, as well as on the adhesive label. This helps considerably in the administration of large tape libraries. Details on this option are given in Chapter 2, Logical Save to Tape: MAGSAV.

Handling of Unrecoverable Read and Write Errors

An unrecoverable read error occurs when the system fails to read a tape block after 20 attempts. The block is lost completely and the system skips past it to read the remaining data. If the block lost is a directory block, enhanced MAGRST recognizes this, and recreates the missing directory (with default security and attribute settings), so that subsequent tape files are restored at the correct level.

An unrecoverable write error occurs when the system fails to write a tape block after 20 attempts. You cannot write any more data to that reel of tape. When an unrecoverable error occurs, the system rewinds the tape to the last checkpoint, and overwrites the existing data with end-of-tape (EOT) labels. MAGSAV then prompts you to mount another tape and continues the save on the newly mounted reel from the point at which the previous reel was truncated.

Note

If you are using a 60 MB cartridge drive (QIC-02), the system cannot truncate the tape as described above. These drives allow you to append data to the tape only, and the system cannot backspace and overwrite previously written data with EOT labels. If the system encounters an error when writing to one of these drives, you are prompted to mount another tape and the system then resaves all the data written to the errored reel on the newly mounted reel. Details on saving cartridge tapes, are given in Chapter 2, Logical Save to Tape: MAGSAV.

Extended Indexes

When using enhanced MAGSAV/RST, you can generate extended indexes of save and restore operations in addition to the summary indexes available using standard pre-Rev. 23.0 logical save/restore utilities. The extended index includes tape checkpoint information and the value of the DTM attribute for each file system object that is saved or restored. You enable extended indexing by entering the appropriate response during the MAGSAV and MAGRST dialog. Further details on extended indexes are given in Chapter 5, Tape Indexing.

The DRB Configuration File

The DRB configuration file is introduced at Rev. 23.1. This file allows you to set up default library index pathnames and the number of directory levels to be searched. It is a text file, located at DRB*>DRB_CONFIG, that you can maintain by using your usual text editor. Below is an example Configuration file.

```
/* Define default index level
/* Index directories to be searched to 20 levels

INDEX_LIBRARY_LEVEL 20

/* Define index library pathname

INDEX_LIBRARY_PATHNAME DRB_CMDNCO>DRB.INDEXING>IND

/* Define alternative pathname if first is not available

ALTERNATIVE_IDX_LIB_PATH DRB_CMDNCO>DRB.INDEXING>ALT_IND_LIB
ALTERNATIVE_IDX_LIB_PATH OTHER_PATH>ALT_IND_LIB
```

The default index library indexing level is defined by the line INDEX_LIBRARY_LEVEL *n*, where *n* is the number of levels to be searched. This value relates only to the index library index files, and not to standard index files nor extended index files.

The maximum number of alternate pathnames that can be entered is ten. Alternate directories are used if the index library directory is not available. Index files created in an alternate directory will be in the extended index format and can be imported to the index library using the -IMPORT option with the INDEX_LIB_MANAGER command.

Unattended backup

When run under CPL control, enhanced MAGSAV sets three local variables which can be used to help eliminate the necessity for operator intervention in backup and restore operations. Details are given in Chapter 2, Logical Save to Tape: MAGSAV, and Chapter 3, Logical Restore from Tape: MAGRST.

Command Line Options

The command line options supported by enhanced MAGSAV/RST are listed below. Also listed are those options that were supported by the standard pre-Rev. 23.0 logical save/restore product, but which have been withdrawn from the enhanced product.

MAGSAV Options

Enhanced MAGSAV supports the following command line options:

-BIG	Writes a tape with 16K tape blocks.
-BOOT	Creates a boot tape.
-HELP	Displays the MAGSAV syntax and options.
-INC	Specifies an incremental save.
-INDEX_LIBRARY	Creates an extended index library file.
-LABEL	Invokes a prompt to enter volume serial IDs for any tape that is encountered during a save and does not contain an ANSI label.
-NO_ACL	Instructs MAGSAV not to save file access information.
-NO_DTA	Instructs MAGSAV not to modify the DTA of any file or directory being saved.
-NO_RBF	Instructs MAGSAV not to save Recovery Based Files.
-QUERY	Asks for confirmation before overwriting existing logical tapes.
-REV19	Writes tapes in a non-ANSI format for PRIMOS Revisions 19.0 to 19.4.14.
-REV20	Writes tapes in a non-ANSI format for PRIMOS Revisions 20, 21 and 22.
-SAVE_UFD	Instructs MAGSAV to save all directory entries, modified or not.
-TTY	Prompts for the entry of a tape unit number.
-UNLOAD	Instructs MAGSAV to rewind and unload tape.
-UPDT	Instructs MAGSAV to update the DTB of any saved file and directory.

The full description of the use of these options is described in Chapter 2, Logical Save to Tape: MAGSAV.

Enhanced MAGSAV does not support the following options:

-P300	Writes a tape readable by a P300 system.
-7TRK	Specifies that a 7-track tape is to be saved.
-CAM_TO_DAM	Converts CAM files to DAM files so that they can be restored on pre-Rev. 20 systems. The option -REV19 automatically does this conversion for you.

If you use any of these options, an error message is displayed.

The options -LONG and -VAR available on PRIMOS Rev. 18.0 are now obsolete; if you attempt to use either of these options, a warning message is displayed.

MAGRST Options

Enhanced MAGRST supports the following command line options:

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

-CAM_RBF	Restores all RBF subfiles as CAM files.
-HELP	Displays MAGRST syntax and options.
-QUERY	Prompts for responses when restoring RBFs or when restoring an EPF currently in use.
-NO_ATTRIBUTES	Disables the restoring of DTA/DTC/DTM from tape.
-TTY	Causes a prompt for the entry of a tape unit number from the terminal.
-UNLOAD	Instruct MAGRST to rewind and unload tape.

The use of these options is described in Chapter 2, Logical Restore from Tape: MAGRST. Enhanced MAGRST does not support the following options:

-7TRK	Specifies that a 7-track tape is to be restored.
-DAM_RBF	Restores all RBF subfiles as DAM files.

If you use either of these options, an error message is displayed.

Tape Labels and Block Structure

The format of tapes generated by enhanced MAGSAV incorporates features that improve both the efficiency and performance of the utility. These features are summarized below and are discussed in the following sections:

- ANSI labels
- Block sizes
- Block structure

ANSI Labels

Enhanced MAGSAV writes an ANSI label at the start of each reel of tape. This label conforms to ANSI standard X3.27-1987 and can be read on any system that supports this standard.

Block Sizes

Enhanced MAGSAV writes tape blocks of 12K bytes by default. However, if you are using enhanced MAGSAV on systems running on PRIMOS Rev. 22.0 or a later revision you can use block sizes of 12K bytes or 16K bytes. Writing larger blocks to tape results in faster tape handling and reduces the amount of tape used when you save large files.

To use a block size of 16K bytes, you must first use the MTRS configuration directive to set the buffer size in the system configuration file to 16K or greater and then use the option **-BIG** when you invoke MAGSAV. You cannot write tape blocks larger than 16K bytes. If you do not use the MAGSAV option **-BIG**, the system defaults to writing 12K byte tape blocks irrespective of the MTRS setting in the system configuration file.

Note

You cannot use 16K byte tape blocks when running on systems using PRIMOS Rev. 21 or earlier, because the MTRS directive is not supported on these PRIMOS revisions.

For details of the MTRS directive, refer to the *System Administrator's Guide, Vol. I: System Configuration*.

Caution

If you create a tape using 16K byte blocks, this tape cannot be read on systems where the buffer size is less than 16K bytes. Tapes with 16K byte blocks cannot, therefore, be read on systems running on PRIMOS revisions earlier than PRIMOS Rev. 22.0, or on systems running on PRIMOS Rev. 22.0 or a later revision where the buffer size has not been set to 16K bytes (or greater) using MTRS

Block Structure

The block structure used by enhanced MAGSAV enables the system to handle tapes faster and more efficiently than previous versions of MAGSAV, especially when saving small files. When writing a file to tape, the system writes the pathname, data, and end-of-file (EOF) to tape without intervening inter-block gaps. Several files may be written to the same tape block, if their size allows.

There is a trade-off between performance and resistance to error. Packing more than one file into a single tape block does mean that unrecoverable read errors are more damaging; the loss of one tape block could potentially mean the loss of several small files. If there is an increased risk of tape errors occurring, you can still write the tape in non-ANSI format, by invoking enhanced MAGSAV with one of the command line options `-REV20` or `-BOOT`.

Product Compatibility

Enhanced MAGSAV/RST minimizes any compatibility problems when transporting tapes between systems that use different PRIMOS revisions. Points that you should be aware of when you use the enhanced product with systems running on different revisions are described in the following sections.

Enhanced MAGSAV/RST and PRIMOS

You can implement all features of enhanced MAGSAV/RST when using systems running on PRIMOS Rev. 22.0 or a later revision. If you are running the product on PRIMOS Rev. 21.0, you can implement all features but MAGSAV writes tape blocks of 12K bytes only.

Caution

If you create a tape using 16K byte blocks, this tape cannot be read on systems where the buffer size is less than 16K bytes. Tapes with 16K byte blocks cannot, therefore, be read on systems running on PRIMOS revisions earlier than Rev. 22.0, or on systems running on PRIMOS Rev. 22.0 or a later revision, where the buffer size has not been set to 16K bytes (or greater) using MTRS.

Transporting Tapes and PRIMOS

You can use enhanced MAGSAV to write tapes in non-ANSI format that can be read on pre-Rev. 21.0 systems. The MAGSAV options that allow you to do this are as follows:

- -REV19: writes a MAGSAV tape in non-ANSI format, readable on systems running on PRIMOS Revs. 19.0 to 19.4.14. Any CAM files saved are automatically converted to DAM files. (CAM files were introduced at PRIMOS Rev. 20.0).
- -REV20: writes a MAGSAV tape in non-ANSI format, readable on systems running on PRIMOS Revs. 20, 21, and 22.

If you use any of the above options, you cannot use the MAGSAV options -LABEL, or -QUERY, since these options rely on the tape being in ANSI format.

If you do not specify either of the options -REV19 or -REV20, enhanced MAGSAV defaults to writing ANSI format tapes.

When you use enhanced MAGRST to restore a tape, you do not need to specify the format of the tape. MAGRST automatically determines the tape format for you, by reading the tape label.

Notes

You cannot mix tape formats on the same reel of tape. If you try to do this, an error message is displayed.

Enhanced MAGRST will not restore BRMS tapes. These tapes must be read using BRMS restore commands (See the *Data Backup and Recovery Guide*).

Incremental Saves and PRIMOS

Disks created on systems using PRIMOS revisions earlier than Rev. 19.3 do not support the DTB attribute. You cannot therefore use enhanced MAGSAV to perform incremental saves of these partitions.

LOGICAL SAVE TO TAPE: MAGSAV

This chapter gives comprehensive details on the use of enhanced MAGSAV. Incremental saves and saves of entire partitions are described. Explanations are given of the command line options, and of the system prompts and user responses.

Overview

MAGSAV is a utility that you use to save files and directories from disk to tape, so that each object is stored on tape as a logical entity, instead of its component records being stored in separate areas of the storage medium, as they might be on disk. When you use a physical save utility, the partition has the same format on tape as it had on disk. A logical save is slower than a physical save but does enable you to restore individual objects from the tape created.

Creating a Boot Tape

You can use enhanced MAGSAV to create a boot tape. Boot tapes are used in the initial stages when booting from tape after a command partition crash. Full details on creating a boot tape and on booting from tape are given in Chapter 4, *Creating and Using a Boot Tape*.

Access Rights

To save an object using MAGSAV, you must have the correct access rights to the object on disk. These are as follows:

- Read (R) rights for files
- List (L) and Use (U) rights for directories

If you wish to save an entire directory, you must have read (R) rights to all files within the directory. To make full use of the features available in MAGSAV, you should use the command SPAC to set a priority Access Control List (ACL) on the partition containing the files you wish to save. To use all the available MAGSAV options, you must also be a member of the ACL group .BACKUP\$ that is set up by the System Administrator. If you invoke MAGSAV from the supervisor terminal, you automatically possess privileged user

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

rights and can use all the available MAGSAV options without being a member of .BACKUP\$, but you must still set a priority ACL.

The Save Process

Every time you invoke MAGSAV a separate *logical tape*, or *logical save*, is created. If the logical tape is very large, it may span more than one reel of tape. Conversely, one reel of tape can contain several logical tapes.

When you invoke MAGSAV to write to a previously written tape, you can choose either to append the data to the tape, or to overwrite the existing data on the tape.

Depending on the setting of the read/write lock (rwlock), you can usually save files that are open for reading, but you may not be able to save files that are open for writing; if the file cannot be saved, an informative message is displayed and the system passes on to the next file, if any, to be saved. For details of read/write locks, refer to the RWLOCK command in the *PRIMOS Commands Reference Guide*.

File Security

When you save objects, MAGSAV first writes the object to tape and then writes access information about that object.

MAGSAV always saves specific ACLs attached to files or directories, unless you use the option `-NO_ACL` to prevent this. However, MAGSAV does not save ACL information for file system objects that use default protection.

When you save a directory, MAGSAV automatically saves any access categories within the directory. However, when you save individual files by name, you *must* also specify the names of any access categories associated with the file, as these are not saved automatically.

Passwords attached to directories are automatically saved with the directory to which they belong.

Incremental Saves

You can use MAGSAV for the following types of save:

- **Base Saves:** save all files within a partition or directory.
- **Cumulative Incremental Saves:** save all objects that have been modified since the last base save. When you subsequently restore the data, you need to restore the base save and the last cumulative incremental save.
- **True Incremental Saves:** save all objects that have been modified since the last save, which may have been a base save or an incremental save. When you subsequently restore the data, you need to restore the base save and all incremental saves.

The last two types of save are collectively referred to as incremental saves.

Incremental Control

When you run an incremental save, MAGSAV uses the file system attributes Date/Time Modified (DTM), and Date/Time Backed Up (DTB), to determine which objects to save, and saves those objects whose DTM is later than the DTB.

Use the MAGSAV option `-UPDT` to update the DTB of saved objects. To use this option you must be a member of the ACL group `.BACKUP$`, or else you must invoke MAGSAV from the supervisor terminal.

Note

Enhanced MAGSAV uses the DTB and not the dumped bit setting to provide incremental control. On the first use of enhanced MAGSAV you should therefore perform a full base save which will set the DTB on the saved files.

Command Line Options

MAGSAV is an interactive command that prompts you for information. Invoke MAGSAV by issuing the MAGSAV command using none, one, or more of the available command line options. These options are described below. Some options are restricted to members of the `.BACKUP$` ACL group. If you invoke MAGSAV from the supervisor terminal, you automatically possess privileged user rights and do not need to be a member of `.BACKUP$` in order to use all the available MAGSAV options.

► **MAGSAV** **[options]**

<i>Option</i>	<i>Description</i>
-BIG	Writes a tape with 16K tape blocks, provided the MTRS directive in the system configuration file is set to 16K bytes or greater. You must set the MTRS directive before you invoke MAGSAV. You can use this option only if you are using a system running on PRIMOS Rev. 22.0 or a later revision, and you are writing an ANSI format tape. You cannot use this option if you are writing a non-ANSI tape; therefore, the option <code>-BIG</code> cannot be used with options <code>-REV19</code> and <code>-REV20</code> . If you omit the option, MAGSAV automatically writes 12K byte blocks to tape irrespective of the setting of the MTRS directive.
-BOOT	Creates a boot tape; see Chapter 4 for further details of <code>-BOOT</code> .
-HELP	Displays the MAGSAV syntax and options.
-INC	Specifies an incremental save. Only files and directories with a DTM later than the DTB are saved. If you do not specify <code>-INC</code> , all specified files and directories are saved. This option is used primarily by system operators.

{ -INDEX_LIBRARY } [level] [pathname]
 { -IND_LIB }

This option is introduced at Rev. 23.1. When you specify this option, extended index files are created in the index library, and any redundant index files are deleted.

level specifies the number of directory levels to be indexed. The default is set up in the configuration file. If no default is set in the configuration file then the default is two.

pathname specifies the pathname of the library files to be created. You can set up a default pathname in the DRB configuration file. If you omit this option the default pathname is used. If you omit this option and a default pathname has not been defined, you receive an error message.

-LABEL

Instructs MAGSAV to prompt you for a volume serial ID for any reel that does not contain an ANSI label, encountered during the save. The volume serial ID is an alphanumeric string of a maximum length of 6 ANSI characters that forms part of the tape's ANSI label and which uniquely identifies a particular reel of tape. This is particularly useful if the save spans more than one tape reel. If you specify a string that contains non-ANSI characters you are prompted to reenter the volume serial ID. You cannot use this option if you are writing a non-ANSI tape; therefore, the option -LABEL cannot be used with options -REV19 and -REV20. If you omit the option, MAGSAV automatically writes an ANSI label on tape that contains a null entry for the volume serial ID.

{ -NO_ACL }
 { -NA }

This option instructs MAGSAV not to save ACLs, passwords, or access categories (ACATs) associated with saved objects. If you omit this option, file access information is saved to tape.

-NO_DTA

Instructs MAGSAV not to modify the DTA of any files or directories saved. This option uses the special backup key to open files. You can use this option only if you are a member of the ACL group .BACKUP\$, and also have protect (P) access rights to the disk object. You can also use this option if you invoke MAGSAV from the supervisor terminal. If you omit the option, the DTA of saved objects is set to the current date/time.

-NO_RBF

Instructs MAGSAV not to save any Recovery Based Files (RBFs). Refer to the *ROAM Administrator's Guide* for more information on these files.

Note

If you save an entire partition containing RBFs that also span other partitions, the system automatically accesses these partitions.

- QUERY** Instructs MAGSAV to prompt you for confirmation before overwriting existing logical tapes. You cannot use this option if you are writing a non-ANSI tape; therefore, the option -QUERY cannot be used with options -REV19 and -REV20.
- REV19** Writes a tape in non-ANSI format, readable on systems running on PRIMOS Revisions 19.0 to 19.4.14. Automatically saves CAM files as DAM files. You cannot use this option with options -BIG, -LABEL, or -QUERY.
- REV20** Writes a tape in non-ANSI format, readable on systems running on PRIMOS Revisions 20, 21, and 22. You cannot use this option with options -BIG, -LABEL, or -QUERY.
- { -SAVE_UFD
-SUFD }** Instructs MAGSAV to save all directory entries, whether or not the directories have been modified since the last save. The contents of these entries are saved only if they have been modified. This enables you to recreate the directory structure on disk when you restore the tape. Use this option to save the directory structure when running incremental saves where the save tape is written in non-ANSI format, that is, when running incremental saves using options -REV19 or -REV20.
- TTY** Use this option when running MAGSAV from CPL or command input (COMI) files. Instructs MAGSAV to prompt you to enter the tape unit number, and the response to the overwrite query (see option -QUERY), from your terminal. All other information is taken from the CPL or COMI files.
- UNLOAD** Instructs MAGSAV to rewind and unload the tape when the end of the tape is reached.
- UPDT** Instructs MAGSAV to update the DTB of any files or directories that are saved. You can use this option only if you are a member of the ACL group .BACKUP\$ or if you invoke MAGSAV from the supervisor terminal. This option is used primarily by system operators.

Command Line Examples

Two examples of the MAGSAV command are shown below.

Cumulative Incremental Save: Use the following command to run a cumulative incremental save:

```
OK, MAGSAV -INC
```

The -INC option instructs the system to save only those files or directories whose DTB is later than the DTB. The system does not update the DTB of saved objects. The next time you run an incremental save, the system saves the same objects again, as well as

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

any others that have been updated since this save. When you restore to disk, you need to restore the base save and the latest incremental save.

True Incremental Save: Use the following command to run a true incremental save:

```
OK, MAGSAV -INC -UPDT
```

The `-INC` option instructs the system to save objects in the same way as when running a cumulative incremental save. The `-UPDT` option instructs the system to update the DTB of objects saved. The next time you run an incremental save, the system saves only those objects that have been modified since this save. When you restore to disk, you need to restore the base save and all incremental saves since the base save.

The MAGSAV Dialog

After you invoke MAGSAV by issuing the command and options, the MAGSAV dialog begins. Shown below are the system prompts in the order in which they appear, together with the appropriate user responses. Note that if you are saving to a 60MB cartridge tape, the dialog is slightly different from that shown below. These differences are described in the section, Saving to a 60MB Cartridge Drive, later in this chapter.

Prompt

User Response

Tape unit:

Enter the logical tape unit number for the tape drive you wish to use. The system assumes you are using a 9-track tape unit. Enter Q, or QUIT to quit the program.

If the reel is in ANSI format, the label on tape may contain a volume serial ID that identifies the reel of tape. If it does, a message of the following form is displayed:

```
Volume serial ID is MYVOL1.
```

Enter logical tape number:

Enter a number that denotes the sequential number on the tape for the logical tape you wish to save. Enter 1 for the first save on the reel, 2 for the second and so on. MAGSAV positions the tape to the start of the required logical tape. If you enter APPEND this will position the tape at the end of the last save on tape. If you enter the value 0 or press

Return

MAGSAV assumes that the tape is already correctly positioned. Enter Q or QUIT to quit the program.

If you used the `-QUERY` option and are writing to an ANSI reel that already contains data, a prompt of the form shown below appears:

LOGICAL RESTORE FROM TAPE: MAGRST

Introduction

This chapter gives comprehensive details on the use of enhanced MAGRST. Aspects of restoring files, directories, and partitions are described. Explanations are given of the MAGRST command line options, and of the system prompts and user responses. Procedures are given for restoring individual files and directories, and for restoring entire partitions.

Overview

MAGRST is a utility used for restoring file system objects from tape to disk. You can only use MAGRST to restore tapes previously saved using MAGSAV. Because MAGSAV saves objects as logical entities, you can use MAGRST to restore individual objects to disk. You cannot do this if you use a physical save utility to write to the tape.

Restoring Files, Directories, and Partitions

You can either restore the entire contents of a tape, or just part of the tape. If you restore part of the tape only, this is termed a partial restore. You must specify the pathnames of objects to be restored as recorded on tape. Objects are written into the directory to which you are attached. When you restore an object you may give it a different name from that which it has on tape.

Restoring Directories and Files

When MAGRST restores a directory to disk, the entire directory structure is recreated on disk within the directory to which you are currently attached.

When MAGRST restores individual files to disk without restoring the associated directory, only the filename portion of the pathname on tape is retained. This means that if you restore two files that have different pathnames on tape but the same filenames, the second

file restored overwrites the first. For example, SUE > LOGIN.CPL overwrites MEG > LOGIN.CPL.

When you run incremental saves and the tape is written in ANSI format, the directory structure is saved as well as the files that have been modified since the last incremental save.

When you run incremental saves using the options -REV19 and -REV20, which write tapes in non-ANSI format, the directory structure is not saved to tape unless you use the option -SUF D. If you omit the option -SUF D when writing incremental save tapes in non-ANSI format, you will not be able to recreate the directory structure when you restore this tape to disk. In practice you usually restore the associated base tape before an incremental save tape, and the entire directory structure is recreated when you restore the base tape.

Restoring Segment Directories

When MAGRST restores a segment directory into an area that already contains a segment directory of the same name, the system automatically overwrites or deletes subfiles in the disk directory, and the restored directory is an exact copy of the segment directory on tape.

Restoring Partitions

A partition may occupy the entire contents of one or several tapes. Before restoring a partition from tape, you must ensure that there is sufficient available space on disk. If you do not have sufficient room to restore the tape contents you should first recreate the disk using the MAKE command.

File Security

MAGRST always tries to restore the ACL, access category, or password protection associated with the object restored from tape. However, you should be aware of the following points:

- Because MAGSAV writes an object to tape before it saves the ACLs associated with that object, MAGRST first restores the object to disk, and then restores the ACLs. This means that you can restore an object from tape even when you have no rights to the object, but you may not be able to use the restored object.
- When you are running a partial restore and you restore a file that is protected by an access category, MAGRST does not automatically restore the access category. An error message is displayed and the restored file has default protection on disk. To restore specific files with their access categories, you should first restore the access categories and then the protected files.
- The following table describes the situations which may arise when you restore ACL and Password directories:
 - ACL directory restored from tape:

- Overwrites existing ACL disk directory of the same name. The restored directory is an ACL directory, and the ACLs of objects protected by this directory are set to the values in the restored directory.
- Overwrites existing password disk directory of the same name. The restored directory is a password directory, and the ACLs of objects protected by this directory are lost.
- o Password directory restored from tape:
 - Overwrites existing password disk directory of the same name. The restored directory is a password directory, and the passwords of objects protected by this directory are set to the values in the restored directory.
 - Overwrites existing ACL disk directory of the same name. The restored directory is an ACL directory, and the ACLs of objects protected by this directory are set to their default values.

Command Line Options

MAGRST is an interactive command that prompts you for information. Invoke MAGRST by issuing the MAGRST command using none, one, or more of the available command line options. These options are described below.

► MAGRST [options]

<i>Option</i>	<i>Description</i>
{ -CAM_RBF -CRBF }	Restore all RBF subfiles as CAM files.
-HELP	Displays MAGRST syntax and options.
{ -INDEX_LIBRARY } [level] [pathname] -IND_LIB	This option is introduced at Rev. 23.1. When you specify this option, an index file is created in the index library if one does not already exist. The \$I response to the Ready to restore: prompt is invalid with this option. <i>level</i> specifies the number of directory levels to be indexed. A default level value may be defined in the DRB configuration file, or, if not, the default level is two. <i>pathname</i> is the pathname of the index library. A default pathname can be defined in the DRB configuration file.
{ -NO_ATTRIBUTES -NATT }	By default, MAGRST restores the attributes DTA/DTC/DTM from tape. This option disables the restoring of these attributes from tape and the attribute values of the restored object are set to those of the current date and time.

-QUERY

Use this option when restoring Recovery Based Files (RBFs). If a master RBF of the same name exists on disk, the system prompts you to state if you wish to overwrite the existing copy. If you answer YES, the system deletes the master and slave RBFs from disk, and restores the objects from tape; if you answer NO, the system continues with the next object to restore. If you omit this option, the system overwrites existing master RBFs of the same name, but not existing slave RBFs if they are slave files of a different master RBF; an error message is displayed and the restore is aborted. You can also use this option to instruct MAGRST to query you when restoring an EPF that is currently in use. For further information on RBFs, refer to the *ROAM Administrator's Guide*.

-TTY

Instructs MAGRST to prompt you to enter the tape unit number from your terminal. All other information is taken from the CPL or COMI file. Use this option when running MAGRST from CPL or command input (COMI) files.

-UNLOAD

Instructs MAGRST to rewind and unload the tape when the end of the tape is reached.

The MAGRST Dialog

After you invoke MAGRST by issuing the MAGRST command and options, the MAGRST dialog begins. Shown below are the system prompts in the order in which they appear, together with the appropriate user responses.

Prompt

Response

Tape unit:

Enter the logical tape unit number for the tape drive you wish to use. The system assumes you are using a 9-track tape unit. Enter Q, or QUIT to quit the program.

If the reel has a valid volume serial ID, a message of the following form is displayed:

Volume serial ID is MYVOL1

Enter logical tape number:

Enter a number that denotes the sequential number on tape for the logical tape (or save) that you wish to restore. Enter 1 for the first save on the reel, 2 for the second, and so on. MAGRST positions the tape to the start of the requested save number. If you enter the value 0, or press

LOGICAL RESTORE FROM TAPE: MAGRST

MAGRST assumes that the tape is already correctly positioned. Enter Q, or QUIT to quit the program.

A message of the following form is displayed, showing the details of the logical tape file:

```
Positioning to logical tape number 2...
Name: MYTAPE
Date: 12 1 80
Rev no: 23
Reel no: 1
```

If you enter a save number that is higher than that of the last save on the reel, an error message is displayed, and the system prompts you to re-enter the tape unit number.

Ready to Restore:

You can make any one of the following responses to this system prompt:

```
YES
NO$
A pathname
$Index [pathname] [n]
INDLIB [pathname] [n]
$Extended pathname [n]
NW [filename] [n]
XNW filename [n]
PARTial
CHecKpoint
```

YES restores the entire logical tape and returns you to PRIMOS. If MAGRST cannot access an object during a restore operation, that object is abandoned and the system continues with the next file or directory, if any, to restore.

NO requests a different tape unit and logical tape. MAGRST does not restore the previously specified tape, and prompts you to reenter the tape unit number.

\$A *pathname* attaches you to the specified directory *pathname* on disk. Supply a password if needed.

\$Index [*pathname*] [*n*] generates an index of the restored objects, and restores them to disk. If you omit *pathname*, the index is displayed on the screen. If you specify *pathname*, the index is written to the file specified and is not displayed on the screen. If the file already exists, the index is appended to that file. You cannot specify passwords in the pathname. The argument *n* is a decimal integer that specifies the number of

directory levels in the index. If you omit *n*, the default is two levels.

INDLIB [*pathname*] allows you to create an index library without restoring the tape. *pathname*, if it is specified, overrides a pathname that is entered in the command line.

\$E *pathname* [*n*] generates an extended index of the restored objects, and restores them to disk. The index is written to the file specified by *pathname*. If the file already exists, the index is appended to that file. You cannot specify passwords in the pathname. The argument *n* is a decimal integer that specifies the number of directory levels in the index. If you omit *n*, the default is two levels.

NW [*filename*] [*n*] generates an index of the tape contents, but does not restore any files or directories. If you omit *filename*, the index is displayed on the screen. If you specify *filename*, the index is written to the file specified and is not displayed on the screen. If the file already exists, the index is appended to that file. The argument *n* is a decimal integer that specifies the number of directory levels in the index. If you omit *n*, the default is all levels. Use this option to determine the contents of a tape.

XNW *filename* [*n*] generates an extended index of the tape contents, but does not restore any files or directories. The index is written to the file specified by *pathname*. If the file already exists, the index is appended to that file. The argument *n* is a decimal integer that specifies the number of directory levels in the index. If you omit *n*, the default is 100 levels. Use this option to determine the contents of a tape.

PARTIAL restores only specified files and directories. You are prompted to enter the the names of the objects you wish to restore, as shown below:

TREE NAME:

Enter the pathnames of the objects you wish to restore. These pathnames should be entered exactly as recorded on tape. You may change the name of the object you wish to restore by entering the response *name1 name2*, where *name1* is the pathname of the object on tape and *name2* is the pathname you wish to give to the restored object. After you enter each pathname, MAGRST repeats the prompt. You can specify any number of pathnames. Press

at the prompt to begin the restore process.

CHeckpoint restores only specified files and directories in the same way as the PArTial subcommand, but in this case you are prompted to enter both the pathname of the object you wish to restore, and the number of the checkpoint which immediately precedes the object on tape. The prompt and response format are as shown below:

```
TREE NAME: name1_checkpoint_no_[name2]
```

where *name1* is the pathname of the object on tape, *checkpoint_no* is the number of the checkpoint which immediately precedes the object on tape, and *name2* is the (optional) pathname you wish to give to the restored object. The *checkpoint_no* is obtained from the extended index.

End of Tape Handling

If MAGRST encounters an end-of-tape (EOT) when restoring from tape, an informative message is displayed, the system rewinds the tape (and unloads it, if you specified -UNLOAD), and prompts you to enter the tape unit number for the continuation tape. A typical output is shown below:

```
End of reel (Volume serial ID MYVOL1)
Mount continuation reel
Continuation tape unit: 1
```

The system continues restoring objects from the newly mounted reel. The continuation tape unit does not have to be the same as the tape unit previously used. If the continuation reel is out of sequence, a messages is displayed and you are prompted to reenter the continuation tape unit. If you are running the restore from a CPL or COMI file, use the option -TTY if you wish to enter the continuation tape unit number from your terminal.

Procedure for a Partial Restore

Shown below are the steps you should follow when you use MAGRST to run a partial restore. It is not necessary to shut down either the system or the partition to users.

1. Attach to the directory into which you intend to restore the objects. For example:

```
OK, ATTACH <DSK1>MYDIR
```

2. Assign the tape unit for the tape that is to be restored. For example:

```
OK, ASSIGN MTL
```

3. Mount the reel of tape on the assigned drive. If the objects to restore are contained on a multireel tape volume, this must be the first reel of the volume.
4. Invoke MAGRST and enter the required response when prompted to do so. A typical example is as follows:

```
OK. MAGRST
[MAGRST Rev 23.0 Copyright (c) 1980, Prime Computer, Inc.]
Tape unit: 1
Volume serial ID is MYVOL1
Enter logical tape number: 2
Positioning to logical tape number 2 ...
Name: MYTAPE
Date: 12 10 90
Rev no: 23
Reel no: 1
Ready to Restore: PARTIAL
Tree name: A>FILE1
Tree name: A>FILE2
Tree name: [Return]
*** Starting Restore
*** Restore Complete
OK,
```

5. Unload the tape and unassign the tape unit by issuing the following command:

```
OK. UNASSIGN MT1 -UNLOAD
```

6. Dismount the tape reel.

Procedure for a Checkpoint Restore

The procedure for restoring objects from tape using checkpoints to speed up the tape handling, is very similar to the procedure shown above for a partial restore. However, for a checkpoint restore, you enter the response **CHecKpoint** instead of **PARTIAL**, and then input both the object name and the associated checkpoint number at the **MAGRST** prompt

```
Tree name:.
```

Restore Procedure for an Entire Partition

It is not essential to shut down either the system, or the partition before restoring a partition. However, it is advisable to do so if the partition has many origin directories, or if it holds information used by many users on the system. If you are restoring the command partition, you must shut down the system. Restoring the command partition is carried out as part of the process of booting from tape. For details of boot procedures, refer to Chapter 4, *Creating and Using a Boot Tape*. For a full discussion of preparation procedures to follow before saving and restoring data, refer to Chapter 10, *System Preparation, Startup, and Shutdown*.

LOGICAL RESTORE FROM TAPE: MAGRST

Before you restore the partition from tape, you must ensure that there is sufficient available space on disk. If you do not have sufficient room to restore the tape contents you should first recreate the partition using the MAKE command.

Shown below are the steps you should follow to use MAGRST to restore an entire partition.

If you have decided to shut down the entire system, follow the procedure described in Chapter 10 of this guide under the section, Procedure for Shutting Down the System. If you have decided to shut down only the partition, follow the procedure described in Chapter 10 of this guide under the section, Procedure for Removing a Partition from Service. The following steps must be executed from your supervisor terminal if you have shut down the system, otherwise they may be executed from a user terminal.

1. Attach to the MFD of the partition that you are going to restore. For example:

```
OK, ATTACH <DSK1>MFD
```

2. Assign the tape unit for the tape that you are going to restore. For example:

```
OK, ASSIGN MT1
```

3. Mount the reel of tape on the assigned drive. If the objects to restore are contained on a multireel tape volume, this must be the first reel of the volume.
4. Invoke MAGRST and enter the required response when prompted to do so. A typical example is as follows:

```
OK, MAGRST
[MAGRST Rev. 23.0 Copyright (c) 1990, Prime Computer, Inc.]
Tape Unit: 1
Volume serial ID is MYVOL1
Enter logical tape number: 2
Positioning to logical tape number 2 ...
Name: MYTAPE
Date: 12 10 90
Rev no: 23
Reel no: 1
Ready to Restore: YES
*** Starting Restore
*** Restore Complete
OK,
```

5. Unload the tape and unassign the tape unit by issuing the following command:

```
OK, UNASSIGN MT1 -UNLOAD
```

6. Dismount the tape reel.
7. If you have shut down the entire system, restart the system by following the procedure described in Chapter 10 of this guide, under the section, Procedure for Starting Up the System.

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

If you have shut down only the partition, return it to service by following the procedure described in Chapter 10 of this guide, under the section, Procedure for Returning a Partition to Service.

PART IV
NEW FEATURES
AT REV. 23.1

INDEX LIBRARY MANAGEMENT

This chapter describes the extended index structure and two commands that allow you to perform index library management functions. These commands are:

- SEARCH_INDEX_LIB
- INDEX_LIB_MANAGER

These commands, their options, and their functions are described fully later in this chapter.

The Extended Index Structure

Extended indexes created in the index library are written to files with predefined names. Each volume has its own index file in the index library which is named according to the following scheme.

`*>V.vvvvvv>Snnn.ddd.yymmdd.hhmmss.Rnnn`

Where

<code>vvvvvv</code>	is the 6-character volume serial ID of the current volume. If characters are present which are not valid in a PRIMOS filename they will be replaced by the # character.
<code>Snnn</code>	is the 3-digit zero padded save number for the current save on the current volume.
<code>ddd.yymmdd</code>	is the day and date upon which the save was started.
<code>hhmmss</code>	is the time that the save was started.
<code>Rnnn</code>	is the 3-digit zero padded reel number for the current volume in the current save.

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

This format allows you to select specific save indexes by their filename, and saves you from having to open all the index files. This means, for example, that you can specify all indexes relating to a particular volume and delete them by name when the volume is reused. Also, because the save date and time, and reel number are contained in the filename, you can sort files chronologically, and have the reels of each save in sequence. The advantage of this is that the number of files which need to be processed when looking for the earliest or latest save of a file is greatly reduced.

The following commands allow you to search and administer index library files, selecting objects, using dates of creation or volume IDs.

The SEARCH_INDEX_LIB Command

The SEARCH_INDEX_LIB command searches index library files that are created when you use the -INDLIB option with MAGSAV.

Format

The format for the SEARCH_INDEX_LIB command is shown below.

```
SEARCH_INDEX_LIB search_string [options]
```

where:

search_string is the string used when searching the index files. You can include wildcards in this string, it can be a fully qualified pathname or a partial pathname. In cases where more than one saved object matches the string you have entered, a list of all the matching objects will be displayed. If you enter this command without a search string, or you enter an invalid search string you will receive an error message.

The command options are as follows:

<i>Option</i>	<i>Description</i>
<code>[-INDEX_LIBRARY] pathname</code> <code>[-INDLIB]</code>	If you specify this option SEARCH_INDEX_LIB uses the supplied pathname as the index library directory. If you do not include this option SEARCH_INDEX_LIB uses the system default index library, specified in the DRB config file.
<code>-LATEST</code>	Include this option if you want the most recent copy of the specified object to be reported.

-OLDEST

When you include this option the oldest copy of the specified object is reported.

[**-WRITTEN_AFTER**] date
[**-WRA**]

This option allows you to specify that only saves made after a specific date should be searched.

[**-WRITTEN_BEFORE**] date
[**-WRB**]

This option allows you to specify that only saves made before a specific date should be searched.

You can use the **-WRITTEN_AFTER** option with the **-WRITTEN_BEFORE** option, to search saves created between two specific dates.

-DATE date

When you specify this option only saves made on that specified date are searched. If you attempt to use this option with either or both of the above options, an error message will be displayed.

[**-REVERSE**]
[**-REV**]

When you specify this option the sort order is reversed so that the latest saves of a file are listed first.

```

OK, SEARCH_INDEX_LIB DATAFILE@ -INDLIB USER1>PRIVATE_INDLIB
[SEARCH_INDEX_LIB Rev. 2.0-23.0 Copyright (c) 1989, Prime Computer, Inc.]
Searching Index Library <USRDSK>USER1>PRIVATE_INDLIB....
5 Objects:
Pathname                Date/Time Modified Type Save Type   Volume Save/Check
-----
<USRDSK>USER1>DATAFILE.OLD
      16 Jan 89 11:01:44 SAM Ad Hoc Save DRB001 1/0123
      16 Jan 89 11:01:44 SAM Ad Hoc Save DRB099 1/0001
<USRDSK>USER1>ACCOUNTS_DATA>DATAFILE.890612
      12 Jun 89 15:30:04 SAM Ad Hoc Save DRB213 2/0012
      13 Jun 89 09:15:54 SAM Ad Hoc Save DRB213 3/0014
<USRDSK>USER1>ACCOUNTS_DATA>DATAFILE.890613
      13 Jun 89 15:30:04 SAM Ad Hoc Save DRB213 4/0015
<USRDSK>USER1>ACCOUNTS_DATA>DATAFILE.890614
      14 Jun 89 15:30:04 SAM Ad Hoc Save DRB213 5/0016
<USRDSK>USER1>DATAFILES>
      01 Feb 87 16:55:34 DIR Ad Hoc Save USER13 1/0001
      02 Feb 87 17:00:00 DIR Ad Hoc Save USER13 2/0002
      03 Feb 87 17:00:00 DIR Ad Hoc Save USER13 3/0003
      03 Feb 87 17:00:00 DIR Ad Hoc Save USER13 4/0004
      05 Feb 87 17:00:00 DIR Ad Hoc Save USER13 5/0005
      06 Feb 87 17:00:00 DIR Ad Hoc Save USER13 6/0007
      07 Feb 87 17:00:00 DIR Ad Hoc Save USER13 7/0008
    
```

FIGURE 11-1. A Typical SEARCH_INDEX_LIB Display

The following information is displayed by SEARCH_INDEX_LIB

<i>Information</i>	<i>Description</i>
Pathname	Displays the full file system pathname.
Date/Time Modified	The date and time of the last modification, before the save was performed, is displayed.
Type	Shows the file type.
Save Type	This shows which type of save was performed. This information is needed because a directory may not be complete when an incremental save is carried out. The types of save are: <ul style="list-style-type: none">● Ad Hoc● Base● True Increment● Cumulative Increment
Volume	Displays the volume serial ID for each save of the object.
Save/Check	Displays: <ul style="list-style-type: none">● the save number of each save of the object● the number of the checkpoint immediately preceding the object

The INDEX_LIB_MANAGER Command

The command INDEX_LIB_MANAGER allows users, who have the appropriate access rights, to perform administrative tasks on the index library.

Format

The format for the INDEX_LIB_MANAGER command is shown below.

INDEX_LIB_MANAGER [options]

The command options are as follows

<i>Option</i>	<i>Description</i>
<code>[-INDEX_LIBRARY] pathname</code> <code>[-INDLIB]</code>	If you specify this option, INDEX_LIB_MANAGER uses the specified pathname as the index library directory. If you do not specify this option, INDEX_LIB_MANAGER uses the system default index library, specified in the DRB configuration file.
<code>-DELETE [-NO_QUERY]</code> <code>[-NQ]</code>	This option allows you to delete the specified index files. Before each delete commences you are asked if the delete should be performed. To disable the queries you should specify the <code>-NO_QUERY</code> option.
<code>-IMPORT [pathname]</code>	This option copies index files from the alternative index libraries, specified in the configuration file, into the main index library. If you specify <i>pathname</i> , it must be either the pathname of an index file to be imported, or the pathname of an index library or an alternative index library which contains files to be imported. You can use wildcards, with this option, when specifying a pathname, for example, if you enter <code><USRDSK>USER1>DATAFILES >@@</code> , all the files in the specified directory are imported.
<code>[-REPORT]</code> <code>[-RPT]</code>	This option causes details about the specified index files to be displayed.
<code>-DATE date</code>	This option allows you to specify that only index files, that match the date you have entered, should be processed.
<code>[-VOLUME_ID] volume_id</code> <code>[-VOLID]</code>	When you specify this option only files matching the specified volume ID are listed. You may use wildcards in this option, with the exception of the <code>+</code> character, as this is a valid character within a volume ID.
<code>[-WRITTEN_AFTER] date</code> <code>[-WRA]</code>	This option allows you to specify that only saves made after a specific date should be processed.
<code>[-WRITTEN_BEFORE] date</code> <code>[-WRB]</code>	This option allows you to specify that only saves made before a specific date should be processed.
The following three options, <code>-SORT_DTW</code> , <code>-SORT_VOLID</code> , and <code>-REVERSE</code> are only used with the <code>-REPORT</code> option	
<code>[-SORT_DTW]</code> <code>[-SORTW]</code>	This option causes index files to be sorted by the date they were written, the most recent listed first. This is the default if you specify any other option which has a date criterion.

**[-SORT_VOLID
-SORTV]**

This option specifies that details of index files are sorted by the volume serial ID. This is the default if no date criterion option is specified.

**[-REVERSE
-REV]**

This specifies that the sort order is to be reversed.

```

OK, INDEX_LIB_MANAGER -REPORT -VOLID DRB@ -SORTV
[Index_LIB_MANAGER Rev. 2.0-23.0 Copyright (c) 1989, Prime Computer, Inc.]
Searching Index Library <ADMIN>INDEX_LIBRARY...

216 Volumes.
Volume Save Date/Time Saved Name Save Type Reel
-----
DRB001 1 16 Jan 89 11:01:44 PART1 Base Save
2 16 Jan 89 11:12:30 USRDSK Base Save
3 16 Jan 89 11:21:34 ADMIN Base Save 1
DRB002 1 16 Jan 89 11:21:34 ADMIN Base Save 2
DRB003 1 16 Jan 89 11:21:34 ADMIN Base Save 3
DRB004 1 17 Jan 89 11:01:44 PART1 True Inc
2 17 Jan 89 11:12:30 USRDSK Cum Inc
3 17 Jan 89 11:21:34 ADMIN Cum Inc
4 18 Jan 89 11:01:44 PART1 True Inc
5 18 Jan 89 11:12:30 USRDSK Cum Inc
6 18 Jan 89 11:21:34 ADMIN Cum Inc
DRB005 1 31 Dec 87 18:00:04 YEND Ad Hoc Save 1
DRB006 1 31 Dec 87 18:00:04 YEND Ad Hoc Save 4
DRB007 1 31 Dec 87 18:00:04 YEND Ad Hoc Save 3
DRB008 1 31 Dec 87 18:00:04 YEND Ad Hoc Save 2
DRB009 1 31 Dec 87 18:00:04 YEND Ad Hoc Save 6
DRB010 1 31 Dec 87 18:00:04 YEND Ad Hoc Save 5

-- More --
    
```

FIGURE 11-2. An INDEX_LIB_MANAGER Display Using the -REPORT Option

The following information is displayed for reports sorted when using the -REPORT -VOLID option combination.

<i>Information</i>	<i>Description</i>
Volume	is the volume serial ID for each volume.
Save	is the save number of each save on the volume.
Date/Time Saved	is the date and time that the save was made.
Name	is the save name which you enter when the save is made.
Save Type	is the save type, which is one of the following <ul style="list-style-type: none"> ● Ad Hoc ● Base ● True Increment

Reel

- **Cumulative Increment**

is the reel number of this volume within the save. No reel number will be given if the save is contained entirely on the present volume.

GLOSSARY

Explanations are given on the following pages of some of the terms used in this guide.

ACAT

Access Category. This is a file object that contains the access control parameters associated with one or more objects in the same directory.

ACL

Access Control List. This is a set of user rights associated with individual file system objects, that define the user access rights to these objects. These include, for example, read (R), list (L), delete (D), write (W).

ANSI

American National Standards Institute.

Base Save

A save of all data.

CAM

Contiguous Access Method. This is a method by which the system accesses files, and also a method of file storage. Groups of file records are stored contiguously on the disk. This results in faster file access. Files accessed in this way are called CAM files.

CPL

Command Processing Language. This is a programming language used primarily for processing commands.

Cumulative Incremental Save

An incremental save recording all changes since the base save. This form of save requires only the base save and the last incremental save for restore.

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

DAM

Direct Access Method. This is a method by which the system accesses files, and also a method of file storage. Individual file records may be stored in separate areas of the storage medium. Files accessed in this way are called DAM files.

DTA

Date/Time Accessed. This is an attribute associated with a file system object specifying the date and time that object was last accessed.

DTB

Date/Time Backed Up. This is an attribute associated with a file system object specifying the date and time that object was last backed up.

DTC

Date/Time Created. This is an attribute associated with a file system object specifying the date and time that object was created.

DTM

Date/Time Modified. This is an attribute associated with a file system object specifying the date and time that object was last modified.

EOT

End of Tape. This is a physical reflective strip on the tape close to the end of the tape, that the tape drive recognizes as signifying the end of the tape reel.

EPF

Executable Program Format. This is one format in which programs that you run are stored on the system.

Extended Index

Extended indexes contain checkpoint information and the date and time each file was modified. You can place extended index files in an Index Library or you can create them as text files.

File System Object

See *object*.

Home Attach Point

The point to which you are attached when you issue a command to start an operation such as a save or restore operation.

Incremental Save

Used to describe both cumulative and true incremental saves - see also *Cumulative Incremental Save* and *True Incremental Save*.

IPR

Independent Product Release. This term describes a product release that is not tied to a PRIMOS revision release.

Logical Tape or Logical Save

The data recorded by a single invocation of MAGSAV. The data may be contained in one or several files or directories, and may occupy one or more reels of tape. If the data saved occupies more than one reel, the continuation logical tape is logical tape 1 on the continuation reel.

Index Library

An index library is a centralized collection of extended indexes maintained by the DRB product.

MFD

Master File Directory. This is the top-level directory of a partition.

Object

Is used throughout this guide to indicate either a file or a directory.

Partition

A separate logical area of file system storage on disk.

PDev

Physical Device Number. A numeric identifier describing the location and size of a partition.

RAT

Record Availability Table. Holds information about which records are in use on a partition.

RBF

Recovery Based File. These files are stored on the system as a master and several slave files. This method of storage enables data updates to be recovered even if there is a system crash during the updating session.

ROAM

Recovery Oriented Access Method. This is the method by which the system accesses Recovery Based Files.

Save Stream

One of the devices being written to when PSR writes multiple copies of a single save.

OPERATOR'S GUIDE TO DATA BACKUP AND RECOVERY

Tape Block

The system writes data to tape in discrete blocks, rather than as a continuous stream. MAGSAV writes 12K byte blocks by default. You can write tape blocks of 16K bytes when running on PRIMOS Rev. 22.0 or later revisions, using the configuration directive MTRS and the MAGSAV option -BIG. Refer to Chapters 1 and 2 for details of block sizes.

Top Level Directory

A directory immediately below an MFD in the file structure.

True Incremental Save

An incremental save that records changes since the last base or incremental save. This form of save requires the base save and all incremental saves to restore the data.

Volume

A physical object of storage media, for example, a reel of tape, or a disk.

Volume Serial ID

An alphanumeric string of a maximum length of 6 ANSI characters contained within an ANSI tape label, that uniquely identifies the reel of tape. This identification is particularly useful in the case of multireel volumes.

Index

■ ■ ■ ■ ■ ■ ■ ■

A

Access categories MAGSAV/RST
-No_Acl, 2-4
restoring, 3-2
saving, 2-2

ACL
-No_Acl, 2-2, 2-4
restoring, 3-2
saving, 2-2
saving objects, 2-1

Appending to tape, PSR save dialog, 6-9

Archive saves
physical save to tape, 6-2
PSR -SAVE -ARCHIVE, 6-6
PSR examples, 6-13
PSR restore dialog, 7-5
PSR save dialog, 6-8

Attributes MAGSAV/RST
-No_ATTributes, 1-2, 3-3
-NO_DTA, 1-2, 2-4
DTA, 1-2, 2-4, 3-3
DTB, 1-3, 1-8, 2-3, 2-5, 2-10, 3-3, 9-2
DTC, 1-2, 3-3
DTM, 1-2, 1-3, 2-3, 3-3, 5-2, 9-2
incremental control, MAGSAV control, 2-3
logical restore, 1-2
logical save, 1-2
restoring, 3-3

B

.BACKUP\$ MAGSAV/RST, 2-1, 2-3, 2-4, 2-5, 2-10

Backups
base saves, 9-2, 9-4
cartridge tapes, 9-6

CPL program, 6-16
disk mirroring, 9-4
examples, 9-8
incremental control, 9-2
incremental saves, 9-2, 9-4, 9-5
logging, 9-7
logical restore, 9-3
MAGSAV/RST, 9-2
need for, 9-1
performance, 9-5
physical copy to disk, 9-4, 10-2
physical restore, 9-4
policy, 9-8
preparations for tape backup, 10-1
preparations for tape restore, 10-1
PSR, 9-3
retaining, 9-6
scheduling, 9-6
strategy, 9-7
system preparation, 10-3
unattended, 6-16
unattended MAGSAV, 1-4, 2-13, 9-6
unattended PSR, 9-6

Backups MAGSAV, CPL program, 2-13

Base Saves, PSR -SAVE -BASE, 6-6

Base saves
backups, 9-2, 9-4
MAGSAV description, 2-2
physical restore from tape, 6-3, 7-1
physical save to tape, 6-2, 6-3
PSR examples, 6-13, 6-15, 7-9
PSR restore dialog, 7-5, 7-6
PSR save dialog, 6-8

Boot tapes
-BOOT, 2-1, 2-3, 4-1
BOOT_CREATE, 4-3
BOOT_RESTORE, 4-1
creating, 2-1, 4-1, 4-2, 4-4
format, 4-1
list files, 4-2

PRIMOS revisions, 4-1

BOOT_CREATE
command dialog, 4-4
command format, 4-3
command options, 4-4
description, 4-1
examples, 4-5

BOOT_RESTORE, 4-1, 4-6, 4-7

Booting from tape
BOOT_RESTORE, 4-6
description, 4-6
procedure, 4-7

BRMS tapes, 1-8

C

CAM files MAGSAV/RST, 1-5, 1-6, 1-8, 2-5
-CAM_RBF, 3-3

Cartridge tapes
MAGSAV, 2-10
MAGSAV/RST, 1-3
PSR save dialog, 6-9
unattended backup, 9-6

Check disk
Physical copy to disk, 8-5
physical restore from tape, 7-5
PSR copy dialog, 8-5
PSR restore dialog, 7-6

Checkpoints
MAGRST, 1-2
MAGRST dialog, 3-7
MAGRST procedure, 3-8
MAGSAV, 1-1, 1-3
MAGSAV/RST tape indexing, 5-2
physical save to tape, 6-5

Command device
physical copy to disk, 8-2
physical restore from tape, 7-1
physical save to tape, 6-2, 9-3

Operator's Guide to Data Backup and Recovery

Commands

- BOOT_CREATE, 4-1, 4-3
- INDEX_LIB_MANAGER, 11-4
- MAGRST, 3-3
- MAGSAV, 2-3
- MTRESUME, 4-7, 4-8
- MTRS, 1-6, 1-8, 2-3
- PSR -COPY, 8-4
- PSR -RESTORE, 7-5
- PSR -SAVE, 6-6
- SEARCH_INDEX_LIB, 11-2

Configuration file, 1-4

CPL programs

- TTY, 2-5, 3-4
- MAGSAV dialog, 2-10
- Physical saving to tape, 6-15
- unattended backup, 6-16
- unattended backup MAGSAV, 2-13

D

- DAM files MAGSAV/RST, 1-5, 1-6, 1-8, 2-5
- Disk mirroring, 9-4
- DRB configuration file, 1-4

E

End of tape

- MAGRST, 3-7
- MAGSAV, 2-10
- physical restore from tape, 7-7
- physical save to tape, 6-11

EPF, MAGRST, 3-4

Error handling

- MAGSAV/RST, 1-3, 1-7
- physical copy to disk, 8-3, 8-5
- physical restore from tape, 7-3, 7-7
- physical save to tape, 6-5

Extended index, structure, 11-1

H

Hardware considerations, controllers, 9-8

Help

- MAGRST, 3-3
- MAGSAV, 2-3
- physical copy to disk, 8-3

- physical restore from tape, 7-4
- physical save to tape, 6-5

I

Incremental control, backups, 9-2

Incremental saves

- INC, 2-3
- Save_UFD, 2-5, 3-2
- UPDT, 2-3, 2-5
- backup performance, 9-5
- backups, 9-2, 9-4
- control MAGSAV, 1-3
- DTB, 1-3, 1-8, 2-3
- MAGSAV description, 2-2
- MAGSAV dialog, 2-9, 2-10
- MAGSAV examples, 2-5, 2-6
- physical restore from tape, 6-3, 7-1
- physical save to tape, 6-2, 6-3, 9-5
- PRIMOS Revisions MAGSAV/RST, 1-8
- PSR examples, 6-14, 7-9
- PSR restore dialog, 7-6
- PSR save dialog, 6-8
- PST -SAVE -INC, 6-6
- ROAM files, 1-3, 2-10
- Index library, creating, 2-4
- INDEX_LIB_MANAGER command, 11-4

L

Logical tapes MAGSAV/RST

- description, 2-2
- MAGRST dialog, 3-4
- MAGSAV dialog, 2-7
- name, 2-7

M

MAGRST

- command format, 3-3
- command options, 1-5, 3-3
- description, 3-1
- dialog, 3-4
- directory structure, 3-1
- procedure for partial restore, 3-7
- procedure for partition restore, 3-8
- restoring directories, 3-2

MAGRST options, 1-5, 3-3

- No_Attributes, 1-2
- not supported, 1-6

MAGSAV

- command format, 2-3
- command options, 1-5, 2-3
- description, 2-1
- dialog, 2-6
- directory structure, 2-5, 3-2
- procedure for partition save, 2-11

MAGSAV options, 1-5, 2-3

- BIG, 1-6
- BOOT, 2-1, 4-1
- INC, 2-5, 2-6
- LABEL, 1-3, 2-7
- No_Acl, 2-2
- NO_DTA, 1-2
- QUERY, 2-6
- REV19, 1-8
- REV20, 1-8
- Save_UFD, 3-2
- UPDT, 1-3, 2-3, 2-6, 9-3
- not supported, 1-5

MTRESUME, 4-7

MTRS, 1-6, 1-8, 2-3

Multiple save streams, PSR dialog, 6-10

Multiple save streams PSR, description, 6-3

O

Object names

- MAGRST, 3-1, 3-6
- MAGSAV, 2-8

P

Partial restore

- checkpoints, 3-7
- MAGRST dialog, 3-6
- procedure, 3-7

Partial restore MAGRST, description, 3-1

Partition, identifier, 6-6

Partition identifier PSR, 6-4

Partitions

- MAGRST, 3-2
- MAGRST procedure, 3-8
- MAGSAV, 2-9
- MAGSAV procedure, 2-11

physical copy to disk, 8-1, 8-6
 physical restore from tape, 7-1
 physical restore from tape procedure, 7-7
 physical save to tape, 6-1, 6-11
 procedure for removing from service, 10-5
 procedure for returning to service, 10-7
 robust PSR, 7-2, 8-2
 valid source and target PSR, 7-2, 8-2
 write protection PSR, 6-4, 7-3, 8-2

Passwords MAGSAV/RST
 -No_Acl, 2-4
 restoring, 3-2
 saving, 2-2

Performance
 backups, 9-5
 physical copy to disk, 8-8
 physical restore from tape, 7-10
 physical save to tape, 6-18

Physical copy to disk
 backups, 9-4
 command format, 8-4
 command options, 8-4
 description, 8-1
 dialog, 8-5
 examples, 8-5, 8-7
 performance, 8-8
 preparations, 10-2
 valid source and target PSR, 8-2

Physical restore from tape
 command format, 7-5
 command options, 7-5
 description, 7-1
 dialog, 7-5
 examples, 7-9
 preparations, 10-1
 procedure, 7-7, 8-6
 valid source and target PSR, 7-2

Physical save to tape
 command format, 6-6
 command options, 6-6
 description, 6-1
 dialog, 6-8
 examples, 6-12
 performance, 6-18
 preparations, 10-1
 PRIMOS revisions, 6-7
 procedure, 6-11

Physical saves to tape, examples, 6-7

PRIMOS Revisions
 incremental saves MAGSAV/RST, 1-8
 MAGSAV tape compatibility, 1-7
 MAGSAV tape format, 1-8
 physical save to tape, 6-3
 running MAGSAV/RST, 1-7, 1-8

PRIMOS revisions
 boot tapes, 4-1
 physical save to tape, 6-7

Procedures
 booting from tape, 4-7
 checkpoint restore MAGSAV/RST, 3-8
 partial restore, 3-7
 partition restore MAGRST, 3-8
 partition save MAGSAV, 2-11
 physical copy to disk, 8-6
 physical restore from tape, 7-7
 physical save to tape, 6-11
 removing a partition from service, 10-5
 returning a partition to service, 10-7
 system shutdown, 10-3
 system startup, 10-6

PSR options
 -HELP, 6-5, 7-4, 8-3
 -NO_PROTECT, 7-3, 8-2
 -PROTECT, 6-4, 7-3, 8-3

R

Record availability table, PSR -SAVE -NO_RAT, 6-7

Record availability table PSR
 base saves, 6-2
 invalid state, 6-3

ROAM, 6-1

ROAM files
 -CAM_RBF, 3-3
 -NO_RBF, 2-4
 -QUERY, 3-4
 incremental saves MAGSAV, 1-3
 incremental saves MAGSAV/RST, 2-10
 physical copy to disk, 8-2, 10-3
 physical restore from tape, 7-2, 10-3
 physical save to tape, 6-1, 9-3, 10-3

Robust partitions, 7-2, 8-2

S

Save number
 PSR restore dialog, 7-6
 PSR save dialog, 6-9

SEARCH_INDEX_LIB command, 11-2

System shutdown procedure, 10-3
System startup procedure, 10-6

T

Tape blocks MAGSAV/RST
 sizes, 1-6, 1-8, 2-3
 structure, 1-7

Tape density, PSR dialog, 6-10

Tape format MAGSAV/RST
 -REV19, 1-8
 -REV20, 1-8, 2-5
 block sizes, 1-6, 1-8
 block structure, 1-7
 PRIMOS Revisions, 1-8

Tape indexing, extended, 1-4

Tape indexing MAGSAV/RST
 description, 5-1
 examples, 5-3
 format, 5-1, 5-2
 Listing tape contents, 3-6
 listing tape contents, 2-11
 MAGRST dialog, 3-5
 MAGSAV dialog, 2-9

Tape labels
 -LABEL, 1-3, 2-4, 2-7
 ANSI, 1-6
 MAGSAV dialog, 2-7
 PSR save dialog, 6-9

Tape units
 MAGRST dialog, 3-4
 MAGSAV dialog, 2-6
 PSR restore dialog, 7-6
 PSR save dialog, 6-9

V

Volume serial ID
 -LABEL, 1-3, 2-4, 2-7
 MAGRST dialog, 3-4
 MAGSAV dialog, 2-6
 PSR restore dialog, 7-6
 PSR save dialog, 6-9