English

FUJITSU Software BS2000

MAREN V12.5

Tape Management in BS2000
Basics and MAREN Application

User Guide

Edition July 2017

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1 Preface

The software product MAREN is used to manage tape inventories in a data center. It stores all information on the tapes in a separate MAREN catalog, which can be set up as a central catalog for several BS2000 systems.

Close cooperation of MAREN with other BS2000 software products, e.g. HSMS/ARCHIVE, enables the data center to be organized ideally.

1.1 Objectives and target groups of this manual

This “MAREN User Guide” provides an introduction to the management of tapes in a data center and the management of tapes in BS2000 with MAREN. This is followed by a description of the MAREN functions for the nonprivileged MAREN users, in particular the MAREN user program.
The manual is consequently intended for organizers in the data center, BS2000 systems support, operating staff, and MAREN users (privileged and nonprivileged).

The “MAREN System Administrator Guide” [1] describes the installation and configuration of MAREN by BS2000 systems support, as well as the management of tapes and of MAREN in the data center by the privileged MAREN user, in particular the administrator programs MARENADM and MARENEKM.

1.2 Summary of contents

This manual consists of the main parts:

- “Introduction to the management of tapes in the data center and in BS2000 with MAREN”
- “MAREN functions for the nonprivileged MAREN user,” in particular:
  - Typical application examples
  - The MAREN user program
  - MAREN task file table

In order to use the SDF statements and commands, you will require a basic knowledge of the SDF dialog interface. The command syntax and all BS2000 commands which are referenced in this manual are described in the “Commands” manual [3]. *Exception*: The commands for processing the MAREN TFT, see chapter “MAREN task file table” on page 137. For more in-depth information on SDF, please refer to the “SDF Dialog Interface” [9].

Readme file

The functional changes to the current product version and revisions to this manual are described in the product-specific Readme file.

Readme files are available to you online in addition to the product manuals under the various products at *http://manuals.ts.fujitsu.com*. You will also find the Readme files on the Softbook DVD.

Information under BS2000

When a Readme file exists for a product version, you will find the following file on the BS2000 system:

`SYSRME.<product>.<version>.<lang>`

This file contains brief information on the Readme file in English or German (<lang>=E/D). You can view this information on screen using the `SHOW-FILE` command or an editor. The `/SHOW-INSTALLATION-PATH INSTALLATION-UNIT=<product>` command shows the user ID under which the product’s files are stored.

Supplementary product information

Current information, version and hardware dependencies and instructions for installing and using a product version are contained in the associated Release Notice. These Release Notices are available online at *http://manuals.ts.fujitsu.com*.

1.3 Changes since the last edition of the manual

This manual contains the following major changes compared to the preceding manual.

- The MAREN manuals have been completely revised and restructured in the “MAREN User Guide” and the “MAREN System Administrator Guide.”
- Adaptation to BS2000 OSD/BC V11.0.
- For the operating modes in MAREN, only the terms “shared mode” (previously also called RFA mode) and “exclusive mode” (previously also called SPD mode) are now used.
- Changes in the MAREN and MARENADM statement PRINT-VOLUME-ATTRIBUTES:
  - Fields which were highlighted in the SELECT mask are labeled with s in the follow-on masks.
  - Fields which were highlighted in the SORT mask are labeled with o in the follow-on masks.
- Free tapes are always taken from the free tape pool with the name *NO in the MAREN statement RESERVE-FREE-VOLUME.
- In the MAREN statement SHOW-VOLUME-ATTRIBUTES, the S variable LAST-ACCESS-CPU-NAME has been renamed LAST-ACCESS-HOSTNAME. For compatibility reasons, the S variable LAST-ACCESS-CPU-NAME can still be used with its old meaning.

For the privileged user

- The changes are described in the “MAREN System Administrator Guide”.

1.4 Notational conventions

Because certain names are frequently used, for the sake of simplicity and clarity the following abbreviations are used:

- **MAREN** for the MAREN system executing in the BS2000 operating system, controlled by the control programs MARENCP and MARENUCP.

The strings <date>, <time> and <version> in examples refer to the current outputs for the date, time, and version of a software product when the examples are otherwise independent of date, time, and version.

The string <ver> in the file name specifies the current version of MAREN, in this edition <ver>: 125, i.e. MAREN V12.5.

The following notational conventions are used in this manual:

Bold type Wherever syntax representations are explained, the lines that are currently being explained are shown in bold type. The text entered on the screen in examples which display input and output is also shown in bold type.

`Example` Sample inputs and outputs are also shown in typewriter font.

For notes on particularly important information

This symbol designates special information that points out the possibility that data can be lost or that other serious damage may occur.

[ ] References to other publications within the text are given in abbreviated form followed by numbers; the full titles are listed in the “References” section at the back of this manual.

2 Basics of tape management

Tape storage systems (nearline peripherals) provide an additional storage option in the data center to supplement the directly connected disk storage systems (online peripherals).

BS2000 recognizes the following tape storage systems:

- Real tape storage systems
  These tape storage systems operate real LTO magnetic tape cartridges (MTCs) in real MTC devices. MTCs are mounted, unmounted, and stored.
  The data is written directly to the MTC.
  MAREN manages the real MTCs.
- Virtual tape storage systems
  These tape storage systems (e.g. ETERNUS CS) simulate real tape operation for the user. However, the tapes are mounted and unmounted only virtually. The data is initially written to a data cache on disk, and only later migrated to real LTO MTCs. The real MTCs are not visible to BS2000.
  MAREN manages the virtual MTCs.
- Emulated tape devices
  Emulated tape devices on BS2000 servers display BS2000 tapes as files in the Linux file system (EMFILEs) or as files on CD/DVD (CDROM files). This enables data exchange to take place between BS2000 systems via compatible EMFILEs / CDROM files. Use of emulated tape devices is reserved for the system administrator or Customer Support. Information on emulated tape devices is provided in the “Operation and Administration” manual [10].

  BS2000 does not see the EMFILEs and CDROM files, but in both cases tape files of the type BM1662FS which can be addressed by means of their mnemonic. In each case drives of the type T6250 (T9G) are visible which are addressed using their archive numbers and are treated like tapes of this type.
  These tapes can be managed with MAREN.

In the MAREN manuals, the term **tape** is used as a generic term for all real, virtual, or emulated magnetic tapes when no further distinction need be made. Volume, data carrier, and MTC are commonly used synonyms.

By analogy, the term **tape device** is used for all devices which accommodate a tape.

2.1 Properties of real tapes

- Real tapes have a large capacity and thus offer a simple way to increase the storage capacity in a data center, to relieve the load on the disk storage space, and to export large volumes of data for various purposes (e.g. data backup and archival).
- In addition to data transport via networks, as a transportable storage medium tapes permit flexible data storage at various locations. On the one hand, the data center is relieved of the data storage load and, on the other hand, backup and archive volumes can be stored in a protected location (e.g. in a fireproof archive). The tapes are easy to transport, and can be dispatched. Applications for tape transport include:
  - software installation (data is on tapes in compressed form and is installed on a system ready to run)
  - transporting large volumes of data that are not urgently needed
  - transporting data with a high level of security which should not be exchanged through networks for that reason
  - exporting data that is not frequently needed online to less expensive tapes (access time is not important)
- Each tape is managed in BS2000 and MAREN by means of its archive number (synonym: volume serial number, VSN). The archive number should be unique in the data center.
- BS2000 differentiates the various types of tape by means of the volume type. Tapes can only be processed by tape devices that support their specific volume type. The devices that process the various volume types are distinguished by BS2000 through the device type.
- A tape in BS2000 is logically accessed through DMS. Tape device allocation for processing a tape is controlled through the device management of the BS2000 system (NDM). Input and output requests are processed by the BS2000 device drivers.
- The operator is responsible for mounting the tapes in the appropriate tape devices, see section “Tape operator” on page 13.
- When the “tape encryption” function is used on LTO drives (LTO-4 and higher), MAREN manages the encryption keys and supplies the data key required to encrypt or decrypt the tape to the tape device.

2.2 Manual operation of real tapes

Tape operator

The operator to whom the task of tape processing has been assigned, is the “tape operator”. The tape operator performs the following tasks:

- Assigning the real tape devices to the BS2000 systems:

  BS2000 offers the ATTACH-DEVICE and DETACH-DEVICE commands (I/O reconfiguration) to attach or detach devices to or from systems.

- Processing tape requests in accordance with the console messages:
  - mounting and dismounting tapes
  - dealing with error situations reported at the console
- Updating tape management, e.g.:
  - which user is using or has released which tapes
  - which tapes are in the scratch pool
  - at which location is a tape kept

Mounting tapes

When BS2000 encounters a request for a tape (e.g. within a file processing command), it informs the operator that the tape has to be mounted on an available tape device. The request waits for the operator to inform BS2000 of the device name (mnemonic) of the tape device on which the tape has been mounted.

Since the BS2000 system automatically recognizes any available tape devices in its configuration, it can propose a tape device on which to mount the tape. However, the operator may choose to use a different tape device. The BS2000 system also recognizes tapes that have already been mounted.

Operator console

Any tape requests from the BS2000 system are issued to the console in the form of console messages that may or may not require a response. The console is the central location for operating the tapes and tape drives. The operator is informed via a tape request on this tape device and responds to the message when the request has been dealt with.

Locations

All tapes (with the exception of the tapes currently mounted) are stored in the data center at specific locations (see section “Location of the tapes” on page 22),

When a tape is requested, the operator must fetch it from its location.

Tapes that are used for long-term archiving will seldom be mounted again and may be kept at some more remote location. For backups of crucial importance to a company, the tapes are often stored in a fireproof room (fireproof archive).

Request for a specific tape

BS2000 implicitly requests a tape to be mounted when the user requests data storage to tape. The tapes are identified by their archive number.

The archive number is assigned by the user who started the job.

The operator has to react to this explicit tape request by retrieving the tape with the specified archive number from its current location and mounting it in a free tape device.

Requesting any free tape (scratch request)

BS2000 also supports requests for tapes whose archive number is specified neither by the user nor by the application. In this case the tape operator has to select the tape.

If tape operators receive a mount request without an archive number (keyword *SCRATCH) they have to select an tape from their pool. In this case they must bear in mind that the tape selected contains no data which is already being used by another application. In other words, they search for a free tape in a set of scratch tapes. When tape operators have chosen a tape which they intend to mount, they have to respond to the mount request by entering the tape’s archive number.

It is important for the operator to know which tapes are being used by applications and which not. If a large number of tapes are being managed, the operator needs to keep a list of all tapes being used in the data center.

Tape owners and access to data on tapes

In BS2000, data is normally separated on a user-specific basis.

When users write their data to a tape, they have to make sure that no other user can access the tape and the data it contains. A user remains owner of a tape until they release it again or until the expiration date is reached.

However, BS2000 does not contain data protection features referring to tape ownership, because tapes are not inseparably tied to a BS2000 system. They can be removed from it at any time, and can be accessed by any other BS2000 system, regardless of who owns them.

Protection must be implemented by the operator. When a tape is written by the application of a particular user, the request for this tape by another use may not be granted. An exception exists when two or more users agree to share the tape. The tape operator or the tape administrator needs to be informed of the decision. The operator has to change the ownership information in the utilization list that the operator should keep.

The data on the tape is only protected reliably against unauthorized access, in particular from outside the data center, if the data is encrypted.

Tape administrator

The tape administrator works under a BS2000 user ID with the privilege TAPE-ADMINISTRATION. The tape administrator is responsible for managing the tapes in a data center. The tape administrator is responsible for supplying the data center with all tapes required for day-to-day work.

The administrator’s tasks comprise:

- initializing new tapes
- returning tapes which are no longer required to the scratch pool (after the tape user has been informed). Before the tapes are used again, the recorded data should be deleted.
- reinitializing tapes, if necessary, when tapes are released and returned to the scratch pool
- discarding defective tapes
- keeping track of tapes received from a remote data center or of tapes sent to a remote data center

- creating and updating a list containing the following information:
  - Which tapes exist in the data center?
  - Where is which tape kept (location)?
  - Which user is using which tapes?
  - Is a user sharing tapes with other users?
  - Until when does a user need his tapes?
  - Which tapes are allotted to the scratch pool?

  This list is drawn up by the tape administrator and updated by the operator when the tapes are mounted or dismounted.
- organizing secure tape operation (access control)

Encryption-Key-Administrator

When tape encryption is used, the encryption key administrator manages the encryption keys of his/her domain. The BS2000 user ID with the privilege TAPE-KEY-ADMINISTRATION has the authorization for this task.

The administrator’s tasks comprise:

- creating encryption keys
- defining the encryption key for encryption
- managing key boxes
- importing encryption keys of foreign tapes
- additional storage of the encryption data at a secure location to enable it to be reconstructed in the event of a disaster

2.3 Automated operation of tapes

The activities to be performed by the tape operator and tape administrator depend on the size of the data center. The response times to tape requests are a performance factor in the administration of a data center.

When a large number of tapes needs to be managed and processed, this requires automation of the operator and administrator functions.

Magazines

Tapes are combined to form tape magazines. The operator inserts the tapes in a magazine before starting an application. So several tapes are available for mounting with no operator intervention needed when a tape is requested.

Tape magazines function in two different modes:

1. Sequential mode:
   The tapes are used one after the other to execute the BS2000 system's tape requests. This mode is generally used for scratch tapes.
2. Direct mode:
   The tapes are used as they are requested:
   – the application requests a specific tape in the magazine
   – the device locates the tape and mounts it.

As long as one tape is mounted, no other tape in the magazine can be mounted elsewhere.

Tape archive systems

An automated tape archive system (synonym: robot system, archive system for short) comprises a number of tape devices and tapes in a defined local are. For the outside world, it thus forms a self-contained unit. The tape devices installed within the archive system can only be mounted with the tapes contained in that archive system.

Archive systems automatically mount and unmount tapes from the archive system following a request by BS2000.

The archive system is also the location of the tapes.

The tape operator equips the archive system with tapes.

The archive systems used for BS2000 are the virtual archive system ETERNUS CS from FUJITSU and the real archive systems from Quantum Corp.

Automatic tape operator

The archive system replaces the human tape operator in fulfilling mount requests. It is either directly linked with BS2000 or through the interfaces of its tape devices or via its archive system, and it evaluates the messages on the console.

Automatic tape management with MAREN

The list mentioned on page 16 which contains information on the tapes in the data center can be automated with a tape catalog.

The software product MAREN offers various management functions when this is the case. All information on the managed tapes is recorded in the MAREN catalog. The data center tapes are added to the MAREN catalog together with their links and attributes. The information can be modified and deleted.

MAREN supports the tape administrator in his/her management tasks concerning:

– initialization
– ownership and shared use
– transport to various locations
– sending tapes to or receiving them from other data centers
– reservations
– release and expiry
– scratch pool
– logging
– statistical records

MAREN works together with BS2000 to enable the useful life and the state of the tapes to be traced, and it is informed of tape requests and utilization through system interfaces.

Automatic response to scratch requests

Allocating free tapes when scratch tapes are requested can also be automated when an archive system and MAREN are used. In the case of a scratch request, MAREN determines a tape in the free tape pool that meets the reservation requirements (e.g. for the volume type) and supplies its archive number to the requesting application.

2.4 Organization of tape inventories in the data center

Life cycle of a tape in the data center

New tapes must be registered and initialized before they are used in the local data center for the first time.

The tape administrator enters the new tapes in the catalog of existing tapes. This catalog can be implemented and managed using different means. The software product MAREN (MAREN catalog) is recommended for the purpose of automation.
The new tapes are, for example, initialized with the BS2000 utility routine INIT.
The operator needs to know which new tapes are available.
Only then can the operator process tape requests for these tapes.

As soon as an application has written data to a tape, the operator may not mount this tape for any other application unless he/she has been authorized to do so by the tape owner. A tape used by an application is reserved until the application (i.e. the application user, in other words the tape owner) decides that it is no longer required. The criterion of ownership is the user ID under which the application was started. When the tape is released, the user must inform the tape administrator of the fact that it may now be used by other applications again.

A tape can be released again automatically if the user agrees that the tape administrator may use the tape again after a defined period of time has elapsed.

Once a tape has been released and can be used again by other applications, data protection measures require any data still contained on the tape to be deleted or to be protected against access by the next application, so the tape has to be reinitialized.

Without the use of MAREN, the tape administrator has to inform the operator of the current status of the tapes available for tape requests:

- the tape can be reallocated to an application (new or released)
- the tape may only be used by the application it is already allocated to
- the tape may be used by the application it is already allocated to or by other applications

Tapes in different BS2000 systems

How tapes are distributed to different BS2000 systems depends on the way a data center is organized. Here are some options:

- The BS2000 systems are assigned unambiguously to departments (or customers), and the resources are separated from each other.
- the BS2000 systems are allocated to different customers of the data center, depending on the current load. Their resources are shared.

The tapes can be administered as follows:

- in a common pool for all BS2000 systems
- separately according to BS2000 systems
- separately according to customer
  In this case it is recommendable to use lists with information specifying the system on which the tape is located.

The tapes available for new reservations are contained in a free tape pool. Tapes reserved by an application are allocated to the user ID under which the application was started. Tape organization can be graded even more finely by reserving a range of archive numbers for a specific user group or some other criterion (e.g. job name, file name).

Some free tape pools can be reserved for standard applications of the BS2000 system (e.g. HSMS/ARCHIVE). MAREN can manage the pools of other system programs.

Example of how to organize tapes

1. The free tapes are all in a common free tape pool and are available for all users on all BS2000 systems.

	System 1			**System 2**		
	USER1	USER2	USER3	USER1	USER3	USER4
Reserved						
Free	common free tape pool					

2. The free tapes are allocated to individual pools for specific users or user groups on each BS2000 system. The users can only reserve tapes from the pool allocated to them.

	System 1			**System 2**		
	USER1	USER2	USER3	USER1	USER3	USER4
Reserved	only in pool1	only in pool2		only in pool3	only in pool4	only in pool5
Free	pool1	common pool2		pool3	pool4	pool5

3. The tapes and BS2000 systems of various data center customers are grouped to form domains, and each user can only work within his/her domain.

	Domain_1			**Domain_2**		
	System 1		System 2	System 3	System 4	
	USER1	USER2	USER2	USER3	USER4	USER5
Reserved						
Free	common pool					

The tape administrator has to distribute the available resources according to the requirements of the customers. MAREN allow the utilization of tapes to be administered and monitored according to specific requirements.

The regulations concerning the release of tapes (expiration date, retention period) can be defined by the tape administrator and modified on the request of the users. These regulations define, among other things, how a tape's transition from the "reserved" status to the free tape pool is to be effected.

Beside a tape's utilization, the tape administrator must make sure that the data on the tape is retained for the duration of its reservation. The data protection is extended by legal regulations that require data to be retained for a period of time.

The life cycle of the recordings may be lower than the prescribed retention period. In this case the data has to be "refreshed", i.e. it either has to be rewritten or copied to another tape.

Another problem that the tape administrator must keep in mind is the useful life of a tape. If a tape is used frequently, faults may occur that reduce the quality of data recordings. Read errors or sequence errors as well as errors during mounting (load check) will occur more frequently. The tape administrator has to keep an eye on the frequency with which a tape is used and, if necessary, copy its contents to a new tape and throw out the old one.

Location of the tapes

In order to support the operator in searching for specific tapes in a large data center, the tape administrator must record where the tapes are located. This information is referred to as the **location** of the tapes. Each location is identified by the attributes name, usage type (manual / automatic), site (local / remote).

Tape devices are also assigned to locations, which are referred to as device depots. The device depots are defined and managed in BS2000 (ADD-DEVICE-DEPOT command).

Tapes used on manually operated tape devices should be assigned to a special location in the vicinity of such tape devices, so the operator can find them quickly when they need to be mounted. The location of the tape devices (the device depot) must have the same name as the location for the tapes defined in MAREN.

In particular when archive systems are used, the tape devices used in an archive system must be assigned to the same location as the tapes of the archive system. This also applies for the virtual tapes in virtual archive systems (e.g. ETERNUS CS).

Applications can explicitly request tapes to be stored at particular locations. Locations can also be assigned to an application by means of the utility routine MARENLM or using MAREN exits.

Removal of tapes

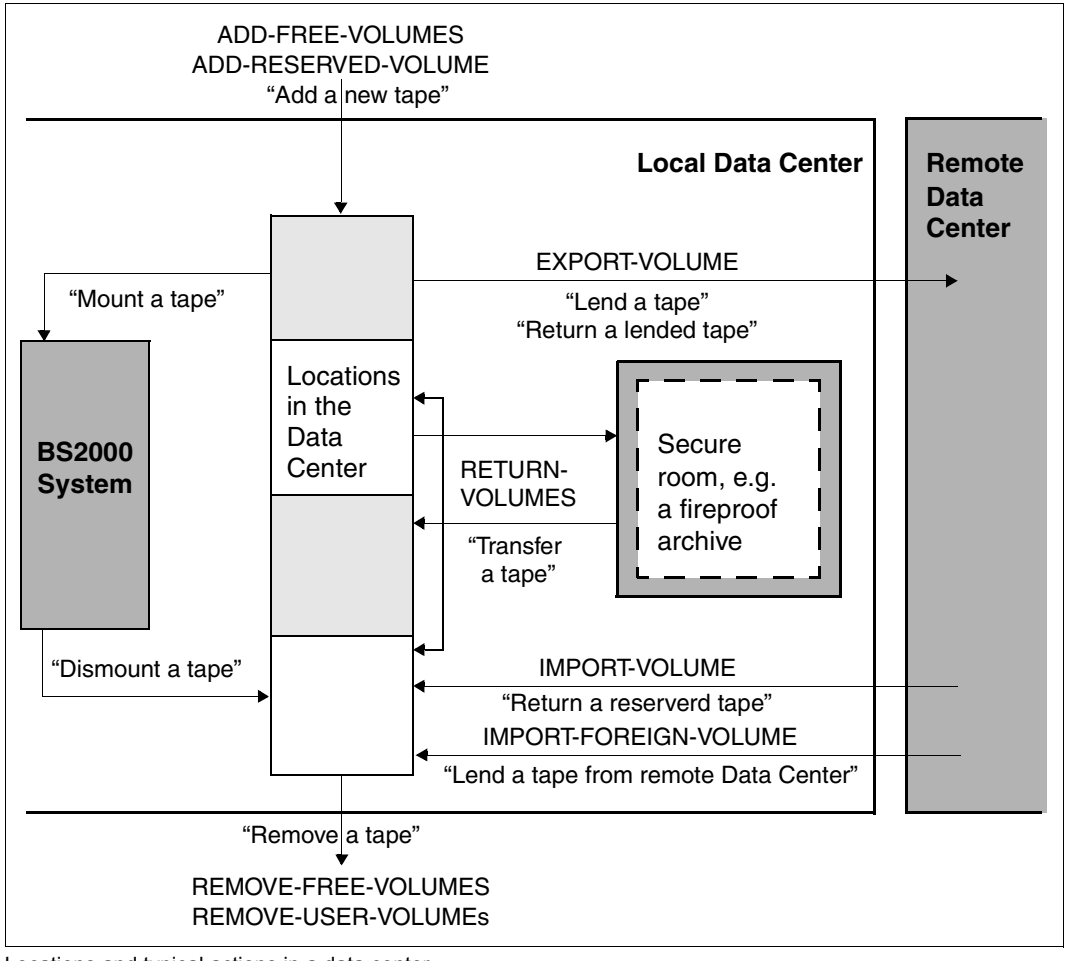
Tapes contained in a loading system are not automatically allocated to the location defined for the device. The tape administrator can change the location allocated to such tapes, if necessary, in order to make this temporary situation known to the applications using the location.

Tapes that are used for archiving or backup purposes are kept in a secure room (e.g. a fireproof room) which forms a location of its own. This room is represented by a separate location, and the volumes contained there are either recorded manually by the tape administrator or by MAREN.

The tape administrator has to record the removal of tapes from one location to another according to his own method.

Tapes can either be moved from one location to another within the same data center or they can be sent to another data center (foreign data center).

Both types of relocation can either be recorded manually or automatically by MAREN. In the case of automatic recording, MAREN must request the operator to perform relocation or transport. This request is realized by console messages and the output of special forms. The operator confirms the relocation (which is then his/her responsibility), and at the same time MAREN records the change of location.



Locations and typical actions in a data center

3 Software product MAREN

The BS2000 software product MAREN is used by privileged and nonprivileged BS2000 users to manage tape inventories in a data center.

MAREN stores all information on the tapes in a separate MAREN catalog. The MAREN catalog can be set up centrally by the MAREN administrator for several BS2000 systems.

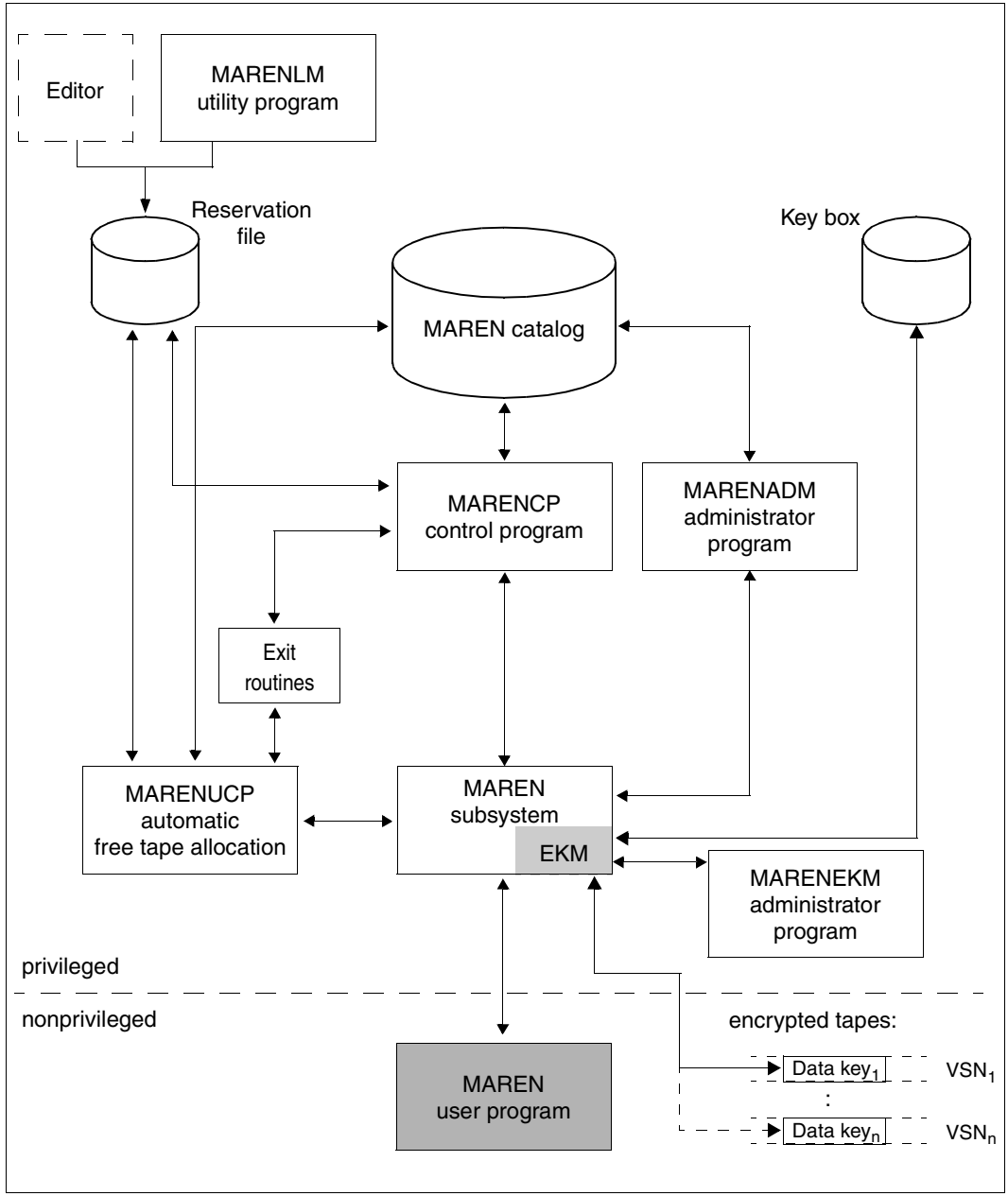
To ensure that the information in the MAREN catalog is always up to date, MAREN cooperates closely with BS2000. Via this interaction, the MAREN catalog is updated each time a tape is processed.

A MAREN subsystem must be started for MAREN to operate. It is set up and supported by systems support or the MAREN administrator.

The MAREN user program is the interface of MAREN for the nonprivileged BS2000 user. It can execute in both interactive and batch mode, and also offers a program interface. Its functions and statements are described in the chapter “The MAREN user program” on page 45.

The MAREN component MARENUCP automates the assignment of free tapes when a tape request is made without an archive number being specified (scratch request) for BS2000 users.

There are also other MAREN components which are used by the privileged MAREN administrator to manage MAREN. For reasons of completeness, these are shown in the figure below. They are described in the “MAREN System Administrator Guide” [1].



Components of MAREN

3.1 MAREN user

The term MAREN user is the generic term for the nonprivileged MAREN user and the privileged MAREN user (MAREN administrator).

MAREN user

The MAREN user works on a user ID which has the privilege STD-PROCESSING. He/She reserves free tapes and manages the tapes which are reserved in the MAREN catalog for his/her user ID with the user program MAREN.

The various functions which MAREN offers the MAREN user are described in the chapter “The MAREN user program” on page 45. Typical applications for the MAREN user are described in the chapter “Working with MAREN for the MAREN user” on page 37.

MAREN administrator

The MAREN administrator work on a user ID which has the privilege TAPE-ADMINISTRATION. They are consequently authorized to perform the administration tasks of MAREN. He/She works mainly with the statements of the MARENADM administrator program.

Some tasks additionally require a particular user ID or the operator role which is entered in the system-specific MAREN parameters is also required for some tasks. The default is the operator role SYSMAREN.

When domains are used, the administrator role is split into two further roles:

- Domain Administrator (DA)
- All-Domain Administrator (ADA)

Encryption key administrator

When data tape encryption is used, the encryption key administrator is responsible for creating and managing encryption keys of his/her own domain.
The encryption key administrator work on a user ID which has the privilege TAPE-KEY-ADMINISTRATION. He/She works mainly with the statements of the MARENEKM administrator program.

3.2 Automatic free tape allocation

The MAREN component MARENUCP automates the allocation of free tapes.

If a tape is requested in BS2000 without specifying an archive number (scratch request), the MARENUCP automatic free tape allocation facility selects a free tape, assigns it to the requester, and marks it as reserved in the MAREN catalog.

In the event of a corresponding request, MARENUCP requests the operator to mount a tape (VSN proposal). The operator can mount the proposed tape or a different free tape, which is then automatically allocated.

If a tape output file is to be created, a tape is automatically assigned in the following cases:

- In the CREATE-FILE or CREATE-FILE-GENERATION command, the operand VOLUME=*NO (default value) or *ANY is used in conjunction with SUPPORT=*TAPE.
- When using the ARCHIVE statement SAVE or EXPORT, TAPES=OPERATOR or TAPES=POOL is specified, and there are no more free tapes available in the ARCHIVE directory.

The MAREN administrator has the task of creating and managing the automatic free tape allocation. This is described in the “MAREN System Administrator Guide” [1].

Further processing of archive numbers

Each archive number reserved by MARENUCP can be stored in a job variable. Provided the software product JV is available (see the “JV” manual [7]).
This function is activated when the MAREN user issues the SET-JV-LINK command to assign the link name MARENJV to any job variable or sets up a job variable with the name `<filename>.MAREN, <filename>.<jobname>` or `<filename>.M<tsn>`.
Thereby `<filename>` is the name of the relevant output file, `<tsn>` is the TSN and `<jobname>` the job name or HSMS request name of the user task. If several such job variables exist, only one is set. A job variable assigned using the link name has the highest priority. Then come the variants with the extensions `.M<tsn>`, `.<jobname>` and `.MAREN`.
If the file name includes a generation number or a version ID, this must be omitted (including parentheses). This permits separate follow-on processing of archive numbers from several output files.

In the case of a multivolume file, a list of VSNs (`<vsn1>,<vsn2>,...`) is created dynamically in the job variable and extended by one entry for each further output tape. A maximum of 36 archive numbers per job variable is possible.

When evaluating a job variable, please note that a job variable already containing a VSN will be extended dynamically to form a VSN list each time the free tape allocation facility is used.

The neatest method of follow-on processing takes place indirectly via SDF, where a job variable is specified in place of part of a command or statement.

The follow-on processing of a VSN is also supported by the following components:

- The name of the HSMS/ARCHIVE directory must be specified for <filename> in the case of HSMS or ARCHIVE applications with a directory file.
- The name “ARCHIVE.SAVE.FILE” is used for <filename> in the case of ARCHIVE applications without a directory file.

Restriction

In HSMS and ARCHIVE the job variables cannot be assigned by means of the link name. Furthermore, the name variant with the extension .M<tsn> is not supported.

Example 1

In the task with the job name BACKUP, an ARCHIVE backup is to be carried out with the directory file TAPE.DIR. Tapes are requested by means of automatic free tape allocation.

```
/set-logon-parameters .. user-identification=userxy01,...,job-name=backup
...
/show-jv-attr tape.dir.
%0000000 :2OSG:$USERXY01.TAPE.DIR.MAREN
%0000000 :2OSG:$USERXY01.TAPE.DIR.BACKUP
%SUM    00002 JV'S; JV-VALUE = 00000000 BYTES
/start-archive
%  ARC0001 ARCHIVE READY
*f na=database.evaluation.0499
*save directory=tape.dir,tapes=operator,device=tape-c4
%  ARC0002 STATEMENT ACCEPTED. ARCHIVE SEQUENCE NUMBER 'A.990510.171336',
VERSION '<version>'
%  ARC0033 ARCHIVE SUBTASK TSN '04AS' GENERATED
%  ARC0003 ARCHIVE STATEMENT COMPLETED
*end
%  ARC0009 ARCHIVE TERMINATED
/show-jv-attr tape.dir.
%0000000 :2OSG:$USERXY01.TAPE.DIR.MAREN
%0000006 :2OSG:$USERXY01.TAPE.DIR.BACKUP
%SUM    00002 JV'S; JV-VALUE = 00000006 BYTES
/show-jv tape.dir.backup
%M5660K
```

Example 2

An output tape allocated by MARENUCP is to be created. The reservation period is to be set to 60 days in the corresponding MAREN archive entry. The tape (with the VSN TC1001 in the example) is then to be sent.

```
...
/create-jv jv-name=tape.file.jv
/set-jv-link link-name=marenjv,jv-name=tape.file.jv
/create-file file-name=tape.file,supp=tape(vol=*no,dev-type=tape-c4)
/add-file-link link-name=...,file-name=tape.file
/start-prog from-file=...
...
/show-jv jv=tape.file.jv
%TC1001
/start-maren
//modify-vol-attr vol=&(*marenjv),protection=par(free-date=60)
%MARM121 MAREN CATALOG ENTRY 'TC1001'/'0001' MODIFIED
//export-vol vol=&(*marenjv),export-addr='Hamburg'
%MARM134 GET VOLUME 'TC1001' FROM CENTRAL ARCHIVE
%MARM170 STATEMENT 'EXPORT-VOLUME' PROCESSED
//end
%MARM098 MAREN TERMINATED NORMALLY
/export-file file=name(file-name=tape.file)
/del-jv jv-name=tape.file.jv
...
```

3.3 Volume group

The MAREN user can combine one or more tapes which are logically related to form a volume group.

He/She determines the criteria according to which the tapes are selected for the volume group. He/She assigns this volume group a name. He/She uses this name to address the tapes of the volume group as a whole in the MAREN statements.

The name of the volume group is another attribute for a tape and is stored in the MAREN catalog. All files which are located on the tape belong to the same volume group. When a volume group is defined for a file on a tape, MAREN automatically updates all the file-specific catalog entries of this tape.

Only reserved tapes can be assigned to a volume group. When the tape is released, the volume group assignment of MAREN is canceled again.

Tapes can be assigned to a volume group at different times during MAREN operation:

- Assignment when reserving a free tape using the MAREN or MARENADM statement RESERVE-FREE-VOLUME VOLUME-GROUP=
- Assignment while scratch tapes are being written
  The MAREN command ADD-MAREN-FILE-ENTRY USAGE=*SCRATCH (VOLUME-GROUP=) enables the MAREN user to assign scratch tapes to a volume group while they are being written (see page 140). The MAREN command REMOVE-MAREN-FILE-ENTRY FILE-NAME=*ALL-SCRATCH-FILES is used to reset the entry in the MAREN TFT again for all future scratch tapes (see page 144).
- Assignment with the MAREN or MARENADM statement MODIFY-VOLUME-ATTRIBUTES

  The name of a volume group is a further attribute for a tape. Nevertheless, when the tapes are selected using the VOLUME=<vsn>(...) and VOLUME=*INTERVAL(...) operands, the FILE-SEQUENCE operand is always specified in addition. The file sequence number specifies the file whose catalog entry is to be modified. The default value is 1. When assigning volume groups, MAREN takes the file sequence number into account as a selection criterion. However, to ensure file consistency, all of this tape's archive entries are modified, i.e. all the files located on the tape then belong to the defined volume group.

The following MAREN or MARENADM statements enable the MAREN user to select tapes by means of the volume group and then to process them further:

MAREN or MARENADM statement	Meaning
EXPORT-VOLUME	The VOLUME-GROUP= operand defines the volume group to which a tape must belong to permit it to be exported.
MODIFY-VOLUME-ATTRIBUTES	The VOLUME-GROUP= operand defines the volume group to which a tape must belong to permit it to be processed.
PRINT-VOLUME-ATTRIBUTES	One field is provided for the volume group in each of the input masks for the selection, sort and layout parameters.
SHOW-VOLUME-ATTRIBUTES	The VOLUME-GROUP= operand defines the volume group to which a tape must belong to permit its catalog entry to be displayed.

MARENADM statement	Meaning
FREE-VOLUME	The VOLUME-GROUP= operand defines the volume group to which a tape must belong to permit it to be released.
RETURN-VOLUMES	The VOLUME-GROUP= operand defines the volume group to which a tape must belong to permit it to be returned.
SHOW-VSNS	The VOLUME-GROUP= operand lists the archive numbers of all reserved tapes which contain the specified volume group in the catalog entry.

The MAREN or MARENADM statements RESERVE-FREE-VOLUME and SHOW-VOLUME-ATTRIBUTES and the MARENADM statement SHOW-VSNS are used to output the name of the volume group in the S variable var(*LIST).VOL-GROUP.

Meaning for the MAREN user

MAREN labels tapes as related which have been created by HSMS/ARCHIVE with a logical connection. These can be processed together in MAREN and MARENADM statements.

However, in BS2000 other tape sets are also created, e.g. multi-volume sets or related FDDRL tapes. These can be combined in a volume group and processed together. Furthermore, tapes which were created using different programs can be combined in a volume group. For instance the tapes of an HSMS backup and an FDDRL backup of the same day. These could, for example, be stored as a group in a fireproof safe and later be fetched from there.

3.4 Encrypted tapes

When the “tape encryption” function is used on LTO drives (LTO-4 and higher), MAREN manages the encryption keys and supplies the data key required to encrypt or decrypt the tape to the tape device.

The MAREN administrator has the task of creating and managing encryption keys. This is described in the “MAREN System Administrator Guide” [1].

3.5 Location

A location is an archive with tapes and tape devices in a BS2000 system. The distribution of the tapes to different locations is organized and managed by the MAREN administrator. The distribution of the tape devices to different locations is the task of BS2000 systems support.

Together with the type of tape, the location is a selection criterion for a free tape being reserved by the user. When no location is specified by the user, an implicit selection is made by MAREN.

The MAREN administrator has the task of creating and managing locations. This is described in the “MAREN System Administrator Guide” [1].

3.6 MAREN network

A MAREN network consists of all the BS2000 systems which access the same (central) MAREN catalog. The MAREN catalog is the central database for all systems of a MAREN network. It is accessed by the MAREN components and users of all systems in the MAREN network.

The MAREN administrator has the task of creating and managing a MAREN network. This is described in the “MAREN System Administrator Guide” [1].

3.7 Domains

Large data centers often offer their services to several customers or they work for separate groups within a large company. In this case a customer or group operates with a specific system or group of systems. This grouping of systems can be transferred to MAREN by defining domains. The information on the domains is stored in the MAREN catalog.
The users access only those tapes which are assigned to the systems of their domain. They cannot access the tapes of another domain. They obtain also no information about them.

When domains are used, the MAREN network is split into different groups.

A Domain Administrator (DA) performs the administrative functions in a domain. An All-Domain Administrator (ADA) defines the domains and administers the entire MAREN catalog. The ADA also has the rights of a DA in the domains.

A MAREN network in which no domains are defined can also be regarded as a network in which all systems and tapes are combined in a single domain. This is then known as the standard domain. In some outputs after SHOW statements the standard domain is therefore displayed even if you are working without domains.

The MAREN administrator has the task of creating and managing domains. This is described in the “MAREN System Administrator Guide” [1].

3.8 MAREN exits

The MAREN exits allow MAREN catalog access to be controlled by modifying the attributes pertaining to the tapes or by controlling the operations on the volumes (accepting/rejecting them).

The MAREN administrator has the task of creating and managing MAREN exits. This is described in the “MAREN System Administrator Guide” [1].

3.9 MAREN messages

The messages generated by MAREN are displayed via the BS2000 message interface.

The MAREN messages consist of:

- a message code (7-character)
- a message text
- an attribute line
- additional explanatory texts (“Meaning” and “Response”)

The message keys generated by MAREN have a uniform format: `MARnnnn` or `MAKnnnn`

Meaning:

MAR Prefix (message class, 3 characters) for all MAREN messages (except for the MARENEKM component)

MAK Prefix (message class, 3 characters) for all MARENEKM messages

nnnn Sequential message number (4 characters)

Guaranteed messages have the message attribute “Warranty: YES”. Further details on message attributes and message output in general is contained in the manual “Introduction to System Administration” [4].

The “Message” and “Response” texts for a particular message can be requested using command `/HELP-MSG-INFORMATION` together with the message key. At program level this can be done using the standard statement of the same name.

All the messages or a subset of the messages in the MAREN message file can be listed using the MSGMAKER utility routine. MSGMAKER is described in the manual “Utility Routines” [5].

4 Working with MAREN for the MAREN user

The sections below describe working with MAREN for the nonprivileged MAREN user.

The MAREN functions described in these sections can be called using the statements of the MAREN user program which are mentioned.

Before tapes can be reserved and used by MAREN users, they must be entered in the MAREN catalog as free tapes by the MAREN administrator. If they have already been written or come from a remote data center, they are added as reserved tapes. In both cases the tapes' attributes are entered in the catalog entry fields.

Initializing tapes for initial use is the task of the MAREN administrator. This is described in the "MAREN System Administrator Guide" [1].

4.1 Outputting catalog entries

The user can output a single catalog entry with the attributes which are preset in the MAREN catalog as follows:

```
//show-volume-attributes vol=m5003k
```

The user can output all the catalog entries under his own user ID with a selection of the attributes stored in the MAREN catalog.

```
//show-volume-attributes volume=*all,user-id=*own
```

In addition to the catalog entries under his own user ID, the user can output those under a foreign user ID. In this case, however, only the shareable catalog entries will be output:

```
//show-volume-attributes user-id=userx001
```

The user can output all tapes for specific file names with a selection of the attributes stored in the MAREN catalog for this purpose.

```
//show-volume-attributes file-name=tape*
```

The user can print all tapes under his/her own user ID with a selection of important catalog entry fields:

```
//print-volume-attributes
```

4.2 Reserving a tape

Attributes and locations of the tapes are noted in the MAREN catalog. They can be used as selection criteria for reservation.

Explicit reservation of a free tape

The free tapes registered in the MAREN catalog can be **explicitly** reserved for a user (more precisely: for a user ID) with the RESERVE-FREE-VOLUME statement. The user thus becomes the owner of the tape.

When a tape is reserved, attributes can be defined for the tape, e.g. expiration date or comments. Otherwise the values preset by the MAREN administrator are used. The attributes are reflected in the catalog entry fields for the tape in the MAREN catalog. They can be displayed and modified by the tape's owner.

The following statement reserves a tape with the default device type set by the MAREN administrator and defines an expiration date for it.

```
//reserve-free-volume protection=*par(free-date=<date>),remark='my tape'
```

Implicit reservation of a free tape

Tapes can be **implicitly** reserved when the automatic free tape allocation of MAREN is enabled, i.e. when the administrator program MARENUCP is running. When a system component detects the reservation request for a tape, it calls MAREN, which then processes the request. The reserved archive number is then returned to the caller.

MAREN then reserves the tapes according to the attributes specified in the reservation request. Tape selection for a reservation can also be influenced by the MAREN administrator via a reservation file or MAREN exits.

No privilege is required for a user to reserve tapes for his/her own user ID. Reserving tapes for other user IDs can be performed by the MAREN administrator. Reserved tapes can be written or read using BS2000 means without calling MAREN explicitly.

The BS2000 user can also use this process with individual software products (e.g. HSMS/ARCHIVE). If the ARCHIVE statement SAVE or EXPORT includes the TAPES=OPERATOR parameter or the TAPES=POOL parameter and the specified directory has no free tape, MAREN implicitly reserves a tape of the specified device type in both cases.

After the command below, the task requests a free tape when OPEN processing of the specified file takes place:

```
/create-file file-name=work.1,support=*tape(device-type=tape-u4)
```

4.3 Providing a reserved tape

A reserved tape need not be requested via MAREN before processing. Using the information in the catalog entry, MAREN checks during processing whether the user has access authorization for this tape. If so, access is permitted, if not, it is rejected. An allocated password can be input via the BS2000 command ADD-PASSWORD.

Tapes can also be provided for processing by the MAREN user with the MOUNT-VOLUME statement. The statement below mounts the tape TAPE01 without write protection:

```
//mount-volume volume=tape01,password=c'ann',access=*write
```

4.4 Modifying catalog entries

The owner of a tape can modify the protection attributes (password, access rights of other user, expiration date, location) and the remark fields using the EDIT-/MODIFY-VOLUME-ATTRIBUTES statements. The MAREN administrator can modify all attributes of all tapes.

If a foreign user ID is to have both read and write access to the tape TAPE01 stored under the user's own ID (making tapes shareable), this can be done as follows:

```
//modify-volume-attributes
   volume=tape01,protection=*par(user-access=*all-users)
```

The tape A11000 is to be protected against unauthorized access by a password C'XYZ'.

```
//modify-volume-attributes volume=a11000,protection=*par(new-pass=c'xyz')
```

The text MYTOOLS is to be entered in the catalog entry field REMARK in order to identify all tapes of the user’s ID:

```
//modify-volume-attributes volume=*all,remark=c'mytools'
```

All tapes containing the most recently created version of the file TAPE.SAVE (tape set) are to remain reserved for the user's own ID until the specified date.

```
//modify-tape-set-attributes
   select=*by-attr(file-name=tape.save,version=*latest),
   protection=*par(free-date=<date>)
```

4.5 Exporting a tape belonging to the user

A tape belonging to the user can be exported, for example to a remote data center, using the EXPORT-VOLUME statement:

```
//export-volume volume=id0101,export-address=c'mailbox DC Hamburg'
```

4.6 Returning a reserved tape

A tape which is reserved but has been exported is added to the MAREN catalog of the local data center again by the MAREN administrator using the MARENADM statement IMPORT-VOLUME.

4.7 Adding a foreign tape

A private tape or one which has been exported from a remote data center is added to the MAREN catalog of the local data center by the MAREN administrator using the MARENADM statement IMPORT-FOREIGN-VOLUME.

4.8 Returning a foreign tape

With the aid of the EXPORT-VOLUME statement, the user can return a foreign tape of which he/she is the owner to the remote data center.

The user requested the MAREN administrator to add the tape to the MAREN catalog for processing using the MARENADM statement IMPORT-FOREIGN-VOLUME. When the user returns this volume, the entry in the MAREN catalog is deleted.

```
//export-volume volume=priv01,export-address=c'mailbox DC Hamburg'
```

4.9 Releasing a tape

Reserved tapes are released when the expiration date stored in the catalog entry field FREE-DATE is reached. They are then available again to be reserved.

MAREN users wishing to release a tape prematurely must do so using the MODIFY-VOLUME-ATTRIBUTES statement to set the release date to the current date. The tape will be released in the next release run, which is usually carried out daily by the MAREN administrator.

```
//modify-volume-attributes volume=y10001,protection=*par(free-date=0)
```

4.10 Processing file versions

Output of all MAREN catalog entries for a tape file

From the MAREN catalog all volumes under the user's own ID (USER-ID=*OWN is the default value) to which the file SAMPLE.TAPESET.1 has been written or for which at least this file name is contained in the MAREN catalog entry are to be output:

```
//show-volume-attributes volume=*all,user-id=*all,
   file-name=sample.tapeset.1(version=*all,type-of-vol=*any)
------------------------------------------------------------------------------
VOLUME FSEQ CR-DATE    CR-TIME  CR-JOB   1STVSN VSEQ USER-ID  FILE-NAME(SHORT.)
------------------------------------------------------------------------------
SAV001 0001 yyyy-01-25 14:36:11 BACKUP01 SAV001 0001 USERXY01 SAMPLE.TAPESET.1
SAV002 0001 yyyy-03-05 14:38:30 BACKUP02 SAV002 0001 USERXY01 SAMPLE.TAPESET.1
SAV003 0001 yyyy-04-07 14:38:03 BACKUP03 SAV003 0001 USERXY01 SAMPLE.TAPESET.1
SAV004 0001 yyyy-04-08 14:41:27 BACKUP03 SAV003 0002 USERXY01 SAMPLE.TAPESET.1
SAV005 0001 yyyy-04-08 14:46:30 BACKUP03 SAV003 0003 USERXY01 SAMPLE.TAPESET.1
SAV006 0001 yyyy-06-23 14:37:25 BACKUP04 SAV006 0001 USERXY01 SAMPLE.TAPESET.1
SAV007 0001 yyyy-06-23 14:40:50 BACKUP04 SAV006 0002 USERXY01 SAMPLE.TAPESET.1
SAV008 0001 yyyy-06-24 14:45:53 BACKUP04 SAV006 0003 USERXY01 SAMPLE.TAPESET.1
SAV009 0001 yyyy-07-14 14:37:01 BACKUP05 SAV009 0001 USERXY01 SAMPLE.TAPESET.1
SAV010 0001 yyyy-04-08 10:15:45 BACKUP04 SAV006 0001 USERXY01 SAMPLE.TAPESET.1
%  MARM120 TOTAL OF 10 MAREN CATALOG ENTRIES PROCESSED
```

Five versions of the SAMPLE.TAPESET.1 tape file exist on the following tapes (yyyy=year):

- version 0 (*LATEST) on SAV009
- version -1 on SAV006, SAV010, SAV007 and SAV008 (multivolume file)
- version -2 on SAV003, SAV004 and SAV005 (multivolume file)
- version -3 on SAV002
- version -4 on SAV001

Output of all MAREN catalog entries for a file version

All the tapes (TYPE-OF-VOL=*ANY) under the user's own user ID are to be output for the last version but one (VERSION=-1) of the SAMPLE.TAPESET.1 file:

```
//show-volume-attributes volume=*all,user-id=*all,
   file-name=sample.tape.set.1(version=-1,type-of-vol=*any)
------------------------------------------------------------------------------
VOLUME FSEQ CR-DATE    CR-TIME  CR-JOB   1STVSN VSEQ USER-ID  FILE-NAME(SHORT.)
------------------------------------------------------------------------------
SAV006 0001 yyyy-06-23 14:37:25 BACKUP04 SAV006 0001 USERXY01 SAMPLE.TAPESET.1
SAV007 0001 yyyy-06-23 14:40:50 BACKUP04 SAV006 0002 USERXY01 SAMPLE.TAPESET.1
SAV008 0001 yyyy-06-23 14:45:53 BACKUP04 SAV006 0003 USERXY01 SAMPLE.TAPESET.1
SAV010 0001 yyyy-06-23 14:59:12 BACKUP04 SAV006 0001 USERXY01 SAMPLE.TAPESET.1
%  MARM120 TOTAL OF 4 MAREN CATALOG ENTRIES PROCESSED
```

In the case of this file version, the first tape, for which VOLUME-SEQUENCE=1 (column VSEQ), is duplicated (archive number SAV006 and SAV010). On the basis of the creation date (CREATION-DATE and CREATION-TIME) it is possible to establish that the tape with the archive number SAV006 comes from an aborted job, whereas the tape with the archive number SAV010 with the later creation date was written in a restart.

Export of all current tapes for a file version

The tapes (TYPE-OF-VOLUMES=*VALID) required for the further processing of the last version but one (VERSION=-1) of the SAMPLE.TAPESET.1 file are to be exported and made available to be picked up at a location described as `MAILBOX 4411`:

```
//export-volume
   volume=*by-file(file-name=tape.file,version=-1,type-of-volume=*valid),
   export-address='mailbox 4411'
%  MARM134 GET VOLUME 'SAV007' FROM CENTRAL ARCHIVE
%  MARM134 GET VOLUME 'SAV008' FROM CENTRAL ARCHIVE
%  MARM134 GET VOLUME 'SAV010' FROM CENTRAL ARCHIVE
%  MARM120 TOTAL OF 3 MAREN CATALOG ENTRIES PROCESSED
%  MARM170 STATEMENT '//EXPORT-VOLUME' PROCESSED
```

Output of tapes that are no longer required for a file version

Tapes that are no longer required are to be output for the last version but one (VERSION=-1) of the SAMPLE.TAPESET.1 file. These were written when the file was created but are no longer required in further processing (TYPE-OF-VOLUMES= *OBSOLETE) because they have been replaced by other tapes in a restart.

```
//show-volume-attributes volume=*all,user-id=*all,
   file-name=sample.tape.set.1(version=-1,type-of-vol=*obsolete)
------------------------------------------------------------------------------
VOLUME FSEQ CR-DATE  CR-TIME  CR-JOB   1STVSN VSEQ USER-ID  FILE-NAME(SHORT.)
------------------------------------------------------------------------------
SAV006 0001 <date>   <time>   BACKUP04 SAV006 0001 USERXY01 SAMPLE.TAPESET.1
%  MARM120 TOTAL OF 1 MAREN CATALOG ENTRIES PROCESSED
```

Release of tapes that are no longer required for a file version

Since the tapes written for the last version but one (VERSION=-1) of the SAMPLE.TAPESET.1 file but replaced in a restart are no longer required, they are to be released prematurely. For this purpose, the release date (FREE-DATE) and, where applicable, the file expiration date (EXPIRATION-DATE) are set to the current date:

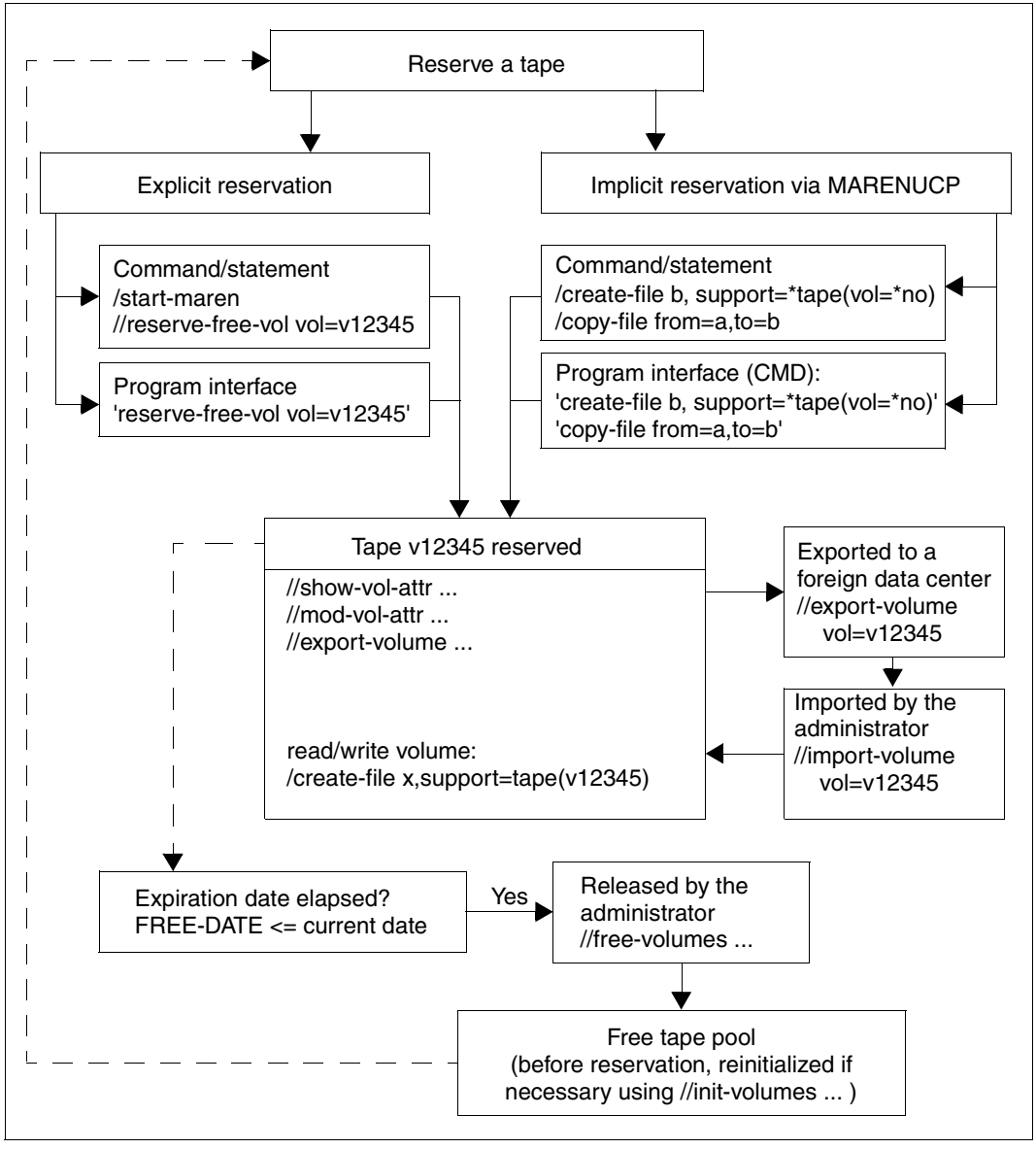
```
//modify-tape-set-attributes
   select=*by-attr(f-name=sample.tapeset.1,version=*all,type-of-vol=*obs),
   prot=*par(free-date=0,expir-date=0)
%  MARM121 MAREN CATALOG ENTRY 'SAV006'/'0001' MODIFIED
%  MARM120 TOTAL OF 1 MAREN CATALOG ENTRIES PROCESSED
```

5 The MAREN user program

The MAREN user program enables the MAREN user to reserve tapes and manage the tapes which are entered in the MAREN catalog under his/her user ID.

These tapes can be reserved either explicitly or implicitly using the MAREN free tape allocation facility (MARENUCP).
The user remains the owner of the reserved tape until the defined expiration date has been reached and the MAREN administrator performs a release run for reserved tapes.
Following a release run, all tapes whose expiration date has elapsed are no longer available to the user.
When an exported tape is returned, this is recorded by the MAREN administrator by means of the MARENADM statement IMPORT-VOLUME.

The diagram on the next page shows the entire procedure from the reservation of a tape to its release:



Procedure from reservation to release of a tape

The MAREN user program enables the user to execute the following **major** functions for his/her tapes:

- Outputting information on entries in the MAREN catalog (catalog entries for short) (PRINT- and SHOW-VOLUME-ATTRIBUTES statements):
  - in S variables
  - to SYSOUT
  - in files (optionally also in CSV format)
  - by email
  - as a list for printing
- Reserving free tapes (RESERVE-FREE-VOLUME statement)
- Modifying catalog entries for the user's own tapes (EDIT- and MODIFY-VOLUME-ATTRIBUTES statements)
  - Adjusting a tape's expiration date
  - Making a tape accessible for other users
  - Protecting a tape with a password
  - Defining a location for a tape
- Providing tapes for processing (MOUNT-VOLUME statement)
- Exporting tapes from the MAREN catalog (EXPORT-VOLUME statement)
  - Exporting or sending a user's own tape
  - Returning a foreign tape to the user

Functions for managing tape sets (MODIFY-TAPE-SET-ATTRIBUTES statement), multifile catalog entries (DELETE-VOLUME-ENTRY statement), and for comparing with the file catalog (CHECK-TSOSCAT statement) complete the functionality of the MAREN user program.

The MAREN user program can run either in interactive mode or as a batch task to execute its functions.

It also offers a program interface, see section "MAREN as a subroutine" on page 129.

5.1 Starting and terminating

The MAREN user program is normally started using the START-MAREN command.

START-MAREN	Alias: **MAREN**
VERSION = ***STD** / <product-version mandatory-man-corr> / <product-version mandatory-man-without-corr> / <product-version without-man-corr>	
,**MONJV** = ***NONE** / <filename 1..54 without-gen-vers>	
,**CPU-LIM**IT = ***JOB-REST** / <integer 1..32767>	

VERSION =
The selected MAREN version is used.

VERSION = *STD
Before MAREN is called, the version is set using the SELECT-PRODUCT-VERSION command (in system mode). This set version is used as the default version.

VERSION = <product-version mandatory-man-corr>
Full version identifier.

VERSION = <product-version mandatory-man-without-corr>
Version identifier excluding the correction status.

VERSION = <product-version without-man-corr>
Version identifier excluding the release and correction status.

MONJV =
Specification of a job variable for monitoring the MAREN run.

MONJV = *NONE
A monitor job variable is not used.

MONJV = <filename 1..54 without-gen-vers>
Explicit specification of the job variable for monitoring the MAREN run.

CPU-LIMIT =
Maximum CPU time in seconds allocated for the program.

CPU-LIMIT = *JOB-REST
The remaining CPU time is to be used for the job.

CPU-LIMIT = <integer 1..32767 *seconds*>
Only the specified time is to be used.

Terminating MAREN

MAREN is terminated by entering the END statement.

5.2 MAREN in interactive mode and in batch mode

MAREN can run either in interactive mode or as a batch task.

MAREN expects to receive all statements via the system file SYSDTA. SYSDTA is assigned to the terminal during interactive operation, and to the ENTER file during batch task.

If MAREN is to be invoked in a procedure, the system file SYSDTA must be assigned with `//ASSIGN-SYSDTA TO=*SYSCMD`.

Error handling in procedures and batch jobs

Information on the progress of a MAREN request is stored in task switches in procedures and batch jobs. MAREN sets the task switches during execution or when execution has been concluded.

Task switch 30 is set if MAREN has executed a statement with a warning. Warnings are issued, for example, if an attempt is made to delete an catalog entry which does not exist in the MAREN catalog.

Task switch 31 is set if MAREN aborts or fails to execute a statement because of an error. This happens, for example, when an attempt is made to output an catalog entry which does not exist in the MAREN catalog, or when no suitable free tape is available for reservation.

The BS2000 command SET-JOB-STEP resets task switches 16-31.

If MAREN rejects a statement because of a syntax error, or if the statement is aborted or not executed due to a processing error, the spin off is triggered.

5.3 MAREN statements

MAREN offers the following statements:

MAREN statement	Meaning
CHECK-TSOSCAT	Output differences between the MAREN catalog and TSOSCAT
DELETE-VOLUME-ENTRY	Delete multifile catalog entries from the MAREN catalog
EDIT-VOLUME-ATTRIBUTES	Enable guided dialog for MODIFY-VOLUME-ATTRIBUTES
END	Terminate MAREN
EXPORT-VOLUME	Export tapes from the MAREN catalog
MODIFY-TAPE-SET-ATTRIBUTES	Modify attributes of all tapes in a tape set
MODIFY-VOLUME-ATTRIBUTES	Modify attributes of tapes
MOUNT-VOLUME	Mount tapes
PRINT-VOLUME-ATTRIBUTES	Create list with information from the MAREN catalog
RESERVE-FREE-VOLUME	Reserve free tapes
RETURN-TO-PROGRAM	Return to the loaded program
SHOW-VOLUME-ATTRIBUTES	Output information from the MAREN catalog
SYSTEM	Switch to BS2000 system mode

The standard SDF statements which are always available are not described (see the manual “SDF Dialog Interface” [9]).

CHECK-TSOSCAT
Output differences between the MAREN catalog and TSOSCAT

This statement enables differences which exist between the MAREN catalog and the file catalog (TSOSCAT) with respect to tape files and file generation groups to be determined. The statement also releases occupied tapes with older file generations.

Differences can have the following causes:

– The MAREN catalog contains information which concerns multiple systems
– The MAREN catalog contains unambiguous archive number assignments, but multiple entries with the same file name can exist
– The TSOSCAT can contain multiple file generation entries for one archive number
– Modifications to the TSOSCAT using the EXPORT-FILE command are not automatically transferred to the MAREN catalog

Format

CHECK-TSOSCAT Alias: **CHTS**

TYPE-OF-FILES = ***ANY** (...) / ***FGG**-ONLY(...)

***ANY**(...)

ATTRIBUTES = ***FI**LE-**NAME** / list-poss(6): ***FI**LE-**NAME** / ***USER-ACCESS** / ***CRE**ATION-**DATE** / ***EXPIR**ATION-**DATE** / ***LAST-ACCESS-DATE** / ***FIRST-VOL**UME

***FGG**-ONLY(...)

FREE-DATE = ***UNCH**ANGED / ***TODAY** / ***DIALOG**

Operands

TYPE-OF-FILES =
Types of tape files to be checked.

TYPE-OF-FILES = *ANY(...)
Specifies that the catalog entries for all tape files are to be checked (see notes on “TYPE-OF-FILES = *ANY” on page 53).

ATTRIBUTES = *FILE-NAME / list-poss(6): *FILE-NAME / *USER-ACCESS / *CREATION-DATE / *EXPIRATION-DATE / *LAST-ACCESS-DATE / *FIRST-VOLUME
File or tape attributes which are to be checked for discrepancies.

TYPE-OF-FILES = *FGG-ONLY(...)
Specifies that all file generation groups cataloged in TSOSCAT are to be checked to establish whether the MAREN catalog still contains entries for older generations which are no longer contained in TSOSCAT (see notes on “TYPE-OF-FILES = *FGG-ONLY” on page 53).

FREE-DATE =
Specifies whether older file generations are only to be logged or whether the relevant tapes are also to be released in the MAREN catalog.

FREE-DATE = *UNCHANGED
Older file generations are only logged.

FREE-DATE = *TODAY
Older file generations are logged and the relevant tapes are released.

FREE-DATE = *DIALOG
If an older file generation is found, the complete MAREN catalog entry for the relevant tape is output. The user can then decide whether or not the tape is to be released. If required, execution of the statement can be terminated at this point. The specification *DIALOG is not permitted in batch mode.

Notes

*TYPE-OF-FILES = *ANY*

- This function merely logs any differences in the TSOSCAT and MAREN catalog entries of tape files. It does not make any changes to the MAREN catalog. Only those attributes specified explicitly in the ATTRIBUTES operand are compared.
- The associated MAREN catalog entry is read for each tape contained in the TSOSCAT entries for tape files if that tape has actually been written to. If the tape does not exist in the MAREN catalog, if it is entered under another user ID there, or if it is entered as a free tape, a line is output which contains the file name from TSOSCAT followed by the archive number and the note “NOT EXISTING” or “NOT RESERVED”. In this event, the individual attributes are not compared.
- If the tape contains the attribute USER-ACCESS = *FOREIGN-READ-ONLY in the MAREN catalog entry (the tape can be accessed in read mode only from foreign user IDs), comparison of the shareability attribute is suppressed since there is no corresponding value in the TSOSCAT entry.
- No comparisons are carried out for temporary tape files.

*TYPE-OF-FILES = *FGG-ONLY*

- If entries for file generations which no longer exist in a TSOSCAT cataloged file generation group are found in the MAREN catalog, and FREE-DATE=*UNCHANGED or *TODAY is specified, these entries are logged with the following attributes:

```
VOLUME
USER-IDENTIFICATION
FILE-NAME
CREATION-DATE
FREE-DATE
```

- If FREE-DATE = *TODAY is specified, the expiration date for the tape is replaced by the current date in the MAREN catalog. This reserves the tape for the user's own user ID until the next release run.
- If FREE-DATE = *TODAY or *DIALOG is specified, those tapes whose expiration date has already elapsed are neither output nor modified since they will be released anyway the next time a release run takes place.
- Archive entries are not generated for temporary tape files or for tapes which are not assigned the own user ID in the MAREN catalog.

Examples

```
//check-tsoscat
THE FOLLOWING DIFFERENCES EXIST BETWEEN MAREN CATALOG AND TSOSCAT:
FILENAME IN TSOSCAT                                    VSN /FSEQ  IN MARENCAT
------------------------------------------------------------------------------
:2OSG:$USER1.TAPE.FILE.2                               M5637K/0001
FILENAME IN TSOSCAT :   TAPE.FILE.2
FILENAME IN MAREN   :   TAPE.FILE.2(1)
------------------------------------------------------------------------------
:2OSG:$USER1.TAPE.FILE.2(3)                           M5637K/0003
FILENAME IN TSOSCAT :   TAPE.FILE.2(3)
FILENAME IN MAREN   :   TAPE.FILE.2(4)
%  MARM17O STATEMENT '//CHECK-TSOSCAT' PROCESSED
```

All differences between the MAREN catalog and TSOSCAT are output to SYSOUT.

```
//check-tsoscat type-of-files=*fgg(free-date=*unch)
THE FOLLOWING MAREN CATALOG ENTRIES HAVE NO CORRESPONDING ENTRIES IN TSOSCAT:
------------------------------------------------------------------------------
VOLUME  USER-ID   FILE-NAME                                CR-DATE  FREE-DATE
------------------------------------------------------------------------------
M3005K USER1    MAREN.SAMPLE(*0001)                       <date>   <date>
MARM17O MARM17O STATEMENT '//CHECK-TSOSCAT' PROCESSED
```

A check is carried out to establish whether the MAREN catalog contains older file generations than the file generation groups in the file catalog. The names of the older file generation groups are output only to SYSOUT (FREE-DATE=*UNCHANGED).

DELETE-VOLUME-ENTRY
Delete multifile catalog entries from the MAREN catalog

A multifile catalog entry is one with a file sequence number greater than 1. Multifile catalog entries are generated automatically when a multifile tape is created. However, these catalog entries are not deleted automatically.

To put it more clearly:

In the case of a multifile tape with four files, the third file is rewritten. The fourth file is thus no longer available. The multifile catalog entry with FSEQ=4 is thus invalidated, but is not automatically deleted. It can be removed by means of the DELETE-VOLUME-ENTRY statement.

With the release of a tape, at the very latest, all associated multifile catalog entries are deleted.

Format

DELETE-**VOL**UME-**ENTRY**	Alias: **DLVE**
VOLUME = <vsn> ,**FI**LE-**SEQ**UENCE = <integer 2..9999>	

Operands

VOLUME = <vsn>
Archive number of the tape whose multifile catalog entry is to be deleted from the MAREN catalog.

FILE-SEQUENCE = <integer 2..9999>
Defines which file sequence number of the specified archive number is to be deleted. All catalog entries with a file sequence number higher than the one specified here are deleted.

Example

```
//delete-volume-entry volume=asr101,file-seq=2
%  MARM106 MAREN CATALOG ENTRY 'ASR101'/'0002' ERASED
%  MARM170 STATEMENT '//DELETE-VOLUME-ENTRY' PROCESSED
```

The catalog entry of tape asr101 with file sequence number 2 is deleted from the MAREN catalog. Any catalog entries with higher file sequence numbers are likewise deleted.

EDIT-VOLUME-ATTRIBUTES
Enable guided dialog for MODIFY-VOLUME-ATTRIBUTES

This statement activates guided dialog for the MODIFY-VOLUME-ATTRIBUTES statement. As far as it is technically possible and makes sense, the predefined default values of the various operands are replaced by values which are valid for the specified tape's catalog entry.

Since the value NO cannot be specified explicitly for the INITIALIZATION operand of the MODIFY-VOLUME-ATTRIBUTES statement, this value is not replaced. In other words, if INITIALIZATION=NO is specified, the value UNCHANGED appears in the menu.

The EDIT-VOLUME-ATTRIBUTES statement is only permitted in interactive mode. It must not be used in procedure and ENTER files.

If the user does not wish the next statement executed to be MODIFY-VOLUME-ATTRIBUTES, he/she should press the K1 key or enter *CANCEL in the NEXT field and select any other MAREN statement.

If the statement EDIT-VOLUME-ATTRIBUTES is used in unguided dialog, the user is prompted for the next statement by "//" or "%STMT". Only if the user switches temporarily to guided dialog by entering "?" is the menu for the MODIFY-VOLUME-ATTRIBUTES statement output containing the current values from the catalog entry for the tape.

Format

EDIT-VOLUME-**ATTRIBUTES** Alias: **EDIT**
VOLUME = <vsn> ,**FI**LE-**SEQ**UENCE = **1** / <integer 1..9999>

Operands

VOLUME = <vsn>
Archive number of the tape whose catalog entry is to be modified.

FILE-SEQUENCE = 1 / <integer 1..9999>
Defines which file sequence number of the specified archive number is to be modified.

Example

```
//edit-volume-attributes volume=tc0022
//?
```

```
PROGRAM  : MAREN                          STATEMENT: MODIFY-VOLUME-ATTRIBUTES


------------------------------------------------------------------------------
VOLUME                = TC0022(
SELECT                = *ALL
PASSWORD              =
PROTECTION            = *PARAMETERS(
DIRECTORY-NAME        = :4V09:$TSOS.HUGO
HOME-LOCATION         = CENTRAL
REMARK                = *NONE
REMARK-2              = *NONE
REMARK-3              = *NONE
USER-FIELD            = *NONE
OVERFLOW-CONTROL      = *BY-PROGRAM




------------------------------------------------------------------------------
NEXT = *CONTINUE
KEYS : F1=?   F3=*EXIT   F5=*REFRESH   F6=*EXIT-ALL   F8=+   F9=REST-SDF-IN
       F11=*EXECUTE   F12=*CANCEL

MESSAGE:  CMD0175 OTHER OPERATIONS DESIRED? PRESS *EXIT KEY
```

EXPORT-VOLUME
Export tapes from the MAREN catalog

The EXPORT-VOLUME statement has the following functions:

- It labels local tapes as exported in the MAREN catalog.
  For an encrypted tape, a file is also created which contains the tape's encryption data. This file must be transferred to the foreign data center in addition to the tape (separately from the tape if possible). See "Notes" on page 62.
- It labels foreign tapes as returned to the owner in the MAREN catalog.
  In the case of foreign tapes, the catalog entry is removed from the MAREN catalog. In the case of encrypted tapes, the associated encryption data in the key box is also deleted.

Format

EXPORT-**VOL**UME Alias: **EXV**

VOLUME = ***BY-FILE**(...) / ***BY-DIR**ECTORY(...) / ***INT**ERVAL(...) /
list-poss(10): <vsn> / ***BY-VOL**UME-**GR**OUP(...)

***BY-FILE**(...)
FILE-**NAME** = <filename 1..41 without-cat-user>
,**VERSION** = ***LATEST** / <integer -9999..0> / ***ALL**
,**USER-ID**ENTIFICATION = ***OWN** / ***ALL** / <name 1..8>
,**TYPE-OF-VOL**UMES = ***VALID** (...) / ***OBSOLETE** / ***ANY**
***VALID**(...)
CLOSE-CHECK = ***Y**ES / ***NO**

***BY-DIR**ECTORY(...)
DIRECTORY-**NAME** = <filename 1..54 without-gen-vers>
,**SAVE-FILE-ID** = ***LATEST** / <integer -32767..0> / <composed-name 15..15>

***INT**ERVAL(...)
FROM = <vsn>
,**TO** = <vsn>
,**FROM-FSEQ** = **1** / <integer 1..9999>

*BY-**VOL**UME-**GR**OUP(...)
VOLUME-**GR**OUP = <text 1..32 without-sep>

,**EXPORT-ADDR**ESS = <c-string 1..50> / ***BY-CAT**ALOG

,**PASS**WORD = ***NONE** / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / ***SECRET**

,**LAYOUT** = ***STD** / <file-name 1..54 without-gen-vers>

Operands

VOLUME =
Archive numbers of the tapes to be exported.

VOLUME = *BY-FILE(...)
All tapes belonging to a file or a tape set are to be exported.

FILE-NAME = <filename 1..41 without-cat-user>
File name to which a tape set is to be exported.

VERSION =
This operand can be used to select a specific version (or status) of the specified file.

VERSION = *LATEST
Selects the latest version of the file (i.e. the last one created).

VERSION = <integer -9999..0>
Specifying 0 is equivalent to *LATEST. Specifying -1 indicates the penultimate file status, etc.

VERSION = *ALL
Selects all the tapes which exist for the specified file name.

USER-IDENTIFICATION =
This operand selects the user ID to which the tapes are assigned (catalog entry field USER-ID).

USER-IDENTIFICATION = *OWN
Only those tapes with the file name specified in the catalog entry and which are assigned to your own user ID are selected.

USER-IDENTIFICATION = *ALL
The user IDs are not evaluated during selection.

USER-IDENTIFICATION = <name 1..8>
Only those archive numbers which are assigned to the specified user ID are selected.

TYPE-OF-VOLUMES =
This operand selects the volume sequences (catalog entry field VOLUME-SEQUENCE) within a tape set. These numbers are usually unique. Some numbers may be duplicated following a restart.

TYPE-OF-VOLUMES = *VALID(...)
If a volume sequence occurs more than once in a tape set, the one created most recently is selected.

CLOSE-CHECK =
This operand allows you to select whether the catalog entry field CLOSE-INDICATOR should be evaluated.

CLOSE-CHECK = *YES
If the CLOSE-INDICATOR catalog entry field is not set to CLOSED for one of the tapes in the selected tape set, the statement is rejected.

CLOSE-CHECK = *NO
The CLOSE-INDICATOR catalog entry field is not evaluated.

TYPE-OF-VOLUMES = *OBSOLETE
If a volume sequence occurs more than once in a tape set, all VSNs are selected except the one most recently created.

TYPE-OF-VOLUMES = *ANY
The volume sequences for a tape set are not checked to establish whether they occur more than once.

VOLUME = *BY-DIRECTORY(...)
All tapes listed in the specified directory (as saved files) are exported.

DIRECTORY-NAME = <filename 1..54 without-gen-vers>
Name of the directory. Only reserved tapes assigned to the POOL of the specified directory are selected.
If this directory is located under a remote user ID, both the user ID and the catalog ID must be entered. The user's own user ID and standard catalog ID can be omitted.

SAVE-FILE-ID =
The tapes that are to be exported are selected using the save file of the directory specified above.

SAVE-FILE-ID = *LATEST
All tapes listed in the last, i.e. most recent save file are selected.

SAVE-FILE-ID = <integer -32767..0>
All tapes listed in the nth save file are selected (the older the save file, the larger the number n). 0 equals *LATEST. Example: if -5 is specified, the tapes are selected from the last save file but five.

SAVE-FILE-ID = <composed-name 15..15>
All tapes in the save file with the specified SAVE-FILE-ID are selected. The SAVE-FILE-ID has the following format: `S.yymmdd.hhmmss`.

VOLUME = *INTERVAL (...)
All tapes whose archive number lies within the range specified below are processed.

FROM = <vsn>
Archive number. All tapes whose archive number is greater than or equal to the specified archive number are processed.

TO = <vsn>
Archive number. All tapes whose archive number is less than or equal to the specified archive number are processed.

FROM-FSEQ = 1 / <integer 1..9999>
File sequence number of the FROM operand. Specifies the precise file sequence number at which processing is to begin. This operand is relevant only if the statement is issued via the MAREN program interface.

VOLUME = list-poss(10): <vsn>
Archive numbers of the tapes to be exported.

VOLUME = *BY-VOLUME-GROUP(...)
All tapes of the specified volume group are exported.

VOLUME-GROUP = <text 1..32 without-sep>
Specifies the volume group to which a tape must belong for it to be exported. “*” can be entered as the last character. In this case all volume groups which begin with the specified string are selected.

EXPORT-ADDRESS = <c-string 1..50> / *BY-CATALOG
Mailing address. Specifies the destination to which the tape is to be sent. If the tape is to be picked up personally, any text to this effect can be specified, e.g. “Mailbox G7” .

EXPORT-ADDRESS = *BY-CATALOG
The mailing address defined in the tape's catalog entry is to be used for exporting.

PASSWORD = *NONE / <c-string 1..4> / <x-string 1..8> /
<integer -2147483648..2147483647> / *SECRET
Password. The previously valid password must be entered here if the tape is protected by a password.

PASSWORD = *NONE
No password is specified.

PASSWORD = *SECRET
Requests a blanked-out input field for the password. Entries in this field are not visible on the screen.
This operand value can only be specified in unguided dialog. In guided dialog, the field provided for entering passwords is always blanked out.

LAYOUT =
Specifies how the export receipt is to be created if the MAREN administrator has not set the EXPORT-RECEIPT parameter to *NO.

LAYOUT = *STD
The export receipt is generated with the default layout.

LAYOUT = <filename 1..54 without-gen-vers>
Layout file. The export receipt is created according to the definitions contained in the layout file by the MAREN administrator.

Notes

- The MAREN administrator can define whether an export receipt is to be created for every export. This receipt is first written to a file and then printed (if desired).
  The file is saved as $<userid>.MAREN.EXPORT-RECEIPT.<vsn>, where <userid> is the user ID of the calling task. If the file already exists, it is extended, otherwise, it is created. If immediate printing is specified in MAREN, the file is automatically deleted after it has been printed. If a list containing several archive numbers is specified, the file is not printed until the last archive number has been processed. If a tape in a list cannot be exported, the EXPORT statement is aborted.
- If the MAREN administrator has specified that export receipts are to be generated but not immediately printed automatically, what users are to do with the MAREN.EXPORT-RECEIPT.<vsn> file under their user IDs depends on arrangements in the data center.
- When a local tape is exported, the catalog entry field EXPORT-DATE is supplied internally with the current date, and the catalog entry field TEMPORARY-LOCATION is set to CENTRAL.
- When exporting a foreign tape, the catalog entry is deleted from the MAREN catalog. All existing multifile catalog entries with an FSEQ > 1 are likewise deleted. In the case of an encrypted tape the associated encryption data in the key box is also deleted.

- If the MAREN catalog contains a temporarily locked tape with the same archive number as the tape to be returned, the export process can only be carried out by the MAREN administrator.
- When this statement is called to export an encrypted home tape, a compiled S procedure with the tape's encryption data is created implicitly. The procedure file has the name `S.PRC.MAREN.ENCRYPTION.DATA.<vsn>`.

  The software product SDF-P is required to create the compiled S procedure.

  The MAREN administrator of the remote data center must call this procedure after the IMPORT-FOREIGN-VOLUME statement has been executed and before the encrypted tape contents are read in order to enter the tape's encryption data into the key box of his/her system.
- With regard to data privacy and data protection, the following must be observed for encrypted tapes when a tape and encryption data are transferred:

  As separate encryption data can be generated for each tape, the tape contents can be encrypted only using the associated procedure file. To prevent the tape plus the encryption data from falling into the wrong hands, the two should be sent separately. The following procedure is recommended:

  ► Send the tape to the partner.

  ► Wait for confirmation of receipt

  ► Send the encryption data (procedure file) to the partner (e.g. by means of File Transfer or by email)
- In the following cases, the statement aborts with an error message and the spin off mechanism is triggered:

  – The tape is not in the MAREN catalog.

  – The tape is currently being processed.

  – The tape is assigned to a foreign user ID in the MAREN catalog, and USER-ACCESS is not ALL-USERS.

  – The tape has already been exported.
  Exception: The tape is already at the specified address. In this case, a message is displayed and processing continues as normal.

  – The operand EXPORT-ADDRESS=*BY-CATALOG has been specified, but the catalog entry contains no mailing address.

  – All the tapes in a tape set are to be exported and one of the selected catalog entries contains the attribute FILE-SEQUENCE > 1 (i.e. the file specified is not the first on the specified tape).

– One of the tapes belonging to the tape set is temporarily locked.

– The tape is assigned to a storage location with the operating mode ROBAR-2. In this case it cannot be moved or exported.

– The tapes are selected using a save file from HSMS, and at least one tape is temporarily locked or at least one tape is being processed or is temporarily locked.

– The file specified in the LAYOUT operand does not exist.

Examples

```
//export-volume volume=id0101,export-address=c'hamburg'
%  MARM134 GET VOLUME 'ID0101' FROM CENTRAL ARCHIVE
%  MARM170 STATEMENT '//EXPORT-VOLUME' PROCESSED
```

Tape ID0101 is exported.

```
//export-volume volume=*by-file(file-name=tape.out),export-addr=*by-cat
%  MARM134 GET VOLUME 'ID0106' FROM CENTRAL ARCHIVE
%  MARM170 STATEMENT '//EXPORT-VOLUME' PROCESSED
```

All tapes used when the tape file TAPE.OUT was last created are exported. The mailing address contained in the catalog entries of these tapes is to be used.

MODIFY-TAPE-SET-ATTRIBUTES
Modify attributes of all tapes in a tape set

A tape set consists of all the tapes which belong to a tape file, or more precisely, all those catalog entries which have the same FILE-NAME and FIRST-VOL values.

The default value *UNCHANGED in a given operand signifies that the previous setting is still applicable.
The value *NONE signifies that the specified catalog entry fields can be deleted in the catalog entry.

Format

MODIFY-**TAPE-SET-ATTR**IBUTES Alias: **MDTSA**

SELECT = ***BY-ATTR**IBUTES (...)

***BY-ATTR**IBUTES(...)

FILE-**NAME** = <filename 1..41 without-cat-user>

,**VERSION** = ***LATEST** / <integer -9999..0> / ***ALL** / ***NOT-CREATED**

,**TYPE-OF-VOL**UMES = ***VALID**(...) / ***OBSOLETE** / ***ANY**

***VALID**(...)

CLOSE-CHECK = ***NO** / ***Y**ES

,**PASS**WORD = ***NONE** / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / ***SECRET**

,**PROT**ECTION = ***UNCH**ANGED / ***PAR**AMETERS(...)

***PAR**AMETERS(...)

NEW-PASSWORD = ***UNCH**ANGED / ***NONE** / <c-string 1..4> / <x-string 1..8> /
<integer -2147483648..2147483647> / ***SECRET**

,**USER-ACCESS** = ***UNCH**ANGED / ***OWNER-ONLY** / ***FOREIGN-READ**-ONLY / ***ALL-USERS**

,**FREE-DATE** = ***UNCH**ANGED / <date> / <integer 0..32767 *days*>

,**EXPIR**ATION-**DATE** = ***UNCH**ANGED / ***NONE** / <date> / <integer 0..32767 *days*>

,**INIT**IALIZATION = ***UNCH**ANGED / ***Y**ES / ***ERASE**

,**HOME-LOC**ATION = ***UNCH**ANGED / <alphanum-name 1..8>

,**REMARK** = ***UNCH**ANGED / ***NONE** / <c-string 1..24>

,**REMARK-2** = ***UNCH**ANGED / ***NONE** / <c-string 1..10>

,**REMARK-3** = ***UNCH**ANGED / ***NONE** / <c-string 1..12>

,**USER-FIELD** = ***UNCH**ANGED / ***NONE** / <c-string 1..54>

Operands

SELECT = *BY-ATTRIBUTES(...)
Tape set to be selected for modification.

FILE-NAME = <filename 1..41 without-cat-user>
File name for which a tape set is to be selected.

VERSION =
This operand can be used to select a specific version (or status) of the specified file.

VERSION = *LATEST
Selects the latest version of the file (i.e. the last one created).

VERSION = <integer -9999..0>
Specifying 0 is equivalent to *LATEST, specifying -1 indicates the penultimate file status, etc.

VERSION = *ALL
Selects all the tapes which exist for the specified file name.

VERSION = *NOT-CREATED
Selects only those volumes which have been reserved with the specified file name but which have not been used (catalog entry fields CREATION-DATE and CREATION-TIME have not been set). The TYPE-OF-VOLUMES setting is of no consequence in this case and is therefore not interpreted.

TYPE-OF-VOLUMES =
This operand selects the volume sequences (catalog entry field VOLUME-SEQUENCE) within a tape set. These numbers are usually unique. Some numbers may be duplicated following a restart.

If VERSION=*NOT-CREATED is specified, the TYPE-OF-VOLUMES operand is ignored.

TYPE-OF-VOLUMES = *VALID(...)
If a volume sequence occurs more than once in a tape set, the one created most recently is selected.

CLOSE-CHECK =
This operand allows you to select whether the catalog entry fields CLOSE-INDICATOR should be evaluated.

CLOSE-CHECK = *NO
The CLOSE-INDICATOR catalog entry field is not evaluated.

CLOSE-CHECK = *YES
If the CLOSE-INDICATOR catalog entry field is not set to CLOSED for one of the tapes in the tape set, the statement is aborted.

TYPE-OF-VOLUMES = *OBSOLETE
If a volume sequence occurs more than once in a tape set, all VSNs are selected except the one most recently created.

TYPE-OF-VOLUMES = *ANY
The volume sequences for a tape set are not checked to establish whether they occur more than once.

PASSWORD = *NONE / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / *SECRET
Password. The previously valid password must be entered here if the tape is protected by a password.

PROTECTION = *UNCHANGED / *PARAMETERS(...)
Tape protection attributes.

NEW-PASSWORD = *UNCHANGED / *NONE / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / *SECRET
Password protecting tapes against unauthorized access. The password C'$$$$' is not permitted. The password is changed using this operand.

NEW-PASSWORD = *SECRET
Requests a blanked-out input field for the password. Entries in this field are not visible on the screen.
This operand value can only be specified in unguided dialog. In guided dialog, the field provided for entering passwords is always blanked out.

USER-ACCESS =*UNCHANGED / *OWNER-ONLY / *FOREIGN-READ-ONLY / *ALL-USERS
Specifies whether foreign user IDs may access the tape.

USER-ACCESS = *OWNER-ONLY
Access to the tape is possible only under the specified user ID.

USER-ACCESS = *FOREIGN-READ-ONLY
Only read access to the tape is possible under a foreign user ID.

USER-ACCESS = *ALL-USERS
Unrestricted access to the tape is possible under a foreign user ID.

FREE-DATE = *UNCHANGED / <date> / <integer 0..32767 *days*>
Expiration date of the tape. Up to this date, the tape remains reserved for the given user ID.

FREE-DATE = <date>
Date in the format `yyyy-mm-dd`. Dates earlier than the current date are rejected.

FREE-DATE = <integer 0..32767 *days*>
Time specification in days (reservation period). MAREN adds this number to the current date to generate the expiration date.

EXPIRATION-DATE = *UNCHANGED / *NONE / <date> / <integer 0..32767 *days*>
File expiration date.

EXPIRATION-DATE = <date>
Date in the format `yyyy-mm-dd`. Dates earlier than the current date are rejected.

EXPIRATION-DATE = <integer 0..32767 *days*>
Time specification in days. MAREN adds this number to the current date to generate the expiration date.

INITIALIZATION = *UNCHANGED / *YES / *ERASE
Specifies whether the tape is to be reinitialized and if required also erased once it reaches its expiration date.

INITIALIZATION = *YES
The tape is to be initialized after being released. However, if data is written to this volume before it is released, the value for INITIALIZATION will revert to NO provided the tape was created without protection criteria.

INITIALIZATION = *ERASE
The tape is to be initialized after being released. The tape contents should also be erased in the process.

HOME-LOCATION = *UNCHANGED / <alphanum-name 1..8>
Location name or symbolic location name. Specifies the location where the tape is normally to be stored.

REMARK = *UNCHANGED / *NONE / <c-string 1..24>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

REMARK-2 = *UNCHANGED / *NONE / <c-string 1..10>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

REMARK-3 = *UNCHANGED / *NONE / <c-string 1..12>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

USER-FIELD = *UNCHANGED / *NONE / <c-string 1..54>
Comment text. This catalog entry field may contain any user-specific data, e.g. name, department.

Notes

- If errors occur when determining the MAREN tape set, e.g. because only the tapes with the volume sequences 1 and 3 have been entered in the MAREN catalog for a given file version but not VSN 2, the catalog entries are not modified.
- It is not possible to change the storage location for tapes of a tape set assigned to a location with the operating mode ROBAR-2.
- Which catalog entry fields play a role when determining a file version and consequently a tape set is described in the “MAREN System Administrator Guide” [1].
- When modifying tape attributes, the FSEQ-1 entry is also modified if entries with FSEQ > 1 are also part of the tape set. The following operands are affected:
  - INITIALIZATION
  - EXPIRATION-DATE
    This may modify FREE-DATE in the FSEQ-1 entry. The initialization flag would also be set when EXPIRATION-DATE is reduced.
  - FREE-DATE
    This is reduced only if the EXPIRATION-DATE operand of all catalog entries for this tape is less than or equal to the new FREE-DATE.
- If the HOME-LOC, FREE-LOC, TEMP-LOC, EXPORT-ADDRESS, or EXPORT-DATE operands are modified in an entry with FSEQ > 1, MAREN outputs warning MARM020.
- If the FSEQ-1 entry cannot be read or modified, e.g. because the entry is still being processed, MAREN outputs warning MARM021.

Example

```
//modify-tape-set-attributes
   select=*by-attr(file-name=tape.file,version=*all,type-of-volumes=*valid),
   protection=*par(user-access=*foreign-read)
```

Read access from foreign user IDs is to be permitted for all tapes under the user's own ID to which the tape file TAPE.FILE has been written. All versions and thereby all tape sets of this file in the MAREN catalog are selected (VERSION=*ALL). If there are individual versions of this file with tapes to which data has been written but which were replaced by other tapes in a subsequent restart, these tapes are not modified (TYPE-OF-VOLUMES=*VALID).

MODIFY-VOLUME-ATTRIBUTES
Modify attributes of tapes in the MAREN catalog

The default value *UNCHANGED in a given operand signifies that the previous setting is applicable.
The value *NONE signifies that the specified catalog entry fields can be deleted in the catalog entry.

Format

MODIFY-**VOL**UME-**ATTR**IBUTES Alias: **MD** / **MDVA**

VOLUME = ***NONE** / <vsn>(...) / ***INT**ERVAL(...) / ***BY-INP**UT-**FILE**(...) / ***ALL**

<vsn>(...)
FILE-**SEQ**UENCE = **1** / <integer 1..9999>
,**FI**LE-**NAME** = ***UNCH**ANGED / ***NONE** / <filename 1..41 without-cat-user>
,**EXPIR**ATION-**DATE** = ***UNCH**ANGED / ***NONE** / <date> / <integer 0..32767 *days*>
,**VOL**UME-**SEQ**UENCE = ***UNCH**ANGED / <integer 1..255>
,**FIRST-VOL**UME = ***UNCH**ANGED / ***NONE** / <vsn>
,**LAST-CL**OSE-**DATE** = ***UNCH**ANGED / ***NONE** / <date>
,**LAST-CL**OSE-**TIME** = ***UNCH**ANGED / ***NONE** / <time>
,**CRE**ATION-**CATALOG-ID** = ***UNCH**ANGED / ***NONE** / <cat-id 1..4>
,**CRE**ATION-**USER-ID** = ***UNCH**ANGED / ***NONE** / <name 1..8>
,**CRE**ATION-**JOB-NAME** = ***UNCH**ANGED / ***NONE** / <name 1..8>
,**CRE**ATION-**DATE** = ***UNCH**ANGED / ***NONE** / <date>
,**CRE**ATION-**TIME** = ***UNCH**ANGED / ***NONE** / <time>

***INT**ERVAL(...)
FROM = ***FIRST** / <vsn>
,**TO** = ***LAST** / <vsn>
,**FROM-FSEQ** = **1** / <integer 1..9999>

***BY-INP**UT-**FILE**(...)
FILE-**NAME** = <filename 1..54>

,**SEL**ECT = ***ALL** / ***BY-DIR**ECTORY(...) / ***BY-VOL**UME-**GR**OUP(...)

***BY-DIR**ECTORY(...)
DIRECTORY-**NAME** = <filename 1..54 without-gen-vers>
,**SAVE-FILE-ID** = ***ALL** / ***LATEST** / <integer -32767..0> / <composed-name 15..15>

***BY**-**VOL**UME-**GR**OUP(...)
VOLUME-**GR**OUP = ***ANY** / ***NONE** / <text 1..32 without-sep>

(part 1 of 2)

,**PASS**WORD = ***NONE** / ***Y**ES / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> /
***SECRET**

,**PROT**ECTION = ***UNCH**ANGED / ***PAR**AMETERS(...)

***PAR**AMETERS(...)

NEW-PASSWORD = ***UNCH**ANGED / ***NONE** / <c-string 1..4> / <x-string 1..8> /
<integer -2147483648..2147483647> / ***SECRET**

,**USER-ACCESS** = ***UNCH**ANGED / ***OWNER-ONLY** / ***FOREIGN-READ**-ONLY / ***ALL-USERS**

,**FREE-DATE** = ***UNCH**ANGED / <date> / <integer 0..32767 *days*>

,**EXPIR**ATION**-DATE** = ***UNCH**ANGED / ***NONE** / <date> / <integer 0..32767 *days*>

,**INIT**IALIZATION = ***UNCH**ANGED / ***Y**ES / ***ERASE**

,**DIR**ECTORY**-NAME** = ***UNCH**ANGED / ***NONE** / <filename 1..54 without-gen-vers>

,**VOL**UME**-GR**OUP = ***UNCH**ANGED / ***NONE** / <text 1..32 without-sep>

,**HOME-LOC**ATION = ***UNCH**ANGED / <alphanum-name 1..8>

,**REMARK** = ***UNCH**ANGED / ***NONE** / <c-string 1..24>

,**REMARK-2** = ***UNCH**ANGED / ***NONE** / <c-string 1..10>

,**REMARK-3** = ***UNCH**ANGED / ***NONE** / <c-string 1..12>

,**USER-FIELD** = ***UNCH**ANGED / ***NONE** / <c-string 1..54>

,**OV**ERFLOW**-CONTROL** = ***BY-PROG**RAM / ***BY-SYS**TEM

(part 2 of 2)

Operands

VOLUME =
Archive numbers of tapes whose catalog entries are to be modified.

VOLUME = <vsn>(...)
Archive number.

FILE-SEQUENCE = 1 / <integer 1..9999>
File sequence number whose catalog entry is to be modified.

FILE-NAME = *UNCHANGED / *NONE / <filename 1..41 without-cat-user>
Name of the file with the specified file sequence number located on the tape. If a directory name is entered in the catalog entry, the specification DIR-NAME= *NONE is required before a file name can be entered.

EXPIRATION-DATE = *UNCHANGED / *NONE / <date> / <integer 0..32767 *days*>
File expiration date. The reservation period can be modified by the MAREN administrator using the MARENADM statement MODIFY-VOLUME-ATTRIBUTES. Nonprivileged users can only change the file expiration date using the RETPD operand in the ARCHIVE statement.

EXPIRATION-DATE = <date>
Date in the format `yyyy-mm-dd`. Dates earlier than the current date are rejected.

EXPIRATION-DATE = <integer 0..32767 *days*>
Time specification in days. MAREN adds this number to the current date to generate the expiration date.

VOLUME-SEQUENCE = *UNCHANGED / <integer 1..255>
File section number within a multivolume file (MV set).

FIRST-VOLUME = *UNCHANGED / *NONE / <vsn>
First archive number of a multivolume file (file set ID).

LAST-CLOSE-DATE = *UNCHANGED / *NONE / <date>
Date in the format `yyyy-mm-dd`. Specifying the last day on which a file on this tape was closed.

LAST-CLOSE-TIME = *UNCHANGED / *NONE / <time>
Time in the format `hh[:mm[:ss]]`, where initial zeros need not be entered for `hh`, `mm` and `ss`. Specifies the time of day a file on this tape was last closed.

CREATION-CATALOG-ID = *UNCHANGED / *NONE / <cat-id>
Catalog ID of the pubset on which the tape was last written to.
If a directory name is entered in the catalog entry, the specification DIR-NAME= *NONE is required before a catalog ID can be entered.

CREATION-USER-ID = *UNCHANGED / *NONE / <name 1..8>
User ID under which the tape was last written to. If a directory name is entered in the catalog entry, the specification DIR-NAME= *NONE is required before a user ID can be entered.

CREATION-JOB-NAME = *UNCHANGED / *NONE / <name 1..8>
Name of the last job which wrote to this tape.

CREATION-DATE = *UNCHANGED / *NONE / <date>
Date in the format `yyyy-mm-dd`. Specifies the day on which the tape was last written to.

CREATION-TIME = *UNCHANGED / *NONE / <time>
Time in the format `hh[:mm[:ss]]`, where initial zeros need not be entered for `hh`, `mm` and `ss`. Specifies the time of day at which the tape was last written to.

VOLUME = *INTERVAL(...)
All tapes whose archive number lies within the range specified below are processed.

FROM = *FIRST
All tapes are processed, starting with the lowest available archive number.

FROM = <vsn>
Archive number. All tapes whose archive number is greater than or equal to the specified archive number are processed.

TO = *LAST
All tapes are processed up to the highest existing archive number.

TO = <vsn>
Archive number. All tapes whose archive number is less than or equal to the specified archive number are processed.

FROM-FSEQ = 1 / <integer 1..9999>
File sequence number of the FROM operand. Specifies the precise file sequence number at which processing is to begin. This operand is relevant only if the statement is issued via the MAREN program interface.

VOLUME = *ALL
All tapes are processed.

VOLUME = *BY-INPUT-FILE(...)
Selects the catalog entries to be modified by means of an input file.

FILE-NAME = <filename 1..54>
Name of a SAM file which contains full catalog entries in MAREN format. Files created with editors can also be assigned.

From all the catalog entries in the input file, only the archive numbers (VOLUME) and file sequence numbers (FILE-SEQUENCE) contained in it are evaluated. The catalog entry for the specified tape is read from the MAREN catalog, and the catalog entry fields specified in the statement are updated there.

If there is no catalog entry in the MAREN for a tape contained in the input file, this fact is logged, task switch 31 is set, and processing continues with the next archive entry from the input file.

If a file is assigned which contains no complete catalog entries and which was created using an editor, the records it contains must have the following format:

Byte	Contents
1-4	Record length field
5-10	Archive number, if necessary padded with trailing blanks, e.g. 'TAPE1 '
11-14	File sequence number, e.g. '0001'
15-510	Not set or any text

Only the catalog entries in the MAREN catalog are updated. The input file remains unchanged.

SELECT =
Specifies which catalog entries are to be selected.

SELECT = *ALL
All catalog entries identified by the VOLUME operand are processed.

SELECT = *BY-DIRECTORY (...)
All tapes of a backup run belonging to a specific directory are processed. The selection may already have been limited using the VOLUME operand.

DIRECTORY-NAME = <filename 1..54 without-gen-vers>
Name of the directory.
Only reserved tapes assigned to the POOL of the specified directory are selected.
If this directory is located under a remote user ID, both the user ID and the catalog ID must be entered. The user's own user ID and standard catalog ID can be omitted.

SAVE-FILE-ID =
The tapes that are to be exported are selected using the save file of the directory specified above.

SAVE-FILE-ID = *ALL
All the tapes of the specified save file are selected.

SAVE-FILE-ID = *LATEST
All tapes listed in the last, i.e. most recent save file are selected.

SAVE-FILE-ID = <integer -32767..0>
All tapes listed in the nth save file are selected (the older the save file, the larger the number n). 0 equals *LATEST. Example: if -5 is specified, the tapes are selected from the last save file but five.

SAVE-FILE-ID = <composed-name 15..15>
All tapes in the save file with the specified SAVE-FILE-ID are selected. The SAVE-FILE-ID has the following format: `S.yymmdd.hhmmss`.

SELECT = *BY-VOLUME-GROUP (...)
The tapes which are to be processed are also selected by specifying the volume group.

VOLUME-GROUP = *ANY / *NONE / <text 1..32 without-sep>
Specifies the volume group to which a tape must belong for it to be processed. When *ANY is specified, the volume group is irrelevant; when *NONE is specified, the tape may not belong to a volume group. “*” can be entered as the last character. In this case all volume groups which begin with the specified string are selected.

PASSWORD = *NONE / *YES / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / *SECRET
Password. The previously valid password must be entered here if the tape is protected by a password.

PASSWORD = *SECRET
Requests a blanked-out input field for the password. Entries in this field are not visible on the screen.
This operand value can only be specified in unguided dialog. In guided dialog, the field provided for entering passwords is always blanked out.

PROTECTION = *UNCHANGED / *PARAMETERS(...)
Tape protection attributes.

NEW-PASSWORD = *UNCHANGED / *NONE / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / *SECRET
Password protecting tapes against unauthorized access. The password C'$$$$' is not permitted. The password is changed using this operand.

NEW-PASSWORD = *UNCHANGED
Specifies that the existing password is not to be changed.

NEW-PASSWORD = *NONE
Specifies that the previous password is to be deleted.

NEW-PASSWORD = *SECRET
Requests a blanked-out input field for the password. Entries in this field are not visible on the screen.
This operand value can only be specified in unguided dialog. In guided dialog, the field provided for entering passwords is always blanked out.

USER-ACCESS =
Specifies whether foreign user IDs may access the tape.

USER-ACCESS = *OWNER-ONLY
Access to the tape is possible only under the specified user ID.

USER-ACCESS = *FOREIGN-READ-ONLY
Only read access to the tape is possible under a foreign user ID.

USER-ACCESS = *ALL-USERS
Unrestricted access to the tape is possible under a foreign user ID.

FREE-DATE = *UNCHANGED / <date> / <integer 0..32767 *days*>
Expiration date of the tape. Up to this date, the tape remains reserved for the given user ID.

FREE-DATE = <date>
Date in the format `yyyy-mm-dd`. Dates earlier than the current date are rejected.

FREE-DATE = <integer 0..32767 *days*>
Time specification in days (reservation period). MAREN adds this number to the current date to generate the expiration date.

EXPIRATION-DATE =
Expiration date for all files on the tape.

EXPIRATION-DATE = *UNCHANGED
The expiration date is not updated.

EXPIRATION-DATE = *NONE
The expiration date is deleted for all selected files.

EXPIRATION-DATE = <date>
Date in the format `yyyy-mm-dd`. Dates earlier than the current date are rejected.

EXPIRATION-DATE = <integer 0..32767 *days*>
Time specification in days. MAREN adds this number to the current date to generate the expiration date.

INITIALIZATION = *UNCHANGED / *YES / *ERASE
Specifies whether the tape is to be reinitialized once it reaches its expiration date.

INITIALIZATION = *YES
The tape is to be initialized after being released. However, if data is written to it before it is released, the value for INITIALIZATION will revert to NO provided the tape was created without protection criteria.

INITIALIZATION = *ERASE
Specifies whether the tape is to be deleted once it reaches its expiration date.

DIRECTORY-NAME = *UNCHANGED / *NONE / <filename 1..54 without-gen-vers>
Name of an directory to which the tape is assigned. If this directory is located under a remote user ID, both the user ID and the catalog ID must be entered. The user's own user ID and standard catalog ID can be omitted. If the catalog entry fields FILE-NAME, CRE-CATALOG-ID, and CRE-USER-ID are supplied with values, these must be deleted with *NONE (e.g. FILE-NAME=*NONE).

DIRECTORY-NAME = *NONE
Any directory name present is deleted.

VOLUME-GROUP = *UNCHANGED / *NONE / <text 1..32 without-sep>
Defines the (new) volume group to which a selected tape is assigned. When *UNCHANGED is specified, the assignment is retained; when *NONE is specified, the affiliation to a volume group may be deleted.

HOME-LOCATION = *UNCHANGED / <alphanum-name 1..8>
Location name or symbolic location name. Specifies the location where the tape is normally to be stored.

REMARK = *UNCHANGED / *NONE / <c-string 1..24>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

REMARK-2 = *UNCHANGED / *NONE / <c-string 1..10>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

REMARK-3 = *UNCHANGED / *NONE / <c-string 1..12>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

USER-FIELD = *UNCHANGED / *NONE / <c-string 1..54>
Comment text. This catalog entry field may contain any user-specific data, e.g. name, department.

OVERFLOW-CONTROL =
Type of screen overflow control in interactive mode.

OVERFLOW-CONTROL = *BY-PROGRAM
Control by the program. After eighteen catalog entries have been processed, a message is displayed inquiring whether the current operation is to be continued or aborted.

OVERFLOW-CONTROL = *BY-SYSTEM
Control by BS2000. Screen overflow control is based entirely on the system parameter TCHOFLO or the value set in the MODIFY-TERMINAL-OPTIONS command.

Notes

- If VOLUME=*INTERVAL/*ALL is specified and some catalog entries cannot be modified in the specified area, these catalog entries are logged with a message to this effect, and the statement is continued.
- A volume expiration date which precedes the expiration date of the first tape of an MF/MV set must not be set for the subsequent tapes in the set. The expiration date for the first tape (VOLUME-SEQUENCE = 1) must be reset if all the tapes in an MF/MV set are to be released.
- If you increment the file expiration date EXPIRATION-DATE, the expiration date FREE-DATE will also be incremented.
- If you decrement the file expiration date EXPIRATION-DATE, the INITIALIZATION catalog entry field is set to YES.
- It is not possible to change the storage location for tapes assigned to a location with the operating mode ROBAR-2.
- The user cannot modify the directory names of own tapes assigned by the MAREN administrator to a directory free tape pool (FREE-POOL=<filename>).
- It is advisable to modify or delete the directory name when the directory whose pool the tape was assigned to is renamed or deleted.
- Tapes in directories are not automatically released when their expiration date is reached. They are released only after they have been removed from the directory using the relevant ARCHIVE or HSMS statements (ARCHIVE: PURGE or POOL; HSMS: MODIFY-ARCHIVE SAVE=*DELETE or VOLUME= *REMOVE). If this is not possible because the directory has been deleted in the meantime, the internal MAREN allocation to a directory can subsequently be canceled using the MODIFY-VOLUME-ATTRIBUTES DIRECTORY-NAME=*NONE statement.
- If the tapes are selected using a save file from HSMS (operand SELECT=*BY-DIRECTORY(...)), temporarily locked catalog entries will also be processed.
- Related tapes can be combined to form a volume group. All files which are located on a tape automatically belong to this volume group. When a reserved tape which is assigned to a volume group is released, the assignment to the volume group is canceled for this tape.

Examples

```
//modify-volume-attributes volume=idx005,free-date=<date>,user-acc=*all
%  MARM121 MAREN CATALOG ENTRY 'TAPE01'/'0001' MODIFIED
```

The expiration date for tape IDX005 is set to the specified date. At the same time, the tape is declared shareable with no restrictions, i.e. foreign user IDs enjoy both read and write access to the tape.

```
//modify-volume-attributes volume=tape01,pass='x2w3',new-pass=*none
%  MARM121 MAREN CATALOG ENTRY 'TAPE01'/'0001' MODIFIED
```

This statement deletes an existing password for the tape tape01.

```
//modify-volume-attributes volume=*int(IDX006,IDX008),remark='project1'
%  MARM121 MAREN CATALOG ENTRY 'IDX006'/'0001' MODIFIED
%  MARM121 MAREN CATALOG ENTRY 'IDX007'/'0001' MODIFIED
%  MARM121 MAREN CATALOG ENTRY 'IDX008'/'0001' MODIFIED
%  MARM120 TOTAL OF 3 MAREN CATALOG ENTRIES PROCESSED
```

This statement enters the text project1 in the remark field of the archived tapes IDX006 through IDX008 belonging to the relevant user.

```
//print-vol-attr vol=*all,sel=*y(save01),output=list.vol.2,layout-contr=*no
%  JMS0066 JOB 'ULF' ACCEPTED ON <date> AT <time>, TSN = 1AV9
%  MARM170 STATEMENT '//PRINT-VOLUME-ATTRIBUTES' PROCESSED
```

All tapes whose catalog entry field REMARK contains the text “SAVEPROG” are to be released. For this purpose, the SELECT parameter of the PRINT-VOLUME-ATTR statement must be set such that the character string in the REMARK catalog entry field must match “SAVEPROG”. This selection criterion is already defined in the parameter set save01. Output is to be written to the LIST.VOL.2.

The output file assigned in PRINT-VOLUME-ATTRIBUTES then serves as the input file for the MODIFY-VOLUME-ATTRIBUTES statement:

```
//modify-volume-attr vol=*by-input-file(f-name=list.vol.2),
  protection=*par(free-date=0)
%  MARM121 MAREN CATALOG ENTRY 'IDX501'/'0001' MODIFIED
%  MARM121 MAREN CATALOG ENTRY 'IDX502'/'0001' MODIFIED
%  MARM121 MAREN CATALOG ENTRY 'IDX503'/'0001' MODIFIED
%  MARM121 MAREN CATALOG ENTRY 'IDX504'/'0001' MODIFIED
%  MARM121 MAREN CATALOG ENTRY 'IDX505'/'0001' MODIFIED
%  MARM120 TOTAL OF 5 MAREN CATALOG ENTRIES PROCESSED
```

MOUNT-VOLUME
Mount tapes

This statement causes tapes which have already been cataloged to be mounted. If the tape is not yet in the user's own system, an appropriate relocation process is initiated.

Format

MOUNT-VOLUME	Alias: **MTV**
VOLUME = list-poss(10):<vsn> ,**PASS**WORD = ***NONE** / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / ***SECRET** ,**ACCESS** = ***READ** / ***WRITE**	

Operands

VOLUME = list-poss(10): <vsn>
Archive numbers of the tapes to be mounted.

PASSWORD = *NONE / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / *SECRET
Password. The previously valid password must be entered here if the tape is protected by a password.

PASSWORD = *NONE
No password is specified.

PASSWORD = *SECRET
Requests a blanked-out input field for the password. Entries in this field are not visible on the screen.
This operand value can only be specified in unguided dialog. In guided dialog, the field provided for entering passwords is always blanked out.

ACCESS = *READ / *WRITE
Specifies whether tapes are to be mounted with or without a write protection.

Notes

- In order to process a tape, an advance request via MAREN is not absolutely essential. However, advance requests can often be useful:
  - For tapes which are located in the central archive or in a foreign system; these can be fetched before processing actually commences and mounted as required.
  - In cases where the operator is not certain, he/she can be told whether to mount tapes with or without write protection.
  - If the tape is not located on the local system but is located in the local data center, the operator is informed of the location from where he/she should fetch it.
- Tapes located outside the local data center, e.g. in the fire-proof archive, cannot be requested for mounting. In this case, procedure is governed by the organizational regulations of the particular data center.
- No mount requests are displayed for tapes which are located in archive systems.

Examples

```
//mount-volume volume=tapexy
```

This statement mounts the tape with the archive number TAPEXY.

```
//mount-volume volume=tape01,password=c'ann',access=*read
```

The tape tape01 is to be mounted with write protection. The tape is protected with the password C'anna', which must be specified before the request can be honored.

PRINT-VOLUME-ATTRIBUTES
Create list with information from the MAREN catalog

The selection and sort criteria and also the specifications for print editing can be defined individually and saved. The information to be output is output to a file in MAREN format. The file can also be created in CSV format to permit spreadsheet processing. It can also be specified that an file should be output on a printer or sent by email after it has been created.

Information from the MAREN catalog to SYSOUT or in S variables is provided by the SHOW-VOLUME-ATTRIBUTES statement, see page 110.

Format

PRINT-VOLUME**-ATTR**IBUTES Alias: **PR** / **PRVA**

VOLUME = ***ALL** / ***INT**ERVAL(...)

***INT**ERVAL(...)
- **FROM** = ***FIRST** / <vsn>
- ,**TO** = ***LAST** / <vsn>
- ,**FROM-FSEQ** = **1** / <integer 1..9999>

,**SELECT** = ***NO** / ***Y**ES(...)

***Y**ES(...)
- **PAR**AMETER**-SET** = **STD** / <name 1..15>
- ,**PAR**AMETER**-FILE** = ***STD** / <filename 1..54>
- ,**UPD**ATE = ***NO** / ***PERM**ANENT / ***TEMP**ORARY

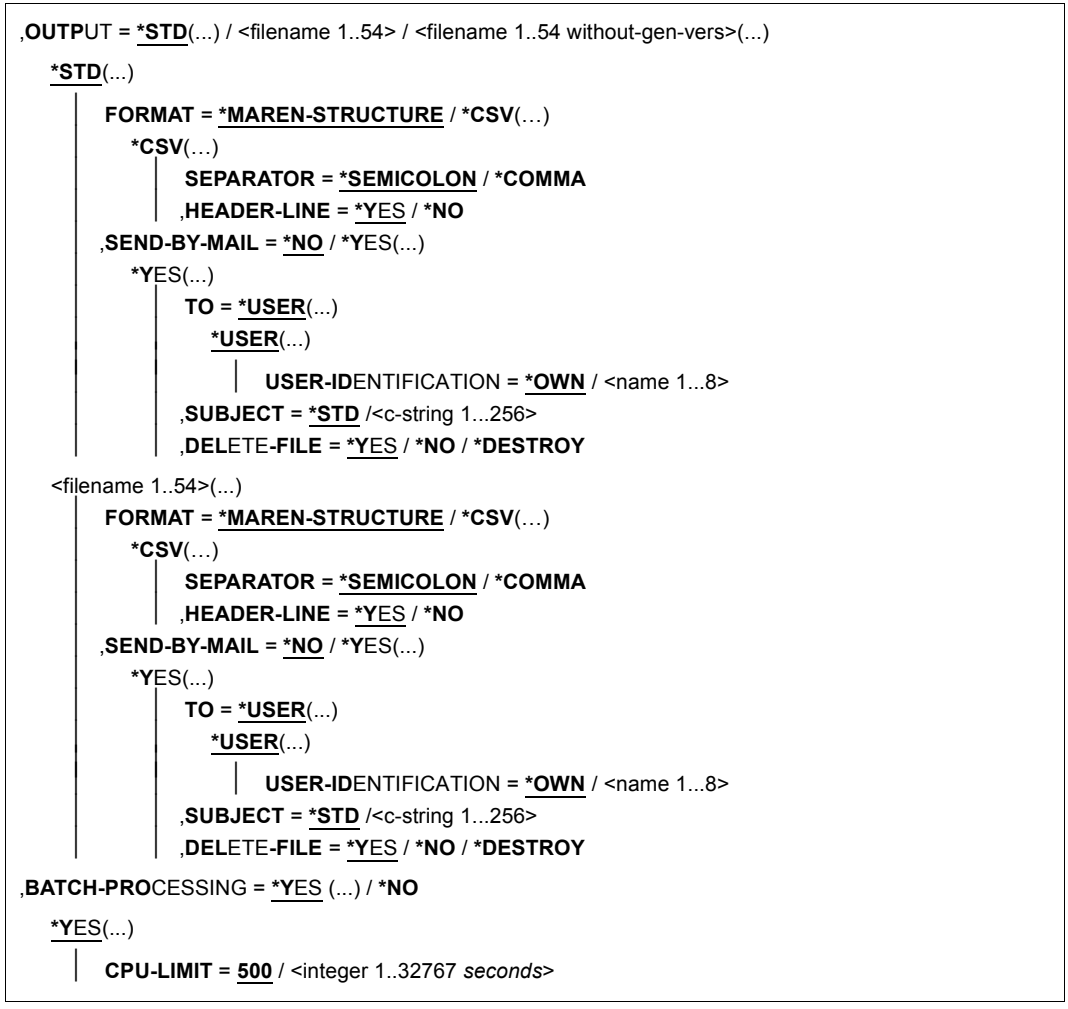
,**SORT** = ***NO** / ***Y**ES(...)

***Y**ES(...)
- **PAR**AMETER**-SET** = **STD** / <name 1..15>
- ,**PAR**AMETER**-FILE** = ***STD** / <filename 1..54>
- ,**UPD**ATE = ***NO** / ***PERM**ANENT / ***TEMP**ORARY

,**LAYOUT-CONTR**OL = ***Y**ES (...) / ***NO**

***Y**ES(...)
- **PAR**AMETER**-SET** = **STD** / <name 1..15>
- ,**PAR**AMETER**-FILE** = ***STD** / <filename 1..54>
- ,**UPD**ATE = ***NO** / ***PERM**ANENT(...) / ***TEMP**ORARY(...)
  - ***PERM**ANENT(...)
    - **UPD**ATE-**HEAD**ER = ***STD** / ***OLD**
  - ***TEMP**ORARY(...)
    - **UPD**ATE-**HEAD**ER = ***STD** / ***OLD**
- ,**START-PRINT** = ***Y**ES (...) / ***NO**
  - ***Y**ES(...)
    - **SP**OOLOUT**-NAME** = ***NONE** / <alphanum-name 1..8>
    - ,**DEL**ETE**-FILE** = ***Y**ES / ***NO** / ***DESTROY**
    - ,**TO-PR**INTER =***STD** / ***PR**INTER-**NAME**(...) / ***PR**INTER-**POOL**(...)
      - ***PR**INTER-**NAME**(...)
        - **PR**INTER-**NAME** = <alphanum-name 1..8>
      - ***PR**INTER-**POOL**(...)
        - **PR**INTER-**POOL** = <alphanum-name 1..8>
    - ,**FORM-NAME** = ***STD**/<alphanum-name 1..8>

(part 1 of 2)


,OUTPUT = *STD(...) / <filename 1..54> / <filename 1..54 without-gen-vers>(...)
*STD(...)
FORMAT = *MAREN-STRUCTURE / *CSV(…)
*CSV(…)
SEPARATOR = *SEMICOLON / *COMMA
,HEADER-LINE = *YES / *NO
,SEND-BY-MAIL = *NO / *YES(...)
*YES(...)
TO = *USER(...)
*USER(...)
USER-IDENTIFICATION = *OWN / <name 1...8>
,SUBJECT = *STD /<c-string 1...256>
,DELETE-FILE = *YES / *NO / *DESTROY
<filename 1..54>(...)
FORMAT = *MAREN-STRUCTURE / *CSV(…)
*CSV(…)
SEPARATOR = *SEMICOLON / *COMMA
,HEADER-LINE = *YES / *NO
,SEND-BY-MAIL = *NO / *YES(...)
*YES(...)
TO = *USER(...)
*USER(...)
USER-IDENTIFICATION = *OWN / <name 1...8>
,SUBJECT = *STD /<c-string 1...256>
,DELETE-FILE = *YES / *NO / *DESTROY
,BATCH-PROCESSING = *YES (...) / *NO
*YES(...)
CPU-LIMIT = 500 / <integer 1..32767 seconds>

(part 2 of 2)

Operands

VOLUME =
Archive numbers of tapes about which information is required.

VOLUME = *ALL
All tapes are processed.

VOLUME = *INTERVAL(...)
All tapes whose archive number lies within the range specified below are processed.

FROM = *FIRST
All tapes are processed, starting with the lowest available archive number.

FROM = <vsn>
Archive number. All tapes whose archive number is greater than or equal to the specified archive number are processed.

TO = *LAST
All tapes are processed up to the highest existing archive number.

TO = <vsn>
Archive number. All tapes whose archive number is less than or equal to the specified archive number are processed.

FROM-FSEQ = 1 / <integer 1..9999>
File sequence number of the FROM operand. Specifies the precise file sequence number at which processing is to begin. This operand is relevant only if the statement is issued via the MAREN program interface.

SELECT =
Specifies which catalog entries are to be added to the list. Preselection may already have been carried out using the VOLUME parameter.

SELECT = *NO
No selection criteria.

SELECT = *YES (...)

PARAMETER-SET =
Specifies the selection criteria to be used.

PARAMETER-SET = STD
All records are output.

PARAMETER-SET = <name 1..15>
Name of the parameter set containing the selection criteria.

PARAMETER-FILE = *STD / <filename 1..54>
See notes on page 94.

UPDATE =
Specifies whether the parameter set is to be modified before it is used.

UPDATE = *NO
The parameter set is not modified.

UPDATE = *PERMANENT
The parameter set is modified before use. The modified parameter set is written to the parameter file. If the parameter set does not yet exist, it is created.

UPDATE = *TEMPORARY
*Relevant only in connection with BATCH-PROCESSING=*NO.*
The parameter set is modified before use. It is not written to the parameter file.

SORT =
Specifies whether sort criteria are to be used.

SORT = *NO
No sort criteria.

SORT = *YES(...)

PARAMETER-SET =
Specifies which sort criteria are to be used.

PARAMETER-SET = STD
The default sort criteria are used.

PARAMETER-SET = <name 1..15>
Name of the parameter set containing the sort criteria.

PARAMETER-FILE = *STD / <filename 1..54>
See notes on page 94.

UPDATE =
Specifies whether the parameter set is to be modified before it is used.

UPDATE = *NO
The parameter set is not modified.

UPDATE = *PERMANENT
The parameter set is modified before use. The modified parameter set is written to the parameter file. If the parameter set does not yet exist, it is created.

UPDATE = *TEMPORARY
*Relevant only in connection with BATCH-PROCESSING=*NO.*
The parameter set is modified before use. It is not written to the parameter file.

LAYOUT-CONTROL =
Specifies whether the file is to be edited for printing, which parameter files are to be used, and in what way.

LAYOUT-CONTROL = *YES(...)
The output file is to be edited for printing with printer control characters, headers, page numbers, etc.

PARAMETER-SET =
Specifies the layout to be used.

PARAMETER-SET = STD
The default layout is to be used.

PARAMETER-SET = <name 1..15>
Name of the parameter set containing the layout.

PARAMETER-FILE = *STD / <filename 1..54>
LMS library for saving the parameter sets. See notes on page 94.

UPDATE =
Specifies whether the parameter set is to be modified before it is used.

UPDATE = *NO
The parameter set is not modified.

UPDATE = *PERMANENT(...)
The parameter set is modified before use. The modified parameter set is written to the parameter file. If the parameter set does not yet exist, it is created.

UPDATE-HEADER =
Specifies if the display of headers 2 and 3 is to be recalculated by MAREN or if the existing headers in the mask “Entering the layout parameters (structure of header lines):” on page 98 are to be suggested.

UPDATE-HEADER = *STD
Headers 2 and 3 will be created by MAREN.

UPDATE-HEADER = *OLD
Headers 2 and 3 are taken from an existing parameter record. If there is no parameter record, then the response is the same as when UPDATE-HEADER=*STD is used.

UPDATE = *TEMPORARY(...)
*Relevant only in connection with BATCH-PROCESSING=*NO.*
The parameter set is modified before use. It is not written to the parameter file.

UPDATE-HEADER =
Specifies if the display of headers 2 and 3 is to be recalculated by MAREN or if the existing headers in the mask "Entering the layout parameters (structure of header lines):" on page 98 are to be suggested.

UPDATE-HEADER = *STD
Headers 2 and 3 will be created by MAREN.

UPDATE-HEADER = *OLD
Headers 2 and 3 are taken from an existing parameter record. If there is no parameter record, then the response is the same as when UPDATE-HEADER=*STD is used.

START-PRINT =
Specifies whether the output file is to be printed immediately.

START-PRINT = *YES(...)
Specifies that the output file is to be automatically printed immediately.

As output files in CSV format cannot be printed out, START-PRINT=*NO is assumed in this case.

SPOOLOUT-NAME = *NONE / <alphanum-name 1..8>
Job name to be assigned to the spoolout task. This name will also appear on the header page.

SPOOLOUT-NAME = *NONE
No special job name. If a job name was assigned to the job that issued the spoolout job, this name is used.

DELETE-FILE = *YES / *NO / *DESTROY
Specifies whether the output file is to be deleted after it has been printed.

If this entry contradicts the DELETE-FILE operand in SEND-BY-MAIL=*YES(...), DELETE-FILE=*NO is assumed implicitly.

TO-PRINTER =
Specifies which printer is to be used for printing.

TO-PRINTER = *STD
The printout will be output on the standard system printer.

TO-PRINTER = *PRINTER-NAME(...)
The printout will be output on a specific printer.

PRINTER-NAME = <alphanum-name 1..8>
Name of the printer used for printing.

TO-PRINTER = *PRINTER-POOL(...)
The print job will be sent to a printer pool.

PRINTER-POOL = <alphanum-name 1..8>
Name of the printer pool to which the print job was sent.

FORM-NAME =
Specifies which form will be used for printing. Standard forms must be defined for all printer types in the SPOOL parameter file.

FORM-NAME = *STD
The standard form is used for printing.

FORM-NAME = <alphanum-name 1..6>
Name of the form used when printing.

START-PRINT = *NO
Specifies that the output file is not to be printed automatically.

LAYOUT-CONTROL = *NO
Specifies that the output file is not to be edited for printing, i.e. all selected catalog entries are transferred unformatted to the output file.

OUTPUT =
Determines the name of the output file and, if required, other details regarding the output format and transfer by email.

OUTPUT = *STD(...)
Output takes place to a file with the name `MAREN.PRINT.yyyymmdd.hhmmss`.

FORMAT =
Determines the format of the output file.

FORMAT = *MAREN-STRUCTURE
Output takes place in MAREN format.

FORMAT = *CSV(…)
*START-PRINT=*NO is always assumed for files in CSV format.*
Output takes place in CSV (comma separated value) format. Files in CSV format can be read in so that the columns are retained, and they can be processed further with a spreadsheet program (e.g. EXCEL).

SEPARATOR = *SEMICOLON / *COMMA
Determines the separator which is to be set between the various output values. The default separator is a semicolon (;). Optionally a comma (,) can be used as the separator.

HEADER-LINE = *YES / *NO
Specifies whether a header line should be output to name the output columns. The default is *YES, i.e. the header line is output. The header line contains the names of the attributes.

SEND-BY-MAIL = *NO / *YES(...)
Specifies whether the output file should be sent by email. The default is *NO, i.e. it is not sent by email. Transfer by email takes place only if the file to be sent contains at least one entry.

SEND-BY-MAIL = *YES(...)
The output file should be sent as an email attachment. The recipient is addressed by means of his/her user ID, i.e. the email address is taken from the user entry concerned.

TO = *USER(...)
Details of transfer by email:

USER-IDENTIFICATION = *OWN / <name 1...8>
Specifies the user ID. The recipient's email address is taken over from this user entry. If the user entry contains more than one email address, all the addresses are taken over as recipients. The default is *OWN, i.e. the caller's user ID.

SUBJECT = *STD / <c-string 1...256>
Determines the content of the email's "Subject" field.
The default is *STD, i.e. MAREN uses a standard text.

DELETE-FILE = *YES / *NO / *DESTROY
Specifies whether the file should be automatically deleted after it has been sent.
*YES (default) causes the file to be deleted after it has been sent.
*DESTROY also causes it to be deleted, and the memory space is overwritten with binary zeros.

If this entry contradicts the DELETE-FILE operand in START-PRINT=*YES(...), DELETE-FILE=*NO is assumed implicitly.

OUTPUT = <filename 1..54>
Only for specifying a file generation.
Output is directed to the specified file generation in MAREN format.

OUTPUT = <filename 1..54 without-gen-vers>(...)
Output is directed to the specified file.

FORMAT = *MAREN-STRUCTURE / *CSV(…)
Determines the format of the output file. The default is output in MAREN format.
Output in CSV format is described under the OUTPUT=*STD(...) operand on page 90.

SEND-BY-MAIL = *NO / *YES(...)
Specifies whether the output file should be sent by email. The default is *NO, i.e. it is not sent by email.
Transfer by email is described under the OUTPUT=*STD(...) operand on page 90.

BATCH-PROCESSING =
This option allows the output file to be created in a separate batch task, thus avoiding long wait times at the terminal .

BATCH-PROCESSING = *YES(...)
The output file is to be created in a batch task.

CPU-LIMIT = 500 / <integer 1..32767 *seconds*>
Maximum CPU time in seconds allocated for the batch task.

BATCH-PROCESSING = *NO
Specifies that no separate batch task is to be started.

Notes

The layout of a list and the way in which the selected catalog entries are sorted are determined by specifying parameter sets. These parameter sets can be freely defined by the user by means of screen masks, and can be re-used at a later date.

The layout, selection, and sort parameters are combined to form a parameter set, which is assigned a name of 6 characters in length. The parameter sets are stored as S elements in the LMS library specified in the PARAMETER-FILE operand. Querying of the table of contents, deleting or copying parameter sets, etc. can only be performed with the LMS program (see the “LMS” manual [8]).

In MAREN, the parameter set with the highest version number is used. A parameter set of the current version is always written. Modifications made to a parameter set of an earlier version are not saved, even when it is initially used as a template. A modified parameter set of an earlier version is therefore stored in the current version and the relevant parameter set in the earlier version remains unchanged.

In a batch task, the parameter sets are not modified before use. In interactive mode, the records can be modified temporarily (for the current printout only) or permanently (saved to a separate parameter file). The creation and modification of parameter sets are only possible if a print file is subsequently created (unless creation of the print file is aborted).

For each parameter set, the user can specify the parameter file to be used for reading or writing. If no file is specified, the file MAREN.PARAMETER-FILE is used under the calling user ID. If this file is not available or does not contain the specified record, the file `$SYSMAREN.MAREN.PARAMETER-FILE` is used or, if IMON is available, the file linked with the logical ID `SYSPAR.PRINT`. If neither of these files exist, the default parameters are used.

The following applies to the individual parameters:

- **Select parameters**

  A comparison string and a comparison operator (EQ,NE,LT,GT,LE,GE,=,<,>,<=,>=) can be defined for each catalog entry field. Only those catalog entries for which all comparison criteria are fulfilled are selected. Partially qualified comparison strings are permitted. The end of a partially qualified string is indicated by an asterisk (*). Partial qualification is not permitted for numeric catalog entry fields. Leading zeros can be ignored.

  Two formats are permitted for date fields:

  1. Absolute date in the format "`yyyy-mm-dd`". The minimum entry is the year specification and the following hyphen.
  2. Relative date of up to four digits with a positive (optional) or negative sign. The absolute date is calculated from the relative date and the current date when the PRINT-VOLUME-ATTRIBUTES statement is executed. The absolute date thus calculated is used for comparison.

  The number of catalog entries can be further restricted by means of the parameter VOLUME = *INTERVAL(...) .

  Catalog entry fields which do not appear in the list can also be used for selection purposes. The catalog entry fields selected are labeled with "s" in the follow-on masks SORT and LAYOUT.

- **Sort parameters**

  The user can specify up to ten catalog entry fields which are to be used for sorting. The sort hierarchy (if more than one sort field is specified) and sort direction ("A": ascending/"D": descending) can be specified.

  Catalog entry fields which do not appear in the list can also be used for sorting purposes. The catalog entry fields selected are labeled with "o" in the follow-on mask LAYOUT.

- **Layout parameters**

  One line (of max. 240 characters) can be output for each catalog entry. The mask allows the user to define which catalog entry fields are to be used in the output line, together with the sequence and length (shorter or longer than the catalog entry) in which they are to be output. The separators between columns can be freely defined.

  A follow-on mask suggests a two-line header based on the selected column structure. It can be changed as required. The line length is determined by the sum of the catalog entry field lengths together with the separators. A page header can also be freely defined.

The following variables can be used in the header:

&DATE	Date of creation of the list
&TIME	Time
&PAGE	Page number

- **Default parameter sets**

  A default layout parameter set is stored in the MAREN user program.

  This default layout has no effect if a layout parameter set with the name STD is contained in the parameter file under the calling user ID or in the global parameter file (see the “Notes” on page 93). This allows the data center or user to define individual default parameters.

Examples

Example 1

```
//print-volume-attributes
%  JMS0066 JOB 'ULF2' ACCEPTED ON <date> AT <time>, TSN = 09N5
%  MARM170 STATEMENT '//PRINT-VOLUME-ATTRIBUTES' PROCESSED
```

If the statement is entered without operands, MAREN first searches for the default parameter set for creating a print file under the calling user ID. If the default parameter set is not available there, it searches under the user ID SYSMAREN or, if IMON is used, the file with the logical name `SYSPAR.PRINT`.

If a default own parameter set has been defined, this layout is used when generating the list.

If neither the caller nor the MAREN administrator has defined a default parameter set, a list is generated using the default layout defined in MAREN. This list contains all tapes of the caller's user ID and is sorted according to archive number.

The private parameter sets are stored in the `MAREN.PARAMETER-FILE` file under the calling user ID.

```
A|MAREN <version>                                                                                                                  <date> <time> PAGE    1|
 |-----------------------------------------------------------------------------------------------------------------------------------------|
 |VOLUME|FSEQ|DEV-TYPE|          REMARK          |U|P|ACC-|VOLUME-   |FILE/DIR-NAME (SHORTENED)      |CREATION  |LAST-ACC  |HOME-   |E|
 |      |    |        |                          |A|W|CNT |FREEDATE  |                               |-DATE     |-DATE     |LOCATION|X|
 |-----------------------------------------------------------------------------------------------------------------------------------------|
 |      |    |        |                          | | |    |          |                               |          |          |        | |
 |C0725K|   1|TAPE-U4 |SF-INVESTIGATION          |A|Y|  24|<date>    |SYSIMPL.SDF.SYSTEM.SYNTAX.M10  |<date>    |<date>    |HALLE46 | |
 |G5110K|   1|TAPE-U4 |IMON BLZ ENGL. D017ZE17   |A| |  45|<date>    |                               |          |<date>    |HALLE46 | |
 |G6013K|   1|TAPE-U4 |IMON BLZ D017ZE17         |A|Y|  10|<date>    |                               |          |<date>    |HALLE46 | |
 |M4696K|   1|TAPE-U4 |                          |F| |  17|<date>    |ARCHIVE.SAVE.FILE(990222-133704|<date>    |<date>    |ROBOTER2| |
 |M5632K|   1|TAPE-U4 |                          |A| |   0|<date>    |:2OSG:$USER1.ULF.ARCHIVE.DIR   |          |          |ROBOTER2| |
 |      |    |        |                          | | |    |          |                               |          |          |        | |
 |M5633K|   1|TAPE-U4 |                          |A| |   0|<date>    |:2OSG:$USER1.ULF.ARCHIVE.DIR   |          |          |ROBOTER2| |
 |M5634K|   1|TAPE-U4 |                          |A| |   0|<date>    |TAPE.FILE.1                    |          |          |ROBOTER2| |
 |M5635K|   1|TAPE-U4 |                          |A| |   3|<date>    |TAPE.FILE.1                    |<date>    |<date>    |ROBOTER2| |
 |M5636K|   1|TAPE-U4 |                          |A| |   0|<date>    |:2OSG:$USER1.ULF.ARCHIVE.DIR   |          |          |ROBOTER2| |
 |M5637K|   1|TAPE-U4 |                          |A| |   8|<date>    |TAPE.FILE.2(1)                 |<date>    |<date>    |ROBOTER2| |
 |      |    |        |                          | | |    |          |                               |          |          |        | |
 |M5637K|   2|TAPE-U4 |                          |A| |   1|<date>    |TAPE.FILE.2(2)                 |<date>    |<date>    |ROBOTER2| |
 |M5637K|   3|TAPE-U4 |                          |A| |   3|<date>    |TAPE.FILE.2(4)                 |<date>    |<date>    |ROBOTER2| |
 |M5638K|   1|TAPE-U4 |                          |A| |   3|<date>    |TAPE.FILE.X(*0002)             |<date>    |<date>    |ROBOTER2| |
 |M5639K|   1|TAPE-U4 |                          |A| |   1|<date>    |TAPE.FILE.X(*0002)             |<date>    |<date>    |ROBOTER2| |
 |M5640K|   1|TAPE-U4 |                          |A| |   0|<date>    |TAPE.FILE.2                    |          |          |ROBOTER2| |
 |      |    |        |                          | | |    |          |                               |          |          |        | |
 |M5655K|   1|TAPE-U4 |                          |0| |   0|<date>    |TAPE.FILE.3                    |          |          |ROBOTER2| |
 |-----------------------------------------------------------------------------------------------------------------------------------------|
 | TOTAL     16 MAREN CATALOG ENTRIES FOR USERID USER1                                                                                    |
 |-----------------------------------------------------------------------------------------------------------------------------------------|
 |                                                                                                                                         |
 | THIS LIST WAS CREATED BY MAREN (1100) USING FOLLOWING PARAMETERS:                                                                       |
 |  INTERVAL : FROM=*FIRST TO=*LAST  FROM-FSEQ=0001                                                                                        |
 |  SELECT   : N                                                                                                                           |
 |  SORT     : N                                                                                                                           |
 |  LAYOUT   : PARAMETER-SET =STD    UPDATE=NO                                                                                             |
 |                      -FILE=*STD                                                                                                         |
 |-----------------------------------------------------------------------------------------------------------------------------------------|
```

Example 2

A list containing all tapes whose expiration dates will fall in the next 10 days is to be generated. The list is to be sorted in descending order according to the date each volume was last accessed, and then in ascending order according to file names.

It is to contain the following information:

```
FREE-DATE
VOLUME
FILE-NAME (30 characters long)
CREATION-DATE
LAST-ACCESS-DATE
INITIALIZATION
```

In order to ensure that the list can be generated again in the future with a minimum of effort, the information on selection, sorting, and layout is to be stored permanently in the default parameter file. The name of the parameter set should be “free10” for all three types (selection, sorting and layout).

Statement used to create the parameter set and the first list:

```
//print-volume-attributes sel=*yes(par-set=free10,update=*permanent),
   sort=*yes(par-set=free10,update=*permanent),
   layout-contr=*yes(par-set=free10,update=*permanent),batch-proc=*no
```

The following masks are displayed in the sequence shown. When the shaded values are entered, the next screen is displayed.

Entering the selection parameters:

```
SELECT-PAR-SET: FREE10          FILE:
FIELD      OP,TEXT
VOLUME      __ ______       FILE-SEQ       __ ____       DEV-TYPE     __ ________
USER-ID     __ ________     HOME-LOCATION  __ ________   RESERV-DATE  __ __________
ACCOUNT     __ ________     FREE-LOCATION  __ ________   FREE-DATE   <= +10_______
USER-ACC    __ ________     TEMP-LOCATION  __ ________   EXPIR-DATE   __ __________
PASSWORD    __ _                                       AUDIT        __ _
EXP-AD/DAT  __ ____________________________________________________ /__ __________
REMARK      __ _____________________________ 2 __ __________ 3 __ ____________
USER-FIELD  __ ____________________________________________________
FILE-NAME   __ ____________________________________________________
FREE-POOL   __ ____________________________________________________
SAVE-FILE   __ _________________ SUB-SV/SQ__ __/__ ___   JOB/REQ-NAM __ ________
VOL-GROUP   __ ____________________________________       L-A-DATE     __ __________
VOL-SEQ     __ ____          CR-DATE      __ __________   L-A-TIME     __ ________
FIRST-VOL   __ ______        CR-TIME      __ _________    L-A-USER-ID  __ ________
DEV-NAME    __ ____          LA-CL-DATE   __ __________   L-A-ACCOUNT  __ ________
OPEN-MODE   __ __            LA-CL-TIME   __ ________     L-A-JOB-NAM  __ ________
CLOSE-IND   __ _             CR-CAT-ID    __ ____         L-A-TSN      __ ____
VOL-STATUS  __ _             CR-USER-ID   __ ________     L-A-SNO      __ ___
INIT        __ _             RES-COUNT    __ ____         L-A-HOSTNAM  __ ________
REG-DATE    __ __________    ACCES-COUNT  __ ____         L-W-BLK-CNT  __ __________
DIR-ON-VOL  __ _             CHECK-COUNT  __ __           L-A-FU-NAME  __ ________
ADM-FIELD   __ ________   /2 __ ________________          L-A-FU-FLAG  __ __
```

Entering the sort parameters:

```
SORT-PAR-SET: FREE10          FILE:
FIELD         NR,A/D
VOLUME....... __ _       FILE-SEQ....... __ _      DEV-TYPE........... __ _
USER-ID...... __ _       HOME-LOCATION.. __ _      RESERV-DATE........ __ _
ACCOUNT...... __ _       FREE-LOCATION.. __ _      FREE-DATE.......... __ _ s
USER-ACC..... __ _       TEMP-LOCATION.. __ _      EXPIRATION-DATE.... __ _
PASSWORD..... __ _                                 AUDIT.............. __ _
EXPORT-AD.... __ _       EXPORT-DATE.... __ _
REMARK....... __ _       REMARK-2....... __ _      REMARK-3........... __ _
USER-FIELD... __ _
FILE-NAME.... _2 a       FREE-POOL...... __ _      SAVE-FILE.......... __ _
SUB-SAVE..... __ _       SUB-SEQUENCE... __ _      CR-JOB-/REQ-NAME... __ _
VOLUME-GROUP. __ _                                 LAST-ACC-DATE...... _1 d
VOL-SEQ...... __ _       CR-DATE........ __ _      LAST-ACC-TIME...... __ _
FIRST-VOL.... __ _       CR-TIME........ __ _      LAST-ACC-USER-ID... __ _
DEV-NAME..... __ _       LAST-CL-DATE... __ _      LAST-ACC-ACCOUNT... __ _
OPEN-MODE.... __ _       LAST-CL-TIME... __ _      LAST-ACC-JOB-NAME.. __ _
CLOSE-IND.... __ _       CR-CAT-ID...... __ _      LAST-ACC-TSN....... __ _
VOL-STATUS... __ _       CR-USER-ID..... __ _      LAST-ACC-SNO....... __ _
INIT......... __ _       RESERV-COUNT... __ _      LAST-ACC-HOSTNAME.. __ _
REG-DATE..... __ _       ACCESS-COUNT... __ _      LAST-WRITE-BLK-CNT. __ _
DIR-ON-VOL... __ _       CHECK-COUNT.... __ __     LAST-ACC-FUNC-NAME. __ _
ADM-FIELD.... __ _       ADM-FIELD-2.... __ _      LAST-ACC-FUNC-FLAG. __ _
```

Entering the layout parameters (structure of individual lines):

```
LAYOUT-PAR-SET: FREE10          FILE:
FIELD          NR,LEN
VOLUME........ _2 _6      FILE-SEQ....... __ _4     DEV-TYPE........... __ _8
USER-ID...... __ _8       HOME-LOCATION.. __ _8     RESERV-DATE........ __ _1
ACCOUNT...... __ _8       FREE-LOCATION.. __ _8     FREE-DATE.......... _1 10 s
USER-ACC..... __ _1       TEMP-LOCATION.. __ _8     EXPIRATION-DATE.... __ 10
PASSWORD..... __ _1                                  AUDIT.............. __ _1
EXPORT-AD.... __ 50       EXPORT-DATE.... __ 10
REMARK....... __ 24       REMARK-2....... __ 10     REMARK-3........... __ 12
USER-FIELD... __ 54
FILE-NAME.... _3 30 o     FREE-POOL...... __ 54     SAVE-FILE.......... __ 15
SUB-SAVE..... __ _2       SUB-SEQUENCE... __ _3     CR-JOB-/REQ-NAME... __ _8
VOLUME-GROUP. __ 32                                  LAST-ACC-DATE...... 11 10 o
VOL-SEQ...... __ _4       CR-DATE........ _4 10     LAST-ACC-TIME...... __ _8
FIRST-VOL.... __ _6       CR-TIME........ __ _8     LAST-ACC-USER-ID... __ _8
DEV-NAME..... __ _2       LAST-CL-DATE... __ 10     LAST-ACC-ACCOUNT... __ _8
OPEN-MODE.... __ _2       LAST-CL-TIME... __ _8     LAST-ACC-JOB-NAME.. __ _8
CLOSE-IND.... __ _1       CR-CAT-ID...... __ _4     LAST-ACC-TSN....... __ _4
VOL-STATUS... __ _7       CR-USER-ID..... __ _8     LAST-ACC-SNO....... __ _3
INIT......... _6 _1       RESERV-COUNT... __ _4     LAST-ACC-HOSTNAME.. __ _8
REG-DATE..... __ 10       ACCESS-COUNT... __ _4     LAST-WRITE-BLK-CNT. __ _4
DIR-ON-VOL... __ _1       CHECK-COUNT.... __ _2     LAST-ACC-FUNC-NAME. __ _8
ADM-FIELD.... __ _8       ADM-FIELD-2.... __ 16     LAST-ACC-FUNC-FLAG. __ _2
SEPARATOR=|
```

Entering the layout parameters (structure of header lines):

```
LAYOUT-PARAMETER-SET: FREE10  FILE:
HEADER-LINES

1ST LINE:
 Freigabe in 10 Tagen bzw. weniger          &DATE              &PAGE



2ND LINE:
|FREE-     |VOLUME|FILE-NAME                       |CR-       |L-A-      |I|



3RD LINE:
|DATE       |      |                                |DATE      |DATE      | |



PROPOSAL FOR 2ND LINE:
|FREE-     |VOLUME|FILE-NAME                       |CR-       |L-A-      |I|



LINE LENGTH   74
```

The generated list looks like this:

```
A|Freigabe in 10 Tagen bzw. weniger         <date>                1       |
 |-------------------------------------------------------------------------|
 |FREE-     |VOLUME|FILE-NAME                      |CR-       |L-A-      |I|
 |DATE      |      |                               |DATE      |DATE      | |
 |----------------------------------------------------------------------------|
 |          |      |                               |          |          | |
 |<date>    |M5638K|TAPE.FILE.X(*0002)             |<date>    |<date>    |N|
 |<date>    |M5639K|TAPE.FILE.X(*0002)             |<date>    |<date>    |N|
 |<date>    |M4696K|ARCHIVE.SAVE.FILE(990222-13370)|<date>    |<date>    |N|
 |<date>    |M5635K|TAPE.FILE.1                    |<date>    |<date>    |N|
 |<date>    |M5637K|TAPE.FILE.2(1)                 |<date>    |<date>    |Y|
 |          |      |                               |          |          | |
 |<date>    |M5637K|TAPE.FILE.2(2)                 |<date>    |<date>    |N|
 |<date>    |M5637K|TAPE.FILE.2(4)                 |<date>    |<date>    |N|
 |<date>    |M5632K|:2OSG:$USER1.ARCHIVE.DIR       |          |          |N|
 |<date>    |M5633K|:2OSG:$USER1.ARCHIVE.DIR       |          |          |N|
 |<date>    |M5636K|:2OSG:$USER1.ARCHIVE.DIR       |          |          |N|
 |          |      |                               |          |          | |
 |<date>    |M5634K|TAPE.FILE.1                    |          |          |N|
 |<date>    |M5640K|TAPE.FILE.2                    |          |          |N|
 |<date>    |M5655K|TAPE.FILE.3                    |          |          |N|
 |-------------------------------------------------------------------------|
 | TOTAL     13 MAREN CATALOG ENTRIES FOR USERID USER1                     |
 |-------------------------------------------------------------------------|
 |                                                                         |
 | THIS LIST WAS CREATED BY MAREN (110) USING FOLLOWING PARAMETERS:        |
 |  INTERVAL : FROM=*FIRST TO=*LAST  FROM-FSEQ=0001                        |
 |  SELECT   : PARAMETER-SET =FREE10 UPDATE=NO                             |
 |                     -FILE=*STD                                          |
 |  SORT     : PARAMETER-SET =FREE10 UPDATE=NO                             |
 |                     -FILE=*STD                                          |
 |  LAYOUT   : PARAMETER-SET =FREE10 UPDATE=NO                             |
 |                     -FILE=*STD                                          |
 |-------------------------------------------------------------------------|
```

After the statement has been executed, the generated list is output to a printer.

The list can be generated again at a later point in time (without having to fill out masks) with the same format, e.g. with the statement below in a batch task:

```
/print-volume-attributes
   select=*yes(par-set=free10),sort=*yes(par-set=free10),
   layout-contr=*yes(par-set=free10)
```

RESERVE-FREE-VOLUME
Reserve free tapes

This statement reserves tapes from the free pool with the name *NO for the user's own user ID. The tape can be assigned specified protection attributes. Catalog entry fields can be assigned values.

Format

RESERVE-**FREE-VOL**UME Alias: **RSFV**

NUMBER-OF-VOLUMES = **1** / <integer 1..32767>

,**SEL**ECT = ***STD** / ***BY-ATTR**IBUTES(...)

***BY-ATTR**IBUTES(...)
VOLUME = ***ALL** / ***INT**ERVAL(...)
***INT**ERVAL(...)
FROM = ***FIRST** / <vsn>
,**TO** = ***LAST** / <vsn>
,**DEV**ICE-**TYPE** = ***STD** / <structured-name 1..8>
,**HOME-LOC**ATION = ***STD** / <alphanum-name 1..8>

,**PROT**ECTION = ***STD** / ***PAR**AMETERS(...)

***PAR**AMETERS(...)
PASSWORD = ***NONE** / <c-string 1..4> / <x-string 1..8> /
<integer -2147483648..2147483647> / ***SECRET**
,**USER-ACCESS** = ***OWNER-ONLY** / ***FOREIGN-READ**-ONLY / ***ALL-USERS**
,**FREE-DATE** = ***STD** / <date> / <integer 0..32767 *days*>

,**FI**LE-**NAME** = ***NONE** / <filename 1..41 without-cat-user>

,**VOL**UME-**GR**OUP = ***NONE** / <text 1..32 without-sep>

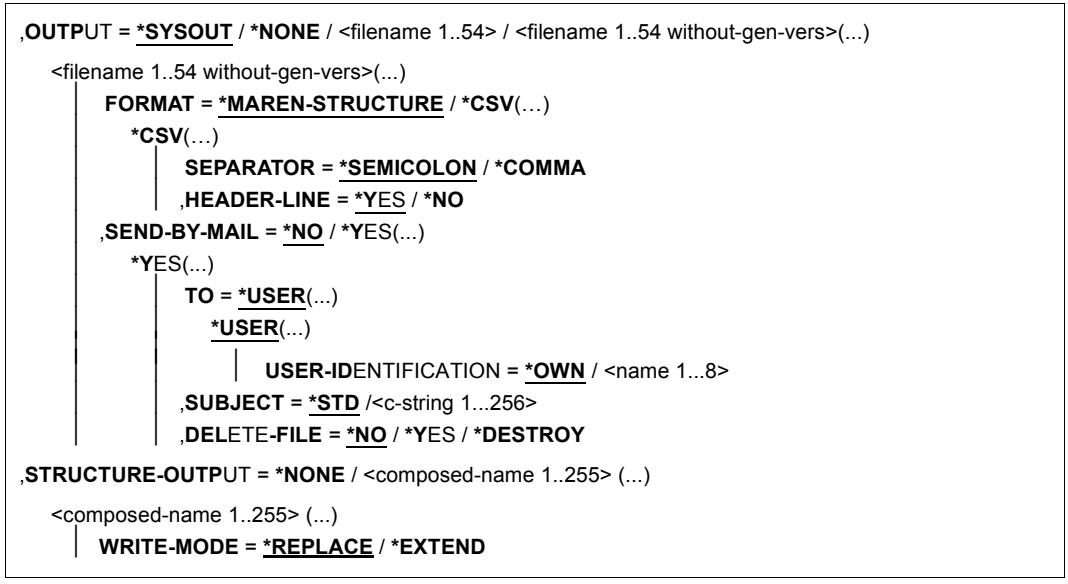
,**REMARK** = ***NONE** / <c-string 1..24>

,**REMARK-2** = ***NONE** / <c-string 1..10>

,**REMARK-3** = ***NONE** / <c-string 1..12>

,**USER-FIELD** = ***NONE** / <c-string 1..54>

(part 1 of 2)



(part 2 of 2)

Operands

NUMBER-OF-VOLUMES = 1 / <integer 1..32767>
Number of tapes. Specifies how many free tapes are to be reserved.

SELECT =
Specifies the criteria to be used to select free tapes.

SELECT = *STD
The standard criteria listed below are used.

SELECT = *BY-ATTRIBUTES(...)

VOLUME =
Specifies a number range from which free tapes are to be selected.

VOLUME = *ALL
All tapes are processed.

VOLUME = *INTERVAL(...)
All tapes whose archive number lies within the range specified below are processed.

FROM = *FIRST
All tapes are processed, starting with the lowest available archive number.

FROM = <vsn>
Archive number. All tapes whose archive number is greater than or equal to the specified archive number are processed.

TO = *LAST
All tapes are processed up to the highest existing archive number.

TO = <vsn>
Archive number. All tapes whose archive number is less than or equal to the specified archive number are processed.

DEVICE-TYPE =
Device type.

DEVICE-TYPE = *STD
The tapes are of the default device type defined by the MAREN administrator.

DEVICE-TYPE = <structured-name 1..8>
Device type. For a list of possible entries (depending on the BS2000 version), see manual “System Installation” [6].

HOME-LOCATION = *STD / <alphanum-name 1..8>
Location name or symbolic location name. Specifies the archive from which the free tapes are to be selected.

HOME-LOCATION = *STD
The selection is made from the default location defined by the MAREN administrator.

PROTECTION =
Protection attributes of the tapes.

PROTECTION = *STD
The standard criteria listed below are used.

PROTECTION = *PARAMETERS(...)

PASSWORD = *NONE / <c-string 1..4> / <x-string 1..8> / <integer -2147483648..2147483647> / *SECRET
Password. The previously valid password must be entered here if the tape is protected by a password.

PASSWORD = *NONE
No password is specified.

PASSWORD = *SECRET
Requests a blanked-out input field for the password. Entries in this field are not visible on the screen.
This operand value can only be specified in unguided dialog. In guided dialog, the field provided for entering passwords is always blanked out.

USER-ACCESS =
Specifies whether foreign user IDs may access the tape.

USER-ACCESS = *OWNER-ONLY
Access to the tape is possible only under the own user ID.

USER-ACCESS = *FOREIGN-READ-ONLY
Only read access to the tape is possible under a foreign user ID.

USER-ACCESS = *ALL-USERS
Unrestricted access to the tape is possible under a foreign user ID.

FREE-DATE =
Expiration date of the tape. Up to this date, the tape remains reserved for the given user ID.

FREE-DATE = *STD
The reservation period defined by the MAREN administrator applies.

FREE-DATE = <date>
Date in the format `yyyy-mm-dd`.

FREE-DATE = <integer 0..32767 *days*>
Time specification in days (reservation period). MAREN adds this number to the current date to generate the expiration date.

FILE-NAME = *NONE / <filename 1..41 without-cat-user>
Name of the file which is subsequently to be written to the tape.

VOLUME-GROUP = *NONE / <text 1..32 without-sep>
Specifies the volume group to which the newly reserve tape is assigned. When *NONE is specified, it is not assigned to a volume group.

REMARK = *NONE / <c-string 1..24>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

REMARK-2 = *NONE / <c-string 1..10>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

REMARK-3 = *NONE / <c-string 1..12>
Comment text. This catalog entry field is output in response to the MAREN statement SHOW-VOLUME-ATTRIBUTES.

USER-FIELD = *NONE / <c-string 1..54>
Comment text. This catalog entry field may contain any user-specific data, e.g. name, department.

OUTPUT =
Determines the output medium for the catalog entries. Output to SYSOUT is the default.

OUTPUT = *SYSOUT
Output is directed to SYSOUT.

OUTPUT = *NONE
No output takes place. This specification only makes sense for structured output in an S variable (see the STRUCTURE-OUTPUT operand).

OUTPUT = <filename 1..54>
Only for specifying a file generation.
Output is directed to the specified file generation in MAREN format. Passwords are overwritten with C'$$$$'. Only the number of records written is displayed on SYSOUT.

OUTPUT = <filename 1..54 without-gen-vers>(...)
Name of the SAM output file to which all selected catalog entries are to be written. Passwords are overwritten with C'$$$$'. Only the number of records written is displayed on SYSOUT. The output format and transfer by email can also be specified.

FORMAT =
Determines the format of the output file.

FORMAT = *MAREN-STRUCTURE
Output takes place in MAREN format.

FORMAT = *CSV(…)
Output takes place in CSV (comma separated value) format. Files in CSV format can be read in so that the columns are retained, and they can be processed further with a spreadsheet program (e.g. EXCEL).

SEPARATOR = *SEMICOLON / *COMMA
Determines the separator which is to be set between the various output values. The default separator is a semicolon (;). Optionally a comma (,) can be used as the separator.

HEADER-LINE = *YES / *NO
Specifies whether a header line should be output to name the output columns. The default is *YES, i.e. the header line is output. The header line contains the names of the attributes.

SEND-BY-MAIL = *NO / *YES(...)
Specifies whether the output file should be sent by email. The default is *NO, i.e. it is not sent by email. Transfer by email takes place only if the file to be sent contains at least one entry.

SEND-BY-MAIL = *YES(...)
The output file should be sent as an email attachment. The recipient is addressed by means of his/her user ID, i.e. the email address is taken from the user entry concerned.

TO = *USER(...)
Details of transfer by email:

USER-IDENTIFICATION = *OWN / <name 1...8>
Specifies the user ID. The recipient's email address is taken over from this user entry. If the user entry contains more than one email address, all the addresses are taken over as recipients. The default is *OWN, i.e. the caller's user ID.

SUBJECT = *STD /<c-string 1...256>
Determines the content of the email's "Subject" field.
The default is *STD, i.e. MAREN uses a standard text.

DELETE-FILE = *NO / *YES / *DESTROY
Specifies whether the file should be automatically deleted after it has been sent.
The default is *NO, i.e. the file is not deleted.
*YES causes the file to be deleted after it has been sent. *DESTROY also causes it to be deleted, and the memory space is overwritten with binary zeros.

STRUCTURE-OUTPUT =
Controls the structured output in S variables.

STRUCTURE-OUTPUT = *NONE
No structured output takes place.

STRUCTURE-OUTPUT = <composed-name 1..255> (...)
Name of the S variable to be used for the structured output.

WRITE-MODE =
Determines whether the output should replace or extend the current content of the S variables.

WRITE-MODE = *REPLACE
The current content of the S variable is replaced by the new output.

WRITE-MODE = *EXTEND
The new output extends the current content of the S variable.

Notes

The RESERVE-FREE-VOLUME statement is not absolutely essential to reserve a free tape for the user's own ID, since reservation from the pool of free tapes takes place automatically when SCRATCH tapes are requested at FILE or EOV processing time. Nevertheless, this statement is useful in the following instances:

- At an early point in time, it can be ensured that any free tapes will be readily available.
- If no RETENTION-PERIOD is specified in the FILE command/macro, an reservation period deviating from the default value can be entered for this function.
- The user-specific catalog entry fields, such as the password or remarks field, can be filled out.
- With the DEVICE-TYPE operand, no distinction is made between TAPE-C5 and TAPE-C6. Consequently, a type TAPE-C5 tape can be reserved when a type TAPE-C6 tape is requested.
- When a tape with the DEVICE-TYPE=TAPE-UxE is reserved, MAREN searches for a free tape of the type TAPE-Ux and changes its type to TAPE-UxE. In the case of tapes of the type TAPE-UxE the tape contents are encrypted when they are written. All read and write accesses must take place with DEVICE=TAPE-UxE. When the tape is released using FREE-VOLUMES, the volume type is reset to TAPE-Ux as the type TAPE-UxE only exists in the MAREN catalog for reserved tapes.

Example

```
//reserve-free-volume protection=*par(free-date=<date>),remark='my tape'
%  MARM127 VOLUME 'IDY015' RESERVED FOR USER ID 'USER1'
```

This statement reserves a tape with the default device type set by the MAREN administrator and defines an expiration date for it.

```
//reserve-free-volume num-of-vol=2,select=*by-attr(dev-type=tape-c4),
   prot=*par(free-date=200,user-acc=*all)
%  MARM127 VOLUME 'IDY020' RESERVED FOR USER ID 'USER1'
%  MARM127 VOLUME 'IDY031' RESERVED FOR USER ID 'USER1'
%  MARM120 TOTAL OF 2 MAREN CATALOG ENTRIES PROCESSED
```

This statement reserves two tapes of the type TAPE-C4. It is flagged in the catalog entry as being shareable without restrictions and reservation period of 200 days.

Output in S variables

This statement supports the structured output in S variables (controlled by the STRUCTURE-OUTPUT operand).

Further information on S variables is provided in the “Commands” manual [3].

Output information	Name of the S variable	T	Contents
Access counter (8-digit) It is incremented each time the tape is accessed.	var(*LIST).ACCESS-COUNT	S	<integer 0..99999999>
Creation date	var(*LIST).CRE-DATE	S	yyyy-mm-dd
Creation job name For HSMS request name	var(*LIST).CRE-JOB-NAME	S	” <name 1..8>
Creation time	var(*LIST).CRE-TIME	S	hh:mm:ss
Device type	var(*LIST).DEV-TYPE	S	<structured-name 1..8>
Name of an directory (with catalog ID and user ID) which contains the tape.	var(*LIST).DIR-NAME	S	<filename 1..54 >
Displays whether the tape contains the directory which was also saved	var(*LIST).DIR-ON-VOL	S	*NO *YES
Status (exported or not)	var(*LIST).EXPORTED	S	*NO *YES
First archive number of the MF/MV set	var(*LIST).FIRST-VOL	S	<vsn>
File name of a tape file Without catalog ID and user ID	var(*LIST).F-NAME	S	<filename 1..41>
Expiration date of the tape Specifies when the reservation of the tape for a user ID can be terminated	var(*LIST).FREE-DATE	S	yyyy-mm-dd
Release location A tape is moved to this location during the clear-up run	var(*LIST).FREE-LOCATION	S	<alphanum-name 1..8>
Name of the free tape pool in which this tape is located or in which it should be located when it is shared	var(*LIST).FREE-POOL	S	*NO
File sequence number (4-digit)	var(*LIST).F-SEQ	S	<integer 1..9999>
Standard location	var(*LIST).HOME-LOCATION	S	<alphanum-name 1..8>
Name of the system with last access	var(*LIST). LAST-ACCESS-HOSTNAM	S	<alphanum-name 1..8>
Date of the last access	var(*LIST).LAST-ACCESS-DATE	S	yyyy-mm-dd
User ID of the last access	var(*LIST).LAST-ACCESS-USER-ID	S	<name 1..8>
Password	var(*LIST).PASS	S	*NONE *YES

(part 1 of 2)

Output information	Name of the S variable	T	Contents
Remark field	var(*LIST).REMARK	S	<c-string 1..24>
Reservation counter (4-digit) This counter is incremented with each new reservation of the tape	var(*LIST).RESERV-COUNT	S	<integer 0..9999>
Reservation date Date on which a tape is reserved	var(*LIST).RESERV-DATE	S	yyyy-mm-dd
SAVE-FILE-ID (HSMS) or SAVE-VERSION (ARCHIVE)	var(*LIST).SFID	S	<c-string 1..15>
Number of subtask for parallel save run in HSMS	var(*LIST).SUBSAVE	S	<integer 0..15>
Number of subsequent tape within a parallel save run in HSMS	var(*LIST).SUBSEQ	S	<integer 0..999>
Shareability of the tape	var(*LIST).USER-ACCESS	S	OWNER-ONLY FOREIGN-READ ALL-USERS
Account number	var(*LIST).USER-ACCOUNT	S	<alphanum-name 1..8>
User field. Data such as name and department or data relevant for operations scheduling can be entered here.	var(*LIST).USER-FIELD	S	<c-string 1..54>
User ID of the owner	var(*LIST).USER-ID	S	<name 1..8>
Tape archive number	var(*LIST).VOL	S	<vsn>
Volume group	var(*LIST).VOL-GROUP	S	<text 1..32>
Volume sequence number	var(*LIST).VOL-SEQ	S	<integer 1..255>
Tape status F = FREE P = PRIVATE R = RESERVED D = DEFECT	var(*LIST).VOL-STA-1	S	F/P/R/D

(part 2 of 2)

RETURN-TO-PROGRAM
Return to the loaded program

This statement terminates a MAREN subroutine and returns you to the calling user program. It can be executed only if MAREN was called as an interactive subroutine (see section “Interactive subroutine” on page 129).

Format

RETURN-**TO-PROG**RAM

The RETURN-TO-PROGRAM statement has no operands.

SHOW-VOLUME-ATTRIBUTES
Output information from the MAREN catalog

This statement outputs information from a MAREN catalog file to SYSOUT. If an individual archive number is entered, its complete catalog entry is shown. If a number range is entered or *ALL is specified, selected important catalog entry fields are output.
If an output file is specified, the complete catalog entries of the specified tapes are output. The file can also be created in CSV format to permit spreadsheet processing. It can also be specified that the file is sent by email after it has been created.

Lists with information from the MAREN catalog are created by the PRINT-VOLUME-ATTRIBUTES statement, see page 83.

Format

SHOW-VOLUME-**ATTR**IBUTES Alias: **SH** / **SHVA**

VOLUME = ***ALL** / ***INT**ERVAL(...) / <vsn>(...)

***INT**ERVAL(...)
FROM = ***FIRST** / <vsn>
,**TO** = ***LAST** / <vsn>
,**FROM-FSEQ** = **1** / <integer 1..9999>

<vsn>(...)
FILE-**SEQ**UENCE = **1** / <integer 1..9999>

,**USER-ID**ENTIFICATION = ***OWN** / <name 1..8>

,**FI**LE-**NAME** = ***ALL** / ***NONE** / <filename 1..41 without-cat-user-gen-vers with-wild>(...) /
<filename 1..41 without-cat-user-gen-vers>(...)

<filename 1..41 without-cat-user-gen-vers with-wild>(...)
VOLUME = ***ANY** / ***NEXT**(...)
***NEXT**(...)
FROM = ***FIRST** / <vsn>
,**FROM-FSEQ** = <integer 1..9999>

<filename 1..41 without-cat-user-gen-vers>(...)
VERSION = ***ALL** / ***LATEST** / <integer -9999..0> / ***NOT-CREATED**
,**TYPE-OF-VOL**UMES = ***ANY** / ***VALID**(...) / ***OBSOLETE**
***VALID**(...)
CLOSE-CHECK = ***NO** / ***Y**ES

(part 1 of 2)

(part 2 of 2)

[1] The operand value `*V8.1-AND-LOWER` is obsolete. It can still be specified for compatibility reasons.

Operands

VOLUME =
Archive numbers of tapes about which information is required.

VOLUME = *ALL
All tapes are processed.

VOLUME = *INTERVAL (...)
All tapes whose archive number lies within the range specified below are processed.

FROM = *FIRST
All tapes are processed, starting with the lowest available archive number.

FROM = <vsn>
Archive number. All tapes whose archive number is greater than or equal to the specified archive number are processed.

TO = *LAST
All tapes are processed up to the highest existing archive number.

TO = <vsn>
Archive number. All tapes whose archive number is less than or equal to the specified archive number are processed.

FROM-FSEQ = 1 / <integer 1..9999>
File sequence number of the FROM operand. Specifies the precise file sequence number at which processing is to begin. This operand is relevant only if the statement is issued via the MAREN program interface.

VOLUME = <vsn>(...)
Archive number of the desired tape.

FILE-SEQUENCE = 1 / <integer 1..9999>
Specifies which file sequence number of the specified archive numbers is to be processed.

USER-IDENTIFICATION = *OWN / <name 1..8>
All catalog entries of tapes assigned to this user ID are displayed. In the case of a foreign user ID, only the shareable tapes are displayed.

USER-IDENTIFICATION = *OWN
Only volumes of the user’s own ID are selected.

FILE-NAME =
This allows you to limit output to catalog entries with a specific file name.

FILE-NAME = *ALL
All catalog entries which contain a file name are output.
The default value *ALL is taken into account only if *ALL or *NONE is specified in the DIRECTORY-NAME operand.

FILE-NAME = *NONE
Catalog entries which contain a file name are not output.

FILE-NAME = <filename 1..41 without-cat-user-gen-vers with-wild>(...)
A wildcard (*) can be specified as the last character of the file name (e.g. PROG*). In this case, all catalog entries for all file names which begin with the character string specified (“PROG”) are selected. The VOLUME operand can be used to define the tape with which output is to begin.

VOLUME = *ANY / *NEXT(...)
Tape with which output is to begin.
This operand must be specified for the MAREN program interface. It ensures that all catalog entries can be read. In interactive mode, it is possible to specify the tape with which output is to begin.
The default value is *ANY, i.e. all catalog entries relating to files that match the specified string are output.

VOLUME = *NEXT(...)
All catalog entries after the specified catalog entry whose file names match the specified string are output.
Thus all entries can be listed for the MAREN program interface.
The last catalog entry read must be specified in the FROM and FROM-FSEQ operands.

FROM = <vsn>
Archive number of the tape with which output is to begin.

FROM-FSEQ = <integer 1..9999>
File sequence number which matches the archive number.

FILE-NAME = <filename 1..41 without-cat-user-gen-vers>(...)
Only catalog entries with this file name are output.

VERSION =
This operand is evaluated only if VOLUME=*ALL or *INTERVAL.
This operand can be used to select a specific version (or status) of the specified file for which the associated tapes are to be output.

VERSION = *ALL
Selects all versions which exist for the specified file name.

VERSION = *LATEST
Selects the latest version of the file (i.e. the last one created).

VERSION = <integer -9999..0>
Specifying 0 is equivalent to specifying *LATEST, specifying -1 indicates the penultimate file status, etc.

VERSION = *NOT-CREATED
Selects only those tapes which have been reserved with the specified file name but which have not been used (the CREATION-DATE and CREATION-TIME catalog entry fields have not been set). The TYPE-OF-VOLUMES setting is of no consequence in this case and is therefore not interpreted.

TYPE-OF-VOLUMES =
This operand selects the volume sequences (catalog entry field VOLUME-SEQUENCE) within a tape set. These numbers are usually unique. Some numbers may be duplicated following a restart.

If the following are specified, the TYPE-OF-VOLUMES operand is ignored:
– VERSION = *NOT-CREATED
– VOLUME = <vsn>

TYPE-OF-VOLUMES = *ANY
The volume sequences for a tape set are not checked to establish whether they occur more than once.

TYPE-OF-VOLUMES = *VALID(...)
If a volume sequence occurs more than once in a tape set, the one created most recently is selected.

CLOSE-CHECK =
This operand allows you to select whether the catalog entry fields CLOSE-INDICATOR should be evaluated.

If the following are specified, the CLOSE-CHECK operand is ignored:
– VERSION = *NOT-CREATED
– VOLUME = <vsn>

CLOSE-CHECK = *NO
The CLOSE-INDICATOR catalog entry field is not evaluated.

CLOSE-CHECK = *YES
If the CLOSE-INDICATOR catalog entry field is not set to CLOSED for one of the tapes in the tape set, the statement is aborted.

TYPE-OF-VOLUMES = *OBSOLETE
If a volume sequence occurs more than once in a tape set, all VSNs are selected except the one most recently created.

DIRECTORY-NAME =
Only tapes which are assigned to the specified directory are selected. If this directory is located under a remote user ID, both the user ID and the catalog ID must be entered. The user's own user ID and standard catalog ID can be omitted.

DIRECTORY-NAME = *ALL(...)
All catalog entries which contain the name of a directory are output.
The default value *ALL is taken into account only if *ALL or *NONE is specified in the FILE-NAME operand.

DIRECTORY-ON-VOLUME = *ANY / *YES
Specifies whether the output should be restricted to tapes which contain a directory at the end of the tape. The default *ANY causes tapes to be displayed irrespective of whether they contain a directory.

DIRECTORY-NAME = *NONE
Catalog entries containing the name of a directory are not output.

DIRECTORY-NAME = <filename 1..54 without-gen-vers>(...)
Name of the directory.

VOLUME-STATUS =
Selects tapes in the specified directory on the basis of their status.

VOLUME-STATUS = *RESERVED(...)
Only reserved tapes are to be output. If these are assigned to a foreign user ID, only the tape which are shareable are displayed.

SAVE-FILE-ID =
The tapes that are to be exported are selected using the save file of the directory specified above.

SAVE-FILE-ID = *ALL
All tapes from the specified directory are exported.

SAVE-FILE-ID = *LATEST
All tapes listed in the last, i.e. most recent save file are selected.

SAVE-FILE-ID = <integer -32767..0>
All tapes listed in the nth save file are selected (the older the save file, the larger the number n). 0 equals *LATEST. Example: if -5 is specified, the tapes are selected from the last save file but five.

SAVE-FILE-ID = <composed-name 15..15>
All tapes in the save file with the specified SAVE-FILE-ID are selected. The SAVE-FILE-ID has the following format: `S.yymmdd.hhmmss`.

DIRECTORY-ON-VOLUME = *ANY / *YES
Specifies whether the output should be restricted to tapes which contain a directory at the end of the tape. The default *ANY causes tapes to be displayed irrespective of whether they contain a directory.

VOLUME-STATUS = *FREE
Only tapes which are still in MAREN's HSMS/ARCHIVE free tape pool for the specified directory are to be output, i.e. those volumes which are available for future HSMS/ARCHIVE backups using this directory.
The USER-IDENTIFICATION operand is not evaluated.

VOLUME-GROUP = *ANY / *NONE / <text 1..32 without-sep>
Only those tapes are output which are assigned to the specified volume group. When *ANY is specified, the volume group to which the tape belongs is irrelevant. When *NONE is specified, the tape may not be assigned to a volume group. “*” can be entered as the last character. In this case all volume groups which begin with the specified string are selected.

HOME-LOCATION =
Location name or symbolic location name.

HOME-LOCATION = *ALL
All permanent locations are processed.

HOME-LOCATION = <alphanum-name 1..8>
All catalog entries with the specified permanent location are processed.

DEVICE-TYPE =
Device type.

DEVICE-TYPE = *ALL
The catalog entries of all device types are output.

DEVICE-TYPE = *STD
All tapes of the default device type defined by the MAREN administrator are listed.

DEVICE-TYPE = <structured-name 1..8>
Device type. For a list of possible entries (depending on the BS2000 version), see manual “System Installation” [6].

OUTPUT =
Determines the output medium.

OUTPUT = *SYSOUT
Output is directed to SYSOUT.

OUTPUT = *NONE
No output takes place. This specification only makes sense for structured output in an S variable (see the STRUCTURE-OUTPUT operand).

OUTPUT = <filename 1..54>
Only for specifying a file generation.
Output is directed to the specified file generation in MAREN format. Passwords are overwritten with C'$$$$'. Only the number of records written is displayed on SYSOUT.

OUTPUT = <filename 1..54 without-gen-vers>(...)
Name of the SAM output file to which all selected catalog entries are to be written. Passwords are overwritten with C'$$$$'. Only the number of records written is displayed on SYSOUT. The output format and transfer by email can also be specified.

FORMAT =
Determines the format of the output file.

FORMAT = *MAREN-STRUCTURE
Output takes place in MAREN format.

FORMAT = *CSV(…)
Output takes place in CSV (comma separated value) format. Files in CSV format can be read in so that the columns are retained, and they can be processed further with a spreadsheet program (e.g. EXCEL).

SEPARATOR = *SEMICOLON / *COMMA
Determines the separator which is to be set between the various output values. The default separator is a semicolon (;). Optionally a comma (,) can be used as the separator.

HEADER-LINE = *YES / *NO
Specifies whether a header line should be output to name the output columns. The default is *YES, i.e. the header line is output. The header line contains the names of the catalog entry fields.

SEND-BY-MAIL = *NO / *YES(...)
Specifies whether the output file should be sent by email. The default is *NO, i.e. it is not sent by email. Transfer by email takes place only if the file to be sent contains at least one entry.

SEND-BY-MAIL = *YES(...)
The output file should be sent as an email attachment. The recipient is addressed by means of his/her user ID, i.e. the email address is taken from the user entry concerned.

TO = *USER(...)
Details of transfer by email:

USER-IDENTIFICATION = *OWN / <name 1...8>
Specifies the user ID. The recipient's email address is taken over from this user entry. If the user entry contains more than one email address, all the addresses are taken over as recipients.
The default is *OWN, i.e. the caller's user ID.

SUBJECT = *STD /<c-string 1...256>
Determines the content of the email's "Subject" field.
The default is *STD, i.e. MAREN uses a standard text.

DELETE-FILE = *NO / *YES / *DESTROY
Specifies whether the file should be automatically deleted after it has been sent.
The default is *NO, i.e. the file is not deleted.
*YES causes the file to be deleted after it has been sent. *DESTROY also causes it to be deleted, and the memory space is overwritten with binary zeros.

STRUCTURE-OUTPUT =
Controls the structured output in S variables.

STRUCTURE-OUTPUT = *NONE
No structured output takes place.

STRUCTURE-OUTPUT = <composed-name 1..255>(...)
Name of the S variable to be used for the structured output.

WRITE-MODE =
Determines whether the output should replace or extend the current content of the S variables.

WRITE-MODE = *REPLACE
The current content of the S variable is replaced by the new output.

WRITE-MODE = *EXTEND
The new output extends the current content of the S variable.

OVERFLOW-CONTROL =
Type of screen overflow control in interactive mode.

OVERFLOW-CONTROL = *BY-PROGRAM
Control by the program: After eighteen catalog entries have been processed, a message is displayed inquiring whether the current operation is to be continued or aborted.

OVERFLOW-CONTROL = *BY-SYSTEM
Control by BS2000: Screen overflow control is based entirely on the system parameter TCHOFLO or the value set in the MODIFY-TERMINAL-OPTIONS command.

INFORMATION =
If a single tape is specified, this operand determines the output format for output to SYSOUT.

INFORMATION = *STD
The output format is determined on the basis of the MAREN parameters if no previous entry (SHOW-INFORMATION=NORMAL, MAXIMUM) modified the standard format for this particular program run.

INFORMATION = *NORMAL
Output will contain all essential information. Output is not guaranteed and may be changed again in future software versions. If *NORMAL is specified, this will remain the new standard until the program is loaded the next time.

INFORMATION = *MAXIMUM
The output contains all information. Output is not guaranteed and may be changed again in future software versions. If *MAXIMUM is specified, this will remain the new standard until the program is loaded the next time.

Notes

- Only one of the operands FILE-NAME and DIRECTORY-NAME may ever have an operand value other than the default *ALL.
- Using the operand VOLUME-STATUS = *FREE, it is possible to check prior to the start of a HSMS/ARCHIVE backup run whether there are still enough tapes for backup runs using this directory. This operand should only be used if the MAREN administrator has actually set up an HSMS/ARCHIVE free tape pool for this directory. A step normally only undertaken in response to an explicit user request.
- If an individual archive number is specified and this is not found in the MAREN catalog, or a number range is specified and no catalog entry is found within this range, the statement is aborted with an error message and the spin off is triggered.
- If an individual VSN is specified, only YES or NONE is output for PASSWORD, and foreign user IDs and their account numbers are replaced by “$”.
  By default, information is entered in a single screen in interactive mode, whereas in batch mode it is entered line by line. Setting task switch 5 selects line-by-line input in interactive mode too. This improves the readability of catalog entries in SYSOUT logs.
- If the FSEQ number *001 appears in a specification based on number ranges, a temporarily locked tape is involved.
- Specification of a single archive number will be rejected if made together with the parameter FILE-NAME=<filename>(...) and if non-default values are used for its VERSION and TYPE-OF-VOLUMES operands.
- When a list of tapes is displayed, the VOLUME GROUP column appears only when the VOLUME-GROUP operand contains a wildcard. If another selection operand was also specified, another display layout may be preferred.
  If the name of the volume group is longer than 28 characters, it is truncated by an asterisk at position 28.

Examples

Example 1: Output of a single MAREN catalog entry

```
//show-volume-attributes volume=qe0044, information=*maximum
VOLUME    = QE0044       FILE-SEQ      = 0001          DEV-TYPE    =  TAPE-C4
USER-ID   = TSOS         HOME-LOCATION = HSMSLOC       RESERV-DATE =  <date>
ACCOUNT   = ADMINSTR     FREE-LOCATION = HSMSLOC       FREE-DATE   =  <date>
USER-ACC  = OWNER-ONLY   TEMP-LOCATION = CENTRAL       EXPIR-DATE  =  <date>
PASSWORD  = NONE
EXPORT-AD = C'XCXXX                                                '  /
REMARK /1 = C'                         ' /2 = C'          ' /3 = C'          '
USER-FIELD= C'                                                       '
DIR-NAME  = :POPP:$TSOS.MAREN.V90B.DIR
SAVE-FILE = S.020716.142715 SUBSAVE/SEQ = 00/001 CR-JOB/REQUEST-NA = SFID#003
FREE-POOL = *TSOS                                CR-CAT-ID          = SXV7
VOL-GROUP =                                      CR-USER-ID         = TSOS
VOL-SEQ   = 0001       CR-DATE      = <date>     LAST-ACC-DATE      = <date>
FIRST-VOL = QE0044     CR-TIME      = <time>     LAST-ACC-TIME      = <time>
CLOSE-IND = CLOSED     LAST-CL-DATE = <date>     LAST-ACC-USER-ID   = TSOS
VOL-STATUS= RESERVED   LAST-CL-TIME = <time>     LAST-ACC-ACCOUNT   =ADMINSTR
INIT      = YES        DIR-ON-VOL   =           LAST-ACC-JOB-NAME  =SFID#003
                                                 LAST-ACC-TSN       =
                                                 LAST-ACC-HOSTNAME  = POPPEA2
                                                 LAST-WRITE-BLK-CNT = 7423
OPEN-MODE = OUTIN      ACCESS-COUNT = 00000030   LAST-ACC-SNO       = 089
```

Information output with all information.

Example 2: Output of all tapes under the own user ID

```
//show-volume-attributes volume=*all,user-id=*own
VOLUME FSEQ DEV-TYPE CR-DATE    L-A-DATE   FREE-DATE  UA E REMARK (SHORTENED)
-------------------------------------------------------------------------
C0725K 0001 TAPE-C4  <date>     <date>     <date>     AL   SF-EVALUATION
G5110K 0001 TAPE-C4             <date>     <date>     AL
G6013K 0001 TAPE-C4             <date>     <date>     AL
M4696K 0001 TAPE-C4  <date>     <date>     <date>     FR
M5632K 0001 TAPE-C4                        <date>     AL
M5633K 0001 TAPE-C4                        <date>     AL
M5634K 0001 TAPE-C4                        <date>     AL
M5635K 0001 TAPE-C4  <date>     <date>     <date>     AL    PROGRAM 1
M5636K 0001 TAPE-C4                        <date>     AL
M5637K 0001 TAPE-C4  <date>     <date>     <date>     AL    SAVE PROJECT1
M5637K 0002 TAPE-C4  <date>     <date>     <date>     AL
M5637K 0003 TAPE-C4  <date>     <date>     <date>     AL
%  MARM120 TOTAL OF 12 MAREN CATALOG ENTRIES PROCESSED
```

Meaning of the catalog entry fields:

VOLUME	Archive number
FSEQ	File sequence number
DEV-TYPE	Device type
CR-DATE	Creation date
L-A-DATE	Last access
FREE-DATE	Tape expiration date; If no date is entered, the tape is a foreign tape.
UA	USER-ACCESS - the following values may be displayed: – AL for ALL-USERS – FR for FOREIGN-READ-ONLY – OW for OWNER-ONLY
E	Export flag An exported tape is flagged with “E” (EXPORTED).
REMARK	Remark field (first 20 characters only)

Example 3: Output of all tapes for a specific file name

```
//show-volume-attributes file-name=tape*
------------------------------------------------------------------------------
VOLUME FSEQ CR-DATE    CR-TIME  CR-JOB   1STVSN VSEQ FILE/DIR-NAME(SHORTENED)
------------------------------------------------------------------------------
M5634K 0001                     ULF             0001 TAPE.FILE.1
M5635K 0001 <date>     <time>   ULF      M5635K 0001 TAPE.FILE.1
M5638K 0001                     ULF2            0001 TAPE.FILE.2
M5639K 0001                     ULF2            0001 TAPE.FILE.2
M5640K 0001                     ULF2            0001 TAPE.FILE.2
M5637K 0001 <date>     <time>   ULF2     M5637K 0001 TAPE.FILE.2(1)
M5637K 0002 <date>     <time>   ULF2     M5637K 0001 TAPE.FILE.2(2)
M5637K 0003 <date>     <time>   ULF2     M5637K 0001 TAPE.FILE.2(4)
M5655K 0001                             0001 TAPE.FILE.3
%  MARM120 TOTAL OF 9 MAREN CATALOG ENTRIES PROCESSED
```

Meaning of the catalog entry fields:

VOLUME	Archive number
FSEQ	File sequence number
CR-DATE	Creation date
CR-TIME	Creation time
CR-JOB	Creation job name
1STVSN	First archive number of the MF/MV set
VSEQ	File section number
FILE/DIR-NAME	File or directory name (first 26 characters only)

Example 4: Output of all MAREN catalog entries for a directory with a specific SAVE-FILE-ID

```
//show-volume-attributes directory-name=maren.v90b.dir(save-file-id=-0)
%  MARM195 NO DIRECT ACCESS TO MAREN CATALOG POSSIBLE
 ------------------------------------------------------------------------------
 VOLUME USER-ID  REQ-NAME DIRECTORY-NAME (SHORTENED)  SAVE-FILE-ID SUB-SV/SEQ
 ------------------------------------------------------------------------------
 QE0020 TSOS     SFID#001 :POPP:$TSOS.MAREN.V90B.DIR   S.020716.135432 00 001
 QE0021 TSOS     SFID#001 :POPP:$TSOS.MAREN.V90B.DIR   S.020716.135432 01 001
 QE0023 TSOS     SFID#001 :POPP:$TSOS.MAREN.V90B.DIR   S.020716.135432 02 001
 QE0022 TSOS     SFID#001 :POPP:$TSOS.MAREN.V90B.DIR   S.020716.135432 03 001
 QE0024 TSOS     SFID#001 :POPP:$TSOS.MAREN.V90B.DIR   S.020716.135432 03 002
%  MARM120 TOTAL OF 5 MAREN CATALOG ENTRIES PROCESSED
```

The information concerning all of the tapes contained in the last, i.e. in the most recent save file is output.

Example 5: Output of all tapes for a specific volume group

```
//show-volume-attributes *interval(sh,sh9),vol-group=EPSWOS3*
------------------------------------------------------------------------------
VOLUME FSEQ VOLUME-GROUP                1STVSN VSEQ FILE/DIR-NAME(SHORTENED)
------------------------------------------------------------------------------
SH0024 0001 EPSWOS3-GER                 SH0024 0001 TAPE.FILE
SG0025 0001 EPSWOS3-CLM-AAAAAAAAAAAAAAA* SH0025 0001 :2OS6:$SYSHSMS.DIR.12345
```

The tapes which belong to the volume groups EPSWOS3* are output for a range of archive numbers. If the name of the volume group is longer than 28 characters, it is truncated by an asterisk at position 28.

Output in S variables

This statement supports the structured output in S variables (controlled by the STRUCTURE-OUTPUT operand). Further information on S variables is provided in the “Commands” manual [3].

Depending on the VOLUME operand, the following S variables are created:

Entry in the VOLUME operand	Abbreviated notation in table, Condition column
VOLUME=<vsn> (one tape) VOLUME=*ALL/*INTERVAL (multiple tapes)	1 2

Output information	Name of the S variable	T	Contents	Condition
Access counter (8-digit) It is incremented each time the tape is accessed.	var(*LIST).ACCESS-COUNT	S	<integer 0..99999999>	1,2
CLOSE indicator Provides information on whether creation of a tape file has been terminated correctly.	var(*LIST).CLOSE-INDICATOR	S	OPENED CLOSED	1
Catalog ID from the file name at the time of file creation. It is only supplied if F-NAME exists	var(*LIST).CRE-CAT-ID	S	<cat-id>	1
Creation date	var(*LIST).CRE-DATE	S	yyyy-mm-dd	1,2
Creation job name For HSMS request name	var(*LIST).CRE-JOB-NAME	S	” <name 1..8>	1,2
Creation time	var(*LIST).CRE-TIME	S	hh:mm:ss	1,2
User ID from the file name at the time of file creation. It is only supplied if F-NAME exists.	var(*LIST).CRE-USER-ID	S	” <name 1..8>	1
Device type	var(*LIST).DEV-TYPE	S	<structured-name 1..8>	1,2
Name of a directory (with catalog ID and user ID) which contains the tape.	var(*LIST).DIR-NAME	S	<filename 1..54>	1,2
Displays whether the tape contains the directory which was also saved	var(*LIST).DIR-ON-VOL	S	*NO *YES	1,2
File expiration date	var(*LIST).EXPIR-DATE	S	yyyy-mm-dd	1
Mailing address. In the case of the EXPORT-VOLUME statement, the mailing address can, for instance, be entered here	var(*LIST).EXPORT-ADDR	S	<c-string 1..50>	1
Export date For tapes which are not exported this catalog entry field contains a blank	var(*LIST).EXPORT-DATE	S	yyyy-mm-dd	1

(part 1 of 4)

Output information	Name of the S variable	T	Contents	Condition
Status (exported or not)	var(*LIST).EXPORTED	S	*NO *YES	1,2
File name of a tape file Without catalog ID and user ID Provided the file is not contained in a directory.	var(*LIST).F-NAME	S	<filename 1..41>	1,2
File sequence number (4-digit)	var(*LIST).F-SEQ	S	<integer 1..9999>	1,2
First archive number of the MF/MV set	var(*LIST).FIRST-VOL	S	<vsn>	1,2
Expiration date of the tape Specifies when the reservation of the tape for a user ID can be terminated.	var(*LIST).FREE-DATE	S	yyyy-mm-dd	1,2
Release location A tape is moved to this location during the clear-up run.	var(*LIST).FREE-LOCATION	S	<alphanum-name 1..8>	1,2
Name of the free tape pool in which this tape is located or in which it should be located when it is shared	var(*LIST).FREE-POOL	S	<filename 1..54> *NO *GLOBAL *TSOS	1,2
Standard location	var(*LIST).HOME-LOCATION	S	<alphanum-name 1..8>	1,2
initialization flag	var(*LIST).INIT	S	YES NO ERASE	1
Account number of the last access	var(*LIST).LAST-ACCESS-ACCOUNT	S	<alphanum-name 1..8>	1
Date of the last access	var(*LIST).LAST-ACCESS-DATE	S	yyyy-mm-dd	1,2
Name of the system with last access	var(*LIST).LAST-ACCESS-HOSTNAM	S	<alphanum-name 1..8>	1,2
Job name of the last access	var(*LIST).LAST-ACCESS-JOB-NAM	S	<name 1..8>	1
Time of the last access	var(*LIST).LAST-ACCESS-TIME	S	hh:mm:ss	1
TSN of the last access Only as long as the tape is occupied	var(*LIST).LAST-ACCESS-TSN	S	<alphanum-name 1..4>	1
User ID of the last access	var(*LIST).LAST-ACCESS-USER-ID	S	<name 1..8>	1,2
Session number during the last access.	var(*LIST).LAST-ACC-SESSION-NR	S	<integer 1..255>	1
CLOSE date	var(*LIST).LAST-CLOSE-DATE	S	yyyy-mm-dd	1
CLOSE time	var(*LIST).LAST-CLOSE-TIME	S	hh:mm:ss	1
Block counter for the tape	var(*LIST).LAST-WRT-BLOCK-CNT	S	<integer 0..9999999999>	1

(part 2 of 4)

Output information	Name of the S variable	T	Contents	Condition
OPEN type of last access	var(*LIST).OPEN-MODE	S	INPUT OUTPUT EXTEND INOUT OUTIN SINOUT REVERSE	1
Password for access	var(*LIST).PASS	S	*NONE *YES	1,2
Remark field	var(*LIST).REMARK	S	<c-string 1..24>	1,2
Remark field which can be freely set	var(*LIST).REMARK-2	S	<c-string 1..10>	1
Remark field which can be freely set	var(*LIST).REMARK-3	S	<c-string 1..12>	1
Reservation counter (4-digit) This counter is incremented with each new reservation of the tape.	var(*LIST).RESERV-COUNT	S	<integer 0..9999>	2
Reservation date Date on which a tape is reserved	var(*LIST).RESERV-DATE	S	yyyy-mm-dd	1,2
SAVE-FILE-ID (HSMS) or SAVE-VERSION (ARCHIVE)	var(*LIST).SFID	S	<c-string 1..15>	1,2
Number of subtask for parallel save run in HSMS	var(*LIST).SUBSAVE	S	<integer 0..15>	1,2
Number of subsequent tape within a parallel save run in HSMS	var(*LIST).SUBSEQ	S	<integer 0..999>	1,2
Current location	var(*LIST).TEMP-LOCATION	S	” <name 1..8>	1
Shareability of the tape	var(*LIST).USER-ACCESS	S	OWNER-ONLY FOREIGN-READ ALL-USERS	1,2
Account number of the tape owner	var(*LIST).USER-ACCOUNT	S	<alphanum-name 1..8>	1,2
User field. Data such as name and department or data relevant for operations scheduling can be entered here.	var(*LIST).USER-FIELD	S	<c-string 1..54>	1,2
User ID of the tape owner	var(*LIST).USER-ID	S	<name 1..8>	1,2
Tape archive number	var(*LIST).VOL	S	<vsn>	1,2
Volume group Only has a valid value with reserved tapes, otherwise it is undefined.	var(*LIST).VOL-GROUP	S	<text 1..32>	1,2
Volume sequence number (4-digit)	var(*LIST).VOL-SEQ	S	<integer 1..255>	1,2

(part 3 of 4)

Output information	Name of the S variable	T	Contents	Condition
Tape status	var(*LIST).VOL-STA	S	FREE PRIVATE RESERVED DEFECT	1
Tape status F = FREE P = PRIVATE R = RESERVED D = DEFECT	var(*LIST).VOL-STA-1	S	F/P/R/D	2

(part 4 of 4)

SYSTEM
Switch to BS2000 system mode

System commands can be entered in BS2000 system mode. The MAREN user program remains loaded and can be resumed again using the RESUME-PROGRAM command. The START-/LOAD-EXECUTABLE-PROGRAM (or START-/LOAD-PROGAM) and EXIT-JOB (or LOGOFF) commands, however, terminate the MAREN user program.

As the SDF standard statement HOLD-PROGRAM provides the same functionality, the SYSTEM statement should no longer be used in new procedures or ENTER files. In existing jobs it should gradually be replaced by the HOLD-PROGRAM statement.

Format

SYSTEM

The SYSTEM statement does not have any operands.

5.4 MAREN as a subroutine

The MAREN user program can be called from a user program as a subroutine. For this purpose, the MARENU module from the SYSLIB.MAREN.<ver> library must be linked into the user program.

There are two types of MAREN subroutine:

- Interactive subroutine
- Program interface

5.4.1 Interactive subroutine

The entry point MARENDU is used for the interactive subroutine. This mode enables you to work with MAREN in interactive mode after a call from a user program in the same way as if you issued a START-MAREN command.

MARENDU is called using the @PASS EXTNAME=MARENDU statement.

With the exception of the BATCH-PROCESSING=YES operand of the PRINT-VOLUME-ATTRIBUTES statement, the full range of functions of the MAREN user program is available. The user program remains loaded. Control is returned to the calling user program when the MAREN statement END or RETURN-TO-PROGRAM is issued or after abnormal termination of the MAREN user program.

No data transfer takes place between the calling user program and the MAREN interactive subroutine. Only indirect data transfer is possible, e.g. using the following MARENADM statement you can create an output file which then serves as an input file in the user program:

```
//SHOW-VOLUME-ATTRIBUTES OUTPUT= &filename,...
```

When calling the subroutine, the usual register conventions must be observed:

Register 13: This register contains the address of a save area which consists of 18 words and which must be made available by the calling user program. This area is used by MARENU to save the registers of the calling program.

Register 14: This register contains the address of the re-entry point to the calling program.

Register 15: This register contains the entry point address of MARENDU.

Return information is not required unless MAREN is terminated abnormally, as all results are displayed directly in the dialog.

5.4.2 Program interface

The entry point MARENPS is used for the program interface. In this mode, the statements to be issued to MAREN and all accruing data and results are exchanged between the user program and the user program MAREN via storage areas. There is no data communication with the system files SYSDTA and SYSOUT.

The program interface does not provide access to the full range of functions of the MAREN user program.
The following MAREN statements may **not** be used. Those marked with “(*)” are standard SDF statements, see also the “SDF Dialog Interface” manual [9]):

```
//CHECK-TSOSCAT
//EDIT-VOLUME-ATTRIBUTES
//EXECUTE-SYSTEM-COMMAND (*)
//HOLD-PROGRAM (*)
//MODIFY-SDF-OPTIONS (*)
//MODIFY-TAPE-SET-ATTRIBUTES
//REMARK             (*)
//RESET-INPUT-DEFAULTS (*)
//RESTORE-SDF-INPUT  (*)
//SHOW-INPUT-DEFAULTS (*)
//SHOW-INPUT-HISTORY (*)
//SHOW-SDF-OPTIONS   (*)
//STEP               (*)
//WRITE-TEXT         (*)
```

The following operand values are strictly prohibited:

```
PASSWORD=*SECRET
NEW-PASSWORD=*SECRET
VOLUME=<vsn list>
```

Instead, the corresponding statement must be issued individually for each archive number.

The following operand values must not be used with certain statements. If these operand values introduce a structure, no operand in that structure may be used:

`OUTPUT = <filename>`
in the statements RESERVE-FREE-VOLUME, SHOW-VOLUME-ATTRIBUTES
Any output files required can be created by the calling main program from the catalog entries provided by MARENPS.

`VOLUME = *BY-FILE`
in the statement EXPORT-VOLUME

`VOLUME = *BY-INPUT-FILE`
in the statement MODIFY-VOLUME-ATTRIBUTES

`VERSION = *LATEST / <integer -9999..0> / *NOT-CREATED`
in the statement SHOW-VOLUME-ATTRIBUTES

`TYPE-OF-VOLUMES = *VALID / *OBSOLETE`
in the statement SHOW-VOLUME-ATTRIBUTES

`BATCH-PROCESSING = *YES`
in the statement PRINT-VOLUME-ATTRIBUTES

`UPDATE = *TEMPORARY / *PERMANENT`
in the statement PRINT-VOLUME-ATTRIBUTES
This applies to the UPDATE operand in each of the structures SELECT, SORT, and LAYOUT-CONTROL.

`NUMBER-OF-VOLUMES = <integer 2..10>`
in the statement RESERVE-FREE-VOLUME
This operand is not evaluated. As a rule, only a tape is processed. Otherwise the statement should be issued more than once.

`SAVE-FILE-ID <> *ALL`
in the statements

5.4.3 Data transfer areas

The user program must have two storage areas for data transfer when the MAREN program interface MARENPS is called:

- Statement area (maximum of 1014 bytes)

  Here the user program must provide a MAREN statement in the form of a variable-length record (record length field of 4 bytes) using the usual BS2000 format. The statement can be written with or without the two slashes. The statement area must be aligned on a halfword boundary.

- Catalog entry area (1014 bytes)

  In this area, MAREN transfers either a complete catalog entry or merely the catalog entry fields RETFLAG and ERRORKEY to the user program, depending on the statement. The individual catalog entry fields can be symbolically addressed via the Dsect MARENA or the copy element MARENAC.

  The catalog entry is returned either in V8 format (1014 bytes). The secondary index area of a catalog in V8.1 format is not supported at the program interface.

When calling the program interface, the contents of the catalog entry area are of no significance.

The MARENA macro generates a DSECT for symbolic address of the individual catalog entry fields. The MARENA macro is also contained in the SYSLIB.MAREN.<ver> library. If the operand MF=L is specified in the macro call, a data area is created with the same length as the catalog entry with field designations identical to the names in the relevant DSECT.

The COPY statement can be used to copy the source element MARENAC into a COBOL source program. MARENAC defines the MAREN catalog entry. The copy element MARENAC is also contained in the library SYSLIB.MAREN.<ver>.

Once a statement has been executed, MARENPS automatically reverts to the user program. The RETURN-TO-PROGRAM statement is therefore superfluous in this case. The END statement closes the MAREN files if they were opened in direct access mode.

Specification of a number range, which is possible for some statements using the operand VOLUME=*INTERVAL(FROM=..., TO=...,FSEQ=...), is also supported by the program interface. However, only the first applicable catalog entry is processed, after which control is immediately passed back to the caller. If necessary, the user program must repeat the statement in a loop, each time setting the start of the number range (FROM operand and FROM-FSEQ operand) to the last archive number obtained and incrementing FSEQ. Please note the following when incrementing FSEQ: if only one catalog entry per archive number is to be processed, FSEQ must be set at 9999. If, however, all available FSEQ entries are to be processed for each archive number, FSEQ must be incremented by 1 except if FSEQ=*001 (temporarily locked tape).

Return codes

After each return from the MAREN program interface, the user program must inspect the return information in the catalog entry field RETFLAG. Only when RETFLAG=A applies has the statement been executed normally. RETFLAG=E means that no hits were made in the specified number range. For all other RETFLAGs, additional return information in the catalog entry field ERRORKEY must be evaluated. This field contains the seven-digit message code of the message otherwise output to SYSOUT by the MAREN program.

RETFLAG may be set to the following values:

RETFLAG	Meaning
A	The statement was executed without errors.
D	A DMS error occurred while accessing a file. The name of the specified file is contained in the catalog entry field FILENAME. The DMS error code is contained in the catalog entry field ERRORKEY.
E	No hit was found within the specified number range
I	Invalid entry.
L	Logical error, e.g. an attempt was made to export a tape which has already been exported.
M	Internal error in MAREN; the exact cause of the error is shown in the catalog entry field ERRORKEY.
N	The specified archive number does not exist in the MAREN catalog.
O	The MAREN administrator has activated offline logging; as a result, access to the MAREN catalog is not possible.
P	The catalog entry was simultaneously modified by another task; the statement must therefore be repeated.
S	Access to another system via MSCF was not successful.
T	The tape is still reserved by another task in the same system.
V	The tape has not yet been released by another task in another system, i.e. the internal MAREN access lock on this tape still exists.
X	The request was rejected by the MAREN administrator via a exit routine.
0	The console message MAR0085 was acknowledged by the operator with tsn.0.
2	The console message MAR0085 or MAR0086 was acknowledged by the operator with tsn.2.

The following registers must be loaded to enter the subroutine:

Register 1: This register contains the address of an operand list with a length of two words:
First word: Address of the statement area
Second word: Address of the archive record area

Register 13: This register contains the address of a save area which consists of 18 words and which must be made available by the calling user program. This area is used by MAREN to save the registers of the calling program.

Register 14: This register contains the address of the re-entry point to the calling program.

Register 15: This register contains the entry point address of MARENPS.

5.4.4 Notes on integrating MAREN as a subroutine

In order to use the user program MAREN as a subroutine, a linkage module which loads a module from the SYSLNK file has to be included in the main program.

This MAREN linkage module is stored in the SYSLIB.MAREN.<ver> file as an object module (OM) with the name MARENU, and is assigned the entry MARENPS when MAREN is used as a program interface or MARENDU when it is used as an interactive subroutine.

The linkage module performs the following activities:

- It determines the MAREN version to be loaded dynamically.
  If the user did not specify a particular MAREN version with SELECT-PRODUCT-VERSION before calling his/her main program, the most recent version installed in the system is selected.
- The names of the SYSLNK and SYSREP flies are determined, taking due account of the version.
- These names are used to complete the BIND parameter list for loading the relevant prelinked MAREN module dynamically.

Error situation

If an error occurs while the file names are being ascertained, the default names of the MAREN version for which the linkage module was supplied are used for dynamic loading.

5.4.5 Example

The following example shows the structure of an Assembler main program. The macro calls for structured programming with ASSEMBH (e.g. @IF) are not supported by ASSEMBH-BC (see the “ASSEMBH” manual [2]).
The sample program has the goal that access to all tapes with a archive number in the range ABC001 to ABC099 is to be restricted to the user's own ID (USER-ACCESS = *OWNER-ONLY).

```
            ...
            @CYCLE
MODIFY      DS    0H
            ...
            @PASS EXTNAME=MARENPS,PAR=STMT  CALL MAREN PROGRAM INTERFACE
            @CAS2 RETFLAG,COMP=CLI          CHECK RETURN FLAG
            @OF   RETFLAGA                  RETURN FLAG 'A' = OK
            MVC   ANWVSN,ARCHIVNR           SET VSN IN STATEMENT
            @IF   EQ                        SET NEXT FSEQ IN STATEMENT
            CLC   FSEQ,=C'*001'             SUPPRESSED VOLUME?
            @THEN
            MVC   ANWFSEQ,=C'0001'          IF YES - NEXT FSEQ = '0001'
            @ELSE
            PACK  DOWO,FSEQ                 OTHERWISE ADD 1 TO FSEQ
            AP    DOWO,=PL1'1'
            UNPK  ANWFSEQ,DOWO+5(3)
            OI    ANWFSEQ+3,X'F0'
            @BEND
            @OF   RETFLAGE                  RETFLAG 'E' = NO MORE ENTRIES
            ...
            @OFRE                           ERROR EXIT
            ...
            @BEND
            @BEND
            ...
DOWO        DS    D                         WORKAREA
STMT        DS    Y(STMTEND)                AREA FOR MAREN STATEMENT
            DC    CL2' '
            DC    C'//MOD-VOL-ATTR VOL=*INT(FROM='
ANWVSN      DC    CL6'ABC001'
            DC    C',FROM-FSEQ='
ANWFSEQ     DC    CL4'0001'
            DC    C',TO=ABC099),'
            DC    C'PROT=*PAR(USER-ACCESS='
            DC    C'*OWNER-ONLY)'
STMTEND     EQU   *-STMT
            ...
            MARENA MF=L,LAYOUT=V8           AREA FOR MAREN CATALOG ENTRY
            ...
```

6 MAREN task file table

In connection with file name-oriented tape processing, MAREN BS2000 commands are offered for working with the MAREN TFT (Task File Table). The commands are offered in the SDF menu under the application domain STORAGE-MANAGEMENT.

Functional description

When accessing a tape file that is not contained in the TSOSCAT file catalog, the tapes belonging to this file can be determined from the MAREN catalog.

This is only possible if the system on which the tape file was created and the system on which it is to be further processed both use the same MAREN catalog. The information required for file assignment concerning the tapes to be used and their device type is located in the MAREN catalog and can be called from there. Manual specification of the archive number and their device type is no longer necessary, with the result that the assignment of a tape file `TAPE.FILE` now looks simply like this:

```
/IMPORT-FILE SUPPORT=*TAPE(VOLUME=*ANY,DEVICE-TYPE=*ANY,FILE-NAME=TAPE.FILE)
```

DMS processed such a command and pass the file name on to MAREN. If the MAREN catalog contains entries with this name, MAREN returns the archive number and device type of the tapes marked in these MAREN catalog entries to DMS (“volume substitution”). Using the information received from MAREN, DMS can complete the file assignment and request the required tapes.

One problem that can arise in connection with volume substitution is that the same file name may occur more than once in the MAREN catalog. his is the case if the same tape file was created at different times and using different tapes, and if the relevant tapes in the MAREN catalog have not yet been released. These individual versions of a file are not distinguished by the file name. By default, MAREN can select the latest (youngest) file version. But it must also be possible to address an older file version.

Another potential problem lies in the fact that tape files cannot always be uniquely assigned to user IDs. This means that there may be several entries in the file catalog (TSOSCAT) for the same tape file in the Data Management System. For example, the two file names $USERA.TAPE.FILE and $USERB.TAPE.FILE may refer to the same file on the same tape. For this reason, BS2000 tape management only stores the max. 41-character file name without the user ID in the tape labels (HDR3 label) and, for the same reasons, the tape file names are not given user IDs in the MAREN catalog.

Volume substitution encounters problems at the latest when the file name involved has several entries in the MAREN catalog and the associated tape files were created under different user IDs. Selection based on the file version does not always provide a solution here, as the different tape files with the same name may easily refer to files with completely different contents (e.g. file $A.XY contains inventory data, and file $B.XY contains personnel data).

Selection of a specific file version and specification of which user IDs have to be taken into account are handled by means of the command ADD-MAREN-FILE-ENTRY.

In the context of volume substitution the VERSION operand determines which file version in the MAREN catalog is accessed in a subsequent IMPORT-FILE command (with VOLUME=*ANY) and thereby which archive numbers are required for processing.

The USER-IDENTIFICATION operand determines whether only MAREN catalog entries from the user's own or from a foreign user ID are to be evaluated when determining this volume serial number. It should be borne in mind in this context that only the MAREN catalog entries of shareable tapes (with USER-ACCESS=*ALL-USERS or *FOREIGN-READ-ONLY) of foreign user IDs can be evaluated.

The decision made by way of ADD-MAREN-FILE-ENTRY is stored in a task-specific table, where it is chained to any entries created in earlier ADD-MAREN-FILE-ENTRY commands and subsequently evaluated in the course of volume substitution. This MAREN-specific file table, known as the MAREN TFT (Task File Table), is created when the ADD-MAREN-FILE-ENTRY command is first entered and deleted at the latest when the task is terminated (EXIT-JOB command).
This table contains only one entry for a given file name, i.e. if a file name already entered in the MAREN TFT is used in an ADD-MAREN-FILE-ENTRY command, the values stored there for the VERSION and USER-IDENTIFICATION operands are replaced by the current values.

Entries in the MAREN TFT can also be explicitly deleted from this table. This is done using the REMOVE-MAREN-FILE-ENTRY command.

Information on the entries in the MAREN TFT can be requested using the SHOW-MAREN-FILE-ENTRY command. The information displayed can refer to all entries in the MAREN TFT or to one specific file name.

Overview

BS2000 command	Meaning
ADD-MAREN-FILE-ENTRY	Adds an entry to the MAREN TFT
REMOVE-MAREN-FILE-ENTRY	Removes an entry from the MAREN TFT
SHOW-MAREN-FILE-ENTRY	Outputs information from the MAREN TFT

ADD-MAREN-FILE-ENTRY
Adds an entry to the MAREN TFT

Domain: STORAGE-MANAGEMENT

Privileges: all except OPERATING, HARDWARE-MAINTENANCE and SECURITY-ADMINISTRATION

This command allows an entry to be added to the MAREN TFT for a tape file. The USAGE operand defines the effect of the MAREN TFT entry:

- *SELECT
  A specific file version is to be processed for the specified tape file. By default, at volume substitution MAREN selects the latest file version entered under the user ID of the caller in the MAREN catalog.
- *SCRATCH
  For the specified tape file, the location and free pool must be specified from which scratch tapes are requested if an archive number is not specified when the file is created. In addition, scratch tapes can be assigned to a volume group.

If there is already an entry for the specified file name in the MAREN TFT, this entry is deleted and a new one created.

Format

ADD-MAREN-**FI**LE-**ENTRY** Alias: **ADMFE**

FILE-**NAME** = <filename 1..54> / ***ALL-SCRATCH-FI**LES

,**USAGE** = ***SELECT**(...) / ***SCRATCH**(...)

***SELECT**(...)

VERSION = ***LATEST** / <integer -9999..0>

,**USER-ID**ENTIFICATION = ***OWN** / ***ANY** / <name 1..8>

***SCRATCH**(...)

LOCATION = ***STD** / <alphanum-name 1..8>

,FREE-POOL = ***STD** / ***NO** / ***GLOBAL** / ***TSOS** / <text 2..32 without-sep>

,**VOL**UME-**GR**OUP = ***NONE** / <text 1..32 without-sep>

Operands

FILE-NAME = <filename 1..54>
This operand specifies the file name for which an entry is to be added to the MAREN task file table.

FILE-NAME = *ALL-SCRATCH-FILES
The entry in MAREN-TFT applies for all scratch tapes requested in the future.
This operand value may only be specified in conjunction with USAGE=*SCRATCH(...).

USAGE =
Specifies the effect of the MAREN TFT entry.

USAGE = *SELECT(...)
A specific file version of the specified file is to be used.

VERSION =
This operand can be used to select a specific version (or status) of the specified file.

VERSION = *LATEST
Selects the latest version of the file (i.e. the last one created).

VERSION = <integer -9999..0>
Specifying 0 here is equivalent to specifying LATEST; the entry -1 specifies the previous file status, etc.

USER-IDENTIFICATION =
This operand selects the user ID to which the tapes are assigned (catalog entry field USER-ID).

USER-IDENTIFICATION = *OWN
Only those archive numbers are selected which are assigned to your own user ID, i.e. the user ID of the current task.

USER-IDENTIFICATION = *ANY
Selection is not based on user IDs. For foreign user IDs only shareable archive numbers (USER-ACCESS=*ALL-USERS or *FOREIGN-READ-ONLY) are selected.

USER-IDENTIFICATION = <name 1..8>
Only archive numbers of the specified user ID are selected. In the case of a foreign user ID, only shareable archive numbers (USER-ACCESS=*ALL-USERS or *FOREIGN-READ-ONLY) are selected.

USAGE = *SCRATCH(...)
Specifies which location and which volume group is to be used for free tape assignment if a archive number (scratch tape) is not specified when the file is created.

When locations are used, the specified location must have been configured appropriately in the reservation file. Otherwise it is ignored.

LOCATION =
Specifies the location to be used for the assignment of a scratch tape.

LOCATION = *STD
The location is not specified. MAREN's current defaults apply.

LOCATION = <alphanum-name 1..8>
If the file is created without specifying a archive number, MAREN selects a free archive number from this location.

FREE-POOL =
Specifies the free tape pool.

FREE-POOL = *STD
No free tape pool was specified.

FREE-POOL = *NO
A free tape is to be picked from the *NO free tape pool.

FREE-POOL = *GLOBAL
A free tape is to be picked from the *GLOBAL free tape pool.

FREE-POOL = *TSOS
A free tape is to be picked from the *TSOS free tape pool

If aliases are specified for the *NO, *GLOBAL or *TSOS values, then these operand values will be expanded to their full length for compatibility reasons (e.g. *GL is expanded to *GLOBAL).

FREE-POOL = <text 2..32 without-sep>
Specifies the name of a free tape pool.
The name of the free tape pool must begin with “*” followed by at least one character from A-Z or 0-9. The characters “.”, “-” and “_” are permitted, but not at the end and not next to each other.

VOLUME-GROUP = *NONE / <text 1..32 without-sep>
Specifies the volume group. When *NONE is specified, the tape is not assigned to a volume group.

Notes

*Notes on USAGE=*SCRATCH(...)*

- The request for a location can still be rejected by a MAREN exit or by MARENLM. In this case, processing is aborted regardless of the location.
- The definition of a location does not apply to other tasks or subtasks. If the file is opened in a subtask and a free tape is requested, the location defined for the file is not used.
- The definition of a location can also be used for other system components as well as for file processing (e.g. for FDDRL).

Note on VOLUME-GROUP

- Related tapes can be combined to form a volume group. The volume group is a tape-specific attribute. i.e. all files which are located on a tape belong to the same volume group.

Command return codes

(SC2)	SC1	Maincode	Bedeutung
	0	CMD0001	The command was executed without errors.
	1	MARM189	Syntax error in the command
1	32	MARM184	Error (&00) when executing macro (&01)
2	64	MARC201	Error when completing the file name

REMOVE-MAREN-FILE-ENTRY
Removes an entry from the MAREN TFT

Domain: STORAGE-MANAGEMENT

Privileges: all except OPERATING, HARDWARE-MAINTENANCE and SECURITY-ADMINISTRATION

This command deletes an entry from the MAREN TFT.

Format

REMOVE-**MAR**EN-**FI**LE-**ENTRY**	Alias: **RMMFE**
FILE-**NAME** = <filename 1..54> / ***ALL-SCRATCH-FI**LES	

Operands

FILE-NAME = <filename 1..54>
This specifies the file name for which the entry in the MAREN TFT is to be deleted.

FILE-NAME = *ALL-SCRATCH-FILES
The entry for all scratch tapes should be removed from the MAREN TFT.

Command return codes

(SC2)	SC1	Maincode	Bedeutung
	0	CMD0001	The command was executed without errors.
	1	CMD0001	Specified file name not in the MAREN TFT
	1	MARM189	Syntax error in the command
1	32	MARM184	Error (&00) when executing macro (&01)
2	64	MARC201	Error when completing the file name

SHOW-MAREN-FILE-ENTRY
Outputs information from the MAREN TFT

Domain: STORAGE-MANAGEMENT

Privileges: all except OPERATING, HARDWARE-MAINTENANCE and SECURITY-ADMINISTRATION

This command outputs information contained in the MAREN TFT.

Format

SHOW-MAREN-**FI**LE-**ENTRY**	Alias: **SHMFE**
FILE-**NAME** = ***ALL** / ***ALL-SCRATCH-FI**LES / <filename 1..54>	

Operands

FILE-NAME = *ALL
Information on all entries in the MAREN TFT is output.

FILE-NAME = *ALL-SCRATCH-FILES
Information on all scratch tapes is output.

FILE-NAME = <filename 1..54>
Specifies the file names for which the MAREN TFT entry is to be output.

Notes

The values for the operands FILE-NAME, VERSION and USER-ID used with the ADD-MAREN-FILE-ENTRY command are output for each entry in the MAREN TFT. The following special features must be borne in mind here:

- The file name is always output in full (including the catalog ID and user ID).
- VERSION=*LATEST is equivalent to VERSION=0 in the output.
- If USER-ID=*OWN has been specified, the current user's user ID is substituted for *OWN in the output.

Command return codes

(SC2)	SC1	Maincode	Bedeutung
	0	CMD0001	The command was executed without errors.
	1	MARM189	Syntax error in the command
1	32	MARM184	Error (&00) when executing macro (&01)
1	64	MARC100	No MAREN TFT exists or the existing MAREN TFT does not contain the specified entry
2	64	MARC201	Error when completing the file name

Example

All the entries in the MAREN TFT are to be output.

Possible output:

```
/show-mar-file-entry
%FILE-NAME                                    VERSION  USER-ID  LOCATION
       FREE-POOL-NAME
%:2OSG:$USER1.XX.Y                            -0002    USER1

%:2OSX:$USER1.TAPEFILE.1                                        ROBOTER1
       *BACKUP1
%:1OSN:$USER1.TAPEFILE.2                       0000    USER1
```

Glossary

This glossary explains some of the terms used frequently in the MAREN manuals and the terms are listed in alphabetical order. Cross-references are indicated by *italics*.

administrator without domains
: An MAREN administrator who works in the MAREN network without domains (see also *MAREN administrator*).

All-Domain Administrator (ADA)
: See *MAREN administrator.*

archive number
: Each tape has a six-character archive number under which it is known in MAREN. This archive number must match the tape's volume serial number (VSN), which is assigned when initialization takes place in BS2000. The VSN is the name under which the tape is known in BS2000. In the MAREN manuals, the terms "archive number" and "VSN" are used synonymously.

archive record (archive database)
: Database of an *tape archive system* with logical and physical information about tapes, tape devices, and robots. The archive record allocates the archive number of a tape to its location.

archive system
: One of the tape archive systems supported by MAREN if no further distinction need be made between the archive systems. In the MAREN manuals, the abbreviated term archive system is used for tape archive system.

archive system (real)
: The real archive systems from Quantum Corp. consist of the components archive computer, robots, and storage systems for tapes. They are linked to a BS2000 system and receive jobs from BS2000 via *ROBAR*.

archive system (virtual)

The virtual ETERNUS CS archive system is an archive of *virtual tapes*. The virtual tapes are created on a RAID disk system and are swapped out asynchronously to real tapes or retrieved from there, as the necessity occurs. The real tapes and tape devices are transparent to the BS2000. MAREN manages only the *virtual tapes*.

catalog entry field

An catalog entry at the MAREN catalog is consists of catalog entry field containing the various attributes of the tapes (e.g. the FREE-DATE catalog entry field contains the expiration date).

data key

A key (256-bit long bit string) which an LTO drive uses for encryption/decryption of the tape contents. The data key is generated by MAREN and supplied to the tape device.
The data key is stored in the metadata of the encrypted tape and can therefore only be lost together with the tape.
To protect the tape contents from being read by unauthorized persons, MAREN encrypts the data key using the *encryption key*.

domain

A domain is a group of *systems* within a *MAREN network*. A domain consists not only of the systems, but also of the tapes which are processed on these systems. The information on the domains is stored in the MAREN catalog.

Domain Administrator (DA)

See *MAREN administrator*.

encryption key

MAREN requires the encryption key to encrypt/decrypt the *data key*.
The encryption key consists of the *key value* and the *key ID*.
Only with the encryption key can the data key of a tape be decrypted and the tape contents read again.
MAREN stores the encryption keys in a *key box* and fetches the required encryption key from the key box when a tape is read.

expiration date (of a file)

This is the expiration date for a file on a *tape*. It corresponds to field 10 (expiration date) in the HDR1 label on the tape when a tape file has been generated. This date is defined when the file is created using the RETENTION-PERIOD parameter in the ADD-FILE-LINK command. MAREN ensures that the *expiration date* of the tape is at least the same as the expiration date of the file.

expiration date (of a tape)

Until this date is reached, a *reserved tape* is available for the user (to be more precise: the user ID) which has been entered. Afterwards it is transferred to the pool of *free tapes*.

foreign tape

This tape is not owned by the local data center. It is imported to the *MAREN catalog* by a user via the administrator with the purpose of being processed in the local data center for a limited period of time.

free pool

This is the set of free tapes available for new reservations.

free tape

This is a *tape* in the local data center which can be reserved by a user when required.

key box

This is a special ISAM file in which MAREN stores the *encryption keys*. The system key box `$SYSMAREN.MAREN.KEY-BOX` on the system's home pubset must contain the encryption keys of all tapes which may be decrypted on this system. A maximum of one encryption key of the system key box is defined as the write encryption key for writing encrypted tape contents.
"Private" key boxes are used for storing copied keys or for backup copies. MAREN uses a transfer key box specifically for exporting/importing encrypted tapes.

key ID

The key ID is assigned by MAREN and is used to find the *encryption key*, which is required for decryption. It is assigned by MAREN and is globally unique, the encryption key administrator being able to specify the first 4 characters on a user-specific basis.

key value

The key value can be up to 256 bytes in length and is used to encrypt the *data key*. The encryption key administrator specifies the key value when the *encryption key* is generated.

locally available

A tape is locally available if the catalog entry field TEMP-LOCATION in the *volume catalog* indicates a location in the vicinity of the local data center. Locations of this kind are defined in the MAREN parameter set with "L".

location

Archive containing tapes and tape devices in the local data center. A location is identified by its name, type and *operating mode*.

MAREN administrator

The MAREN administrator monitors and manages the MAREN operation. MAREN administrators identify themselves by entering the MAREN password. When the software product SECOS is used, the user ID (SYSMAREN) of the MAREN administrator should have the TAPE-ADMINISTRATION privilege. When domains are used two different administrator roles exist:

– The Domain Administrator (DA)
  DAs are permitted to execute statements of the MARENADM administrator program within their own domain. They may not work in other domains.
– The All-Domain Administrator (ADA)
  ADAs administer the domains using special statements of the MARENADM administrator program. Furthermore they are permitted to perform DA tasks in all domains. To do this they can explicitly adopt the role of the DA. The default domain- and system-specific parameters then apply for the ADA. The ADA must have authorization to execute statements on at least one *system* in the *MAREN network*.

MAREN catalog

Central database of the MAREN containing all information on the administered tapes. The MAREN catalog comprises the *volume catalog* with the *catalog entry field*, secondary index files and possibly logging files (if any).

MAREN encryption key administrator

When data volume encryption is used, the encryption key administrator manages the *encryption keys* of his/her domain. The user ID with the privilege TAPE-KEY-ADMINISTRATION has the authorization for this task.
The administrator's tasks comprise:

– creating *encryption keys*
– defining the *encryption key* for encryption
– managing *key boxes*
– importing *encryption keys* of foreign tapes
– Additional storage of the encryption data at a secure location to enable it to be reconstructed in the event of a disaster

MAREN network

A MAREN network consists of all the *systems* which access the same *MAREN catalog*.

MAREN parameters

The MAREN parameters control execution of MAREN and the control programs MARENCP and MARENUCP. The following types of MAREN parameter exist:

- System-specific parameters which are defined with the MARENADM statements EDIT-/MODIFIY-MAREN-PARAMETERS.
- Domain-specific parameters which are defined with the MARENADM statement MODIFIY-DOMAIN-PARAMETERS.
- Global parameters which are defined with the MARENADM statement MODIFIY-GLOBAL-PARAMETERS.

MAREN transaction

Access to the *MAREN catalog* via the control program MARENCP.

MAREN user

Generic term for the nonprivileged MAREN user (*MAREN user*) and the privileged MAREN user (*MAREN administrator*).

MAREN user (nonprivileged)

Possesses no special privileges. He/She reserves *free tapes* and manages his/her *own tapes* with the MAREN user program.

offline logging

If the *MAREN catalog* is not available for any reason, offline logging can be activated. This means that processing continues without the MAREN catalog but that logging records continue to be written. This is only possible if the control task MARENCP continues to run. Once the error has been recovered, a current MAREN catalog can be generated using the UPDATE-MAREN-CATALOG statement. Offline logging is activated if a MARENCP ENTER file without the link name MARENCAT is started.

operating mode

MAREN determines the *archive system* to which it is to send its jobs not only from the locations and the archive systems, but also from the operating mode of the *location*. The operating modes are “EXTERNAL”, “ROBAR-1” and “ROBAR-2”.

reserved tape

This is a tape which *belongs to the user* and which is assigned to a certain user (and therefore a user ID) for a limited period of time. The reservation can be made explicitly using the RESERVE-FREE-VOLUME MAREN statement or implicitly, e.g. via the *scratch request*. Reservation is terminated when the *expiration date* is reached.

scratch request

A tape is requested but no archive number is specified.

secondary indexes

The MAREN catalog contains secondary indexes for the user ID and the file name in addition to the tape-related ISAM index. ISAM access to an catalog entry is therefore now also possible via the secondary indexes for the user ID and the file name.

spin off

If a statement is rejected in a procedure or batch task because of a syntax error, or if the statement is aborted or not executed due to a processing error, all subsequent statements through to the next STEP statement are skipped. If the sequence of statements contains no further STEP statement, the spin off mechanism (spin off for short) is triggered when the program is ended (END). All commands through to the next SET-JOB-STEP, EXIT-JOB, LOGOFF, CANCEL-PROCEDURE, END-PROCEDURE or EXIT-PROCEDURE command, or to the end of the procedure or the ENTER file are skipped.

standard domain (STD-DOM)

A standard domain contains the tapes which can be processed on all *systems*. Systems do not generally belong to the standard domain.

system

Generic term for various BS2000 servers, virtual machines, and Server Units with BS2000 (SU /390, SU x86 on SE servers) which operate with the same *MAREN catalog* in a *MAREN network*.

tape

In the MAREN manuals, **tape** is used as a generic term for all real, virtual, or emulated magnetic tapes when no further distinction need be made. Volume, data carrier, and MTC are commonly used synonyms.
Each tape must have its own unique identification (*archive number*, synonym: VSN).
By analogy, the term **tape device** is used for all devices which accommodate a tape.

tape encryption

A hardware feature of LTO drives with which data is written to the tape in encrypted form or the data is decrypted again when the volume is read.

tape set

The tapes belonging to a file version form a tape set in the MAREN catalog. However, the term is independent from the term as it is used in various BS2000 commands (e.g. CREATE-TAPE-SET).

tape status

A tape's availability which is stored in the *MAREN catalog* as an attribute. A tape can be freely available (FREE) or reserved for a particular user (RESERVED). Foreign tapes are managed with the status FOREIGN or PRIVATE.

temporarily locked tape

A tape is locked temporarily when the MAREN administrator adds a tape with the same archive number to the MAREN catalog.
The lock remains valid until this tapes, usually a foreign tape, is deleted from the MAREN catalog. The temporarily locked tape cannot be processed again until it has been made available again in this way.

user's own domain

The user's own domain is the domain on the *system* in which the ADA or DA is currently working.

user's own tape

This tape is owned by the local data center and is made available to users for a limited period, i.e. reserved in the MAREN catalog for its user ID.

virtual tape

A virtual *tape* is not a real storage medium. This storage area is reserved for the virtual tape on a real storage medium. The storage area is processed in the same way as a real tape. From the viewpoint of the user, only the virtual tape exists, the real one is transparent.
The ETERNUS CS archive system, for instance, uses virtual tapes.

volume

Data storage medium from the BS2000 point of view. Each volume is managed by the BS2000 under its own unique VSN (Volume Sequence Number). In the MAREN manuals, as a rule the term *tape* is used. For historical reasons, some other terms are also used in MAREN: *volume catalog*, *volume group*.

volume catalog

File of the *MAREN catalog*. The volume catalog comprises the global parameter set, the system-specific parameters sets and the catalog entry containing information on all *tapes* managed in the MAREN.

volume group

Logically related tapes are combined by the *MAREN user to form a volume group.* Via a name the user has selected, he/she addresses the tapes of a volume group in particular MAREN and MARENADM statements. The volume group is an additional catalog entry field in the *volume catalog*, not a separate administrative unit. All files on a tape belong to the same volume group.

write encryption key

An *encryption key* with which the relevant data key is encrypted when encrypted adata is written. The encryption key administrator defines which encryption key from the system *key box* is used as the write encryption key.

Related publications

You will find the manuals on the internet at *http://manuals.ts.fujitsu.com*. You can order printed versions of manuals which are displayed with the order number.

[1] **MAREN** (BS2000)
Tape Management in BS2000
MAREN Administration
System Administrator Guide

[2] **ASSEMBH**
Description

[3] **BS2000OSD/BC**
Commands
User Guide

[4] **BS2000 OSD/BC**
Introduction to System Administration
User Guide

[5] **BS2000 OSD/BC**
Utility Routines
User Guide

[6] **BS2000OSD/BC**
System Installation
User Guide

[7] **JV** (BS2000)
Jobvariablen
Benutzerhandbuch

[8] **LMS** (BS2000)
User Guide

[9] **SDF** (BS2000)
SDF Dialog Interface
User Guide

[10] **FUJITSU Servers BS2000 SE Series**
Operation and Administration
User Guide

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