DFSMS/MVS Version 1 Release 5

Access Method Services for VSAM Catalogs

SC26-4905-02

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SC26-4905-02

Note|

Before using this information and the product it supports, be sure to read the general information under “Notices” on page ix.

Third Edition (March 1999)

This edition applies to Version 1 Release 5 of DFSMS/MVS (5695-DF1), Release 7 of OS/390 (5647-A01), and any subsequent releases until otherwise indicated in new editions. Make sure you are using the correct edition for the level of the product.

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This book documents intended Programming Interfaces that allow the customer to write programs to obtain services of DFSMS/MVS.

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About This Book

This book is intended to help catalog administrators and VSAM system programmers use access method services commands. It contains reference information about the access method services commands used to manipulate VSAM catalogs and VSAM data sets.

This book gives the syntax, a brief description, and examples of each access method services command used with VSAM catalogs and the objects cataloged in them. For information on the use of commands related to VSAM catalog format and structure, see *DFSMS/MVS Version 1 Release 5 Managing Catalogs*, SC26-4914. For information on the use of commands related to VSAM data set format and structure, see *DFSMS/MVS Version 1 Release 5 Using Data Sets*, SC26-4922.

Required Product Knowledge

To use this book effectively, you should be familiar with:

- Catalog administration
- Job control language
- VSAM data administration.

Required Publications

You should be familiar with the information presented in the following publications:

Publication Title	Order Number
DFSMS/MVS Version 1 Release 5 Macro Instructions for Data Sets	SC26-4913
DFSMS/MVS Version 1 Release 5 Managing Catalogs	SC26-4914
DFSMS/MVS Version 1 Release 5 Using Data Sets	SC26-4922
OS/390 MVS JCL Reference	GC28-1757
OS/390 MVS JCL User's Guide	GC28-1758
OS/390 MVS System Messages, Vol 1 (ABA-ASA)	GC28-1784
OS/390 MVS System Messages, Vol 2 (ASB-EZM)	GC28-1785
OS/390 MVS System Messages, Vol 3 (GDE-IEB)	GC28-1786
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Referenced Publications

Within the text, references are made to the following publications:

Short Title	Publication Title	Order Number
OS/390 MVS Programming: Authorized Assembler Services Guide	*OS/390 MVS Programming: Authorized Assembler Services Guide*	GC28-1763
OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN	*OS/390 MVS Programming: Authorized Assembler Services Reference, Volume 1 (ALESERV-DYNALLO)*	GC28-1764
OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG	*OS/390 MVS Programming: Authorized Assembler Services Reference, Volume 2 (ENFREQ-IXGWRITE)*	GC28-1765
OS/390 MVS Programming: Authorized Assembler Services Reference LLA-SDU	*OS/390 MVS Programming: Authorized Assembler Services Reference, Volume 3 (LLACOPY-SDUMPX)*	GC28-1766
OS/390 MVS Programming: Authorized Assembler Services Reference SET-WTO	*OS/390 MVS Programming: Authorized Assembler Services Reference, Volume 4 (SETFRR-WTOR)*	GC28-1767
DFSMS/MVS DFSMSdfp Diagnosis Reference	*DFSMS/MVS Version 1 Release 5 DFSMSdfp Diagnosis Reference*	LY27-9606
DFSMS/MVS Macro Instructions for Data Sets	*DFSMS/MVS Version 1 Release 5 Macro Instructions for Data Sets*	SC26-4913

Short Title	Publication Title	Order Number
DFSMS/MVS Managing Catalogs	*DFSMS/MVS Version 1 Release 5 Managing Catalogs*	SC26-4914
DFSMS/MVS Installation Exits	*DFSMS/MVS Version 1 Release 5 Installation Exits*	SC26-4908
DFSMS/MVS Using Data Sets	*DFSMS/MVS Version 1 Release 5 Using Data Sets*	SC26-4922
DFSORT Application Programming Guide R14	*DFSORT Application Programming Guide Release 14*	SC33-4035
OS/390 TSO/E Command Reference	*OS/390 TSO/E Command Reference*	SC28-1969
OS/390 TSO/E User's Guide	*OS/390 TSO/E User's Guide*	SC28-1968
OS/390 MVS System Messages, Vol 1 (ABA-ASA)	*OS/390 MVS System Messages, Volume 1 (ABA-ASA)*	GC28-1784
OS/390 MVS System Messages, Vol 2 (ASB-EZM)	*OS/390 MVS System Messages, Volume 2 (ASB-EZM)*	GC28-1785
OS/390 MVS System Messages, Vol 3 (GDE-IEB)	*OS/390 MVS System Messages, Volume 3 (GDE-IEB)*	GC28-1786
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OS/390 MVS System Messages, Vol 5 (IGD-IZP)	*OS/390 MVS System Messages, Volume 5 (IGD-IZP)*	GC28-1788

References to Product Names Used in DFSMS/MVS Publications

DFSMS/MVS publications support DFSMS/MVS, 5695-DF1, as well as the DFSMSdfp base element and the DFSMShsm, DFSMSdss, and DFSMSrmm features of OS/390, 5647-A01. This section explains the conventions used in our library when referencing these product names:

- *MVS* refers to:
  - MVS/ESA SP Version 5, 5695-047 or 5695-048
  - The MVS base control program (BCP) of OS/390, 5647-A01.

  When a particular product is required, the reference includes the complete name. For more information about OS/390 elements and features, including their relationship to MVS/ESA SP and related products, please refer to *OS/390 Planning for Installation,* GC28-1726.

  All MVS book titles refer to the OS/390 editions. Users of MVS/ESA SP Version 5, should use the corresponding MVS/ESA book. Refer to the *OS/390 Information Roadmap,* GC28-1727, for titles and order numbers for all the elements and features of OS/390.

- *RACF* refers to:
  - Resource Access Control Facility (RACF), Version 2, 5695-039

  - The RACF element of the OS/390 Security Server, an optional feature of OS/390.

  When a particular product is required, the reference includes the complete name.

  All RACF book titles refer to the Security Server editions. Users of RACF Version 2 should use the corresponding book for their level of the product.

  Refer to *OS/390 Security Server (RACF) Introduction,* GC28-1912, for more information about the Security Server.

- *CICS* refers to:

  - CICS/MVS, 5665-403
  - CICS/ESA, 5685-083
  - The CICS element of the CICS Transaction Server for OS/390, 5665-147

  When a particular product is required, the reference includes the complete name. The exception is when used in conjunction with VSAM record-level sharing (RLS), which requires the Transaction Server.

  All CICS book titles refer to the CICS Transaction Server for OS/390 editions. Users of CICS/MVS and CICS/ESA should use the corresponding books for those products.

  Please see *CICS Transaction Server for OS/390: Planning for Installation* for more information.

Summary of Changes

This section no longer includes the product highlights. For similar information, please see these books:

- *DFSMS/MVS Planning for Installation,* SC26-4919. This book describes each functional enhancement and its requirements for implementation.
- *DFSMS/MVS General Information,* GC26-4900, “What's New in Version 1 Release 5” provides an overview of each enhancement.

The following sections describe the updates to this book.

Third Edition, March 1999

This publication is a minor revision in support of the functional changes introduced with DFSMS/MVS Version 1 Release 5. This book was last published June, 1994. Vertical lines to the left of the text and illustrations indicate technical changes or additions since the June 1994 version.

This revision also includes maintenance and editorial changes.

The following summarizes the changes to that information:

- Chapter 3, the parameter IMBED is unsupported in DEFINE ALTERNATEINDEX and DEFINE CLUSTER commands.
- Chapter 3, the new required parameter VSAMCATALOG has been added to the DEFINE USERCATALOG command.
- Appendix A, the Device Type Translation table has been updated. The LISTCAT code for IBM 3590 High Performance Tape Subsystem has been added.

Second Edition, June 1994

Minor technical and editorial changes have been made.

Chapter 1. Using Access Method Services

Access method services is a service program used with the virtual storage access method (VSAM) to establish and maintain catalogs and data sets. If you plan to use VSAM, or if you are responsible for maintaining the system catalog, you must use access method services commands.

There are two types of access method services commands: functional commands that are used to request the actual work (for example, defining a data set or listing a catalog) and modal commands that allow the conditional execution of functional commands. The access method services modal commands are presented in Chapter 2, "Modal Command Execution" on page 21. The access method services functional commands and their parameters are listed in alphabetic order in Chapter 3, "Functional Command Syntax" on page 33. Examples of the use of each command are included. TSO users can only use functional commands.

This is a reference book only. See *DFSMS/MVS Managing Catalogs* and *DFSMS/MVS Using Data Sets* for information on the tasks performed using access method services commands.

Tasks Performed by Access Method Services

Figure 1 lists the tasks that can be performed using access method services commands. The "Task" column lists the tasks you might want to perform. The "Description" column further describes the tasks. The "Command" column shows the commands that can be used to perform each task.

Figure 1 (Page 1 of 3). Tasks and Commands

Task	Description	Command
Alter	attributes in catalog entries	ALTER
Attach	user catalog to the master catalog	IMPORT CONNECT
Backup	VSAM catalog	REPRO
	VSAM data set	EXPORT or REPRO
	non-VSAM data set	REPRO
Build	alternate index	DEFINE ALTERNATEINDEX and BLDINDEX
Catalog	VSAM data set	DEFINE CLUSTER
	VSAM data set with alternate index	DEFINE CLUSTER and ALTERNATEINDEX
	non-VSAM data set	DEFINE NONVSAM
	generation data group	DEFINE GENERATIONDATAGROUP
Connect	user catalog to a master catalog or another user catalog	IMPORT CONNECT
	OS CVOL to a master catalog	DEFINE NONVSAM
Convert	non-VSAM data set to VSAM format	REPRO
	VSAM data set to SAM format	REPRO
	OS CVOL entries to VSAM catalog entries	CNVTCAT
Copy	data set or catalog	REPRO

Figure 1 (Page 2 of 3). Tasks and Commands

Task	Description	Command
Define	VSAM catalog	DEFINE USERCATALOG
	alias for a non-VSAM data set	DEFINE ALIAS
	alias for a user catalog	DEFINE ALIAS
	alias for a VSAM data set	DEFINE PATH
	alternate index	DEFINE ALTERNATEINDEX and BLDINDEX
	relationship between an alternate index and its base cluster generation data group	DEFINE PATH DEFINE GENERATIONDATAGROUP
	page space	DEFINE PAGESPACE
	swap data set	DEFINE PAGESPACE
	VSAM data set	DEFINE CLUSTER
	VSAM data space	DEFINE SPACE
	catalog entry for a non-VSAM data set	DEFINE NONVSAM
Delete	user catalog	DELETE USERCATALOG
	alias	DELETE ALIAS
	VSAM data spaces and data sets	ALTER REMOVEVOLUMES
	alternate index and its paths	DELETE ALTERNATEINDEX
	path	DELETE PATH
	any type of catalog entry	DELETE
	VSAM data set	DELETE CLUSTER
	VSAM data space	DELETE SPACE
	generation data group	DELETE GENERATIONDATAGROUP
	non-VSAM data set	DELETE NONVSAM
	page space	DELETE PAGESPACE
Disconnect	user catalog	EXPORT DISCONNECT
Export	user catalog	EXPORT DISCONNECT
	VSAM data set	EXPORT or EXPORTRA
Import	user catalog	IMPORT CONNECT
	VSAM data set	IMPORT or IMPORTRA
Inspect	a key-sequenced data set (KSDS) cluster	EXAMINE
List	password	LISTCAT
	data set's contents	PRINT
	catalog's contents	PRINT
	contents of a catalog or of a catalog entry (formatted)	LISTCAT
	contents of a catalog recovery area	LISTCRA
Load	records into a data set	REPRO
	alternate index	BLDINDEX
Move	catalog to another system	EXPORT DISCONNECT and IMPORT CONNECT

Figure 1 (Page 3 of 3). Tasks and Commands

Task	Description	Command
	VSAM data set to another system	EXPORT/IMPORT
	non-VSAM data set to another system	REPRO
Print	data set	PRINT
Recover	from a processing-program failure	VERIFY
	from a catalog failure	LISTCRA EXPORTRA IMPORTRA and RESETCAT
Rename	data set	ALTER
Restore	data set's end-of-file information	VERIFY
	catalog entry and/or the contents of its object data set from a portable copy	EXPORTRA/IMPORTRA or RESETCAT IMPORT
Uncatalog	data set	DELETE
Unload	data set or catalog	REPRO
Verify	VSAM data set's end-of-file indicators	VERIFY

Notational Conventions

A uniform notation describes the syntax of access method services commands. This notation is not part of the language; it is merely a way of describing the syntax of the commands. The command syntax definitions in this book use the following conventions:

[ ] Brackets enclose an optional entry. You may, but need not, include the entry. Examples are:

- **[***length***]**
- **[MF=E]**

‘ An OR sign (a vertical bar) separates alternative entries. You must specify one, and only one, of the entries unless you allow an indicated default. Examples are:

- **[REREAD‘LEAVE]**
- **[***length***‘'S']**

{ } Braces enclose alternative entries. You must use one, and only one, of the entries. Examples are:

- **BFTEK={S‘A}**
- **{K‘D}**
- **{***address***‘S‘O}**

Sometimes alternative entries are shown in a vertical stack of braces. An example is:

```
MACRF={{(R[C‘P])}
       {(W[C‘P‘L])}
       {(R[C],W[C])}}
```

In the example above, you must choose only one entry from the vertical stack.

. . . An ellipsis indicates that the entry immediately preceding the ellipsis may be repeated. For example:

- **(***dcbaddr***,[(***options***)],. . .)**

A blank (an empty space) indicates that a blank must be present before the next parameter.

UPPERCASE BOLDFACE

Uppercase boldface type indicates entries that you must code exactly as shown. These entries consist of keywords and the following punctuation symbols: commas, parentheses, and equal signs. Examples are:

- **CLOSE , , , ,TYPE=T**
- **MACRF=(PL,PTC)**

UNDERSCORED UPPERCASE BOLDFACE

Underscored uppercase boldface type indicates the default used if you do not specify any of the alternatives. Examples are:

- **[EROPT={ACC‘SKP‘ABE}]**
- **[BFALN={F‘D}]**

Lowercase Italic

Lowercase italic type indicates a value to be supplied by you, the user, usually according to specifications and limits described for each parameter. Examples are:

- *number*
- *image-id*
- *count*.

How to Code Access Method Services Commands

All access method services commands have the general structure:

COMMAND *parameters* **.... [** *terminator***]**

Commands

COMMAND specifies the type of service requested. The parameters further describe the service requested. The terminator indicates the end of the command statement.

Commands can begin at or to the right of the left margin. For batch processing jobs, the default margins are 2 and 72.

Commands are separated from their parameters by one or more separators (blanks, commas, or comments). For some parameters, parentheses are specified as separators. Comments are strings of characters surrounded by a /* and an */. Comments can contain any characters except an */.

Note: The defaulted character set does not contain lower case. See “PARM Command” on page 24 for information on changing the character set used by IDCAMS.

See “Notational Conventions” on page 3 for the notational system used to describe the structure of the command parameters and how to use them. These parameters appear throughout this book, usually in a table at the beginning of each command.

Many of the commands and keyword parameters can be abbreviated. The abbreviations allowed are listed in the description of each command and in Appendix D, “Command Reference Summary” on page 309. Keyword parameters in plural form may also be coded in the singular form. Restrictions that apply to abbreviations under TSO are described under “From a Time Sharing Option (TSO) Terminal” on page 14.

Positional and Keyword Parameters

A parameter can be either a positional parameter or a keyword parameter. Positional parameters must always appear first in a parameter set. In access method services, positional parameters are never optional. For example, in:

```
DELETE -
     USERCAT -
```

USERCAT is a positional parameter that specifies the entryname to be deleted.

A keyword parameter is a specific character string, which may have a value following it. For example, in:

```
VOLUME (25DATA)
```

VOLUME is a keyword that indicates that the value 25DATA is a volume serial number.

A keyword parameter can have a set of subparameters. Subparameters follow the same rules as parameter sets in general. When the subparameters are positional, the first subparameter is always required.

Positional parameters and subparameters sometimes consist of lists of items. Unless the list contains only one item, it must be enclosed in parentheses, which may be preceded and followed by blanks, commas, or comments. For example:

DELETE(*entryname* **[...])**

indicates that, if more than one entry is to be deleted, the list of entrynames must be enclosed in parentheses. However, if only one entryname is specified, the parentheses are not required.

An item in a list can be a parameter set itself. Each such item, as well as the list of items, is enclosed in parentheses. Given:

OBJECTS((*entryname* **NEWNAME (***newname***))...)**

the following are valid:

```
     OBJECTS -
       (ENTRY1 NEWNAME(NEWNAME1))

     OBJECTS -
       ((ENTRY1 NEWNAME(NEWNAME1)) -
       (ENTRY2 NEWNAME(NEWNAME2)))
```

In the first case, only one entry is to be renamed. The entryname and its new name are enclosed in parentheses.

In the second case, each entryname and its new name are enclosed in parentheses and the entire list is enclosed in parentheses.

All parameters and subparameters must be separated from each other by one or more separators (commas, blanks, or comments). There is one exception: Parameters that immediately follow a subparameter set that is enclosed in parentheses need not be separated from the closing parenthesis.

A value cannot contain commas, semicolons, blanks, parentheses, or slashes unless the entire value is enclosed in single quotation marks. A single quotation mark in a field enclosed in single quotation marks must be coded as two single quotation marks.

The values you specify in the parameters can be surrounded by separators. Some values can be longer than a single record. When a value is longer than a single record, you indicate that it is continued by coding a plus sign (+) followed only by blanks or a comment. The first nonseparator character found in a record following the plus sign is treated as a continuation of the value.

In some parameters it is necessary to specify a password following the name of a catalog entry or the name of a JCL DD statement. You do this by coding the name, a slash, and the password. (Separators are allowed on either side of the slash.) For example:

```
DELETE PAYROLL/CTLGPAY
```

specifies the password CTLGPAY for the data set PAYROLL.

When you specify a password following a name, you must remember the convention for entering commands. If you code:

```
MYNAME/*WORD*/
```

MYNAME is treated as a name followed by the comment WORD. If you want *WORD*/ to be the password, you code either:

```
MYNAME/'*WORD*/'
```

or

```
MYNAME/ *WORD*/
```

Notice that the second example contains a blank after the first slash that separates the name from the password.

How to Code Subparameters

The following coding conventions apply to the subparameters listed in this section:

- When the subparameter contains a special character, enclose it in single quotation marks; for example, CODE('*SECRET*').
- When the subparameter contains a special character **and** a single quotation mark, code the embedded quotation mark as two single quotation marks; for example, VOLUMES('one''&').
- When you code the subparameter in hexadecimal form, two hexadecimal characters represent one alphanumeric or special character. Because the character

string will be right justified, you should use an even number of hexadecimal characters; for example, MASTERPW(X'E3D6D7') is the same as MASTERPW(TOP).

- When the subparameter contains a lowercase alphabetic character, it will be folded to an uppercase alphabetic character.

The subparameters most often referred to in this book are:

aliasname
can contain 1 to 44 alphanumeric or national characters, and two special characters (the hyphen (-) and the 12-0 overpunch (X'C0')).

Names that contain more than 8 characters must be segmented by periods; 1 to 8 characters may be specified between periods.

The first character of any name or name segment must be either an alphabetic character or a national character.

code
can contain 1 to 8 alphanumeric or special characters.

entryname
can contain 1 to 44 alphanumeric or national characters, and two special characters (the hyphen (-) and the 12-0 overpunch (X'C0')).

Names that contain more than 8 characters must be segmented by periods; 1 to 8 characters may be specified between periods. A name that is segmented by periods is called a qualified name. Each name segment is referred to as a qualifier.

The first character of any name or name segment must be either an alphabetic character or a national character.

For a partitioned data set, entryname must be specified in the format: pdsname(membername). Blank characters are not allowed between the left and right parentheses enclosing the membername, or between pdsname and the left parentheses.

If you specify an entryname in the format entryname(modifier), and the entryname is not the name of a partitioned data set, only that portion of the name preceding the left parenthesis will be used. The modifier enclosed in parentheses will be ignored.

entrypoint
can contain 1 to 8 alphanumeric or national characters, and two special characters (the hyphen (-) and the 12-0 overpunch (X'C0')).

The first character of any name or name segment must be either an alphabetic character or a national character.

newname
can contain 1 to 44 alphanumeric or national characters, and two special characters (the hyphen (-) and the 12-0 overpunch (X'C0')).

Names that contain more than 8 characters must be segmented by periods; 1 to 8 characters may be specified between periods.

The first character of any name or name segment must be either an alphabetic character or a national character.

ownerid
can contain 1 to 8 EBCDIC characters.

password
can contain 1 to 8 alphanumeric or special characters.

*pdsname***(***membername***)**
specifies the entryname for a partitioned data set. Blank characters are not allowed between the left and right parentheses enclosing the membername, or between pdsname and the left parenthesis.

string
can contain 1 to 255 EBCDIC characters.

volser
a volume serial number, can contain 1 to 6 alphanumeric, national, or special characters.

Alphanumeric, National, and Special Characters

The following is a list of alphanumeric, national, and special characters that are referred to throughout this book:

- Alphanumeric characters:

  alphabetic characters A-Z
  numeric characters 0-9

- National characters:

  at sign @
  dollar sign $
  pound sign #

- Special characters:

  ampersand &
  asterisk *
  blank
  braces { or }
  brackets [or]
  comma ,
  equal sign =
  hyphen -
  parenthesis (or)
  period .
  plus sign +
  semicolon ;
  single quotation mark '
  slash /

How to Continue Commands and Parameters

Commands can be continued on several records or lines. Except for the last line, each record or line must have a hyphen or a plus sign as the last nonblank character before or at the right margin.

A hyphen indicates continuation of the command. A plus sign indicates continuation of the command and continuation of a value within the command.

These two types of continuation are shown in the following example:

```
DELETE -
  (ENTRY1 -
  ENTRY2 -
  ENTR+
    Y3) -
  NONVSAM
```

A blank record or a record ending with a complete comment must end with a continuation mark when it appears in the middle of a command and when it precedes or follows the THEN and ELSE clauses of an IF command.

- IF LASTCC = 0 -
  THEN -
  REPRO ...
  /*COMMENT WITH NO CONTINUATION MARK AFTER*/
  ELSE -
  PRINT ...

Because no continuation mark (hyphen) follows the comments, a null command is assumed. The ELSE keyword will not match up with the THEN keyword.

Records ending with partial comments must always end with a continuation mark. Also, remember that only blank characters may appear between a continuation mark and the end of the record.

Note: The DO-END sequence does not require continuation characters. If continuation characters are used, they may be taken as a null command or cause unpredictable results.

The Terminator

The terminator indicates the end of the command. The terminator can be either a semicolon or the absence of a continuation mark.

If you use the semicolon as the terminator, it cannot be enclosed in quotation marks or embedded in a comment. Everything to the right of the semicolon is ignored.

If there is information to the right of the semicolon that is continued to another record, all the information (including the continued information) is ignored.

For example, if you code:

```
PARM TEST (TRACE); PARM -
GRAPHICS (CHAIN(TN))/*COMMENT*/ -
PRINT ...
REPRO ...
```

Characters following the semicolon terminator are ignored. Because there is a continuation mark (hyphen) at the end of the second record, the PRINT command is also ignored. The first PARM command and the REPRO command are the only commands recognized.

Identifying Data Sets and Volumes

Access method services commands require that both data sets and volumes be identified when they are used. A data set must be identified when it is accessed. A volume or volumes must be identified when VSAM accesses the volume table of contents (VTOC), allocates or releases space using OS/VS DADSM functions, or accesses a catalog recovery area. (See *DFSMS/MVS Managing Catalogs* for information on this option.)

A VSAM data set or volume can be identified through JCL or by the data set name or volume serial number within the command that requires the data set or volume for its execution. If JCL is not used, an attempt is made to dynamically allocate the data set or volume, as required.

Dynamic Allocation

To dynamically allocate a VSAM data set, the data set name must exist and be cataloged. The catalog that contains the entry must be either a user catalog identified with a JOBCAT or STEPCAT DD statement, a user catalog whose name or alias is the first qualifier of the qualified data set name, or the master catalog.

To dynamically allocate a non-VSAM data set, the data set name must exist and must be cataloged. The catalog that contains the entry must be a user catalog identified with a JOBCAT or STEPCAT DD statement, or a user catalog or OS CVOL whose name or alias is the first qualifier of the qualified data set name, or the master catalog.

Access method services dynamically allocates VSAM and non-VSAM data sets with a disposition of OLD.

When a user catalog is identified by name in an access method services command (using the CATALOG parameter) or when VSAM determines that a specific user catalog must be accessed, an attempt is made to dynamically allocate it, if it has not been identified with a JOBCAT or STEPCAT DD statement.

To dynamically allocate a volume, it must already be mounted as permanently resident or reserved. The PRIVATE and PUBLIC use attributes should be carefully considered when you mount a volume.

Password Protection

Data sets may be protected by passwords, Resource Access Control Facility (RACF*), or an equivalent product. The description of each password subparameter defines the level of password or RACF authorization required for the command. A data set may have both password protection and RACF protection, but if RACF is active, password protection is bypassed. See *DFSMS/MVS Managing Catalogs* for more information.

JCL DD Statements

When a JCL DD statement is used to identify a data set, the following information must be included on the DD statement.

- The data set name
- The unit and volume serial number(s), if the data set is not cataloged
- The disposition

- For VSAM data sets, the AMP='AMORG' parameter is required if the JCL also supplies unit and volume serial number information.

For a VSAM Data Set

The two DD statements that follow demonstrate two different methods by which you can describe and allocate a VSAM data set:

```
//VSAMDS1  DD   DSN=VSAM.DATA.SET1,DISP=OLD
//VSAMDS2  DD   DSN=VSAM.DATA.SET2,VOL=SER=VSER01,
//              UNIT=3380,DISP=OLD,AMP='AMORG'
```

Access method services does not provide specific protection for data sets in a shared environment. Therefore, specify DISP=OLD on the DD statement for any data set that could be accessed improperly in a shared environment.

For a Volume

To identify and allocate a volume, specify the following information:

- The volume serial number
- The disposition
- The unit.

For example, the following DD statement identifies and allocates volume VSER01:

```
//VOLDD    DD   VOL=SER=VSER01,UNIT=3380,DISP=OLD
```

Concatenated DD statements are supported under circumstances explicitly specified in the remainder of this publication.

“Direct Allocation Using JOBCAT and STEPCAT DD Statements” on page 12 contains a description of the DD statements required for user catalogs.

For a Non-VSAM Data Set

Methods of describing and allocating non-VSAM data sets are shown in the DD statements in the examples included in the descriptions of the following commands: BLDINDEX, EXPORT, IMPORT, REPRO, PRINT, EXPORTRA, and IMPORTRA.

For a Snap Dump

If access method services encounters a condition that requires it to abort a job, it takes a snap dump of virtual storage. An AMSDUMP DD statement is required to obtain the snap dump; for example,

```
//AMSDUMP  DD   SYSOUT=A
```

If you do not supply an AMSDUMP DD statement, and access method services encounters a condition requiring the job to be aborted, it produces only an abbreviated dump.

For a Target Data Set

The normal target data set for listing is SYSPRINT. The default parameters of this data set are:

- Record format: VBA
- Logical record length: 125, that is, 121+4
- Block size: 0.

Print lines are 121 bytes in length. The first byte is the ANSI (American National Standards Institute) control character. The minimum specifiable LRECL is 121 (U-format records only). If a smaller size is specified, it is overridden to 121.

You can alter the preceding defaults by specifying other values in the DCB parameter of the SYSPRINT statement. You cannot, however, specify a record format of F or FB. If F or FB are specified, they will be changed to VBA.

For an Alternate Target Data Set

In several commands you have the option of specifying an alternate target data set for listing. When specifying an alternate target data set, you should not specify F or FB record formats.

Note: JCL statements, system messages, and job statistics are written to the SYSPRINT output device, not to the alternate target data set.

Direct Allocation Using JOBCAT and STEPCAT DD Statements

User catalogs can be allocated directly by using a JOBCAT or STEPCAT DD statement. Although this option is supported, its use is not recommended.

You can specify a catalog that is to be available for use only within a job step, or one that is to be available for the entire job. A STEPCAT DD statement identifies a catalog available for a single job step; a JOBCAT DD statement identifies a catalog available during the entire job. When both JOBCAT and STEPCAT catalogs are specified, the user catalog specified by STEPCAT is used for the job step. The JOBCAT and STEPCAT statements you code should be in the form:

```
  //JOBCAT   DD  DISP={OLD‘SHR},
  //             DSNAME=usercatname
```

and

```
  //STEPCAT  DD  DISP={OLD‘SHR},
  //             DSNAME=usercatname
```

Because the master catalog contains information about each user catalog, you do not need to specify the catalog's volume and device information.

You can specify more than one user catalog for a job or job step. To indicate another user catalog, follow the JOBCAT or STEPCAT DD statement with a concatenated DD statement (an unlabeled DD statement that specifies the name of another user catalog):

```
 //STEPCAT DD DISP=SHR,DSN=MGMTCAT1
 //        DD DISP=SHR,DSN=MGMTCAT2
```

Supplying a JOBCAT or STEPCAT DD statement to allocate the catalog is optional when:

- Your job processes a user catalog (when your sequence of access method services commands adds, modifies, lists, or deletes a catalog entry)
- Your job includes a space allocation request directed toward a volume that contains VSAM data spaces (a DEFINE SPACE or DELETE SPACE command)
- Your job causes a VSAM data set to be opened and that data set is defined in a user catalog (that is, a REPRO or PRINT of a VSAM data set, a DELETE with the ERASE option, EXPORT, IMPORT, IMPORTRA, BLDINDEX, or VERIFY).

For information on REPRO and JOBCAT/STEPCAT DD statements, see *DFSMS/MVS Managing Catalogs*.

Supplying a JOBCAT or STEPCAT DD statement to allocate the catalog is required when:

- Your job opens the catalog as a data set (for example, using the PRINT command to print a catalog, using the LISTCRA command with the COMPARE option, or using the VERIFY command to restore end-of-file indicators of a user catalog).
- Your job causes the scheduler allocation of the user catalog to be bypassed because unit and volume information was specified on the DD statement describing the VSAM data set defined in that user catalog.

Invoking Access Method Services

When you want to use an access method services function, you issue a command and specify its parameters. Your request is decoded, one command at a time, and the appropriate functional routines are then called to perform all services required by that command.

You can invoke the access method services program in three ways:

- As a job or job step
- From a TSO terminal
- From within your own program.

  You can execute the IDCAMS program and include the command and its parameters as input to the program. You can also call the IDCAMS program from within another program and pass the command and its parameters to the IDCAMS program. For information on invoking access method services also see Appendix C, “Invoking Access Method Services from Your Program” on page 301.

Time sharing option (TSO) users can execute access method services functional commands from the TSO terminal as though they were TSO commands. (See Appendix C, “Invoking Access Method Services from Your Program” on page 301, for information on invoking access method services.)

As a Job or Jobstep

You can use job control language (JCL) statements to invoke access method services. The examples that illustrate each command's use invoke access method services with JCL statements. You identify the access method services program with PGM=IDCAMS.

```
//YOURJOB  JOB  YOUR INSTALLATION'S JOB=ACCOUNTING DATA
//JOBCAT   DD   DSNAME=YOUR.CATALOG,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//STEPCAT  DD   DSNAME=ANOTHER.CATALOG,DISP=SHR
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *

(access method services commands and their parameters)

/*
```

- //YOURJOB is required. The JOB statement describes your job to the system. Your installation might require you to supply user identification, accounting, and authorization information with the JOB statement's parameters.
- //JOBCAT is optional. The JOBCAT DD statement identifies a user catalog that can be used by each of the job's steps. Because the master catalog is always open and available to all jobs on the system, you should not identify it with a JOBCAT DD statement. Although this option is supported, its use is not recommended.
- //STEP1 is required (that is, an EXEC statement is required). The EXEC statement invokes access method services to decode and process the input statements (the access method services commands and parameters contained in the SYSIN data set). You can use the PARM operand of the EXEC statement to pass parameters to access method services. See the description of the PARM command in Chapter 2, “Modal Command Execution” on page 21, for an explanation of the options you can specify.
- //STEPCAT is optional. The STEPCAT DD statement identifies a user catalog that can be used when processing the jobstep. If user catalogs are identified with JOBCAT and STEPCAT DD statements, only the catalog(s) identified with the STEPCAT DD statement and the master catalog are used with the jobstep. Because the master catalog is always open and available to all jobs on the system, you should not identify it with a STEPCAT DD statement. Although this option is supported, its use is not recommended.
- //SYSPRINT is required. The SYSPRINT DD statement identifies the output device (usually a printer in a batch job) to which access method services sends messages and output information. (See “For a Target Data Set” on page 11 for more details on how to describe an output device other than SYSOUT=A.)
- //SYSIN is required. The SYSIN DD statement identifies the source of the input statements. An input statement is a functional or modal command and its parameters. When you code SYSIN DD *, you identify the immediately following statements as input.

The last input statement may be followed by a delimiter statement that has “/*” in the first two columns. The restrictions that apply to all access method services commands are described in “How to Code Access Method Services Commands” on page 4.

From a Time Sharing Option (TSO) Terminal

TSO is a subsystem that provides conversational time sharing from remote terminals. You can use TSO with VSAM and access method services to:

- Execute access method services commands
- Execute a program to call access method services.

When you use TSO to process your data, you can invoke access method services from your TSO terminal. Each time you issue an access method services command as a TSO command, TSO builds the appropriate interface information and invokes access method services.

You can issue one command at a time. Access method services processes the command completely before TSO allows you to continue processing. All the access method services functional commands referred to in this book are supported in a TSO environment.

When TSO is used with access method services, the following differences must be observed:

- TSO allows the initial characters of a keyword to be supplied as an abbreviation of the keyword. The only restriction is that enough initial characters must be supplied to make the keyword unique. TRACKS, for example, could be abbreviated TR, TRA, or TRAC, because no other keyword within the same command can be abbreviated in the same way.

  Some abbreviations that are acceptable to access method services, such as CYL, CYLINDER, REC, RECORD, cannot be used under TSO because the abbreviations do not contain enough initial characters to make the keyword unique. TSO cannot tell whether you mean CYLINDERS or CYLINDERFAULT when CYL or CYLINDER is used. Similarly, abbreviations REC and RECORD are ambiguous; TSO does not know if you mean RECORDS or RECORDSIZE.
- In addition, the abbreviations described in the remainder of this publication (for example, TRK for TRACKS) are acceptable to TSO.
- When a parameter's value consists of a list of one or more parenthesized parameter sets, the outer parentheses surrounding the list are always required. For example, if lowkey and highkey form a parameter set that can be repeated several times, then the outer parentheses are required even when just one parameter set is specified; as follows:

  ```
  KEYWORD((lowkey highkey))
  ```
- Under TSO, a volume serial number can consist of alphabetic, national, numeric, or special (hyphen only) characters; if any other characters are used, the volume serial number cannot be used as an entryname under TSO.
- A data set name can be specified in quotation marks or not in quotation marks. Under TSO, however, a prefix (for example, the userid) is added to a name that is not in quotation marks. The prefix becomes the first qualifier in the name.
- Under TSO, a password can be supplied with any entryname; the password is ignored if not required.

  Note: At a TSO terminal, the logon password is checked before you are prompted to supply a password for a cluster. Checking the logon password counts as one attempt to obtain a password. If you have not specified ATTEMPTS in the DEFINE command, only one attempt to supply the catalog's password is allowed because the default is two.
- Under TSO, the necessary qualifiers are added to the name specified. However, in some cases you are prompted to complete a fully qualified name. You are also prompted to supply any required parameters that may have been omitted.
- The modal commands, used to control execution (IF-THEN-ELSE command sequence, DO-END command sequence, SET, and PARM), are not allowed under TSO.
- Under TSO, the SYSPRINT data set is not used. The OUTFILE parameter may be used in certain commands to specify a data set to receive the output produced from access method services.

For details about the format of a displayed catalog entry (resulting from a LISTCAT command) for a TSO user, see Appendix A, “Interpreting LISTCAT Output Listings” on page 249.

Other TSO restrictions are noted with the descriptions of each appropriate parameter.

For details about writing, executing programs and allocating data sets with TSO, see *OS/390 TSO/E User's Guide*, and *OS/390 TSO/E Command Reference*.

Order of Catalog Use

You can specify the catalog to be searched or selected for an entry with the CATALOG parameters, or with a JOBCAT DD or STEPCAT DD statement.

Catalog Search Order for ALTER

1. If a catalog is specified in the CATALOG parameter, only that catalog is searched. If the entry is not found, a “no entry found” error is returned.
2. Any user catalog(s) specified in the current job step with a STEPCAT DD statement is searched. If more than one catalog is specified for the job step, the catalogs are searched in order of concatenation. If the entry is found, no other catalog is searched.

   If a STEPCAT catalog is specified and the entry is not found, the JOBCAT catalog is not searched. The catalog search continues with step 3.

   If no STEPCAT catalog is specified for the job step, and a user catalog is specified for the current job with a JOBCAT DD statement, the JOBCAT catalog(s) is searched. If more than one catalog is specified for the job, the catalogs are searched in order of concatenation. If the entry is found, no other catalog is searched.
3. If the entry is identified with a qualified entryname, it is not of the generic form, and its first qualifier is either:

   The name of a user catalog
   The alias of a user catalog
   The alias of an OS CVOL.

   The user catalog or OS CVOL so identified is searched. If the entry is found, no other catalog is searched.
4. The master catalog is searched.
5. If the entry is not found in any of the indicated catalogs, a “no entry found” error is returned to the user.

Catalog Selection Order for BLDINDEX

1. If a catalog is specified with the CATALOG parameter, that catalog is selected to contain work file entries.
2. The user catalog specified in the current job step (STEPCAT) or, if none is specified for the job step, the user catalog specified for the current job (JOBCAT) is selected to contain the work file entries. If more than one catalog is specified for the job or job step, the first STEPCAT or JOBCAT catalog is selected to contain the work file entries.
3. If the entries (data set name on the DD statement) are identified with qualified entrynames and the first qualifier is either:

   The name of a user catalog
   The alias of a user catalog.

The user catalog so identified is selected to contain the work file entries.

4. The master catalog is selected to contain the work file entries.

Catalog Selection for CNVTCAT

The target catalog selected to receive the converted entries is the catalog specified in the OUTFILE, OUTDATASET, or CATALOG parameter.

The source catalog (the catalog that contains the entries to be converted) is the catalog specified in the INFILE or INDATASET parameter.

If there are alias entries for OS CVOLs, the master catalog always receives alias entries that point to OS CVOLs.

Catalog Selection Order for DEFINE

1. If a catalog is specified in the CATALOG parameter, that catalog is selected to contain the entry to be defined.
2. When a non-VSAM generation data group (GDG) data set is defined, the catalog containing the GDG base is selected to contain the non-VSAM entry still to be defined.
3. The first user catalog specified in the current job step (STEPCAT) or, if none is specified for the job step, the first user catalog in the current job (JOBCAT) is selected to contain the entry to be defined. ("Direct Allocation Using JOBCAT and STEPCAT DD Statements" on page 12 describes how to specify a user catalog for the current job or job step.)
4. If no user catalog is specified for the current job or job step, the entry's name is a qualified name, and the first qualifier (the first one to eight characters before the period) is either:

   The name of a user catalog
   The alias of a user catalog.

   The catalog so identified is selected to contain the entry to be defined.
5. If no catalog has either been explicitly or implicitly identified, VSAM defines an object in the master catalog.

Catalog Search Order for DELETE

If this is not a generic delete, the order in which catalogs are searched to locate an entry to be deleted is:

1. If a catalog is specified in the CATALOG parameter, only that catalog is searched. If the entry is not found, a "no entry found" error is returned.
2. Any user catalog(s) specified in the current job step (with a STEPCAT DD statement) is searched. If more than one catalog is specified for the job step, the catalogs are searched in order of concatenation. If the entry is found, no other catalog is searched.

   If a STEPCAT catalog is specified and the entry is not found, the JOBCAT catalog is not searched. The catalog search continues with step 3.

   If no STEPCAT catalog is specified for the job step, and a user catalog is specified for the current job (with a JOBCAT DD statement), the JOBCAT catalog(s) is searched. If more than one catalog is specified for the job, the catalogs are searched in order of concatenation. If the entry is found, no other catalog is searched.

3. If the entry is identified with a qualified entryname and its first qualifier is:

   The name of a user catalog
   The alias of a user catalog
   The alias of an OS CVOL.

   the user catalog or OS CVOL so identified is searched. If the entry is found, no other catalog is searched.

4. If the entry is not found, the master catalog is searched. If the entry is not found in the master catalog, a “no entry found” error is returned to the user.

If this is a generic delete, the order in which catalogs are searched to locate all applicable entries to be deleted is:

1. If a catalog is specified in the CATALOG parameter, only that catalog is searched. If an entry that matches the supplied qualifiers is not found, a “no entry found” error is returned.

2. Any user catalog(s) specified in the current job step (with a STEPCAT DD statement) is searched. If more than one catalog is specified for the job step, the catalogs are searched in order of concatenation. The JOBCAT catalog is not searched. The catalog search continues with step 3.

   If no STEPCAT catalog is specified for the job step, and a user catalog is specified for the current job (with a JOBCAT DD statement), the JOBCAT catalog(s) is searched. If more than one catalog is specified for the job, the catalogs are searched in order of concatenation. The catalog search continues with step 3.

3. If the entry is identified with a qualified entryname and its first qualifier is:

   The name of a user catalog
   The alias of a user catalog
   The alias of an OS CVOL.

   the user catalog or OS CVOL so identified is searched. The catalog search continues with step 4.

4. The master catalog is searched.

5. If an entry has not been found in any of the catalogs searched that matches the supplied qualifiers, a “no entry found” error is returned.

Warning: If the generic form of entryname is used to delete catalog entries, and the catalog is not specified via the CATALOG parameter, entries may be deleted from the master catalog if they meet the specified qualification.

Catalog Search Order for LISTCAT

When the ENTRIES parameter is not specified, or when the command is not executed through TSO and it is not a generic LISTCAT, the order in which catalogs are searched when entries are to be listed using the LISTCAT command is:

1. If a catalog is specified in the CATALOG parameter, only that catalog is listed.

2. The first user catalog specified in the current job step (STEPCAT) or, if none is specified, the first user catalog specified in the current job (JOBCAT) is listed.

3. If no user catalog is specified in the current job or job step, the master catalog is listed.

If the command is not a generic LISTCAT and the ENTRIES or LEVEL parameter is specified; or when the command is executed through TSO, the order in which catalogs are searched when entries are to be listed using the LISTCAT command is:

1. If a catalog is specified in the CATALOG parameter, only that catalog is searched. If the entry is not found, a “no entry found” error is returned.
2. Any user catalog(s) specified in the current job step (STEPCAT) or, if none is specified for the job step, any user catalog(s) specified for the current job (JOBCAT). If more than one catalog is specified for the job or job step, the job or job step catalogs are searched in order of concatenation. If the entry is found, no other catalog is searched.
3. When the entry is not found, and the entry's name is a qualified name, with a first qualifier (the first 1 to 8 characters before a period) that is:

   The name of a user catalog
   The alias of a user catalog
   The alias of an OS CVOL.

   that user catalog or OS CVOL is searched. If the entry is found, no other catalog is searched.
4. The master catalog is searched. If the entry is not found, a “no entry found” error is returned.

When the ENTRIES parameter is specified and this is a generic LISTCAT, the order in which catalogs are searched is:

1. If a catalog is specified in the CATALOG parameter, only that catalog is searched. If an entry is not found that matches the supplied qualifiers, a “no entry found” error is returned.
2. Any user catalog(s) specified in the current job step (STEPCAT) or, if none is specified for the job step, any user catalog(s) specified for the current job (JOBCAT). If more than one catalog is specified for the job or job step, the job or job step catalogs are searched in order of concatenation. The catalog search continues with step 3.
3. If the entry's name is a qualified name, and the first qualifier (the first 1 to 8 characters before a period) is:

   The name of a user catalog
   The alias of a user catalog
   The alias of an OS CVOL.

   that user catalog or OS CVOL is searched. The catalog search continues with step 4.
4. The master catalog is searched. If an entry has not been found in any of the catalogs search that matched the supplied qualifiers, a “no entry found” error is returned to the user.

Chapter 2. Modal Command Execution

This chapter describes the modal commands and condition codes, followed by modal command examples.

- IF-THEN-ELSE command sequence controls command execution on the basis of condition codes
- NULL command specifies no action be taken
- DO-END command sequence specifies more than one functional access method services command and its parameters
- SET command resets condition codes
- CANCEL command terminates processing of the current job step
- PARM command specifies diagnostic aids and printed output options.

These commands cannot be used when access method services is executed under TSO.

IF-THEN-ELSE Command Sequence

The IF-THEN-ELSE command sequence is used to control command execution. The syntax of the IF-THEN-ELSE command sequence is:

IF	**{LASTCC‘MAXCC}** *operator number* **THEN[** *command*‘ **DO** *command set* **END]** **[ELSE[** *command*‘ **DO** *command set* **END]]**

where:

IF specifies that one or more functional commands are to be executed based on a test of a condition code. The condition code is set by a SET command or is set to reflect the completion status of previous functional commands.

LASTCC
specifies that the condition code value that resulted from the immediately preceding function command is to be compared, as indicated by the *operator*, to the number following the *operator*. For the meaning of condition codes, see “Condition Codes” on page 26.

MAXCC
specifies that the maximum condition code value that has been established by any previous function command or by a SET command is to be compared, as indicated by the *operator*, to the number following the *operator* to determine whether the THEN action is to be performed. For the meaning of condition codes, see “Condition Codes” on page 26.

operator

specifies the comparison to be made between the variable and the following number. There are six possible comparisons:

Equal, specified as = or EQ
Not equal, specified as ¬= or NE
Greater than, specified as > or GT
Less than, specified as < or LT
Greater than or equal, specified as >= or GE
Less than or equal, specified as <= or LE.

number

specifies the decimal integer that is to be compared with MAXCC or LASTCC. Both LASTCC and MAXCC are initialized to zero upon entry to access method services. For the meaning of condition codes, see "Condition Codes" on page 26.

THEN

specifies that a single command or a group of commands (introduced by DO) is to be executed if the comparison was true. THEN can be followed by another IF command.

ELSE

specifies that a single command or a group of commands (introduced by DO) is to be executed if the previous comparison is false. ELSE can be followed by another IF command.

When an IF command appears in a THEN or ELSE clause, it is called a nested IF command. The maximum level of nesting allowed is 10, starting with the first IF specified. Within a nest of IF commands, the innermost ELSE clause is associated with the innermost THEN clause, the next innermost ELSE clause with the next innermost THEN clause, and so on. (To say it another way, each ELSE is matched with the nearest preceding unmatched THEN.) Should there be an IF command that does not require an ELSE clause, follow the THEN clause with a null ELSE clause (ELSE), unless the nesting structure does not require one.

Null Commands

If THEN or ELSE is not followed by a continuation character or by a command in the same record, the THEN or ELSE results in no action.

The null command supports an ELSE command that balances an IF-THEN-ELSE command sequence, and allows null THEN commands. The null command is, in essence, a THEN or ELSE command that is not followed by a command continuation character.

To indicate a null ELSE command, specify:

```
ELSE
```

To indicate a null THEN command, specify:

```
IF ... THEN
ELSE ...
```

The null command is used to indicate that no action is to be taken if the IF clause is satisfied (a null THEN command), or if the IF clause is not satisfied (a null ELSE command).

DO-END Command Sequence

DO
specifies that the group of commands that follow is to be treated as a single unit, that is, to be executed as a result of a single IF command. The set of commands is terminated by END. A command following a DO must begin on a new line.

END
specifies the end of a set of commands initiated by the nearest unended DO. END must be on a line by itself.

Note: Continuation characters should not be used in the DO-END sequence; they may be taken as a null command or cause unpredictable results.

SET Command

The SET command is used to change or reset a previously defined condition code. (For the meaning of condition codes, see “Condition Codes” on page 26.) It is possible to terminate all processing merely by setting MAXCC or LASTCC to 16. The syntax of the SET command is:

SET	**{MAXCC‘LASTCC}=***number*

where:

SET
specifies that a condition code value is to be set. A SET command that follows a THEN or ELSE that is not executed does not cause the value of LASTCC or MAXCC to be altered.

MAXCC
specifies that the value to be reset is the maximum condition code set by a previous functional command. Setting MAXCC does not affect the value of LASTCC.

LASTCC
specifies that the value to be reset is the condition code set by the immediately preceding functional command.

number
specifies the value to be assigned to MAXCC or LASTCC. The maximum value that can be assigned is 16; a greater value will be reduced to 16. If the value assigned to LASTCC is greater than the value of MAXCC, MAXCC is set equal to the higher value.

CANCEL Command

The CANCEL command terminates processing of the current job step. When the CANCEL command is issued, the remainder of the command stream will not be processed, including any part of an unexpected IF-THEN-ELSE statement or DO-END pair. The step will be terminated with a return code in register 15 equal to the value of the highest condition code encountered before the CANCEL command was executed. A termination message will be printed indicating that the CANCEL Command was issued. (See “Condition Codes” on page 26 for the meaning of condition codes.) The syntax of the CANCEL command is:

CANCEL	

The CANCEL command has no parameters.

PARM Command

The PARM command specifies processing options to be used during execution. These options remain in effect until changed by another PARM command. You can also specify these options in the PARM field of an EXEC statement (in the JCL). The syntax of the PARM command is:

PARM	**[TEST(** **{[TRACE]** **[AREAS(***areaid***[** *areaid***...])]** **[FULL((***dumpid***[** *begin***[** *count***]])[(***dumpid***...)...])]‘** **OFF})]** **[GRAPHICS(CHAIN(***chain***)‘TABLE(***mname***))]** **[MARGINS(***leftmargin* *rightmargin***)]**

where:

TEST(
{[TRACE]
[AREAS(*areaid***[** *areaid***...])]**
[FULL((*dumpid[begin[count]]***)[(***dumpid***..)...])]‘**
OFF})

specifies the diagnostic aids to be used. After the TEST option has been established, it remains in effect until it is reset by another PARM command. The TRACE, AREAS, and FULL parameters may be used concurrently. See *DFSMS/MVS DFSMSdfp Diagnosis Reference* for a description of the IDCAMS diagnostic aids and lists of the dump point and area identifiers.

TRACE
specifies that trace tables are to be printed whenever a dump point is encountered.

AREAS(*areaid***[** *areaid***...])**
specifies modules that are to have selected areas of storage dumped at their dump points. *areaid* is a 2-character area identifier defined within the implementation.

FULL((*dumpid*[*begin*[*count*]])[(*dumpid*...)...])

specifies that a full region dump, as well as the trace tables and selected areas, are to be provided at the specified dump points. *dumpid* specifies the 4-character identifier of the dump point.

begin

is a decimal integer that specifies the iteration through the named dump point at which the dump is to be produced. (The default is 1.)

count

is a decimal integer that specifies the number of times that dumps are to be produced. (The default is 1.)

If the FULL keyword is specified, an AMSDUMP DD statement must be provided. For example:

```
//AMSDUMP DD SYSOUT=A
```

OFF

specifies that testing is to stop.

GRAPHICS(CHAIN(*chain*)‘TABLE(*mname*))

specifies the print chain graphic character set or a special graphics table to be used in producing the output.

CHAIN(AN‘HN‘PN‘QN‘RN‘SN‘TN)

specifies the graphic character set of the print chain you want to use. PN is used by the processor unless explicitly directed to use another set of graphics.

AN

Arrangement A, standard EBCDIC character set, 48 characters

HN

Arrangement H, EBCDIC character set for FORTRAN and COBOL, 48 characters

PN

PL/I alphanumeric character set

QN

PL/I preferred alphanumeric character set for scientific applications

RN

Preferred character set for commercial applications of FORTRAN and COBOL

SN

Preferred character set for text printing

TN

Character set for text printing, 120 characters

TABLE(*mname*)

specifies the name of a user-supplied table. This 256-byte table defines the graphics for each of the 256 possible bit patterns. Any character to be printed is translated to the bit pattern found in such a table at the position corresponding to its numeric value (0 through 255). If the print chain does not have a graphic for a byte's bit pattern, the table should specify a period as the output graphic. The table must be stored as a module accessible through the LOAD macro (VS).

MARGINS(*leftmargin rightmargin***)**
specifies that the margins of input records on which command statements are written are to be changed. The normal left and right margins are 2 and 72, respectively. If MARGINS is coded, all subsequent input records are scanned in accordance with the new margins. This feature may be used in conjunction with the comment feature. Respecifying the margins can cause the /* and */ characters to be omitted from the scan and thus cause comments to be treated as commands.

leftmargin
specifies the location of the left margin.

rightmargin
specifies the location of the right margin. The right margin value must be greater than the left margin value.

Condition Codes

The condition codes that are tested in the IF-THEN-ELSE command sequence follow:

Code **Explanation**

0 Indicates the function was executed as directed and expected. Some informational messages might be issued.

4 Indicates that some problem was met in executing the complete function, but it was possible to continue. The continuation might not provide the user with exactly what is wanted, but no permanent harm will have been done by such continuation. A warning message was issued. An example of the kind of problem encountered is:

```
The system was unable to locate an entry in a LISTCAT command.
```

8 Indicates that a requested function was completed, but major specifications were unavoidably bypassed. For example, an entry to be deleted or altered could not be found in the catalog, or a duplicate name was found while an entry was being defined and the define action was terminated.

12 Indicates that the requested function could not be performed. This condition code is set as a result of a logical error. A logical error condition exists when inconsistent parameters are specified, when required parameters are missing, or when a value specified for key length, record size, or buffer space is too small or too large. More information on logical errors that occur during VSAM record processing is in *DFSMS/MVS Macro Instructions for Data Sets*.

16 Indicates that a severe error occurred that caused the remainder of the command stream to be flushed. This condition code might result in the following examples: A system output data set cannot be opened (a SYSPRINT DD statement was missing, for example); an unrecoverable error occurred in a system data set; or access method services encountered improper IF-THEN-ELSE command sequences.

Condition codes that are tested in the IF-THEN-ELSE command sequence or set by the SET command cannot be passed from one job step to the next. However, the maximum condition code value established by any previous functional command or SET command is passed to the operating system when the access method services processor returns control to the system.

Common Continuation Errors in Coding Control Commands

Continuation rules must be used cautiously when modal commands appear in the input stream. (See “How to Continue Commands and Parameters” on page 8.) The following examples show common continuation errors:

-
  ```
  IF LASTCC = 0 -
  THEN
  LISTCAT
  ```

  A continuation mark (hyphen) is missing after the THEN keyword. A null command is assumed after the THEN keyword, and the LISTCAT command is unconditionally executed.

-
  ```
  IF LASTCC = 0 -
  THEN -
  REPRO ...
  /*ALTERNATE PATH*/
  ELSE -
  PRINT ...
  ```

  Because no continuation mark (hyphen) follows the comment, a null command is assumed. The ELSE keyword will not match up with the THEN keyword. Note the correct use of the continuation marks on the other records.

-
  ```
  IF LASTCC = 0 -
  THEN -
  REPRO ...
  ELSE -

  PRINT ...
  ```

  Because a blank line with no continuation mark (hyphen) follows the ELSE keyword, the ELSE becomes null and the PRINT command is unconditionally executed.

-
  ```
  PARM TEST ( - /*COMMENT*/
  TRACE)
  ```

  Because characters other than blanks appear between the continuation mark (hyphen) and the end of the record, the PARM command will not be continued onto the second record.

-
  ```
  PARM TEST ( TRA+
  /*FIELD CONTINUATION*/
  CE)
  ```

Because no continuation was indicated, the end of the PARM command is found after the second record. The command is rejected.

Modal Command Execution Examples

The examples that follow show the use of the IF-THEN-ELSE command sequence, the SET command, the CANCEL command, and the PARM command.

Using Nested IF Commands: Example 1

Nested IF commands are used to determine whether a REPRO, DELETE, or PRINT command is to be executed.

```
IF LASTCC > 4  -
  THEN IF MAXCC < 12  -
    THEN REPRO...
    ELSE DELETE...
  ELSE IF LASTCC = 4  -
    THEN
    ELSE PRINT...
```

If the value of LASTCC is greater than 4, the value of MAXCC is tested. If the value of MAXCC is less than 12, the REPRO command is executed. If the value of MAXCC is 12 or greater, the DELETE command is executed. Again, if the value of LASTCC is 4 or less, LASTCC is tested for being exactly 4; no action is to be taken in this case. If LASTCC is less than 4, the PRINT command is executed.

Using Nested IF Commands: Example 2

Nested IF commands are used to determine whether a REPRO or a PRINT command is to be executed.

```
IF LASTCC > 4  -
  THEN IF MAXCC < 12  -
    THEN REPRO ...
    ELSE
  ELSE IF LASTCC = 4  -
    THEN PRINT ...
```

If the first IF command determines that LASTCC is greater than 4, and the second IF command determines that MAXCC is 12 or greater, no functional commands are executed. The null ELSE command is used here to specify that the next ELSE is to correspond to the first THEN.

Using the MAXCC Parameter: Example 3

If the maximum condition code is 0, an entry from a catalog is listed and a data set is printed. If the maximum condition code is not 0, replace the highest condition code established in processing so far with 8.

```
IF MAXCC=0 THEN DO
  LISTCAT  CATALOG (AMASTCAT/MST27) ENT (MN01.C005)
  PRINT INFILE (AJK006)
  END
  ELSE ...
  SET MAXCC=8
```

Using the LASTCC Parameter: Example 4

If you want to list a catalog and print a data set if the last condition code is 0, but want to list its catalog entry before and after a VERIFY command if the last condition code is greater than 0, specify:

```
IF LASTCC = 0 THEN DO
  LISTCAT
  PRINT INFILE (AJK006)
  END
  ELSE DO
    LISTCAT ENTRY (AJK006) ALL
    VERIFY FILE (AJKJCL6)
    LISTCAT ENTRY (AJK006) ALL
    END
```

Using the CANCEL Command: Example 5

In this example, if the maximum condition code is not 0, the maximum condition code is set to 12 and the step terminated with CANCEL.

```
IF MAXCC=0 -
  THEN DO
    LISTCAT  CATALOG (AMASTCAT/MST27) ENT (MN01.C005)
    PRINT INFILE (AJK006)
    END
  ELSE DO
    SET MAXCC=12
    CANCEL
    END
```

Using the PARM Command: Example 6

In this example, two dumps will be produced on the third and fourth times through the dump point ZZCA.

```
//LISTC JOB ...
//STEP1  EXEC PGM=IDCAMS
//AMSDUMP  DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SYSIN  DD  *
     PARM -
        TEST -
        (FULL -
            (ZZCA 03 02))
     LISTCAT -
           LEVEL(SYS1) -
           ALL
     PARM -
        TEST(OFF)
/*
```

The job control language statement, AMSDUMP DD describes the dump data set. This DD statement is required when FULL is specified.

The PARM command parameters are:

- TEST indicates diagnostic testing is to be done.

- FULL(ZZCA 03 02) specifies that a region dump, as well as the trace tables and selected areas is to be printed the third and fourth time execution passes through dump point ZZCA.

Using the PARM Command: Example 7

In this example a dump will be produced the first time the program goes through dump points ZZCA or ZZCR:

```
//LISTC JOB ...
//STEP1  EXEC PGM=IDCAMS
//AMSDUMP  DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SYSIN  DD  *
     PARM -
        TEST -
        (FULL( -
            (ZZCA 01 01) -
            (ZZCR 01 01)))
     LISTCAT -
           LEVEL(SYS1) -
           ALL
     PARM -
        TEST(OFF)
/*
```

The job control language statement: AMSDUMP DD describes the dump data set. This DD statement is required when the FULL parameter is specified.

The PARM command parameters are:

- TEST indicates diagnostic testing is to be done.
- FULL((ZZCA 01 01)(ZZCR 01 01)) specifies that a region dump, as well as the trace tables and selected areas is to be printed the first time through dump points ZZCA and ZZCR.

Using the PARM Command: Example 8

In this example selected areas of storage will be displayed for selected dump points starting with ZZ or LC:

```
//LISTC JOB ...
//STEP1  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN  DD  *
     PARM -
        TEST -
        (AREAS -
             (ZZ LC))
     LISTCAT -
           LEVEL(SYS1) -
           ALL
     PARM -
        TEST(OFF)
/*
```

Note: An AMSDUMP DD statement is not required in this example.

The PARM command parameters are:

- TEST indicates diagnostic testing is to be done.
- AREAS(ZZ LC) specifies that trace tables and selected areas of storage will be printed. This information is used by service personnel for diagnostic purposes.

Chapter 3. Functional Command Syntax

This chapter contains the access method services functional commands for VSAM catalogs, OS CVOLs, and for VSAM and non-VSAM data sets. The commands are arranged alphabetically, with a summary of the required and optional parameters following each command section. The required parameters are arranged in alphabetic order, with a discussion of the parameter and an abbreviation following. The optional parameters are in the same syntax and follow the required parameters.

Examples of how each command is used are provided at the end of each command.

For an explanation of the symbols used in the command syntax, see “Notational Conventions” on page 3. See “How to Code Subparameters” on page 6 for coding conventions that apply to the subparameters used in access method services commands.

Functional Command Syntax Summary

This section provides reference information about the following functional commands.

- ALTER is used to alter attributes of data sets and catalogs that have already been defined.
- BLDINDEX builds alternate indexes for existing data sets.
- CNVTCAT converts OS CVOL entries into VSAM catalog entries.
- DEFINE defines the following objects:
  - DEFINE ALIAS defines an alternate name for a non-VSAM data set or a user catalog.
  - DEFINE ALTERNATEINDEX defines an alternate index.
  - DEFINE CLUSTER defines a cluster for a key-sequenced, entry-sequenced, or relative record data set.
  - DEFINE GENERATIONDATAGROUP creates a catalog entry for a generation data group.
  - DEFINE NONVSAM defines a catalog entry for a non-VSAM data set.
  - DEFINE PAGESPACE defines an entry for a page space data set.
  - DEFINE PATH defines a path directly over a base cluster or over an alternate index and its related base cluster.
  - DEFINE SPACE defines a VSAM data space.
  - DEFINE USERCATALOG|MASTERCATALOG defines a user catalog.
- DELETE deletes catalogs, VSAM data sets, and non-VSAM data sets.
- EXAMINE analyzes and reports on the structural consistency of the index component and/or data component of a key-sequenced data set cluster.
- EXPORT disconnects user catalogs and exports VSAM data sets.
- EXPORT DISCONNECT disconnects a user catalog.

- EXPORTRA recovers VSAM and non-VSAM catalog entries from catalog recovery areas, and recovers data for VSAM objects (clusters and alternate indexes) by means of catalog recovery areas.
- IMPORT connects user catalogs and imports VSAM data sets.
- IMPORT CONNECT connects a user catalog.
- IMPORTRA reconstructs multiple VSAM data sets from a data set created by the EXPORTRA command.
- LISTCAT lists catalog entries.
- LISTCRA lists or compares the contents of a given catalog recovery area.
- PRINT is used to print VSAM data sets, non-VSAM data sets, and catalogs.
- REPRO copies VSAM and non-VSAM data sets, copies catalogs, unloads and reloads VSAM catalogs.
- RESETCAT compares catalog entries with catalog recovery area (CRA) entries to regain access to catalog data.
- VERIFY causes a catalog to correctly reflect the end of a data set after an error occurred while closing a VSAM data set. The error may have caused the catalog to be incorrect.

ALTER

The ALTER command modifies the attributes of previously defined catalog entries. The syntax of this command is:

ALTER	*entryname*[/*password*] **[ADDVOLUMES(***volser*[*volser*...]**)]** **[ATTEMPTS(***number***)]** **[AUTHORIZATION(***entrypoint*[*string*]**)]** **[BUFFERSPACE(***size***)]** **[CODE(***code***)]** **[CONTROLPW(***password***)]** **[EMPTY‘NOEMPTY]** **[ERASE‘NOERASE]** **[EXCEPTIONEXIT(***entrypoint***)]** **[FILE(***ddname***)]** **[FREESPACE(***CI-percent*[*CA-percent*]**)]** **[INHIBIT‘UNINHIBIT]** **[KEYS(***length offset***)]** **[MASTERPW(***password***)]** **[NEWNAME(***newname***)]** **[NULLIFY(** **[AUTHORIZATION(MODULE‘STRING)]** **[CODE]** **[CONTROLPW]** **[EXCEPTIONEXIT]** **[MASTERPW]** **[OWNER]** **[READPW]** **[RETENTION]** **[UPDATEPW])]** **[OWNER(***ownerid***)]** **[READPW(***password***)]** **[RECORDSIZE(***average maximum***)]** **[REMOVEVOLUMES(***volser*[*volser*...]**)]** **[SCRATCH‘NOSCRATCH]** **[SHAREOPTIONS(***crossregion*[*crosssystem*]**)]** **[TO(***date***)‘FOR(***days***)]** **[UNIQUEKEY‘NONUNIQUEKEY]** **[UPDATE‘NOUPDATE]** **[UPDATEPW(***password***)]** **[UPGRADE‘NOUPGRADE]** **[WRITECHECK‘NOWRITECHECK]** **[CATALOG(***catname*[/*password*]**)]**

Entry Types That Can Be Altered

An “X” in Figure 2 on page 36 indicates you can alter the value or attribute for the type of catalog entry specified. KEYS and RECORDSIZE, when specified for a cluster or alternate index, apply to its data component entry only, and not to the cluster or alternate index entry. Some attributes can be specified only for the cluster's or alternate index's data or index component entry—you must identify the component with its entryname. You can use the LISTCAT command to determine the names generated for the object's components.

When you identify a group of entries with a generic name, entries whose entrynames match the supplied qualifiers are altered if they contain the type of information specified with the ALTER command's other parameters.

You cannot alter the following types of entries: alias entries, a catalog's data or index component entries, or a master catalog's self-describing entries. You cannot change a fixed-length relative record data set into a variable-length relative record data set, or vice versa.

Figure 2 (Page 1 of 2). ALTER Parameters and the Entry Types to Which Each Applies

	Type of Catalog Entry										
Attributes that can be altered	**ALTERNATE INDEX**	**AIX DATA**	**AIX INDEX**	**CLUSTER**	**CLUSTER DATA**	**CLUSTER INDEX**	**PAGESPACE**	**PATH**	**USERCATLG**	**NON VSAM**	**GDG**
ADDVOLUME		X	X		X	X					
ATTEMPTS	X	X	X	X	X	X	X	X	X		
AUTHORIZATION	X	X	X	X	X	X	X	X	X		
BIND		X	X		X	X					
BUFFERSPACE		X			X				X		
CODE	X	X	X	X	X	X	X	X	X		
CONTROLPW	X	X	X	X	X	X	X	X	X		
CYLINDERFAULT		X	X		X	X					
DESTAGEWAIT		X	X		X	X					
EMPTY											X
ERASE		X			X						
EXCEPTIONEXIT		X	X		X	X					
FOR	X			X				X	X	X	X
FREEESPACE		X			X						
INHIBIT		X	X		X	X					
KEYS	X	X		X	X						
MASTERPW	X	X	X	X	X	X	X	X	X		
NEWNAME	X	X	X	X	X	X	X	X		X	
NODESTAGEWAIT		X	X		X	X					
NOEMPTY											X
NOERASE		X			X						
NONUNIQUEKEY		X									
NOSCRATCH											X
NOUPDATE								X			
NOUPGRADE	X										
NOWRITECHECK		X	X		X	X					
NULLIFY	X	X	X	X	X	X	X	X	X	X	X
AUTHORIZATION	X	X	X	X	X	X	X	X	X		
CODE	X	X	X	X	X	X	X	X	X		
CONTROLPW	X	X	X	X	X	X	X	X	X		

Figure 2 (Page 2 of 2). ALTER Parameters and the Entry Types to Which Each Applies

	Type of Catalog Entry										
Attributes that can be altered	**ALTERNATE INDEX**	**AIX DATA**	**AIX INDEX**	**CLUSTER**	**CLUSTER DATA**	**CLUSTER INDEX**	**PAGESPACE**	**PATH**	**USERCATLG**	**NON VSAM**	**GDG**
EXCEPTIONEXIT		X	X		X	X					
MASTERPW	X	X	X	X	X	X	X	X	X		
OWNER	X	X	X	X	X	X	X	X	X	X	X
READPW	X	X	X	X	X	X	X	X	X		
RETENTION	X			X			X	X	X	X	X
UPDATEPW	X	X	X	X	X	X	X	X	X		
OAM [1]											
OWNER	X	X	X	X	X	X	X	X	X	X	X
READPW	X	X	X	X	X	X	X	X	X		
RECORDSIZE	X	X		X	X						
REMOVEVOLUMES		X	X		X	X					
SCRATCH											X
SHAREOPTIONS		X	X		X	X					
TO	X			X			X	X	X	X	X
UNINHIBIT		X	X		X	X					
UNIQUEKEY		X									
UPDATE								X			
UNDATEPW	X	X	X	X	X	X	X	X	X		
UPGRADE	X										
WRITECHECK		X	X		X	X					

1. Alter commands cannot be run against OAM data sets.

ALTER Parameters

Required Parameters

entryname[**/***password*]

names the entry to be altered and supplies a password.

When attributes of a catalog are to be altered, entryname must specify the catalog name.

If the entry has a qualified name (for example, PAYROLL.74.MAY), you can identify the entry with its full name (all qualifiers), or you can substitute an asterisk for any one qualifier but the first. This kind of shortened name (for example, PAYROLL.*.MAY), is called a generic name. You must always specify the first qualifier of a qualified entry name. If you specify the full entry name, only that entry is modified. If you substitute one of the qualifiers with an asterisk, all entries whose entry names match the supplied qualifiers are altered.

For example, when you specify PAYROLL.*, the entries that are altered have names that contain two qualifiers, the first of which is PAYROLL. When you specify PAYROLL.*.MAY, the entries that are altered are the entry names that contain three qualifiers, of which the first is PAYROLL and the third and last is MAY.

You must identify all qualifiers in the qualified name. For example, PAYROLL.* cannot be used to identify a qualified name that contains three or more qualifiers, even if its first qualifier is PAYROLL. Similarly, PAYROLL.81.MAY.* cannot be used to identify a qualified name that has more or fewer than four qualifiers.

See *DFSMS/MVS Managing Catalogs* for a description of how to alter data or index entrynames or cluster entry subparameters.

If you are renaming a member of a non-VSAM partitioned data set, the entryname must be specified in the syntax: pdsname(membername).

You can use generic names to rename a group of cataloged objects. To do this, specify both the entry name and the new name as generic names. For example, if each entry name identified with the generic name A.*.B is to be renamed with the generic name A.*.C, all entry names that have A as the first qualifier and B as the third and last qualifier are renamed. The new names have A as the first qualifiers and C as the third and last qualifiers:

Old Name	New Name
A.$1.B	A.$1.C
A.$2.B	A.$2.C
A.$3.B	A.$3.C

If each entry name identified with the generic name A.B.*.D is to be renamed, all entry names that have A and B as the first and second qualifiers, and D as the fourth and last qualifier, are renamed. If the new generic name is C.*.DATA, the entry names are renamed as follows:

Old Name	New Name
A.B.$1.D	C.$1.DATA
A.B.$2.D	C.$2.DATA
A.B.$3.D	C.$3.DATA

password

specifies the password of the entry or catalog to be altered.

If you are altering a password-protected entry in a password-protected catalog, you must specify a password. The password can be specified with the entryname or in the CATALOG parameter.

- Use the master password for the entry or for the catalog that contains the entry for an alternate index, cluster, page space, path, user catalog, data, or index. Alter RACF authority for an entry or for the catalog is required.
- If a data or index component entry is to be altered, use the master password of the cluster component or catalog. Alter RACF authority for a cluster component or a catalog is required.
- Use the update- or higher-level password of the catalog that contains the entry for non-VSAM and generation data group (GDG). Update or higher RACF authority to the catalog is required.

Optional Parameters

ADDVOLUMES(*volser***[***volser***])**

specifies volumes to be added to the list of candidate volumes. The volumes to be added as candidate volumes must already be owned by the catalog that contains the entry being altered. (Space must have been defined on a volume to be added or the volume must have been identified as a candidate volume.)

Note: If an ALTER ADDVOLUMES is done to a data set that is already opened and allocated, the data set must be closed, reopened, and reallocated before VSAM can extend onto the newly added candidate volume.

Abbreviation: AVOL

ATTEMPTS(*number***)**

specifies the maximum number of times the operator can try to enter a correct password in response to a prompting message. This parameter only has effect when the entry's master password is not null. A prompting message is issued only if the user has not already supplied the appropriate password.

number

is an integer from 0 to 7. When ATTEMPTS(0) is coded, the operator is not prompted and is not allowed to enter a password from the console.

Note to TSO users: At a TSO terminal, the logon password is checked first, before the user is prompted to supply a password. Checking the logon password counts as one attempt to obtain a password. If ATTEMPTS is not specified, the user has one attempt to supply the password, because the default is 2.

Abbreviation: ATT

AUTHORIZATION(*entryname***[** *string***])**

specifies that a user-security-verification routine (USVR) is available for additional security verification.

entryname

specifies the name of the USVR.

string

specifies information to be passed on to the USVR when it receives control to verify authorization. The length defined for the authorization verification record must be from 1 to 256 characters.

Abbreviation: AUTH

BUFFERSPACE(*size***)**

specifies the minimum space to be provided for buffers. It is recommended that the amount specified be not less than the amount specified in the original definition. If the amount is less, VSAM attempts to get enough space to contain two data component control intervals and, if the data is key-sequenced, one index component control interval. BUFFERSPACE can be specified only for a catalog, or the data component of a cluster or alternate index. If BUFFERSPACE is specified for a catalog, then the CATALOG parameter is required.

size

specifies the amount of space to be provided for buffers. If you are altering the bufferspace for a VSAM catalog on a 3380, the decimal values you can specify are 4096, 6144, 8192, 10240, 12288, and 14336. If you are altering the bufferspace for a VSAM catalog not residing on a 3380, the decimal values you can specify are limited to 3072, 4608, 6144, 7680, 9216, and 10752.

size can be expressed in decimal (n), hexadecimal (X'n'), or binary (B'n') form, but must not exceed 16776704. If the size specified is less than the amount VSAM requires, VSAM gets the amount it requires when the data set is opened.

Abbreviations: BUFSP or BUFSPC

CATALOG(*catname***[/***password***])**
specifies the catalog containing the entry to be altered. See "Catalog Search Order for ALTER" on page 16 for information about the order in which catalogs are searched.

catname
specifies the name of the catalog that contains the entry.

password
specifies the master password of the catalog that contains the entry to be altered. If the entry to be altered is password-protected and the catalog is also password-protected, a password must be entered, either through this parameter or through the entryname parameter. Alter RACF authority to the catalog is required.

Abbreviation: CAT

CODE(*code***)**
specifies a code name for the entry being altered. If an attempt is made to access a password protected entry without a password, the code name is used in a prompting message. The code enables the operator or TSO terminal user to be prompted for the password without disclosing the name of the entry.

If CODE is not specified and an attempt is made to access a cluster or component that is password protected without supplying a password, the operator or TSO terminal user is prompted with the name of the entry.

CONTROLPW(*password***)**
specifies a control password for the entry being altered.

Abbreviation: CTLPW

EMPTY‘NOEMPTY
specifies what is to happen when the maximum number of generation data sets has been cataloged.

EMPTY
specifies that, when the maximum number of generation data sets is exceeded, all the generation data sets will be uncataloged.

Abbreviation: EMP

NOEMPTY
specifies that when the maximum number of generation data sets is exceeded, only the oldest generation data set will be uncataloged.

Abbreviation: NEMP

ERASE‘NOERASE
specifies whether the data component is to be erased when its entry in the catalog is deleted.

ERASE
specifies the component is to be overwritten with binary zeros when its catalog entry is deleted.

Abbreviation: ERAS

NOERASE
specifies the component is not to be overwritten with binary zeros when its catalog entry is deleted.

Abbreviation: NERAS

EXCEPTIONEXIT(*entrypoint***)**
specifies the name of the user-written routine that receives control when an exception (usually an I/O error) occurs while the entry's object is being processed.

An exception is any condition that causes a SYNAD exit to be taken. The object's exception exit routine is processed first, then the user's SYNAD-exit routine receives control.

Note: You may not specify this parameter to add an exception-exit routine to a VSAM cluster that is cataloged in a VSAM catalog created in an OS/VS2 Release 2 (or lower release level) system.

Abbreviation: EEXT

FILE(*ddname***)**
specifies one of the following:

- The name of a DD statement that identifies the volume whose catalog recovery area contains a copy of the catalog entry. For a description of catalog recovery area contents for each volume, see *DFSMS/MVS Managing Catalogs*.
- The name of a DD statement that identifies the volume of an entry which will be renamed. The entry must be a non-VSAM data set or the data or index component of a unique cluster, alternate index, or page space.
- The name of a DD statement that identifies a partitioned data set when a member is to be renamed.

If multiple volumes of different device types are to be identified via FILE, you must use concatenated DD statements. If you specify ADDVOLUMES or REMOVEVOLUMES, the volume(s) being added or removed must be identified. If you specify NEWNAME for a non-VSAM data set or the data or index component of a unique cluster, alternate index, or page space that does not reside on the same volume as the catalog recovery area entry, that volume(s) must be identified.

If FILE is not specified, an attempt is made to dynamically allocate the catalog recovery area volume(s) or the object's volume. Therefore, the volume must be mounted as permanently resident or reserved.

FREESPACE(_CI-percent_**[** _CA-percent_**])**

specifies the amount of space (percentage of space) that is to be left free after any allocation and after any split of control intervals (CI-percent) and control areas (CA-percent).

The amounts, as percentages, must be equal to or less than 100. If you specify 100% of free space, one record is placed in each control interval and one control interval is placed in each control area.

This parameter may be specified to alter the data component of a cluster or alternate index.

If the FREESPACE is altered after the data set has been loaded, and sequential insert strategy processing is being used, this allocation of free space may not be honored.

Abbreviation: FSPC

INHIBIT‘UNINHIBIT

specifies whether the entry being altered can be accessed for any operation or only for read operations.

INHIBIT

specifies that the entry being altered is to be read-only.

Abbreviation: INH

UNINHIBIT

specifies that the read-only restriction set by a previous ALTER or EXPORT command is to be removed.

Abbreviation: UNINH

KEYS(_length_ _offset_**)**

specifies the length and offset of the object's key. If the entry being altered defines an alternate index, offset applies to the alternate key in the data records in the base cluster.

Restrictions: KEYS can be specified only if all the following are true:

- The object whose entry is being altered is an alternate index, a path, a key-sequenced cluster, or a data component of a key-sequenced cluster or alternate index.
- The object whose entry is being altered contains no data records.
- The values for KEYS in the object's catalog entry are default values. For default values, see the DEFINE command that defines the object.

If the values for KEYS in the object's catalog entry are not default values, and ALTER KEYS specifies the same nondefault values, processing continues for any other parameters specified on the command, and no error message is issued.

- The new values for KEYS do not conflict with the control interval size specified when the object was defined.
- The key fits within the record whose length is specified by the RECORDSIZE parameter.
- The key fits in the first record segment of a spanned record.

length offset specifies the length of the key (between 1 and 255), in bytes, and its displacement from the beginning of the data record, in bytes.

MASTERPW(*password***)**
specifies a master password for the entry being altered. For more details about the object's master password, see the DEFINE command that defines the object.

- If MASTERPW is not specified, the highest level password specified becomes the password for all higher levels.
- The AUTHORIZATION, CODE, and ATTEMPTS parameters have no effect unless the entry has a master password associated with it.
- With the master password, all operations are allowed.

Note that the master password must exist to alter lower-level passwords. It must be the last level of authority to be altered when nullifying all levels of authority.

Abbreviation: MRPW

NEWNAME(*newname***)**
specifies that the entry to be altered is to be given a new name.

You may not be able to rename a data set if you are changing the high-level qualifiers of the data set's name and those qualifiers are an alias name of a catalog.

If you are changing a high-level qualifier, ALTER NEWNAME will successfully rename a data set, but the renamed data set will remain cataloged in the original (source) catalog. Because the master catalog will not point to the correct user catalog, you will only be able to access the renamed data set by JOBCAT/STEPCAT.

Note: You can not ALTER the data portion of a page space data set to a new name.

To give the altered entry a new name:

- Unless the object being renamed is a path, the object's volume must be mounted because the volume's VTOC is modified.

  You can use the FILE parameter to supply a JCL DD statement to cause the object's volume(s) to be allocated. If you do not supply a DD statement, an attempt is made to dynamically allocate the object's volume(s). The volume(s) must be mounted as either permanently resident or reserved.

  If another program has access to the data set while this operation is being performed, the program may be unable to access the data set after it is renamed. This may result in a failure.

- If you specify generic names, you must specify both the entryname and the newname as generic names. For information on specifying generic names, see *DFSMS/MVS Managing Catalogs*.
- If you are renaming a member of a non-VSAM partitioned data set, the newname must be specified in the syntax: pdsname(membername).
- If you are renaming a VSAM data set that is RACF protected, the existing RACF data set profile will be renamed.
- If a data set profile exists for the new data set name prior to the ALTER command, the command is terminated and the data set name and/or protection attributes remain unchanged.

  If the old profile cannot be found or cannot be altered to the new name, the NEWNAME action will not be completed in the catalog, and an error message will indicate why the action was not completed.

  If the rename fails, it is possible that either the object exists with both the original and the new name, or that the data set was not closed.

Abbreviation: NEWNM

NULLIFY([AUTHORIZATION(MODULE‘STRING)]
[CODE][CONTROLPW][EXCEPTIONEXIT]
[MASTERPW][OWNER][READPW]
[RETENTION][UPDATEPW])

specifies that the protection attributes identified by subparameters of NULLIFY are to be nullified. Attributes are nullified before any respecification of attributes is performed.

If all levels of passwords are nullified and none are respecified, CODE, AUTHORIZATION, and ATTEMPTS have no effect.

Abbreviation: NULL

AUTHORIZATION(MODULE‘STRING)

specifies that either the user-authorization routine or the user-authorization record is to be nullified.

Abbreviation: AUTH

MODULE

specifies that the module name is to be removed from the catalog record, but the module itself is not to be deleted. Both the user-authorization routine and the user-authorization record (character string) are nullified.

Abbreviation: MDLE

STRING

specifies that the authorization record is to be nullified, but the corresponding module is not nullified.

Abbreviation: STRG

CODE

specifies that the code name used for prompting is to be nullified.

CONTROLPW

specifies that the control password is to be nullified.

Abbreviation: CTLPW

EXCEPTIONEXIT

specifies that the entry's exception exit is to be nullified. The module name is removed from the catalog record, but the exception-exit routine itself is not deleted.

Abbreviation: EEXT

MASTERPW

specifies that the master password is to be nullified. If a new master password is not specified and if other passwords exist, the highest level password that exists automatically becomes the password for all higher levels, including the master password.

Abbreviation: MRPW

OWNER

specifies that the owner identification is to be nullified.

READPW

specifies that the read password is to be nullified.

Abbreviation: RDPW

RETENTION

specifies that the retention period which was specified in a TO or FOR parameter is to be nullified.

Abbreviation: RETN

UPDATEPW

specifies that the update password is to be nullified.

Abbreviation: UPDPW

OWNER(*ownerid***)**

specifies the owner identification of the entry being altered.

READPW(*password***)**

specifies a read password for the entry being altered.

Abbreviation: RDPW

RECORDSIZE(*average maximum***)**

specifies new average and maximum lengths for data records that will be contained in the object whose entry is being altered.

If the object whose entry is being altered is a path pointing to the alternate index, the alternate index is altered; if it is a path pointing directly to the base cluster, the base cluster is altered.

If the object whose entry is being altered is an alternate index, the length of the alternate key must be within the limit specified by maximum.

Restrictions: RECORDSIZE can be specified only if all of the following are true:

- The object whose entry is being altered is an alternate index, a cluster, a path, or a data component.
- The average and maximum record lengths of a relative record data set do not become equal if they used to be unequal, or become unequal if they were equal before. You cannot use ALTER to change the average and maximum lengths specified to change a fixed-length relative record data set into a variable-length relative record data set, or vice versa.
- The object whose entry is being altered contains no data records.
- The value for maximum RECORDSIZE in the object's catalog entry is the default value. For default values, see the DEFINE command that defines the object.

  Note: If the value for RECORDSIZE in the object's catalog entry is not the default value, and ALTER RECORDSIZE specifies the same nondefault value, processing continues for any other parameters specified on the command, and no error message is issued.
- For an alternate index, if NONUNIQUEKEY is specified, the record length to be specified accounts for the increased record size resulting from the multiple prime-key pointers in the alternate index data record.
- The maximum record length to be specified is at least seven bytes less than control interval size, unless the record is a spanned record.
- The record length to be specified is large enough to contain all prime and alternate keys previously defined.

Abbreviation: RECSZ

REMOVEVOLUMES(*volser***[** *volser***])**
has two uses:

1. REMOVEVOLUMES specifies volume(s) to be removed from the list of candidate volumes associated with the entry being altered. If you are also adding volumes, the volumes to be removed are removed after the new volumes are added to the candidate list. The name of the data or index component must be specified in the *entryname* parameter.

   Note: If a volume to be removed contains data that belongs to the entry being altered, the volume is not removed.
2. REMOVEVOLUMES specifies volume(s) from which all VSAM data spaces are to be removed and VSAM ownership is to be taken away—without access to the user catalog that owns the volume(s). For this use of REMOVEVOLUMES, the name of the master catalog and its master password (if any) must be specified in the *entryname* parameter, and the FILE parameter is required. (You can have only one DD statement with this use

of ALTER REMOVEVOLUMES—only volumes of the same device type can be processed.)

For information and cautions about this use of ALTER REMOVEVOLUMES, see *DFSMS/MVS Managing Catalogs*.

Abbreviation: RVOL

SCRATCH‘NOSCRATCH
specifies whether generation data sets, when they are uncataloged, are to be removed from the VTOC of the volume on which they reside.

SCRATCH
indicates that the data set's format-1 DSCB is to be removed (scratched) from the VTOC so that the data set can no longer be accessed.

Abbreviation: SCR

NOSCRATCH
indicates that the data set's format-1 DSCB is not to be removed from the VTOC.

Abbreviation: NSCR

SHAREOPTIONS(*crossregion***[** *crosssystem***])**
specifies how a data or index component of a cluster or alternate index can be shared among users. (For a full description of data set sharing, see *DFSMS/MVS Using Data Sets*.)

crossregion
specifies the amount of sharing allowed among regions within the same system or within multiple systems using global resource serialization (GRS). Independent job steps in an operating system or multiple systems using GRS can access a VSAM data set concurrently.

To share a data set, each user must specify DISP=SHR in the data set's DD statement. The values that can be specified are:

1 specifies that the data set can be shared by any number of users for read processing, or the data set can be accessed by only one user for read and write processing. With this option, VSAM ensures complete data integrity for the data set.

2 specifies that the data set can be accessed by any number of users for read processing and it can also be accessed by one user for write processing. With this option, VSAM ensures write integrity by obtaining exclusive control for a control interval when it is to be updated.

If a user requires read integrity, it is that user's responsibility to use the ENQ and DEQ macros appropriately to provide read integrity for the data obtained by the program. (For information on using ENQ and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG*.)

3 specifies that the data set can be fully shared by any number of users. With this option, each user is responsible for maintaining both read and write integrity for the data the program accesses. User programs that ignore the write integrity guidelines can cause VSAM program checks, lost or inaccessible records, irreversible data set failures, and other unpredictable results. This option places heavy responsibility on each user sharing the data set.

4 specifies that the data set can be fully shared by any number of users and buffers used for direct processing are refreshed for each request. This option requires the program to use the ENQ and DEQ macros to maintain data integrity while sharing the data set. Improper use of the ENQ macro can cause problems similar to those described under SHAREOPTIONS 3. (For information on using ENQ and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG*.)

crosssystem

specifies the amount of sharing allowed among systems. Job steps of two or more operating systems can gain access to the same VSAM data set regardless of the disposition specified in each step's DD statement for the data set. To get exclusive control of the data set's volume, a task in one system issues the RESERVE macro. The level of cross-system sharing allowed by VSAM applies only in a multiple operating system environment. The values that can be specified are:

1 Reserved

2 Reserved

3 specifies that the data set can be fully shared. With this option, each user is responsible for maintaining both read and write integrity for the data the program accesses. User programs that ignore write integrity guidelines can cause VSAM program checks, irreversible data set failures, and other unpredictable results. This option places heavy responsibility on each user sharing the data set.

4 specifies that the data set can be fully shared. Buffers used for direct processing are refreshed for each request. This option requires that you use the RESERVE and DEQ macros to maintain data integrity while sharing the data set. (For information on using RESERVE and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference LLA-SDU*.) Writing is limited to PUT-update and PUT-insert processing that does not change the high used RBA if your program opens the data set with DISP=SHR.

Data set integrity cannot be maintained unless all jobs accessing the data set in a cross-system environment specify DISP=SHR. Improper use of the RESERVE macro can cause problems similar to those described under SHAREOPTIONS 3.

Abbreviation: SHR

TO(*date***)‘FOR(***days***)**

specifies the retention period for the entry being altered.

These parameters cannot be specified for the data or index components of clusters, alternate indexes, or catalogs. In the case of a non-VSAM data set the expiration date in the catalog will be updated, but the expiration date in the format-1 DSCB will not be changed.

TO(*date***)**

specifies the date, in the form yyddd, where yy is the year and ddd is the number (001 through 365) of the day through which the entry is to be kept.

FOR(*days***)**

specifies the number of days for which the entry is to be kept. The maximum number that can be specified is 9999.

If the number specified is 0 through 1830, the cluster is retained for the number of days specified; if the number is between 1831 and 9999, the cluster is retained through the year 1999.

UNIQUEKEY‘NONUNIQUEKEY

specifies whether the alternate-key value can be found in more than one of the base cluster's data records.

UNIQUEKEY

specifies that each alternate-key value is unique. If the same alternate-key value is found in more than one of the base cluster's data records, an error results.

UNIQUEKEY can be specified only for an empty alternate index (that is, an alternate index that is defined but not yet built).

Abbreviation: UNQK

NONUNIQUEKEY

specifies that a given alternate-key value might point to more than one data record in the cluster. NONUNIQUEKEY can be specified for an alternate index at any time.

If the alternate index is empty, you should also consider specifying RECORDSIZE to ensure that each alternate index record is large enough to contain more than one data record pointer.

Abbreviation: NUNQK

UPDATE‘NOUPDATE

specifies whether a base cluster's alternate index upgrade set is to be allocated when the path's name is allocated.

UPDATE

specifies that the cluster's alternate index upgrade set is to be allocated when the path's name is allocated with a DD statement.

Abbreviation: UPD

NOUPDATE

specifies that the cluster's alternate index upgrade set is not to be allocated but the path's cluster is to be allocated.

Note: If the path is opened specifying NOUPDATE and sharing a control block structure which specifies UPDATE, the upgrade set has been allocated and the upgrade set may be updated.

Abbreviation: NUPD

UPDATEPW(*password***)**

specifies an update password for the entry being altered.

Abbreviation: UPDPW

UPGRADE‘NOUPGRADE
specifies whether an alternate index is to be upgraded (that is, kept up to date) when its base cluster is modified.

UPGRADE
specifies that the cluster's alternate index is upgraded (to reflect the changed data) when the cluster's records are added to, updated, or erased. If UPGRADE is specified when the cluster is open, the upgrade attribute does not apply to the alternate index until the cluster is closed and then opened (that is, a new set of VSAM control blocks describes the cluster and its attributes).

UPGRADE can be specified only for an empty alternate index (that is, an alternate index that is defined but not built). However, the UPGRADE attribute is not effective for the alternate index until the alternate index is built (see the BLDINDEX command).

Abbreviation: UPG

NOUPGRADE
specifies that the alternate index is not modified when its base cluster is modified. NOUPGRADE can be specified for an alternate index at any time.

Abbreviation: NUPG

WRITECHECK‘NOWRITECHECK
specifies whether a data or index component is to be checked by a machine action called write check when a record is written into it.

This parameter may be specified to alter the data or index components of a cluster or an alternate index.

WRITECHECK
specifies that a record is to be written and then read, without data transfer, to test for the data check condition.

Abbreviation: WCK

NOWRITECHECK
specifies that a record is to be written only.

Abbreviation: NWCK

ALTER Examples

Alter a Cluster's Attributes: Example 1

An ALTER command is used to specify passwords for an entry-sequenced (nonindexed) cluster, D50.EXAMPLE.ESDS1. No password for the cluster is required because the cluster was defined without passwords.

```
//ALTER1   JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
     ALTER -
         D50.EXAMPLE.ESDS1 -
         MASTERPW(DEPT26M) -
         CONTROLPW(DEPT26C) -
         UPDATEPW(DEPT26U) -
         READPW(DEPT26R) -
         AUTHORIZATION(D26AUTH)
/*
```

The ALTER command adds passwords to the entry-sequenced cluster's cluster catalog entry. However, the passwords are not added to the cluster's data entry. If a user's program supplies the cluster's data entry entryname and opens the data component, the unauthorized user can access the cluster's data records even though the cluster itself is password-protected.

The ALTER command's parameters are:

- D50.EXAMPLE.ESDS1, the name of the entry-sequenced cluster.
- MASTERPW, CONTROLPW, UPDATEPW, READPW, and AUTHORIZATION, specify passwords and the *entryname* of the user-security-verification routine.

Alter the Entrynames of Generically Named Clusters: Example 2

Several clusters with similar names, GENERIC.*.BAKER (where * is any 1- to 8-character simple name), are renamed so that their entrynames are GENERIC.*.ABLE. The name “GENERIC.*.BAKER” is called a generic name.

```
//ALTER2   JOB   ...
//JOBCAT   DD    DSNAME=USERCAT4,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    ALTER -
         GENERIC.*.BAKER -
         NEWNAME(GENERIC.*.ABLE)
/*
```

Job control language statement:

- JOBCAT DD makes a catalog available for this job: USERCAT4.

The ALTER command changes each generic entryname, GENERIC.*.BAKER, to GENERIC.*.ABLE. Its parameters are:

- GENERIC.*.BAKER identifies the objects to be modified.
- NEWNAME specifies that each generic entryname GENERIC.*.BAKER is changed to GENERIC.*.ABLE.

Alter the Attributes of a Generation Data Group: Example 3

In this example, the attributes of a generation data group are modified. Because the attributes of the group are cataloged in the generation data group's base catalog entry, only this entry is modified.

```
//ALTER3   JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    ALTER -
         GDG01 -
         NOEMPTY -
         SCRATCH
/*
```

The ALTER command modifies some of the attributes of generation data group GDG01. Its parameters are:

- GDG01 identifies the object to be modified.
- NOEMPTY specifies that only the oldest generation data set is to be uncataloged when the maximum number of cataloged generation data sets is exceeded.
- SCRATCH which specifies that the generation data set's DSCB is to be removed from the volume's VTOC when the data set is uncataloged.

The attributes specified for the ALTER command override any attributes previously specified for the GDG.

BLDINDEX

The BLDINDEX command builds alternate indexes for existing data sets. Note that issuing this command against a variable-length relative record data set results in an error. The syntax of this command is:

BLDINDEX	**{INFILE(***ddname***[/***password***])‘** **INDATASET(***entryname***[/***password***])}** **{OUTFILE(***ddname***[/***password***]** **[** *ddname***[/***password***]...])‘** **OUTDATASET(***entryname***[/***password***]** **[** *entryname***[/***password***]...])}** **[{EXTERNALSORT‘INTERNALSORT}]** **[{SORTCALL‘NOSORTCALL}]** **[SORTDEVICETYPE***(device type)***]** **[SORTFILENUMBER***(number)***]** **[SORTMESSAGEDD***(ddname)***]** **[SORTMESSAGELEVEL({ALL‘CRITICAL‘NONE})]** **[WORKFILES(***ddname ddname***)]** **[CATALOG(***catname***[/***password***])]**

BLDINDEX can be abbreviated: BIX

BLDINDEX Parameters

Required Parameters

INFILE(*ddname***[/***password***])‘INDATASET(***entryname***[/***password***])**

names the DD statement or data set that identifies the base cluster or a path that points to the base cluster.

INFILE(*ddname***[/***password***])**

specifies the DD statement that identifies the base cluster or a path that points to the base cluster. The base cluster must be defined in the same catalog as the alternate index, and must contain at least one data record.

password

If the base cluster or path is password protected, supply the read (or higher-level) password of the object named in the DD statement. If you do not supply the password, the operator or TSO terminal user will be prompted to supply the correct password. Read or higher RACF authority of the object named in the DD statement is required.

Abbreviation: IFILE

INDATASET(*entryname***[/***password***])**

names the data set that identifies the base cluster or a path that points to the base cluster. The base cluster must be defined in the same catalog as the alternate index, and must contain at least one data record.

password

If the base cluster or path is password protected, you supply the read (or higher-level) password of the named object. Otherwise, the operator or TSO terminal user will be prompted to supply the correct password. Read or higher RACF authority of the named objects is required.

When you specify INDATASET, an attempt is made to dynamically allocate the base cluster's volume. Therefore, the base cluster's volume must be mounted as permanently resident or reserved.

Abbreviation: IDS

OUTFILE(_ddname_**[/**_password_**])‘OUTDATASET(**_entryname_**[/**_password_**])**

names the DD statement or data set that identifies the alternate index or a path that points to the alternate index. You can build more than one alternate index for the same base cluster by specifying more than one ddname or data set name with the OUTFILE or OUTDATASET parameter.

OUTFILE(_ddname_**[/**_password_**][** _ddname_**[/**_password_**]...])**

specifies the DD statement that identifies the alternate index or a path that points to the alternate index. The alternate index must be defined in the same catalog as the base cluster, and must be empty (that is, its high-used RBA equals zero) or defined with the REUSE attribute.

The alternate index must be related to the base cluster identified with INDATASET or INFILE.

password

If the alternate index or path is password protected, supply the update- or higher-level password of the object named in the DD statement. If you do not supply the password, the operator or TSO terminal user will be prompted to supply the correct password. Update or higher RACF authority of the named object is required.

Abbreviation: OFILE

OUTDATASET(_entryname_**[/**_password_**] [**_entryname_**[/**_password_**]...])**

specifies the data set that identifies the alternate index or a path that points to the alternate index. The alternate index must be defined in the same catalog as the base cluster, and must be empty (that is, its high-used RBA equals zero) or must have been defined with the REUSE attribute.

The alternate index must be related to the base cluster identified with INDATASET or INFILE.

password

If the alternate index or path is password protected, you supply the update- or higher-level password of the named object. Otherwise, the operator or TSO terminal user may be prompted to supply the correct password. Update or higher RACF authority for the named object is required.

When you specify OUTDATASET, an attempt is made to dynamically allocate the alternate index's volume. Therefore, the volume must be mounted as permanently resident or reserved.

Abbreviation: ODS

Optional Parameters

CATALOG(_catname_**[/**_password_**])**

names the catalog in which the work files are to be defined. The work files are defined and used by the BLDINDEX routine. When all alternate indexes are built and the work files are no longer needed by the BLDINDEX routine, they are deleted.

password

If the catalog is password protected, supply its update- or higher-level password. If you do not supply the password, the operator will be prompted to supply the correct password. Update or higher RACF authority to the catalog is required.

For information about the order in which a catalog is selected when the CATALOG parameter is not specified, see “Catalog Selection Order for BLDINDEX” on page 16.

Abbreviation: CAT

EXTERNALSORT‘INTERNALSORT

specifies whether the key-pointer pairs are to be sorted entirely within virtual storage.

EXTERNALSORT

specifies that two external sort work files will be defined and built as entry-sequenced clusters. You must provide two DD statements that describe the external sort work files to be defined by BLDINDEX. For more information on how to code the DD statements that describe the work files, see *DFSMS/MVS Using Data Sets*. You can name the DD statements IDCUT1 and IDCUT2. When you choose other names for the work file DD statements, you must identify those DD statements with the WORKFILES parameter.

Abbreviation: ESORT

INTERNALSORT

specifies that access method services will sort the key-pointer pairs entirely within the user-provided virtual storage if possible. If not enough virtual storage is provided when you specify INTERNALSORT, two external sort work files are built and the key-pointer pairs are sorted externally. In this case, you must provide DD statements as for EXTERNALSORT. If the minimum amount of virtual storage is not provided (see *DFSMS/MVS Using Data Sets*), the BLDINDEX processing terminates with an error message.

Abbreviation: ISORT

{SORTCALL‘NOSORTCALL}

Specifies whether or not DFSORT will be used to sort the alternate index.

SORTCALL

Indicates that DFSORT will be used to sort the alternate index. EXTERNALSORT, INTERNALSORT, WORKFILES, and CATALOG are ignored when SORTCALL is specified and DFSORT is available. SORTCALL is the default.

Note: Do not use tape data sets as work data sets.

NOSORTCALL

Indicates that DFSORT will not be used to sort the alternate index. SORTMESSAGELEVEL, SORTDEVICETYPE, SORTMESSAGEDD and SORTFILENUMBER are not allowed if NOSORTCALL is specified.

SORTDEVICETYPE*(device type)*

specifies the DASD device type to be passed to DFSORT in the DYNALLOC parameter in the OPTION control statement. You only need to specify this parameter if you wish to override the default device type used at your site for

DFSORT work data sets. See *DFSORT Application Programming Guide R14* for further details on the DYNALLOC parameter. This parameter is not allowed if NOSORTCALL is specified.

Abbreviation: SORTDVT SDVT

SORTFILENUMBER*(number)*

specifies the maximum number of work data sets to be passed to DFSORT in the DYNALLOC parameter in the OPTION control statement. You only need to specify this parameter if you wish to override the number of work data sets that BLDINDEX determines are needed. See *DFSORT Application Programming Guide R14* for further details on the DYNALLOC parameter. This parameter is not allowed if NOSORTCALL is specified.

Abbreviation: SORTFN SFN

SORTMESSAGEDD*(ddname)*

Specifies the ddname that describes the DFSORT message data set. If a DD statement for this ddname is not present, a message data set with this ddname will be allocated dynamically as a SYSOUT=* data set. SYSOUT is the default for ddname. You must not specify any ddname reserved for use by IDCAMS (SYSPRINT or SYSIN) or DFSORT. See *DFSORT Application Programming Guide R14* for a list of reserved ddnames. This parameter is not allowed if NOSORTCALL or SORTMESSAGELEVEL (NONE) is specified.

Abbreviation: SORTMDD SMDD

SORTMESSAGELEVEL({ALL‘CRITICAL‘NONE})

Specifies the level of DFSORT messages to be printed to the DFSORT message data set. This parameter is not allowed if NOSORTCALL is specified.

Abbreviation: SORTML SML

ALL

Indicates that all DFSORT messages and control statements will be printed to the message data set.

CRITICAL

Indicates that only critical DFSORT messages will be printed to the message data set. No DFSORT control statements will be printed. Critical is the default.

NONE

Indicates that no DFSORT messages or control statements will be printed to the message data set.

WORKFILES(*ddname ddname***)**

names the DD statements that identify the work files you want BLDINDEX to define if an external sort of the key-pointer pairs is required. You can use DD statements to describe two work files that will be defined and opened before the BLDINDEX routine begins processing the base cluster's data records.

When you code the DD statements that describe the work files and identify them with the standard ddnames, IDCUT1 and IDCUT2, you do not need to specify the WORKFILES parameter.

Abbreviation: WFILE

BLDINDEX Example

Build an Alternate Index Over a Key-Sequenced Data Set

This example builds an alternate index over a previously defined base cluster, EXAMPLE.KSDS2. Data records have already been loaded into the base cluster, so that it is not empty. The alternate index and its base cluster are defined in the same catalog, USERRCAT.

```
//BUILDAIX JOB  ...
//STEPCAT  DD   DSNAME=USERRCAT,DISP=SHR
//BASEDD   DD   DSNAME=EXAMPLE.KSDS2,DISP=OLD
//AIXDD    DD   DSNAME=EXAMPLE.AIX,DISP=OLD
//IDCUT1   DD   DSNAME=SORT.WORK.ONE,DISP=OLD,AMP='AMORG',
//     VOL=SER=VSER01,UNIT=3380
//IDCUT2   DD   DSNAME=SORT.WORK.TWO,DISP=OLD,AMP='AMORG',
//     VOL=SER=VSER01,UNIT=3380
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    BLDINDEX INFILE(BASEDD) -
             OUTFILE(AIXDD/AIXUPPW) -
             CATALOG(USERRCAT/USER)
/*
```

Job control language statements:

- STEPCAT DD describes the catalog.
- BASEDD DD describes the base cluster.
- AIXDD DD describes the alternate index.
- IDCUT1 and IDCUT2 DD describe a volume containing VSAM data space to be made available to BLDINDEX for defining and using two sort work data sets in the event an external sort is performed. This data space will not be used by BLDINDEX if enough virtual storage is available to perform an internal sort. If multiple volumes are involved, a maximum of five volumes for each work file can be specified.

The BLDINDEX command builds an alternate index. The assumption is made that enough virtual storage will be available to perform an internal sort. However, note that DD statements with the default ddnames of IDCUT1 and IDCUT2 have been provided for two external sort work data sets in the event that the assumption is incorrect and an external sort must be performed.

The BLDINDEX command's parameters are:

- INFILE names the base cluster. The ddname of the DD statement for this object must be identical to this name. Note that a password is not required, because the base cluster is not protected.
- OUTFILE names the alternate index. The ddname of the DD statement for this object must be identical to this name. The update password of the alternate index is also required.
- CATALOG identifies the user catalog. If it is necessary for BLDINDEX to use external sort work data sets, they will be defined in and deleted from the catalog. The update password will permit these actions.

CNVTCAT

The CNVTCAT command converts OS CVOL entries into VSAM catalog entries. The syntax of this command is:

CNVTCAT	**{INFILE(***ddnamel***)‘** **INDATASET(***entryname***)}** **{OUTFILE(***ddname***[I***password]***)‘** **OUTDATASET(***entryname***[I***password***])‘** **CATALOG(***catname***[I***password***])}** **[CVOLEQUATES((***catname* **(***volser* **[** *volser***...]))[(***catname***...)...])]** **[LIST‘NOLIST]** **[MASTERCATALOG(***catname***[I***password***])]**

CNVTCAT can be abbreviated: CNVTC

CNVTCAT Parameters

Required Parameters

INFILE(*ddname***)‘INDATASET(***entryname***)**
specifies the DD statement or an alias entryname for an OS CVOL to be converted to a VSAM catalog.

INFILE(*ddname***)**
names the DD statement for an OS CVOL to be converted.

ddname
names the DD statement that identifies the OS CVOL to be converted.

Abbreviation: IFILE

INDATASET(*entryname***)**
gives the alias entryname (in the master catalog) of the OS CVOL to be converted. If INDATASET is specified, an attempt is made to dynamically allocate the OS CVOL. The OS system catalog entryname, SYSCTLG, cannot be specified.

entryname
names the entry to be converted.

Abbreviation: IDS

OUTFILE(*ddname***[I***password***])‘OUTDATASET(***entryname***[I***password***])‘**
CATALOG(*catname***[I***password***])**
identifies the VSAM catalog that is to receive the converted OS CVOL entries.

OUTFILE(*ddname***[I***password***])**
names the DD statement that identifies the target VSAM catalog.

ddname
identifies the VSAM target catalog.

password
gives the update- or higher-level password for a password-protected catalog. Update or higher RACF authority to the catalog is required.

Abbreviation: OFILE

OUTDATASET(*entryname***[/***password***])**

names the VSAM target catalog. If OUTDATASET is specified, an attempt is made to dynamically allocate the catalog.

entryname

names the target VSAM catalog. The alias name of the catalog will not be accepted.

password

gives the update- or higher-level password for a password protected catalog. Update or higher RACF authority to the catalog is required.

Abbreviation: ODS

CATALOG(*catname***[/***password***])**

names the catalog that is to receive the converted entries. The alias name of the catalog will not be accepted.

password

gives the update- or higher-level password for a password-protected catalog. Update or higher RACF authority for the catalog is required.

Abbreviation: CAT

Optional Parameters

CVOLEQUATES((*catname* **(***volser***[** *volser***...]]))[(***catname***...)]**

identifies the user catalog to which converted control volume pointer entries (CVPEs) point.

CVPEs point to OS CVOLs that contain entries. The entries in an OS CVOL might have been (or might soon be) converted to VSAM catalog entries.

When a CVPE is converted to an alias entry, the alias entry points to the user catalog that contains (or is to contain) the OS CVOL's converted entries.

When you specify CVOLEQUATES, you must also specify MASTERCATALOG.

catname

names an existing VSAM catalog. This catalog contains or is to contain converted OS/CVOL entries that were cataloged in the OS CVOL pointed to by the CVPE being converted.

volser

specifies the volume serial number(s) of one or more OS CVOLs for which entries have been or are to be converted.

Abbreviation: CVEQU

LIST‘NOLIST

specifies whether entries are to be listed.

LIST

specifies that entries are to be listed after they are converted.

NOLIST

specifies that entries are not to be listed after they are converted.

Abbreviation: NLIST

MASTERCATALOG(*catname***[/***password***])**
names the master catalog in which to place any aliases for user catalogs. MASTERCATALOG is required when CVOLEQUATES is specified.

password
gives the master catalog's update- or higher-level password.

Abbreviation: MCAT

CNVTCAT Examples

The following examples are related and show how the entries of two OS CVOLs in a system can be converted to entries in a catalog. The OS CVOL on volume VSER09 contains control volume pointer entries (CVPEs) that point to the OS CVOL on volume VSER08. Therefore, the two OS CVOLs are chained together with VSER08's OS CVOL at the end of the chain. When two or more OS CVOLs are chained together, the OS CVOL at the end of the chain should be converted first.

Convert OS CVOL Entries to Entries in a VSAM Catalog: Example 1

The entries in the OS CVOL on volume VSER08 are converted to catalog entries and written into the USER11 catalog.

```
//CNVTCAT1  JOB   ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//OSCAT1    DD    VOL=SER=VSER08,DISP=OLD,DSN=SYSCTLG,
//   UNIT=3380
//SYSIN     DD    *
     CNVTCAT -
         INFILE(OSCAT1) -
         CATALOG(USER11/MR)
/*
```

Job control language statement:

- OSCAT1 DD describes and allocates the OS CVOL to be converted.

The CNVTCAT command converts the entries in the OS CVOL on volume VSER08 to entries in a user catalog, USER11.

The command's parameters are:

- INFILE points to the OSCAT1 DD statement.
- CATALOG names an existing catalog, user catalog USER11. USER11 is to receive the converted entries. The user catalog's update- or higher-level password, MR, is required if passwords are used.

Convert an OS CVOL Having Control Volume Pointer Entries: Example 2

The entries in the OS CVOL on volume VSER09 are converted to catalog entries and written into the USER12 catalog. Some of the entries in the OS CVOL are control volume pointer entries and point to the OS CVOL on volume VSER08 (converted in the previous example).

```
//CNVTCAT2  JOB   ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//OSCAT2    DD    VOL=SER=VSER09,DISP=OLD,DSN=SYSCTLG,
//   UNIT=3380
//SYSIN     DD    *
    CNVTCAT -
       INFILE(OSCAT2) -
       CATALOG(USER12/MR) -
       CVOLEQUATES( -
           (USER11 (VSER08))   ) -
       NOLIST -
       MASTERCATALOG(AMASTCAT)
/*
```

Job control language statement:

- OSCAT2 DD describes and allocates the OS CVOL to be converted.

The CNVTCAT command converts the entries in the OS CVOL on volume VSER09 to entries in a user catalog, USER12. Because CVOLEQUATES is specified, an alias entry is built and put in the master catalog to relate the name VSER08 to the user catalog USER11.

The command's parameters are:

- INFILE points to the OSCAT2 DD statement.
- CATALOG names an existing catalog, user catalog USER12. which is to receive the converted entries. The user catalog's update- or higher-level password, MR, is required if passwords are used.
- CVOLEQUATES specifies that control volume pointer entries (CVPEs) are to be converted to alias entries. Each CVPE in VSER09's OS CVOL points to an entry in VSER08's OS CVOL. Each new alias entry points to the USER11 user catalog connector entry in the master catalog. The alias entries are written into the master catalog.
- NOLIST specifies that the entries are not to be listed after they are converted.
- MASTERCATALOG identifies the master catalog. This parameter must be specified because CVOLEQUATES is also specified.

DEFINE ALIAS

The DEFINE ALIAS command defines an alternate name for a non-VSAM data set or a user catalog. The syntax of this command is:

DEFINE	**ALIAS** **(NAME(***aliasname***)** **RELATE(***entryname***))** **[CATALOG(***catname***[***/password***])]**

DEFINE can be abbreviated: DEF

DEFINE ALIAS Parameters

Required Parameters

ALIAS

specifies that an alias for a user catalog or non-VSAM data set is to be defined.

NAME(*aliasname***)**

specifies the alias (the alternate entryname) for a user catalog or non-VSAM data set. An alias must be unique within a catalog.

RELATE(*entryname***)**

names the entry (the user catalog entryname or the non-VSAM data set name) for which the alias is being defined.

Abbreviation: REL

Optional Parameter

CATALOG(*catname***[***/password***])**

identifies the catalog in which the alias is to be defined. If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved. For information about the order in which a catalog is selected when the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

catname

names the catalog. When the alias is for a user catalog connector, *catname* is the name of the master catalog.

password

specifies a password. If the catalog is password protected, supply the catalog's update- or higher-level password. If you do not supply the password, the operator or TSO terminal user is prompted to supply the correct password. Update or higher RACF authority to the catalog is required.

Abbreviation: CAT

DEFINE ALIAS Examples

Define an Alias for a Non-VSAM Data Set: Example 1

An alias is defined for a non-VSAM data set.

```
//DEFALS   JOB    ...
//STEP1    EXEC   PGM=IDCAMS
//STEPCAT  DD     DSNAME=USERCAT4,DISP=OLD
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
     DEFINE ALIAS -
         (NAME(EXAMPLE.NONVSAM1) -
         RELATE(EXAMPLE.NONVSAM) ) -
         CATALOG(USERCAT4/USERMRPW)
/*
```

Job control language statement:

- STEPCAT DD makes a catalog available for this job step: USERCAT4.

The DEFINE ALIAS command defines an alias, EXAMPLE.NONVSAM1, for the non-VSAM data set EXAMPLE.NONVSAM. Its parameters are:

- NAME gives the alias (alternate entryname), EXAMPLE.NONVSAM1.
- RELATE gives the name that the alias is an alternate entryname for, EXAMPLE.NONVSAM.
- CATALOG supplies the name and update password of the user catalog.

Define an Alias for a User Catalog: Example 2

An alias is defined for a user catalog. The alias is defined in the master catalog.

```
//DEFUCALS  JOB   ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
     DEFINE ALIAS -
          (NAME(D40) -
          RELATE(D27UCAT1)) -
          CATALOG(AMAST1/MASTUPW1)
/*
```

The DEFINE ALIAS command defines an alias, D40, for the user catalog, D27UCAT1. Any data set defined in D27UCAT1 having D40 as its first qualifier will be located by VSAM in D27UCAT1 when it is referred to in an access method services command or user program without requiring a JOBCAT or STEPCAT DD statement for D27UCAT1. D27UCAT1 can also be referred to using the alias D40.

The command's parameters are:

- NAME specifies the alias, D40.
- RELATE specifies the name of the user catalog for which D40 is an alternate entryname (alias).
- CATALOG supplies the name and update password of the master catalog.

DEFINE ALTERNATEINDEX

The DEFINE ALTERNATEINDEX command defines an alternate index. Using this command, you can specify attributes for the alternate index as a whole and for the components of the alternate index. The syntax of the DEFINE ALTERNATEINDEX command is:

DEFINE ALTERNATEINDEX (parameters)
[**DATA**(parameters)] -
[**INDEX**(parameters)] -
[**CATALOG**(subparameters)]

DEFINE	**ALTERNATEINDEX** **(NAME(***entryname***)** **RELATE(***entryname***[/***password***])** **{CYLINDERS(***primary***[** *secondary***])‘** **RECORDS(***primary***[** *secondary***])‘** **TRACKS(***primary***[** *secondary***])}** **VOLUMES(***volser***[** *volser***...])** **[ATTEMPTS(***number***‘2)]** **[AUTHORIZATION(***entrypoint***[** *string***])]** **[BUFFERSPACE(***size***)]** **[CODE(***code***)]** **[CONTROLINTERVALSIZE(***size***)]** **[CONTROLPW(***password***)]** **[ERASE‘NOERASE]** **[EXCEPTIONEXIT(***entrypoint***)]** **[FILE(***ddname***)]** **[FREESPACE(***CI-percent***[** *CA-percent***]‘0 0)** **[IMBED‘NOIMBED]** **[KEYRANGES((***lowkey highkey***)[(***lowkey highkey***)...])]** **[KEYS(***length offset***‘64 0)]** **[MASTERPW(***password***)]** **[MODEL(***entryname***[/***password***][** *catname***[/***password* **[ORDERED‘UNORDERED]** **[OWNER(***ownerid***)]** **[READPW(***password***)]** **[RECORDSIZE(***average maximum***‘4086 32600)]** **[REPLICATE‘NOREPLICATE]** **[REUSE‘NOREUSE]** **[SHAREOPTIONS(***crossregion***[** *crosssystem***]‘1 3)]** **[SPEED‘RECOVERY]** **[TO(***date***)‘FOR(***days***)]** **[UNIQUE‘SUBALLOCATION]** **[UNIQUEKEY‘NONUNIQUEKEY]** **[UPDATEPW(***password***)]** **[UPGRADE‘NOUPGRADE]** **[WRITECHECK‘NOWRITECHECK])** **DATA** **([ATTEMPTS(***number***)]** **[AUTHORIZATION(***entrypoint***[** *string***])]** **[BUFFERSPACE(***size***)]** **[CODE(***code***)]** **[CONTROLINTERVALSIZE(***size***)]**

```
  [CONTROLPW(password)]
  [CYLINDERS(primary[ secondary])‘
    RECORDS(primary[ secondary])‘
    TRACKS(primary[ secondary])]
  [ERASE‘NOERASE]
  [EXCEPTIONEXIT(entrypoint)]
  [FILE(ddname * *)]
  [FREESPACE(CI-percent[ CA-percent]) ]
  [KEYRANGES((lowkey highkey)[(lowkey highkey)...])]
  [KEYS(length offset)]
  [MASTERPW(password)]
  [MODEL(entryname[/password][ catname[/password]
  [NAME(entryname)]
  [ORDERED‘UNORDERED]
  [OWNER(ownerid)]
  [READPW(password)]
  [RECORDSIZE(average maximum)]
  [REUSE‘NOREUSE]
  [SHAREOPTIONS(crossregion[ crosssystem])]
  [SPEED‘RECOVERY]
  [UNIQUE‘SUBALLOCATION]
  [UNIQUEKEY‘NONUNIQUEKEY]
  [UPDATEPW(password)]
  [VOLUMES(volser[ volser...])]
  [WRITECHECK‘NOWRITECHECK])]

[INDEX
  ([ATTEMPTS(number)]
  [AUTHORIZATION(entrypoint[ string]) ]
  [CODE(code)]
  [CONTROLINTERVALSIZE(size)]
  [CONTROLPW(password)]
  [CYLINDERS(primary[ secondary])‘
    RECORDS(primary[ secondary])‘
    TRACKS(primary[ secondary])]
  [EXCEPTIONEXIT(entrypoint)]
  [FILE(ddname)]
  [IMBED‘NOIMBED]
  [MASTERPW(password)]
  [MODEL(entryname[/password][ catname[/password]])]
  [NAME(entryname)]
  [ORDERED‘UNORDERED]
  [OWNER(ownerid)]
  [READPW(password)]
  [REPLICATE‘NOREPLICATE]
  [REUSE‘NOREUSE]
  [SHAREOPTIONS(crossregion[ crosssystem])]
  [STAGE‘BIND‘CYLINDERFAULT]
  [UNIQUE‘SUBALLOCATION]
  [UPDATEPW(password)]
  [VOLUMES(volser[ volser...])]
  [WRITECHECK‘NOWRITECHECK])]

[CATALOG(catname[/password])]
```

DEFINE can be abbreviated: DEF

DEFINE ALTERNATEINDEX Parameters

Required Parameters

ALTERNATEINDEX

specifies that an alternate index is to be defined.

The ALTERNATEINDEX keyword is followed by the parameters specified for the alternate index as a whole. These parameters are enclosed in parentheses and, optionally, are followed by parameters specified separately for the DATA and INDEX components.

Abbreviation: AIX

NAME(*entryname***)**

specifies the alternate index's entryname or the name of each of its components. The entryname specified for the alternate index as a whole is not propagated to the alternate index's components.

You can define a separate entryname for the alternate index, its data component, and its index component. If no name is specified for the data or index component, a name is generated.

When the alternate index, data component, and index component are individually named, each can be addressed.

Note: A qualified data set name and an unqualified data set name cannot be placed in the same catalog if the first qualifier of the qualified name is the same as the unqualified name. For example, PAYROLL and PAYROLL.DATA cannot exist on the same catalog.

RELATE(*entryname***[/***password***])**

names the alternate index's base cluster. The base cluster is an entry-sequenced cluster or a key-sequenced cluster to which the alternate index is to be related. You cannot relate an alternate index to a reusable cluster or a relative record cluster.

password

specifies either the base cluster's master password or the catalog's master password (the master password of the catalog that contains the base cluster's entry).

If no password is specified with either the RELATE or the CATALOG parameter, VSAM will ask the operator for the base cluster's master password. Alter RACF authority to the base cluster or catalog is required.

Abbreviation: REL

CYLINDERS(*primary***[** *secondary***])‘**
RECORDS(*primary***[** *secondary***])‘**
TRACKS(*primary***[** *secondary***])**

specifies the amount of space to be allocated to the alternate index from the volume's available space when UNIQUE is specified, or from the available space of one of the volume's VSAM data spaces.

Unless you specify the MODEL parameter, you must specify one, and only one, of the following parameters: CYLINDERS, RECORDS, or TRACKS.

When you specify UNIQUE, space is always allocated in cylinders. If the amount of space you specify for the data component of the alternate index is not an even multiple of cylinder size, VSAM rounds the allocation up to a multiple of a cylinder.

If you specify RECORDS, the amount of space allocated is the minimum number of tracks that are required to contain the specified number of records. However, if you specify TRACKS or RECORDS and the minimum number of tracks exceeds a cylinder, space is allocated in terms of cylinders.

When UNIQUE or REUSE is specified, each volume can contain a maximum of 16 extents.

When the data component is not divided into key ranges and more than one volume is specified, the primary amount of space is allocated only on the first volume when the component is defined. When the component increases in size so as to extend on to additional volumes, the first allocation on each overflow volume is the primary amount.

When KEYRANGES is specified and the data component is to be contained on more than one volume, the primary amount of space is immediately allocated on each volume required for the key ranges. If more than one key range is allocated on a single volume, the primary amount is allocated for each key range.

Secondary amounts can be allocated on all volumes available to contain parts of the alternate index regardless of the key ranges when the alternate index is extended.

You can specify the amount of space as a parameter of ALTERNATEINDEX, as a parameter of DATA, or as a parameter of both DATA and INDEX. If the space is specified as a parameter of:

- ALTERNATEINDEX, the amount specified is divided between the data and index components. The division algorithm is a function of control interval size, record size, device type, and other data set attributes.

  If the division results in an allocation for the data component that is not an integral multiple of the required control area size, the data component's allocation is rounded to the next higher control area multiple. This rounding may result in a larger total allocation for your alternate index than that which you specified.

- DATA, the entire amount specified is allocated to the data component. An additional amount of space, depending on control interval size, record size, device type, and other data set attributes, is allocated to the index component.

To determine the exact amount of space allocated to each component, list the alternate index's catalog entry, using the LISTCAT command.

When you specify UNIQUE and the alternate index's data space is the first data space on a volume that belongs to a recoverable catalog, one additional cylinder is allocated for the catalog recovery area.

The primary and each secondary allocation must be able to be satisfied within five extents; otherwise, your DEFINE or data set extension will fail.

primary
specifies the initial amount of space to be allocated to the alternate index.

secondary

specifies the amount of space that is to be allocated each time the alternate index extends, as a secondary extent. When secondary is specified and the alternate index is allocated, space for the alternate index's data and index components can be expanded to include a maximum of 123 extents.

If the data space that contains all or part of the cluster cannot be extended because the cluster's secondary allocation amount is greater than the data space's secondary allocation amount, VSAM builds a new data space. The new data space's primary and secondary allocation amounts are equal to the cluster's secondary allocation amount.

Abbreviations: CYL, REC, and TRK

VOLUMES(*volser***[** *volser***...])**

specifies the volume(s) on which an alternate index's components are to have space.

If you do not specify the MODEL parameter, VOLUMES must be specified either as a parameter of ALTERNATEINDEX, or as a parameter of both DATA and INDEX.

If the data and index components are to reside on different device types, you must specify VOLUMES as a parameter of both DATA and INDEX. If more than one volume is listed with a single VOLUMES parameter, the volumes must be of the same device type.

You may repeat a volume serial number in the list only if you specify the KEYRANGE parameter. You may want to do this so you will have more than one key range on the same volume. Even in this case, repetition is only valid if all duplicate occurrences are used for the primary allocation of some key range.

The VOLUMES parameter interacts with other DEFINE ALTERNATEINDEX parameters. You should ensure that the volume(s) you specify for the alternate index are consistent with the alternate index's other attributes:

- SUBALLOCATION: If UNIQUE is not specified, the volume must already contain VSAM data space.
- KEYRANGES: If KEYRANGES and UNIQUE are specified for a VSAM catalog, a VSAM data space is built and allocated on a separate volume for each key range.
- ORDERED: If ORDERED is specified, the volumes are used in the order listed. If ORDERED and KEYRANGES are specified, there is a one-to-one correspondence between the key ranges in the key range list and the volumes in the volume serial number list.
- CYLINDERS, RECORDS, TRACKS: The volume(s) contains enough available space to satisfy the component's primary space requirement.
- FILE: The volume information supplied with the DD statement pointed to by FILE must be consistent with the information specified for the alternate index and its components.
- CATALOG: The data space on the volume must be defined before the alternate index, and the catalog specified must own the volume.

Abbreviation: VOL

Optional Parameters

ATTEMPTS(*number***‘2)**

specifies the maximum number of times the operator can try to enter a correct password in response to a prompting message.

This parameter only has effect when the alternate index's master password is not null. A prompting message is issued only when the user has not already supplied the appropriate password.

number

is an integer from 0 to 7. When ATTEMPTS(0) is coded, the operator is not prompted and is not allowed to enter a password from the console.

Note to TSO users: At a TSO terminal, the logon password is checked first, before the user is prompted to supply a password for the alternate index. Checking the logon password counts as one attempt to obtain a password. If ATTEMPTS is not specified, the user has one attempt to supply the alternate index's password, because the default is 2.

Abbreviation: ATT

AUTHORIZATION(*entrypoint***[** *string***])**

specifies that a user-security-verification routine (USVR) is available for additional security verification. When a protected alternate index is opened and the user supplies a correct password other than the alternate index's master password, the USVR receives control. For details on coding a USVR, see *DFSMS/MVS Using Data Sets*.

If a USVR is loaded from an unauthorized library during access method services processing, an abnormal termination will occur.

This parameter has effect only when the master password is not null.

entrypoint

specifies the name of the USVR.

string

specifies information to be passed to the USVR when it receives control to verify authorization. The length defined for the authorization verification record must be from 1 to 256 characters.

Abbreviation: AUTH

BUFFERSPACE(*size***)**

specifies the minimum space that your program's address space is to provide for buffers.

When you specify BUFFERSPACE, you must specify at least enough space to contain two data control intervals and one index control interval. The buffer space size you specify helps VSAM determine the data component's and index component's control interval size. If the specified size is less than VSAM requires for the buffers needed to run your job, VSAM terminates your job and provides an appropriate error message.

When you do not specify BUFFERSPACE, VSAM determines the buffer space size. VSAM determines the control interval size first, then sets the buffer space amount equal to two data control intervals and one index control interval.

size

is the amount of space to be provided for buffers. The value can be expressed in decimal (n), hexadecimal (X'n'), or binary (B'n') form, but must not exceed 16776704.

Abbreviations: BUFSPC or BUFSP

CATALOG(*catname***[/***password***])**

identifies the catalog in which the alternate index is to be defined. The catalog also contains the base cluster's entry (see the RELATE parameter above). For information about the order in which a catalog is selected if the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

catname

specifies the catalog's name.

password

specifies the catalog's update- or higher-level password. If the catalog is password-protected, you must supply the catalog's update- or higher-level password. If no password is specified with the CATALOG parameter, VSAM will prompt the operator for the catalog's update password. Update or higher RACF authority to the catalog is required.

If the base cluster's master password is not specified with the RELATE parameter, the catalog's master password must be specified. Alter RACF authority to the catalog is required.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved.

Abbreviation: CAT

CODE(*code***)**

specifies a code name for the alternate index. If an attempt is made to access a password-protected alternate index without first supplying an appropriate password, a prompting message will be issued to the operator's console (see ATTEMPTS above). The prompting message includes the code name, which identifies the alternate index without revealing its entryname.

This parameter only has effect when the alternate index's master password is not null.

If you do not specify a code name for the alternate index, the prompting message identifies the alternate index with its entryname.

CONTROLINTERVALSIZE(*size***)**

specifies the size of the alternate index's control intervals. The size of the control interval depends on the maximum size of data records, and on the amount of buffer space specified.

When you do not specify the control interval size, VSAM determines the control interval size. If you have not specified BUFFERSPACE and the size of your records permits, VSAM selects the optimum size for the data control interval size and 512 bytes for the index control interval size.

size for the alternate index's data component

Because an alternate index always has the spanned attribute, the control interval size can be less than the maximum record length. You can specify a size from 512 to 8K in increments of 512 or from 8K to 32K in increments of 2K (where K is 1024 in decimal notation.) When you specify a size that is not a multiple of 512 or 2048, VSAM chooses the next higher multiple.

size for the alternate index's index component

You can specify the following values for the index component's control interval size:

```
CISZ = [512 ‘ 1024 ‘ 2048 ‘ 4096]
```

For a discussion of the relationship between control interval size and physical block size, refer to *DFSMS/MVS Using Data Sets*. The discussion also includes restrictions that apply to control interval size and physical block size.

Abbreviations: CISZ or CNVSZ

CONTROLPW(*password***)**
specifies a control password for the entry being defined.

When specified as a parameter of DATA or INDEX, the control password allows the user's program to open the data component or index component for read and write processing of the component's control intervals (that is, the entire control interval, including the data portion of stored records and the control fields VSAM inserts into stored records and control intervals).

If a read or update password is the only password specified for the object, it (the highest-level password) propagates upward and becomes the password for all higher unspecified levels.

Abbreviation: CTLPW

ERASE‘NOERASE
specifies whether the alternate index data component's records are to be erased when the alternate index is deleted.

This attribute applies only to the alternate index's data component.

ERASE
specifies that the records of the alternate index data component are to be overwritten with binary zeros when the alternate index is deleted.

Abbreviation: ERAS

NOERASE
specifies that the records of the alternate index data component are not to be overwritten with binary zeros.

Abbreviation: NERAS

EXCEPTIONEXIT(*entrypoint***)**
specifies the name of the user-written routine, called the exception exit routine, that receives control when an exceptional I/O error condition occurs during the transfer of data between your program's address space and the alternate index's direct access storage space. (An exception is any condition that causes a SYNAD exit to be taken.)

The component's exception exit routine is processed first, then the user's SYNAD exit routine receives control. If an exception exit routine is loaded from an unauthorized library during access method services processing, an abnormal termination will occur.

Abbreviation: EEXT

FILE(*ddname***)**

names the DD statement that identifies the direct access device(s) and volume(s) on which space is to be allocated to the alternate index. If more than one volume is specified in a volume list, all volumes must be of the same device type. When the data component and index component are to reside on separate devices, you can specify a separate FILE parameter as a parameter of DATA and INDEX to point to different DD statements.

When the alternate index is defined in a recoverable catalog, and FILE is specified as a parameter of ALTERNATEINDEX, the FILE parameter can identify the DD statement for all volumes on which space is to be allocated. When defining into a recoverable catalog, FILE also identifies the volume containing the base cluster's index component (when the base cluster is key sequenced) or data component (when the base cluster is entry sequenced).

When the alternate index is cataloged in a recoverable catalog, the DD statement can be concatenated if the volumes are a different device type. Part of the concatenated DD statement describes the alternate index's or component's volumes (of one device type); the other part of the DD statement describes the volume that contains the catalog recovery area (of another device type).

If the FILE parameter is not specified, an attempt is made to dynamically allocate the required volumes. The volume(s) must be mounted as permanently resident or reserved. The DD statement you specify must be in the form:

```
//ddname DD UNIT=(devtype[,unitcount]),
//            VOL=SER=(volser1,volser2,volser3,...),...
```

Note: When FILE refers to more than one volume of the same device type, the DD statement that describes the volumes cannot be a concatenated DD statement.

FREESPACE(*CI-percent***[** *CA-percent***]‘0 0)**

specifies the amount of space that is to be left empty after any primary or secondary allocation and any split of control intervals (*CI-percent*) and control areas (*CA-percent*) when the alternate index is built (see “BLDINDEX” on page 53).

The amount of empty space in the control interval and control area is available for data records that are updated and inserted after the alternate index is initially built.

The amounts are specified as percentages. *CI-percent* translates into a number of bytes equal to, or slightly less than, the percentage value of *CI-percent*. *CA-percent* translates into a number of control intervals equal to, or less than, the percentage value of *CA-percent*.

The percentages must be equal to or less than 100. When you specify 100% of free space, one data record is placed in the first control interval of each control area when the alternate index is built.

Abbreviation: FSPC

IMBED‘NOIMBED

specifies whether the sequence set (the lowest level of the index) is to be placed with the alternate index's data component.

IMBED

specifies that the sequence-set record for each control area is to be written as many times as it will fit on the first track adjacent to the control area. If the allocation is less than a cylinder, one track will be added to the primary and secondary allocation quantities.

Abbreviation: IMBD

| **ATTENTION:** IMBED is no longer supported. If it is specified, it will be
| ignored and no message will be issued.

NOIMBED
specifies that the sequence-set record for each control area is to be written with the other index records.

Abbreviation: NIMBD

The IMBED‘NOIMBED parameter interacts with the REPLICATE‘NOREPLICATE parameter in determining the physical attributes of the index of the alternate index. These index attributes can be used in the following combinations:

- The sequence-set records are adjacent to the data control areas, and only the sequence-set records are replicated (IMBED and NOREPLICATE).
- The sequence-set records are adjacent to the data control intervals, and all levels of index records are replicated (IMBED and REPLICATE).
- All index records are together, and all index records are replicated (REPLICATE and NOIMBED).
- All index records are together, and no index records are replicated (NOREPLICATE and NOIMBED).

For some applications, specifying index options can improve the application's performance. For information on how the index's optional attributes affect performance, see *DFSMS/MVS Using Data Sets*.

KEYRANGES((*lowkey highkey***)**
[(*lowkey highkey***)...])**
specifies that portions of the alternate index's data component are to be put on different volumes. Each portion of the alternate index is called a key range.

The maximum number of key ranges for an alternate index is 123. Key ranges must be in ascending order, and are not allowed to overlap. However, a gap can exist between two key ranges. You cannot insert records within the gap.

Keys can contain 1 to 64 characters; 1 to 128 hexadecimal characters if coded as X'lowkey' X'highkey'.

lowkey
specifies the low key of the key range. If lowkey is shorter than the actual keys, it will be padded on the right with binary zeros.

highkey
specifies the high key of the key range. If highkey is shorter than the actual keys, it will be padded on the right with binary ones.

The KEYRANGES parameter interacts with other DEFINE ALTERNATEINDEX parameters. You should ensure that the KEYRANGES you specify for the alternate index are consistent with the alternate index's other attributes.

- VOLUMES: There should be as many volume serial numbers in the volume serial number list as there are key ranges.

When a volume serial number is duplicated in the volume serial number list, more than one key range is allocated space on the volume. When more than one key range is to be contained on a volume, UNIQUE cannot be coded for the alternate index's data component.

When there are more volumes in the volume serial number list than there are key ranges, the excess volumes are used for overflow records from any key range without consideration for key range boundaries.

When there are fewer volumes in the volume serial number list than there are key ranges, the excess key ranges are allocated on the last volume specified. UNIQUE cannot also be specified.

- UNIQUE: When UNIQUE is specified, each key range resides in its own VSAM data space on a separate volume. Other key ranges for the alternate index cannot also reside on the volume.
- ORDERED: There is a one-to-one correspondence between the volumes in the volume serial number list and the key ranges: The first volume on the volume list contains the first key range, the second volume contains the second key range, and so on.

  If a volume cannot be allocated in the order specified by the volume serial number list, your alternate index definition job terminates with an error message. (For example, the job would terminate if there were no space on one of the volumes specified.)
- KEYS: The low key and high key values must not exceed the key length specified in the KEYS parameter. The KEYS parameter must be specified in the same component as the KEYRANGE parameter.

Abbreviation: KRNG

KEYS(*length offset*‘**64 0)**

describes the alternate-key field in the base cluster's data record.

The key field of an alternate index is called an alternate key. The data record's alternate key can overlap or be contained entirely within another (alternate or prime) key field.

The sum of length plus offset cannot be greater than the length of the base cluster's data record.

When the base cluster's data record is allowed to span control intervals, the record's alternate-key field is within the record's first segment (that is, in the first control interval).

length offset

specifies the length of the alternate key (between 1 and 255), in bytes, and its displacement from the beginning of the base cluster's data record, in bytes.

MASTERPW(*password***)**

specifies a master password for the entry being defined. The master password allows all access method services operations against the alternate index entry and its data and index entries, and allows the user's program to access the alternate index's contents without restriction. For more details on how passwords can be used, see *DFSMS/MVS Managing Catalogs* or *DFSMS/MVS Using Data Sets*.

The AUTHORIZATION, CODE, and ATTEMPTS parameters have no effect unless the entry has a master password associated with it. If MASTERPW is not specified, the highest-level password specified becomes the password for all higher levels.

Abbreviation: MRPW

MODEL(*entryname***[/***password***]**
[*catname***[/***password***]])**

specifies an existing entry to be used as a model for the entry being defined.

You can use an existing alternate index's entry as a model for the attributes of the alternate index being defined. For details about how a model is used, see *DFSMS/MVS Managing Catalogs*.

You may use some attributes of the model and override others by explicitly specifying them in the definition of the cluster or component. If you do not want to add or change any attributes, you need specify only the entry type (alternate index, data, or index) of the model to be used and the name of the entry to be defined.

Unless another entry is specified with the MODEL parameter as a subparameter of DATA or INDEX, when you use an alternate index entry as a model for an alternate index, the data and index components of the model entry are used as models for data and index components of the entry still to be defined.

entryname

names the entry to be used as a model.

password

specifies a password. If the model entry is password-protected and it is cataloged in a password-protected catalog, you supply the read- or higher-level password of either the model entry or its catalog. If you supply both passwords, the catalog's password is used. Read or higher RACF authority to the model or catalog is required.

If you are not specifying new protection attributes for the alternate index and you wish to copy the model's passwords and protection attributes, you must supply the master password of either the model entry or its catalog. Alter RACF authority to the model or catalog is required.

catname

names the model entry's catalog. You must identify the catalog that contains the model entry when:

- You want to specify the catalog's password instead of the model entry's password.
- The model entry's catalog is not identified with a JOBCAT or STEPCAT DD statement, and is not the master catalog.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved. For information about the order in which a catalog is selected when the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

ORDERED‘UNORDERED

specifies whether volumes are to be used in the order in which they are listed in the VOLUMES parameter.

ORDERED

specifies that the volumes are to be used in the order in which they are listed for the VOLUMES parameter.

When you want each key range to reside on a separate volume, you can use ORDERED so that the first key range goes on the first volume, the second key range goes on the second volume, and so on.

If ORDERED is specified and the volumes cannot be allocated in the order specified, the command is terminated. (For example, the command would terminate if there were no space on one of the volumes specified.)

Abbreviation: ORD

UNORDERED

specifies no order for the use of the volumes specified in the VOLUMES parameters.

Abbreviation: UNORD

OWNER(*ownerid***)**

specifies the identification of the alternate index's owner.

Note to TSO users: If the owner is not identified with the OWNER parameter, the TSO user's userid becomes the ownerid.

READPW(*password***)**

specifies a read password for the entry being defined. The read password permits read operations against the entry's records.

When specified as a parameter of DATA or INDEX, the read password allows the user's program to open the data component or the index component for read-only processing of the component's data records (that is, the data portion of the sorted record, not the control fields VSAM inserts into stored records). For more details on how passwords can be used, see *DFSMS/MVS Managing Catalogs*.

Abbreviation: RDPW

RECORDSIZE(*average maximum***‘4086 32600)**

specifies the average and maximum length, in bytes, of an alternate index record.

An alternate index record can span control intervals, so RECORDSIZE can be larger than CONTROLINTERVALSIZE. When you specify a record size that is larger than one control interval, you must also specify spanned records (SPANNED). The formula for the maximum record size of spanned records as calculated by VSAM is as follows:

```
MAXLRECL = CI/CA * (CISZ - 10)
```

where:

- MAXLRECL is the maximum spanned record size
- CI/CA represents the number of control intervals per control area
- CA is the number of control areas
- CISZ is the quantity control interval size.

average and *maximum* are any integer values that do not exceed the capacity of a control area. You can identify the records as fixed length by specifying the same value for average and maximum.

You can use the following formulas to determine the size of the alternate index record when the alternate index supports:

- A key sequenced base cluster

  ```
  RECSZ = 5 + AIXKL + (n x BCKL)
  ```

- An entry sequenced base cluster

  ```
  RECSZ = 5 + AIXKL + (n x 4)
  ```

where:

- RECSZ is the average record size.
- AIXKL is the alternate-key length (see the KEYS parameter).
- BCKL is the base cluster's prime-key length (you can issue the access method services LISTCAT command to determine the base cluster's prime-key length).
- n = 1 when UNIQUEKEY is specified (RECSZ is also the maximum record size).
- n = the number of data records in the base cluster that contain the same alternate-key value, when NONUNIQUEKEY is specified.

When you also specify NONUNIQUEKEY, the record size you specify should be large enough to allow for as many key pointers or RBA pointers as you anticipate. The record length values apply only to the alternate index's data component.

Note: REPRO and EXPORT will not support data sets with record sizes greater than 32760.

Abbreviation: RECSZ

REPLICATE‘NOREPLICATE

specifies how many times each record in the alternate index's index component is to be written on a direct access device track.

For a discussion of the relationship between IMBED‘NOIMBED and REPLICATE‘NOREPLICATE, see the IMBED‘NOIMBED parameter above.

REPLICATE

specifies that each index record is to be written on a DASD track as many times as it will fit.

When you specify REPLICATE, rotational delay is reduced and performance is improved. However, the alternate index's index usually takes more direct access device space.

Abbreviation: REPL

NOREPLICATE

specifies that the index record is to be written on a DASD track only one time.

Abbreviation: NREPL

REUSE‘NOREUSE

specifies whether the alternate index can be used over and over as a new alternate index.

REUSE

specifies that the alternate index can be used over again as a new alternate index. When a reusable alternate index is opened, its high-used RBA can be set to zero if you open it with an access control block that specifies the RESET attribute.

When you use BLDINDEX to build a reusable alternate index, the high-used RBA is always reset to zero when the alternate index is opened for BLDINDEX processing.

You cannot specify REUSE when you also specify KEYRANGES or UNIQUE for the alternate index or its components. Reusable alternate indexes may be multivolumed and are restricted to 16 physical extents per volume.

Abbreviation: RUS

NOREUSE

specifies that the alternate index cannot be used again as a new alternate index.

Abbreviation: NRUS

SHAREOPTIONS(*crossregion*[*crosssystem*]‘1 3)

specifies how an alternate index's data or index component can be shared among users.

For data integrity purposes, you should make sure that share options specified for data and index components are the same. For a description of data set sharing, see *DFSMS/MVS Using Data Sets*.

crossregion

specifies the amount of sharing allowed among regions within the same system or within multiple systems using global resource serialization (GRS). Independent job steps in an operating system or multiple systems using GRS can access a VSAM data set concurrently. To share a data set, each user must specify DISP=SHR in the data set's DD statement. The values that can be specified are:

1 specifies that the data set can be shared by any number of users for read processing, or the data set can be accessed by only one user for read and write processing. With this option, VSAM ensures complete data integrity for the data set.

2 specifies that the data set can be accessed by any number of users for read processing and it can also be accessed by one user for write processing. With this option, VSAM ensures write integrity by obtaining exclusive control for a control interval when it is to be updated. If a user requires read integrity, it is that user's responsibility to use the ENQ and DEQ macros appropriately to provide read integrity for the data the program obtains. (For information on using ENQ and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG*.)

3 specifies that the data set can be fully shared by any number of users. With this option, each user is responsible for maintaining both read and write integrity for the data the program accesses. User programs that ignore the write integrity guidelines can cause VSAM program checks, lost or inaccessible records, irreversible data set failures, and other unpredictable results. This option places heavy responsibility on each user sharing the data set.

4 specifies that the data set can be fully shared by any number of users, and buffers used for direct processing are refreshed for each request. This option requires your program to use the ENQ and DEQ macros to maintain data integrity while sharing the data set. Improper use of the ENQ macro can cause problems similar to those described under SHAREOPTIONS 3. (For information on using ENQ and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG*.)

crosssystem

specifies the amount of sharing allowed among systems. Job steps of two or more operating systems can gain access to the same VSAM data set regardless of the disposition specified in each step's DD statement for the data set.

To get exclusive control of the data set's volume, a task in one system issues the RESERVE macro. The level of cross-system sharing allowed by VSAM applies only in a multiple operating system environment. The values that can be specified are:

1 Reserved

2 Reserved

3 specifies that the data set can be fully shared. With this option, each user is responsible for maintaining both read and write integrity for the data that user's program accesses. User programs that ignore write integrity guidelines can cause VSAM program checks, irreversible data set failures, and other unpredictable results. This option places heavy responsibility on each user sharing the data set.

4 specifies that the data set can be fully shared. Buffers used for direct processing are refreshed for each request. This option requires that you use the RESERVE and DEQ macros to maintain data integrity while sharing the data set. Improper use of the RESERVE macro can cause problems similar to those described under SHAREOPTIONS 3. For information on using RESERVE and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference LLA-SDU*. Writing is limited to PUT-update and PUT-insert processing that does not change the high-used RBA if your program opens the data set with DISP=SHR. Data set integrity cannot be maintained unless all jobs accessing the data set in a cross-system environment specify DISP=SHR.

To ensure data integrity in a shared environment, VSAM provides users of SHAREOPTIONS 4 (cross-region and cross-system) with the following assistance:

- Each PUT request results in the appropriate buffer being written immediately into the VSAM object's direct access device space. VSAM writes out the buffer in the user's address space that contains the new or updated data record.
- Each GET request results in all the user's input buffers being refreshed. The contents of each data and index buffer being used by the user's program are retrieved from the VSAM object's direct access device.

Abbreviation: SHR

SPEED‘RECOVERY

specifies whether the data component's control areas are to be preformatted before alternate index records are loaded into them.

When you specify RECOVERY, your initial load takes longer because the control areas are written initially with end-of-file indicators and again with your alternate index records. When you specify SPEED, your initial load is quicker.

SPEED

specifies that the data component's space is not to be preformatted. Its space might contain data records from a previous use of the space, or it might contain binary zeros; its contents are unpredictable.

If the initial load fails, you must load the alternate index records again from the beginning because VSAM is unable to determine where your last correctly written record is. VSAM cannot find a valid end-of-file indicator when it searches your alternate index records.

RECOVERY

specifies that the data component's control areas are written with records that indicate end-of-file. When an alternate index record is written into a control interval, it is always followed by a record that identifies the record that has just been written as the last record in the alternate index.

If the initial load fails, you can resume loading alternate index records after the last correctly written record, because an end-of-file indicator identifies it as the last record.

Abbreviation: RCVY

TO(*date*)‘FOR(*days*)

specifies the retention period for the alternate index. The alternate index is not automatically deleted when the expiration date is reached. When you do not specify a retention period, the alternate index can be deleted at any time.

TO(*date*)

specifies the date, in the form yyddd, where yy is the year and ddd is the Julian date (001, for January 1, through 365, for December 31), through which the alternate index is to be kept before it is allowed to be deleted.

FOR(*days*)

specifies the number of days for which the alternate index is to be kept before it is allowed to be deleted. The maximum number that can be specified for days is 9999. If the number specified is 0 through 1830, the retention period is the number of days specified. If the number specified is between 1831 and 9999, the retention period is through the year 1999.

UNIQUE‘SUBALLOCATION

specifies whether the alternate index's components are allocated an amount of space from the volume's available space (UNIQUE) or from a VSAM data space's available space (SUBALLOCATION).

UNIQUE

specifies that a VSAM data space is to be built and assigned exclusively to each component of the alternate index. The data space is created when the alternate index is defined. The alternate index's volume(s) must be mounted.

VSAM builds a DSCB in the volume's table of contents (VTOC) to describe the data space. The name of the data space, which is the same as the component's name, is put in the DSCB. A subentry is added to the volume entry (in the VSAM catalog) to describe the VSAM data space.

Abbreviation: UNQ

SUBALLOCATION

specifies that space from one of the VSAM data spaces on the volume is to be assigned to the alternate index's component.

Abbreviation: SUBAL

The space allocation attribute interacts with other DEFINE ALTERNATEINDEX parameters. You should ensure that the space allocation attribute you specify for the alternate index is consistent with other attributes:

- REUSE: You cannot specify REUSE when you specify UNIQUE for an alternate index or its components.
- KEYRANGES: When UNIQUE is specified, a data space is built and allocated on a separate volume for each key range.
- VOLUMES: When UNIQUE is not specified, VSAM data space must exist on the volume that is to contain the alternate index's component.

  When UNIQUE is specified, and more than one volume is specified, VSAM must already own all the volumes except the first. If there is no VSAM space on a volume, you must execute a DEFINE SPACE CANDIDATE before your DEFINE UNIQUE.

UNIQUEKEY‘NONUNIQUEKEY

specifies whether more than one data record (in the base cluster) can contain the same key value for the alternate index.

UNIQUEKEY

specifies that each alternate index key points to only one data record. When the alternate index is built (see “BLDINDEX” on page 53) and more than one data record contains the same key value for the alternate index, the BLDINDEX processing terminates with an error message.

Abbreviation: UNQK

NONUNIQUEKEY

specifies that a key value for the alternate index can point to more than one data record in the base cluster. The alternate index's key record can point to a maximum of 32767 records with nonunique keys.

When you specify NONUNIQUEKEY, the value you specify as the maximum record size should be large enough to allow for alternate index records that point to more than one data record.

Abbreviations: NUNQK

UPDATEPW(*password*)

specifies the update password for the entry being defined. The update password permits read and write operations against the entry's records.

When specified as a parameter of DATA or INDEX, the update password allows the user's program to open the data component or index component for read and write processing of the component's VSAM records (that is, the data portion of the stored record, not the control fields that VSAM inserts into stored records).

If a read password is the only password specified for the object (that is, it is the highest-level password), it propagates upward and becomes the password for all higher levels. If you specify a higher-level password and do not specify an update password, the update or read password is null.

Abbreviation: UPDPW

UPGRADE‘NOUPGRADE

specifies whether the alternate index is to be upgraded (that is, kept up to date) when its base cluster is modified.

UPGRADE

specifies that the cluster's alternate index is upgraded to reflect changed data when the base cluster's records are added to, updated, or erased.

When UPGRADE is specified, the alternate index's name is cataloged with the names of other alternate indexes for the base cluster. The group of alternate index names identifies the upgrade set that includes all the base cluster's alternate indexes that are opened when the base cluster is opened for write operations.

The UPGRADE attribute is not effective for the alternate index until the alternate index is built (see “BLDINDEX” on page 53). If the alternate index is defined when the base cluster is open, the UPGRADE attribute takes effect the next time the base cluster is opened.

Abbreviation: UPG

NOUPGRADE

specifies that the alternate index is not to be upgraded when its base cluster is modified.

Abbreviation: NUPG

WRITECHECK‘NOWRITECHECK

specifies whether an alternate index or component is to be checked by a machine action called write check when a record is written into it.

WRITECHECK

specifies that a record is written and then read, without data transfer, to test for the data check condition.

Abbreviation: WCK

NOWRITECHECK

specifies that the alternate index or component is not to be checked by a write check.

Abbreviation: NWCK

Data and Index Components of an Alternate Index

Attributes can be specified separately for the alternate index's data and index components. A list of the DATA and INDEX parameters is provided at the beginning of this section. These parameters are described in detail as parameters of the alternate index as a whole. Restrictions are noted with each parameter's description.

DEFINE ALTERNATEINDEX Example

Define an Alternate Index

In this example, an alternate index is defined. An example for DEFINE CLUSTER illustrates the definition of the alternate index's base cluster, EXAMPLE.KSDS2. A subsequent example illustrates the definition of a path, EXAMPLE.PATH, that allows you to process the base cluster's data records using the alternate key to locate them. The alternate index, path, and base cluster are defined in the same catalog, USERRCAT.

```
//DEFAIX1  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
      DEFINE ALTERNATEINDEX -
            (NAME(EXAMPLE.AIX) -
            RELATE(EXAMPLE.KSDS2) -
            MASTERPW(AIXMRPW) -
            UPDATEPW(AIXUPPW) -
            KEYS(3 0) -
            RECORDSIZE(40 50) -
            VOLUMES(VSER01) -
            CYLINDERS(3 1) -
            NONUNIQUEKEY -
            UPGRADE) -
         CATALOG(USERRCAT/USERUPPW)
/*
```

The DEFINE ALTERNATEINDEX command creates an alternate index entry, a data entry, and an index entry to define the alternate index EXAMPLE.AIX. The DEFINE ALTERNATEINDEX command also obtains space for the alternate index from one of the VSAM data spaces on volume VSER04, and allocates 3 cylinders for the alternate index's use. Because the alternate index is being defined into a recoverable catalog, the catalog recovery volume will be dynamically allocated. The command's parameters are:

- NAME specifies that the alternate index's name is EXAMPLE.AIX.
- RELATE identifies the alternate index's base cluster, EXAMPLE.KSDS2.
- MASTERPW and UPDATEPW specifies the alternate index's master password, AIXMRPW, and update password, AIXUPPW.
- KEYS specifies the length and location of the alternate key field in each of the base cluster's data records. The alternate key field is the first three bytes of each data record.

- RECORDSIZE specifies that the alternate index's records are variable-length, with an average size of 40 bytes and a maximum size of 50 bytes.
- VOLUMES specifies that the alternate index is to reside on volume VSER01. This example assumes that the volume is already cataloged in the user catalog, USERRCAT.
- CYLINDERS specifies that 3 cylinders are allocated for the alternate index's space. When the alternate index is extended, it is to be extended in increments of 1 cylinder.
- NONUNIQUEKEY specifies that the alternate key value might be the same for two or more data records in the base cluster.
- UPGRADE specifies that the alternate index is to be opened by VSAM and upgraded each time the base cluster is opened for processing.
- CATALOG specifies that the alternate index is to be defined in the user catalog, USERRCAT. The example also supplies the master catalog's update password, USERUPPW.

DEFINE CLUSTER

When you use the DEFINE CLUSTER command, you can specify attributes for the cluster as a whole and for the components of the cluster. The general syntax of the DEFINE CLUSTER command is:

DEFINE CLUSTER (parameters) -
[**DATA**(parameters)] -
[**INDEX**(parameters)] -
[**CATALOG**(subparameters)]

DEFINE	**CLUSTER**
	(NAME(*entryname***)**
	[CYLINDERS(*primary***]** *secondary***])‘**
	RECORDS(*primary***[** *secondary***])‘**
	TRACKS(*primary***[** *secondary***])}**
	VOLUMES(*volser***[** *volser***...])**
	[ATTEMPTS(*number***‘2)]**
	[AUTHORIZATION(*entrypoint***[** *string***])]**
	[BUFFERSPACE(*size***)]**
	[CODE(*code***)]**
	[CONTROLINTERVALSIZE(*size***)]**
	[CONTROLPW(*password***)]**
	[ERASE‘NOERASE]
	[EXCEPTIONEXIT(*entrypoint***)]**
	[FILE(*ddname***)]**
	[FREESPACE(*CI-percent***[** *CA-percent***]‘0 0)]**
	[IMBED‘NOIMBED]
	[INDEXED‘NONINDEXED‘NUMBERED]
	[KEYRANGES((*lowkey highkey***)[(***lowkey highkey***)...])]**
	[KEYS(*length offset***‘64 0)]**
	[MASTERPW(*password***)]**
	[MODEL(*entryname***[/***password***][** *catname***[/***password***]])]**
	[ORDERED‘UNORDERED]
	[OWNER(*ownerid***)]**
	[READPW(*password***)]**
	[RECORDSIZE(*average maximum***)]**
	[REPLICATE‘NOREPLICATE]
	[REUSE‘NOREUSE]
	[SHAREOPTIONS(*crossregion***[** *crosssystem***]‘1 3)]**
	[SPANNED‘NONSPANNED]
	[SPEED‘RECOVERY]
	[TO(*date***)‘FOR(***days***)]**
	[UNIQUE‘SUBALLOCATION]
	[UPDATEPW(*password***)]**
	[WRITECHECK‘NOWRITECHECK])
	[DATA
	([ATTEMPTS(*number***)]**
	[AUTHORIZATION(*entrypoint***[** *string***])]**
	[BUFFERSPACE(*size***)]**
	[CODE(*code***)]**
	[CONTROLINTERVALSIZE(*size***)]**
	[CONTROLPW(*password***)]**

```
  [CYLINDERS(primary[  secondary])‘
    RECORDS(primary[  secondary])‘
    TRACKS(primary[  secondary])]
  [ERASE‘NOERASE]
  [EXCEPTIONEXIT(entrypoint)]
  [FILE(ddname)]
  [FREESPACE(CI-percent[  CA-percent])]
  [KEYRANGES((lowkey  highkey)[(lowkey  highkey)...])]
  [KEYS(length  offset)]
  [MASTERPW(password)]
  [MODEL(entryname[/password][  catname[/password]
  [NAME(entryname)]
  [ORDERED‘UNORDERED]
  [OWNER(ownerid)]
  [READPW(password)]
  [RECORDSIZE(average  maximum)
  [REUSE‘NOREUSE]
  [SHAREOPTIONS(crossregion[  crosssystem])]
  [SPANNED‘NONSPANNED]
  [SPEED‘RECOVERY]
  [UNIQUE‘SUBALLOCATION]
  [UPDATEPW(password)]
  [VOLUMES(volser[  volser...])]
  [WRITECHECK‘NOWRITECHECK])]

[INDEX
  ([ATTEMPTS(number)]
  [AUTHORIZATION(entrypoint[  string])]
  [CODE(code)]
  [CONTROLINTERVALSIZE(size)]
  [CONTROLPW(password)]
  [CYLINDERS(primary[  secondary])‘
    RECORDS(primary[  secondary])‘
    TRACKS(primary[  secondary])]
  [EXCEPTIONEXIT(entrypoint)]
  [FILE(ddname)]
  [IMBED‘NOIMBED]
  [MASTERPW(password)]
  [MODEL(entryname[/password][  catname[/password]])]
  [NAME(entryname)]
  [ORDERED‘UNORDERED]
  [OWNER(ownerid)]
  [READPW(password)]
  [REPLICATE‘NOREPLICATE]
  [REUSE‘NOREUSE]
  [SHAREOPTIONS(crossregion[  crosssystem])]
  [UNIQUE‘SUBALLOCATION]
  [UPDATEPW(password)]
  [VOLUMES(volser[  volser...])]
  [WRITECHECK‘NOWRITECHECK])]

[CATALOG(catname[/password])]
```

DEFINE can be abbreviated: DEF

DEFINE CLUSTER Parameters

Required Parameters

CLUSTER

specifies that a cluster is to be defined.

The CLUSTER keyword is followed by the parameters specified for the cluster as a whole. These parameters are enclosed in parentheses and, optionally, are followed by parameters specified separately for the DATA and INDEX components.

Abbreviation: CL

NAME(*entryname***)**

specifies the cluster's entryname or the name of each of its components. The entryname specified for the cluster as a whole is not propagated to the cluster's components.

You can define a separate entryname for the cluster, its data component, and its index component. If no name is specified for the data and index component, a name is generated. When the cluster, data component, and index component are individually named, each can be addressed. For information on system generated names, see *DFSMS/MVS Using Data Sets*.

Note: A qualified data set name and an unqualified data set name cannot be placed in the same catalog if the first qualifier of the qualified name is the same as the unqualified name. For example, PAYROLL and PAYROLL.DATA cannot exist on the same catalog.

CYLINDERS(*primary***[** *secondary***])‘**
RECORDS(*primary***[** *secondary***])‘**
TRACKS(*primary***[** *secondary***])**

specifies the amount of space to be allocated to the cluster from the volume's available space, when UNIQUE is specified, or from the available space of one of the volume's VSAM data spaces.

If you do not specify the MODEL parameters, you must specify one, and only one, of the following parameters: CYLINDERS, RECORDS, or TRACKS.

When you specify UNIQUE, space is always allocated in cylinders. If the amount of space you specify for the data component of the cluster is not an even multiple of cylinder size, VSAM rounds the allocation upward to a multiple of a cylinder.

If you specify RECORDS, the amount of space allocated is the minimum number of tracks that are required to contain the specified number of records.

Regardless of the allocation type, the control area (CA) size for the data set is calculated based on the smaller of the two allocation quantities (primary or secondary) specified in the define command. A CA is never greater than a single cylinder, but may be less (that is, some number of tracks) depending upon the allocation amount and type used. When tracks or records are specified, the space allocation unit (the CA size) may be adjusted to one cylinder. This occurs if the calculated CA size contains more tracks than exist in a single cylinder of the device being used.

DEFINE RECORDS will allocate sufficient space to contain the specified number of records, but variable factors unknown at define time (such as key compression or method of loading records) may result in inefficient use of the space allocated. This may prevent every data CA from being completely used, and you may be unable to load the specified number of records without requiring secondary allocation.

When UNIQUE or REUSE is specified, each volume can contain a maximum of 16 extents.

When multiple volumes are specified for a data set and the KEYRANGES parameter is not specified for that data set, the following rules and conditions apply:

- The first volume will be defined as the prime volume. The initial allocation of a data set will be on the prime volume. The remaining volumes will be defined as candidate volumes.
- A data set's primary space allocation (defined for each data set) is the amount of space initially allocated on both the prime volume and on any candidate volumes the data set extends to.
- A data set's secondary space allocation (if the data set has a secondary allocation defined) is the amount of space allocated when the primary space is filled and the data set needs additional space on the same volume.
- If a data set extends to a candidate volume, the amount of space initially allocated on the candidate volume will be the primary space allocation. If the data set extends beyond the primary allocation on the candidate volume, then the amount of space allocated will be the secondary space allocation.
- With a DEFINE request, the primary space allocation or each secondary space allocation must be fulfilled in 5 DASD extents or the request will fail. A DASD extent is the allocation of one available area of contiguous space on a volume. For example, if a data set's primary space allocation is 100 cylinders, the allocation must be satisfied by a maximum of 5 DASD extents that add up to 100 cylinders.

When KEYRANGES is specified and the data component is to be contained on more than one volume, the primary amount of contiguous space is immediately allocated on each volume required for the key ranges. If more than one key range is allocated on a single volume, the primary amount is allocated for each key range.

Secondary amounts can be allocated on all volumes available to contain parts of the cluster regardless of the key ranges.

You can specify the amount of space as a parameter of CLUSTER, as a parameter of DATA, or as a parameter of both DATA and INDEX. When a key-sequenced cluster is being defined and the space is specified as a parameter of:

- CLUSTER, the amount specified is divided between the data and index components. The division algorithm is a function of control interval size, record size, device type, and other data set attributes.

  If the division results in an allocation for the data component that is not an integral multiple of the required control area size, the data component's allocation is rounded up to the next higher control area multiple. This rounding may result in a larger total allocation for your cluster than you specified.

- DATA, the entire amount specified is allocated to the data component. An additional amount of space, depending on control interval size, record size, device type, and other data set attributes, is allocated to the index component.

To determine the exact amount of space allocated to each component, list the cluster's catalog entry, using the LISTCAT command.

When you specify UNIQUE, and the cluster's data space is the first data space on a volume that belongs to a recoverable catalog, the equivalent in tracks of one additional cylinder is allocated for the recovery area data space.

The primary and each secondary allocation must be able to be satisfied in 5 extents; otherwise, your DEFINE or data set extension will fail.

primary
specifies the initial amount of space that is to be allocated to the cluster.

secondary
specifies the amount of space that is to be allocated each time the cluster extends, as a secondary extent. When secondary is specified and the cluster is suballocated, space for the cluster's data and index components can be expanded to include a maximum of 123 extents.

If the data space that contains all or part of the cluster cannot be extended because the cluster's secondary allocation amount is greater than the data space's secondary allocation amount, VSAM builds a new data space. The new data space's primary and secondary allocation amounts are equal to the cluster's secondary allocation amount.

Abbreviations: CYL, REC, and TRK

VOLUMES(*volser***[** *volser***...])**
specifies the volume(s) on which a cluster's components are to have space.

If you do not specify the MODEL parameter, VOLUMES must be specified either as a parameter of CLUSTER, or as a parameter of both DATA and INDEX. If the data and index components are to reside on different device types, you must specify VOLUMES as a parameter of both DATA and INDEX. If more than one volume is listed with a single VOLUMES parameter, the volumes must be of the same device type.

You may repeat a volume serial number in the list only if you specify the KEYRANGE parameter. You may want to do this so you will have more than one key range on the same volume. Even in this case, repetition is only valid if all duplicate occurrences are used for the primary allocation of some key range. The VOLUMES parameter interacts with other DEFINE CLUSTER parameters. You should ensure that the volume(s) you specify for the cluster is consistent with the cluster's other attributes:

- SUBALLOCATION: If UNIQUE is not specified, the volume must already contain VSAM data space.
- KEYRANGES: If KEYRANGES and UNIQUE are specified, a VSAM data space is built and allocated on a separate volume for each key range.
- ORDERED: If ORDERED is specified, the volumes are used in the order listed. If ORDERED and KEYRANGES are specified, there is a one-to-one correspondence between the key ranges in the key range list and the volumes in the volume serial number list.

- CYLINDERS, RECORDS, TRACKS: The volume(s) must contain enough unallocated space to satisfy the component's primary space requirement.
- FILE: The volume information supplied with the DD statement(s) pointed to by FILE must be consistent with the information specified for the cluster and its components.
- CATALOG: The data space on the volume must be defined before the cluster, and the catalog specified must own the volume.

Abbreviation: VOL

Optional Parameters

ATTEMPTS(*number*‘**2)**

specifies the maximum number of times the operator can try to enter a correct password in response to a prompting message. This parameter only has effect when the entry's master password is not null. A prompting message is issued only when the user has not already supplied the appropriate password.

number

can be any number, 0 through 7. If 0 is specified, the operator is not prompted and is not allowed to enter a password from the console.

Note to TSO Users: At a TSO terminal, the logon password is checked first, before the user is prompted to supply a password for the cluster. Checking the logon password counts as one attempt to obtain a password. If ATTEMPTS is not specified, the user has one attempt to supply the cluster's password, because the default is 2.

Abbreviation: ATT

AUTHORIZATION(*entrypoint***[** *string***])**

specifies that a user-security-verification routine (USVR) is available for additional security verification. When a protected cluster is accessed and the user supplies a correct password other than the cluster's master password, the USVR receives control. For details on the USVR, see *DFSMS/MVS Installation Exits*.

If a USVR is loaded from an unauthorized library during access method services processing, an abnormal termination will occur.

This parameter only has effect when the entry's master password is not null.

entrypoint

specifies the name of the user's-security-verification routine.

string

specifies information to be passed on to the USVR when it receives control to verify authorization. The length defined for the authorization verification record must be from 1 to 256 characters.

Abbreviation: AUTH

BUFFERSPACE(*size***)**

specifies the minimum space to be provided for buffers. The buffer space size you specify helps VSAM determine the data component's and index component's control interval size. If BUFFERSPACE is not coded, VSAM attempts to get enough space to contain two data component control intervals and, if the data is key sequenced, one index component control interval.

size

is the amount of space to be provided for buffers. Size can be expressed in decimal (n), hexadecimal (X'n'), or binary (B'n') form, but must not exceed 16776704.

The size specified cannot be less than enough space to contain two data component control intervals and, if the data is key sequenced, one index control interval. If the specified size is less than VSAM requires for the buffers needed to run your job, VSAM terminates your DEFINE and provides an appropriate error message.

Abbreviations: BUFSP or BUFSPC

CATALOG(*catname***[/***password***])**

identifies the catalog in which the cluster is to be defined. For information about the order in which catalogs are selected, see “Catalog Selection Order for DEFINE” on page 17.

catname

specifies the name of the catalog in which the entry is to be defined.

password

specifies the catalog's password. If the catalog is password protected, you must supply the update- or higher-level password. If no password is specified, VSAM will prompt the operator for the correct password. Update or higher RACF authority to the catalog is required.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved.

Abbreviation: CAT

CODE(*code***)**

specifies a code name for the entry being defined. If an attempt is made to access a password-protected entry without a password, the code name is used in a prompting message. The code enables the operator to be prompted for the password without disclosing the name of the entry.

If CODE is not specified and an attempt is made to access a cluster or component that is password protected without supplying a password, the operator will be prompted with the name of the entry.

This parameter only has effect when the cluster's or component's master password is not null.

CONTROLINTERVALSIZE(*size***)**

specifies the size of the control interval for the cluster or component.

If CONTROLINTERVALSIZE is specified on the cluster level, it propagates to the component level at which no CONTROLINTERVALSIZE has been specified.

The size of the control interval depends on the maximum size of the data records and the amount of buffer space you provide. If the size you specify is not an integer multiple of 512 or 2048, VSAM selects the next higher multiple for your cluster's control interval size.

If CONTROLINTERVALSIZE is not coded, VSAM determines the size of control intervals. If you have not specified BUFFERSPACE and the size of your records permits, VSAM uses the optimum size for the data component and 512 for the index component.

size (for a cluster's data component)
If SPANNED is not specified, the size of a data control interval must be at least 7 bytes larger than the maximum record length.

If the control interval specified is less than maximum record length plus a 7-byte overhead, then VSAM will increase the data control interval size to contain the maximum record length plus the needed overhead.

If SPANNED is specified, the control interval size can be less than the maximum record length. You can specify a size from 512 to 8K in increments of 512 or from 8K to 32K in increments of 2K (where K is 1024 in decimal notation).

size (for a key-sequenced cluster's index component)
You can specify the following values:

```
CISZ = [512 ‘ 1024 ‘ 2048 ‘ 4096]
```

When you specify a size that is not a multiple of 512 or 2048, VSAM chooses the next higher multiple.

For a discussion of the relationship between control interval size and physical block size, refer to *DFSMS/MVS Using Data Sets*. The discussion also includes restrictions that apply to control interval size and physical block size.

Abbreviations: CISZ or CNVSZ

CONTROLPW(*password*)
specifies a control password for the entry being defined. When specified as a parameter of DATA or INDEX, the control password allows the user's program to open the data component or index component for read and write processing of the component's control intervals (that is, the entire control interval, including the data portion of stored records and the control fields VSAM inserts into stored records and control intervals).

ERASE‘NOERASE
specifies whether the cluster's data component is to be erased when its entry in the catalog is deleted.

ERASE
specifies that the data component is to be overwritten with binary zeros when its catalog entry is deleted.

Abbreviation: ERAS

NOERASE
specifies that the data component is not to be overwritten with binary zeros.

Abbreviation: NERAS

EXCEPTIONEXIT(*entrypoint*)
specifies the name of a user-written routine, called the exception exit routine, that receives control when an exceptional I/O error condition occurs during the transfer of data between your program's address space and the cluster's direct access storage space.

An exception is any I/O error condition that causes a SYNAD exit to be taken. The component's exception-exit routine is processed first, then the user's

SYNAD-exit routine receives control. If an exception exit routine is loaded from an unauthorized library during access method services processing, an abnormal termination will occur. See *DFSMS/MVS Using Data Sets* for a further explanation.

Abbreviation: EEXT

FILE(*ddname***)**
names the DD statement that identifies the direct access device(s) and volume(s) that must be available in order for space to be allocated on the volume(s) specified by the VOLUMES parameter. If more than one volume is specified, all volumes must be the same device type.

If data and index components are to reside on separate devices, you can specify a separate FILE parameter as a parameter of DATA and INDEX to point to different DD statements.

When the cluster is defined in a recoverable catalog, and FILE is specified as a parameter of CLUSTER, the FILE parameter can identify the DD statement for all volumes on which space is to be allocated. The DD statement can be concatenated if the volumes are of different device types: Part of the concatenated DD statement describes the cluster's or component's volume(s) of one device type; the other part of the DD statement describes the volume that contains the catalog recovery area (of another device type).

If the FILE parameter is not specified, an attempt is made to dynamically allocate the required volumes. The volume(s) must be mounted as permanently resident or reserved. When the FILE parameter is specified, the designated volumes are directly allocated before access method services gets control.

The DD statement you specify must be in the form:

```
//ddname DD UNIT=(devtype[,unitcount]),
//            VOL=SER=(volser1,volser2,volser,...),...
```

Note: When FILE refers to more than one volume of the same device type, the DD statement that describes the volumes cannot be a concatenated DD statement.

FREESPACE(*CI-percent***[** *CA-percent***]‘0 0)**
specifies the percentage of each control interval and control area that is to be set aside as free space when the cluster is initially loaded, during a mass insert, and after any split of control intervals (*CI-percent*) and control areas (*CA-percent*). Empty space in the control interval and control area is available for data records that are updated and inserted after the cluster is initially loaded. This parameter applies only to key-sequenced clusters and relative-record clusters with variable-length records. *CI-percent* translates into a number of bytes that is equal to or slightly less than the percentage value of *CI-percent*. *CA-percent* translates into a number of control intervals that is equal to or less than the percentage value of *CA-percent*.

CI-percent and *CA-percent* must be equal to or less than 100. When you specify FREESPACE(100 100), one data record is placed in each control interval used for data and one control interval in each control area is used for data (that is, one data record is stored in each control area when the data set is loaded). When no FREESPACE value is coded, the default specifies that no free space be reserved when the data set is loaded.

When you define the cluster using the RECORDS parameter, the amount of free space specified is not taken into consideration in the calculations to determine primary allocation.

Abbreviation: FSPC

IMBED‘NOIMBED

specifies whether the sequence set (the lowest level of the index) is to be placed with the data component.

IMBED

specifies that the sequence-set record for each control area is written as many times as it will fit on the first track adjacent to the control area. If the allocation is less than a cylinder, one track will be added to the primary and secondary allocation quantities.

Abbreviation: IMBD

ATTENTION: IMBED is no longer supported. If it is specified, it will be ignored and no message will be used.

NOIMBED

specifies that the sequence-set record for each control area is written with the other index records.

Abbreviation: NIMBD

The IMBED‘NOIMBED parameter interacts with the REPLICATE‘NOREPLICATE parameter in determining the physical attributes of the index of the cluster. These index attributes can be used in the following combinations:

- The sequence set records are adjacent to the data control areas, and only the sequence set records are replicated (IMBED and NOREPLICATE).
- The sequence set records are adjacent to the data control intervals, and all levels of index records are replicated (IMBED and REPLICATE).
- All index records are together, and all index records are replicated (REPLICATE and NOIMBED).
- All index records are together, and no index records are replicated (NOREPLICATE and NOIMBED).

For some applications, specifying index options can improve the application's performance. For information on how the index's optional attributes affect performance, see *DFSMS/MVS Using Data Sets*.

INDEXED‘NONINDEXED‘NUMBERED

specifies the type of data organization that the cluster is to have.

When a cluster is defined, you specify whether the data is to be indexed (key sequenced), nonindexed (entry sequenced), or numbered (relative record).

Certain parameters apply only to key-sequenced clusters, as noted in the description of each of these parameters.

If you do not specify the data organization and you also do not specify the MODEL parameter, your cluster will default to key-sequenced (indexed).

If you wish to define either an entry-sequenced or relative record cluster, you must specify the NONINDEXED or NUMBERED parameter unless you specify the MODEL parameter.

The data organization you select must be consistent with other parameters you specify.

INDEXED
specifies that the cluster being defined is for key-sequenced data. If INDEXED is specified, an index component is automatically defined and cataloged. The data records can be accessed by key or by relative byte address (RBA).

Abbreviation: IXD

NONINDEXED
specifies that the cluster being defined is for entry-sequenced data. The data records can be accessed sequentially or by relative byte address (RBA).

Abbreviation: NIXD

NUMBERED
specifies that the cluster's data organization is for relative record data. A relative record cluster is similar to an entry-sequenced cluster, and has fixed-length or variable-length records that are stored in slots. The RECORDSIZE parameter determines if the records are fixed-length or variable-length. Empty slots hold space for records to be added later. The data records are accessed by relative record number (slot number).

Abbreviation: NUMD

KEYRANGES((*lowkey highkey***)**
[(*lowkey highkey***)...])**
specifies that portions of key-sequenced data are to be placed on different volumes. Each portion of the data is called a key range. This parameter applies only to key-sequenced clusters.

The maximum number of key ranges is 123. Keyranges must be in ascending order, and are not allowed to overlap. A gap can exist between two key ranges, but you cannot insert records whose keys are within the gap. The space to be allocated for each key range must be contiguous.

Keys can contain 1 to 64 characters; 1 to 128 hexadecimal characters if coded as `X'lowkey'  X'highkey'`.

lowkey
specifies the low key of the key range. If lowkey is shorter than the actual keys, it will be padded on the right with binary zeros.

highkey
specifies the high key of the key range. If highkey is shorter than the actual keys, it will be padded on the right with binary ones.

The KEYRANGES parameter interacts with other DEFINE CLUSTER parameters. You should ensure that your specification of KEYRANGES is consistent with the cluster's other attributes.

- VOLUMES: There should be as many volume serial numbers in the volume serial number list as there are key ranges. When a volume serial number is duplicated in the volume serial number list, more than one key range is allocated space on the volume.

When more than one key range is to be contained on a volume, UNIQUE cannot be coded for the cluster's data component.

When there are more volumes in the volume serial number list than there are key ranges, the excess volumes are used for overflow records from any key range without consideration for key range boundaries.

When there are fewer volumes in the volume serial number list than there are key ranges, the excess key ranges are allocated on the last volume specified, and UNIQUE cannot also be specified.

- UNIQUE: When UNIQUE is specified, each key range resides on its own volume in its own VSAM data space. Other key ranges for the cluster cannot also reside on the volume.
- ORDERED: There is a one-to-one correspondence between the volumes in the volume serial number list and the key ranges: The first volume on the volume serial number list contains the first key range, the second volume contains the second key range, and so on.

  If a volume cannot be allocated in the order specified by the volume serial number list, your cluster definition job terminates with an error message. (For example, the job would terminate if there were no space on one of the specified volumes.)
- KEYS: The low key and high key values must not exceed the key length specified in the KEY parameter. The KEY parameter must be specified in the same component as the KEYRANGE parameter.

Abbreviation: KRNG

KEYS(*length offset*‘**64 0)**

specifies information about the prime key field of a key-sequenced data set's data records. This parameter applies only to key-sequenced clusters. The default specifies a key field of 64 bytes in length, beginning at the first byte (byte 0) of each data record.

The key field of the cluster's index is called the prime key to distinguish it from other keys, called alternate keys. For more details on how to specify alternate indexes for a cluster, see “DEFINE ALTERNATEINDEX” on page 64.

When the data record is allowed to span control intervals, the record's key field must be within the part of the record that is in the first control interval.

length offset

specifies the length of the key and its displacement (in bytes) from the beginning of the record. The sum of length plus offset cannot exceed the length of the shortest record. The length of the key can be 1 to 255 bytes.

MASTERPW(*password***)**

specifies a master password for the entry being defined. The master password allows all access method services operations against the cluster entry and its data and index entries, and allows the user's program to access the cluster's contents without restriction. For more details on how passwords can be used, see *DFSMS/MVS Managing Catalogs*.

The AUTHORIZATION, CODE, and ATTEMPTS parameters have no effect unless the entry has a master password associated with it. If MASTERPW is not specified, the highest-level password specified becomes the password for all higher levels.

Abbreviation: MRPW

MODEL(*entryname***[/***password***]**
[*catname***[/***password***]])**

specifies an existing entry to be used as a model for the entry being defined.

You can use an existing cluster's entry as a model for the attributes of the cluster being defined. For details about how a model is used, see *DFSMS/MVS Managing Catalogs*.

You may use some attributes of the model and override others by explicitly specifying them in the definition of the cluster or component. If you do not want to add or change any attributes, specify only the entry type (cluster, data, or index) of the model to be used and the name of the entry to be defined.

Unless another entry is specified with the MODEL parameter as a subparameter of DATA or INDEX, when you use a cluster entry as a model for the cluster, the data and index entries of the model cluster are used as models for the data and index components of the cluster still to be defined.

entryname
specifies the name of the cluster or component entry to be used as a model.

password
specifies a password. If the model entry is password-protected and it is cataloged in a password-protected catalog, you must supply the read- or higher-level password of either the model entry or its catalog. If both passwords are supplied, the catalog's password is used. Read or higher RACF authority to the model or catalog is required.

If you are not specifying new protection attributes for the cluster (that is, the model's passwords and protection attributes are being copied), you must supply the master password of either the model entry or its catalog. Alter RACF authority to the model or catalog is required.

catname
names the model entry's catalog. You identify the catalog that contains the model entry for either of these cases:

- You specify the catalog's password instead of the model entry's password.
- The model entry's catalog is not identified with a JOBCAT or STEPCAT DD statement, and is not the master catalog.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved. For information about the order in which a catalog is selected when the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

ORDERED‘UNORDERED
specifies whether volumes are to be used in the order in which they are listed in the VOLUMES parameter.

ORDERED

specifies that the volumes are to be used in the order in which they are listed for the VOLUMES parameter.

When you want each key range to reside on a separate volume, you can use ORDERED so that the first key range goes on the first volume, the second key range goes on the second volume, and so on.

If ORDERED is specified and the volumes cannot be allocated in the order specified, the command is terminated. (For example, the command would terminate if there were no space on one of the volumes specified.)

Abbreviation: ORD

UNORDERED

specifies no order for the use of the volumes specified in the VOLUMES parameters.

Abbreviation: UNORD

OWNER(*ownerid***)**

specifies the identification of the cluster's owner.

Note to TSO Users: If the owner is not identified with the OWNER parameter, the TSO user's userid becomes the ownerid.

READPW(*password***)**

specifies a read password for the entry being defined. The read password permits read operations against the entry's records.

Abbreviation: RDPW

RECORDSIZE(*average maximum*‘*default***)**

specifies the average and maximum lengths, in bytes, of the records in the data component. The minimum record size that you can specify is 1 byte.

RECORDSIZE can be specified as a parameter of either CLUSTER or DATA.

For nonspanned records, the maximum record size + 7 cannot exceed the data component's control interval size (that is, the maximum nonspanned record size, 32 761 + 7 equals the maximum data component control interval size, 32 768).

When you specify a record size that is larger than one control interval, you must also specify spanned records (SPANNED). The formula for the maximum record size of spanned records as calculated by VSAM is as follows:

```
MAXLRECL = CI/CA * (CISZ - 10)
```

where:

- MAXLRECL is the maximum spanned record size
- CI/CA represents the number of control intervals per control area
- CA is the number of control areas
- CISZ is the quantity control interval size.

When you specify NUMBERED, you identify a data set as a relative record data set. If you specify NUMBERED and select the same value for average as for maximum, the relative records must be fixed length. If you specify NUMBERED and select two different values for the average and maximum record sizes, the relative records may be variable length. If you know that your relative records will be fixed length, however, be sure to define them as fixed length; performance will be affected for relative record data sets defined as variable length.

Note: Each variable length relative record will be increased internally in length by four.

When your records are fixed length, you can use the following formula to find a control interval size that contains a whole number (n) of records:

```
CISZ = (n x RECSZ) + 10
```

or

$$n = \frac{(CISZ - 10)}{RECSZ}$$

If you specify SPANNED or NUMBERED for your fixed-length records:

```
CISZ =(n x (RECSZ + 3)) + 4
```

or

$$n = \frac{(CISZ - 4)}{(RECSZ + 3)}$$

where:

- n is the number of fixed-length records in a control interval, and is a positive integer.
- CISZ is the control interval size (see CONTROLINTERVALSIZE parameter).
- RECSZ is the average record size.

default
when SPANNED is specified, the default is RECORDSIZE(4086 32600). Otherwise, the default is RECORDSIZE(4089 4089).

Note: When you specify RECORDS, you must ensure the following:

```
REC(sec) x RECSZ(avg) > RECSZ(max)
```

where:

- REC(sec) is the secondary space allocation quantity, in records.
- RECSZ(avg) is the average record size (default = 4086 or 4089 bytes).
- RECSZ(max) is the maximum record size (default = 4089 or 32600 bytes).

When the SPANNED record size default prevails (32600 bytes), the secondary allocation quantity should be at least 8 records.

Note also that REPRO and EXPORT will not support data sets with record sizes greater than 32760.

Abbreviation: RECSZ

REPLICATE‘NOREPLICATE
specifies how many times each index record is to be written on a track.

REPLICATE
specifies that each index record is to be written on a track as many times as it will fit. With REPLICATE, rotational delay is reduced and performance

is improved. However, the cluster's index usually requires more direct access device space.

This parameter only applies to key-sequenced clusters and variable-length relative record clusters.

Abbreviation: REPL

NOREPLICATE
specifies that the index records are to be written on a track only one time.

Abbreviation: NREPL

For a discussion of the relationship between IMBED‘NOIMBED and REPLICATE‘NOREPLICATE, see the description of the IMBED‘NOIMBED parameter.

REUSE‘NOREUSE
specifies whether the cluster can be opened again and again as a reusable cluster.

REUSE
specifies that the cluster can be opened again and again as a reusable cluster. When a reusable cluster is opened, its high-used RBA is set to zero if you open it with an access control block that specifies the RESET attribute.

REUSE allows you to create an entry-sequenced, key-sequenced, or relative record work file.

When you create a reusable cluster, you cannot build an alternate index to support it. Also, you cannot create a reusable cluster with key ranges (see the KEYRANGE parameter) or with its own data space (see the UNIQUE parameter). Reusable data sets may be multivolume and are restricted to 16 physical extents per volume.

Abbreviation: RUS

NOREUSE
specifies that the cluster cannot be opened again as a new cluster.

Abbreviation: NRUS

SHAREOPTIONS(*crossregion***[** *crosssystem***]‘1 3)**
specifies how a component or cluster can be shared among users. For a description of data set sharing, see *DFSMS/MVS Using Data Sets*. To ensure integrity, you should be sure that share options specified at the DATA and INDEX levels are the same.

crossregion
specifies the amount of sharing allowed among regions within the same system or within multiple systems using global resource serialization (GRS). Independent job steps in an operating system or multiple systems using GRS can access a VSAM data set concurrently. The values that can be specified are:

1 specifies that the data set can be shared by any number of users for read processing, or the data set can be accessed by only one user for read and write processing. With this option, VSAM ensures complete data integrity for the data set.

2 specifies that the data set can be accessed by any number of users for read processing and it can also be accessed by one user for write processing. With this option, VSAM ensures write integrity by obtaining exclusive control for a control interval when it is to be updated. If a user desires read integrity, it is that user's responsibility to use the ENQ and DEQ macros appropriately to provide read integrity for the data the program obtains. (For information on using ENQ and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG*.)

3 specifies that the data set can be fully shared by any number of users. With this option, each user is responsible for maintaining both read and write integrity for the data the program accesses. User programs that ignore the write integrity guidelines can cause VSAM program checks, lost or inaccessible records, irreversible data set failures, and other unpredictable results. This option places heavy responsibility on each user sharing the data set.

4 specifies that the data set can be fully shared by any number of users and buffers used for direct processing are refreshed for each request. This option requires your program to use the ENQ and DEQ macros to maintain data integrity while sharing the data set. Improper use of the ENQ macro can cause problems similar to those described under SHAREOPTIONS 3. (For information on using ENQ and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG*.)

crosssystem

specifies the amount of sharing allowed among systems. Job steps of two or more operating systems can gain access to the same VSAM data set regardless of the disposition specified in each step's DD statement for the data set. However, if you are using GRS across systems or JES3, the data set may or may not be shared depending on the disposition of the system.

To get exclusive control of the data set's volume, a task in one system issues the RESERVE macro. The level of cross-system sharing allowed by VSAM applies only in a multiple operating system environment. The values that can be specified are:

1 Reserved

2 Reserved

3 specifies that the data set can be fully shared. With this option, each user is responsible for maintaining both read and write integrity for the data that user's program accesses.

User programs that ignore write integrity guidelines can cause VSAM program checks, irreversible data set failures, and other unpredictable results. This option places heavy responsibility on each user sharing the data set.

4 specifies that the data set can be fully shared. Buffers used for direct processing are refreshed for each request. This option requires that you use the RESERVE and DEQ macros to maintain data integrity while sharing the data set. Improper use of the RESERVE macro can cause problems similar to those described under SHAREOPTIONS 3. For information on using RESERVE and DEQ, see *OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN* and *OS/390 MVS Programming: Authorized Assembler Services Reference LLA-SDU*. Writing is limited to PUT-update and PUT-insert processing that does not change the high-used RBA if your program opens the data set with DISP=SHR. Data set integrity cannot be maintained unless all jobs accessing the data set in a cross-system environment specify DISP=SHR.

To ensure data integrity in a shared environment, VSAM provides users of SHAREOPTIONS 4 (cross-region and cross-system) with the following assistance:

- Each PUT request results in the appropriate buffer(s) being written immediately to the VSAM cluster's direct access device space (that is, the buffer in the user's address space that contains the new or updated data record, and the buffers that contain new or updated index records when the user's data is key sequenced.)
- Each GET request results in all the user's input buffers being refreshed. The contents of each data and index buffer being used by the user's program are retrieved from the VSAM cluster's direct access device.

Abbreviation: SHR

SPANNED‘NONSPANNED

specifies whether a data record is allowed to cross control interval boundaries.

SPANNED

specifies that, if the maximum length of a data record (as specified with RECORDSIZE) is larger than a control interval, the record will be contained on more than one control interval. This allows VSAM to select a control interval size that is optimum for the direct access device.

When a data record that is larger than a control interval is put into a cluster that allows spanned records, the first part of the record completely fills a control interval. Subsequent control intervals are filled until the record is written into the cluster. Unused space in the record's last control interval is not available to contain other data records.

Note: Using this parameter for a variable-length relative record data set results in an error.

Abbreviation: SPND

NONSPANNED

specifies that the record must be contained in one control interval. VSAM will select a control interval size that accommodates your largest record.

Abbreviation: NSPND

SPEED‘RECOVERY

specifies whether storage allocated to the data component is to be preformatted before records are inserted. SPEED‘RECOVERY applies only to initial loading.

When you specify RECOVERY, your initial load takes longer because the control areas are written initially with end-of-file indicators and again with your data records. When you specify SPEED, your initial load is quicker.

SPEED

specifies that the data component's space is not preformatted. Its space might contain data records from a previous use of the space, or it might contain binary zeros (its contents are unpredictable).

If the initial load fails, you must load the data records again from the beginning, because VSAM is unable to determine where your last correctly written record is. (VSAM cannot find a valid end-of-file indicator when it searches your data records.)

RECOVERY

specifies that the data component's control areas are written with records that indicate end of file. When a data record is written (during the initial load) into a control interval, it is always followed by a record that identifies the record that has just been written as the last record in the cluster.

If the initial load fails, you can resume loading data records after the last correctly written data record, because an end-of-file indicator identifies it as the last record.

Abbreviation: RCVY

TO(*date***)‘FOR(***days***)**

specifies the retention period for the cluster being defined. If neither TO nor FOR is specified, the cluster can be deleted at any time.

TO(*date***)**

specifies the date, in the form yyddd, where yy is the year and ddd is the number (001 through 365) of the day through which the cluster being defined is to be kept.

FOR(*days***)**

specifies the number of days for which the cluster being defined is to be kept. The maximum number that can be specified is 9999. If the number specified is 0 through 1830, the cluster is retained for the number of days specified; if the number is between 1831 and 9999, the cluster is retained through the year 1999.

UNIQUE‘SUBALLOCATION

specifies whether the cluster's components are allocated an amount of space from the volume's available space (UNIQUE) or from a VSAM data space's available space (SUBALLOCATION).

UNIQUE

specifies that a VSAM data space is to be built and assigned exclusively to each component of the cluster. The data space is created when the cluster is defined. The cluster's volume(s) must be mounted. VSAM builds a DSCB in the volume's table of contents (VTOC) to describe the data space. The name of the data space, which is the same as the component's name, is put in the DSCB. A subentry is added to the volume entry (in the VSAM catalog) to describe the VSAM data space.

Abbreviation: UNQ

SUBALLOCATION
specifies that space from one of the VSAM data spaces on the volume is assigned to the cluster's components.

Abbreviation: SUBAL

The space allocation attribute interacts with other DEFINE CLUSTER parameters. You should ensure that the space allocation attribute you specify for the cluster is consistent with other attributes:

- REUSE: You cannot specify REUSE when you specify UNIQUE for a cluster or its components.
- KEYRANGES: When UNIQUE is specified, a data space is built and allocated for each key range. Each key range is on a separate volume.
- VOLUMES: When UNIQUE is not specified, VSAM data space must exist on the volume that is to contain the cluster's component. When UNIQUE is specified, and more than one volume is specified, VSAM must already own all the volumes except the first. If there is no VSAM space on a volume, you must execute a DEFINE SPACE CANDIDATE before your DEFINE UNIQUE.

UPDATEPW(*password***)**
specifies an update password for the entry being defined. The update password permits read and write operations against the entry's records.

If a read password is the only password specified for the object (that is, it is the highest-level password), it propagates upward and becomes the password for all higher levels. If you specify a higher-level password and do not specify an update password, the update password is null.

Abbreviation: UPDPW

WRITECHECK‘NOWRITECHECK
specifies whether the cluster or component is to be checked by a machine action called write check when a record is written into it.

WRITECHECK
specifies that a record is written and then read, without data transfer, to test for the data check condition.

Abbreviation: WCK

NOWRITECHECK
specifies that the cluster or component is not to be checked by a write check.

Abbreviation: NWCK

Data and Index Components of a Cluster

Attributes can be specified separately for the cluster's data and index components. The DATA and INDEX parameters are listed at the beginning of this section. These parameters are described in detail as parameters of the cluster as a whole. Restrictions are noted with each parameter's description.

DEFINE CLUSTER Examples

Define a Key-Sequenced Cluster Specifying Data and Index Parameters: Example 1

A key sequenced cluster is defined. The DATA and INDEX parameters are specified and the cluster's data and index components are explicitly named. This example assumes that, if the cluster is being defined in a VSAM catalog, a VSAM data space exists on volume VSER02. It also assumes that an alias name D40 has been defined for the catalog D27UCAT1. This naming convention causes D40.MYDATA to be cataloged in D27UCAT1.

```
//DEFCLU1  JOB    ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
    DEFINE CLUSTER -
              (NAME(D40.MYDATA) -
              VOLUMES(VSER02) -
              RECORDS(1000 500)) -
         DATA -
              (NAME(D40.KSDATA) -
              KEYS(15 0) -
              RECORDSIZE(250 250) -
              FREESPACE(20 10) -
              BUFFERSPACE(25000)  ) -
         INDEX -
              (NAME(D40.KSINDEX))  -
         CATALOG (D27UCAT1/USERUPPW)
/*
```

The DEFINE CLUSTER command builds a cluster entry, a data entry, and an index entry to define the key sequenced cluster D40.MYDATA. The parameters specified for the cluster as a whole are:

- NAME specifies that the cluster's name is D40.MYDATA.
- VOLUMES specifies that the cluster is to reside on volume VSER02.
- RECORDS specifies that the cluster's space allocation is 1000 data records. When the cluster is extended, it is extended in increments of 500 records. After the space is allocated, VSAM calculates the amount required for the index and subtracts it from the total.

In addition to the parameters specified for the cluster as a whole, DATA and INDEX parameters specify values and attributes that apply only to the cluster's data or index component. The parameters specified for the data component of D40.MYDATA are:

- NAME specifies that the data component's name is D40.KSDATA.
- KEYS specifies that the length of the key field is 15 bytes and that the key field begins in the first byte (byte 0) of each data record.
- RECORDSIZE specifies fixed-length records of 250 bytes.
- BUFFERSPACE specifies that a minimum of 25000 bytes must be provided for I/O buffers. A large area for I/O buffers can help to improve access time with certain types of processing. For example, with direct processing if the high-level index can be kept in virtual storage, access time is reduced. With

sequential processing, if enough I/O buffers are available, VSAM can perform a read-ahead thereby reducing system overhead and minimizing rotational delay.

- FREESPACE specifies that 20% of each control interval and 10% of each control area are to be left free when records are loaded into the cluster. After the cluster's records are loaded, the free space can be used to contain new records.

The parameters specified for the index component of D40.MYDATA are:

- NAME specifies that the index component's name is D40.KSINDEX.

The parameter provides the catalog's password is:

- CATALOG specifies the catalog name and its update password. This parameter would not be necessary if (1) the catalog was not password protected, and (2) D40 was defined as the catalog's alias.

Define a Key-Sequenced Cluster and an Entry-Sequenced Cluster: Example 2

In this example, two VSAM clusters are defined. The first DEFINE command defines a key sequenced VSAM cluster, D40.EXAMPLE.KSDS1. The second DEFINE command defines an entry-sequenced VSAM cluster, D50.EXAMPLE.ESDS1. In both examples, it is assumed that alias names, D40 and D50, have been defined for user catalogs D27UCAT1 and D27UCAT2, respectively, and that neither user catalog is password-protected. This example assumes that VSAM data space that can contain the data sets already exists on volumes VSER02 and VSER03.

```
//DEFCLU2  JOB    ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
    DEFINE CLUSTER -
              (NAME(D40.EXAMPLE.KSDS1) -
              MODEL(D40.MYDATA) -
              VOLUMES(VSER02))
    DEFINE CLUSTER -
              (NAME(D50.EXAMPLE.ESDS1) -
              RECORDS(100 500) -
              RECORDSIZE(250 250) -
              VOLUMES(VSER03) -
              NONINDEXED  )
/*
```

The first DEFINE command builds a cluster entry, a data entry, and an index entry to define the key sequenced cluster D40.EXAMPLE.KSDS1. Its parameters are:

- NAME specifies the name of the key sequenced cluster, D40.EXAMPLE.KSDS1. The cluster will be defined in the user catalog for which D40 has been established as an alias.

- MODEL identifies D40.MYDATA as the cluster to use as a model for D40.EXAMPLE.KSDS1. The attributes and specifications of D40.MYDATA that are not otherwise specified with the DEFINE command's parameters are used to define the attributes and specifications of D40.EXAMPLE.KSDS1. D40.MYDATA is located in the user catalog for which D40 has been established as an alias.

- VOLUMES specifies that the cluster is to reside on volume VSER02.

The second DEFINE command builds a cluster entry and a data entry to define an entry-sequenced cluster, D50.EXAMPLE.ESDS1. Its parameters are:

- NAME specifies the name of the entry-sequenced cluster, D50.EXAMPLE.ESDS1. The cluster will be defined in the user catalog for which D50 has been established as an alias.
- RECORDS specifies that the cluster's space allocation is 100 records. When the cluster is extended, it is extended in increments of 500 records.
- RECORDSIZE specifies that the cluster's records are fixed-length (the average record size equals the maximum record size) and 250 bytes long.
- VOLUMES specifies that the cluster is to reside on volume VSER03.
- NONINDEXED specifies that the cluster is to be an entry-sequenced cluster.

Define a Key-Sequenced Cluster (in a Unique Data Space) in a VSAM Catalog: Example 3

This example defines a key sequenced cluster. The cluster is unique; it is the only cluster in a VSAM data space.

```
//DEFCLU3  JOB    ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//VOL4     DD     VOL=SER=VSER04,UNIT=3380,DISP=OLD
//SYSIN    DD     *
    DEFINE CLUSTER -
         (NAME(ENTRY) -
         RECORDSIZE(80 80) -
         FILE(VOL4) -
         KEYS(10 10) -
         VOLUMES(VSER04) -
         UNIQUE -
         CYLINDERS(5 10)  ) -
      CATALOG(USERCAT3)
/*
```

The DEFINE CLUSTER command builds a cluster entry, a data entry, and an index entry to define the key sequenced cluster ENTRY. The DEFINE CLUSTER command also allocates a data space and allocates it for the cluster's exclusive use. The command's parameters are:

- NAME specifies the cluster's name is ENTRY.
- RECORDSIZE specifies that the records are fixed-length, 80-byte records.
- FILE specifies the name of a DD statement that describes the cluster's volume and causes it to be mounted. The volume must be mounted so that VSAM can record the format-1 DSCBs of the key sequenced cluster in the volume's VTOC. If FILE is not specified, an attempt is made to dynamically allocate the volume.
- KEYS specifies that the length of the key field is 10 bytes and that the key field begins in the 11th byte (byte 10) of each data record.
- VOLUMES and UNIQUE specify that ENTRY is to reside alone in a data space on volume VSER04. Access method services will create two data spaces for the cluster: one for the data component, and one for the index. Both data spaces are to be on volume VSER04. This example assumes that volume VSER04 has enough available space to contain the new data space. This

example also assumes that either the volume's entry is in the MYCAT catalog or that volume VSER04 is not owned by a VSAM catalog at the beginning of the job.

- CYLINDERS specifies that five cylinders are allocated for the cluster's data space. When the cluster's data or index component is extended, the component is to be extended in increments of 10 cylinders.
- CATALOG specifies the name of the catalog into which the cluster will be defined. In this example, USERCAT3 is not password-protected and an attempt will be made to dynamically allocate it.

Define a Relative Record Cluster in a Catalog: Example 4

In this example, a relative record cluster is defined. The cluster is suballocated (it can reside in a VSAM data space with other VSAM objects). Volume VSER01 does not have to be mounted or allocated at this time.

```
//DEFCLU4  JOB    ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
     DEFINE CLUSTER -
            (NAME(EXAMPLE.RRDS1) -
            RECORDSIZE(100 100) -
            VOLUMES(VSER01) -
            TRACKS(10 5) -
            NUMBERED) -
         CATALOG(USERCAT/USERUPPW)
/*
```

The DEFINE CLUSTER command builds a cluster entry and a data entry to define the relative record cluster, EXAMPLE.RRDS1 in the user catalog. The DEFINE CLUSTER command also obtains space for the cluster from the VSAM data space on volume VSER01, and allocates 10 tracks for the cluster's use. The command's parameters are:

- NAME specifies that the cluster's name is EXAMPLE.RRDS1.
- RECORDSIZE specifies that the records are fixed-length, 100-byte records. Average and maximum record length must be equal for a fixed-length relative record data set, but must not be equal for a variable-length relative record data set.
- VOLUMES specifies that the cluster is to reside on volume VSER01. This example assumes that the volume is already cataloged in the user catalog, USERCAT.
- TRACKS specifies that ten tracks are to be allocated for the cluster. When the cluster is extended, it is to be extended in increments of 5 tracks.
- NUMBERED specifies that the cluster's data organization is to be relative record.
- CATALOG supplies the user catalog's update password, USERUPPW.

Define a Reusable Entry-Sequenced Cluster in a Catalog: Example 5

In this example, a reusable entry-sequenced cluster is defined. The cluster can be used as a temporary data set. Each time the cluster is opened, its high-used RBA can be reset to zero. The cluster is suballocated (that is, it can reside in a VSAM data space with other VSAM objects).

```
//DEFCLU5  JOB   ...
//STEP1    EXEC   PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
     DEFINE CLUSTER -
            (NAME(EXAMPLE.ESDS2) -
            RECORDSIZE(2500 3000) -
            SPANNED -
            VOLUMES(VSER03) -
            CYLINDERS(2 1) -
            NONINDEXED -
            REUSE -
            MASTERPW(ESD2MRPW) -
            UPDATEPW(ESD2UPPW)  ) -
         CATALOG(D27UCAT2/USERMRPW)
/*
```

The DEFINE CLUSTER command builds a cluster entry and a data entry to define the entry-sequenced cluster, EXAMPLE.ESDS2. The DEFINE CLUSTER command also obtains space for the cluster from one of the Class 1 VSAM data spaces on volume VSER03, and assigns ten tracks for the cluster's use. VSER03 does not have to be mounted or allocated at this time. The command's parameters are:

- NAME specifies that the cluster's name is EXAMPLE.ESDS2.
- RECORDSIZE specifies that the records are variable-length, with an average size of 2500 bytes and a maximum size of 3000 bytes.
- SPANNED specifies that data records can cross control interval boundaries.
- VOLUMES specifies that the cluster is to reside on volume VSER03. This example assumes that the volume is already cataloged in the user catalog, D27UCAT2.
- CYLINDERS specifies that two cylinders are to be allocated for the cluster's space. When the cluster is extended, it is to be extended in increments of one cylinder.
- NONINDEXED specifies that the cluster's data organization is to be entry sequenced. This parameter overrides the INDEXED parameter.
- REUSE specifies that the cluster is to be reusable. Each time the cluster is opened, its high-used RBA can be reset to zero and it is effectively an empty cluster.
- MASTERPW and UPDATEPW specifies the master password, ESD2MRPW, and the update password, ESD2UPPW, for the cluster.
- CATALOG specifies that the cluster is to be defined in a user catalog, D27UCAT2. The example also supplies the user catalog's master password, USERMRPW.

Define a Key-Sequenced Cluster in a Catalog: Example 6

In this example, a key sequenced cluster is defined. In other examples, an alternate index is defined over the cluster, and a path is defined that relates the cluster to the alternate index. The cluster, its alternate index, and the path entry are all defined in the same catalog, USERRCAT.

```
 //DEFCLU6  JOB   ...
 //STEP1    EXEC   PGM=IDCAMS
 //SYSPRINT DD    SYSOUT=A
 //SYSIN    DD    *
      DEFINE CLUSTER -
             (NAME(EXAMPLE.KSDS2)) -
          DATA -
             (MASTERPW(DAT2MRPW) -
             UPDATEPW(DAT2UPPW) -
             READPW(DAT2RDPW) -
             RECORDS(500 100) -
             EXCEPTIONEXIT(DATEXIT) -
             ERASE -
             FREESPACE(20 10) -
             KEYS(6 4) -
             RECORDSIZE(80 100) -
             VOLUMES(VSER01) ) -
          INDEX -
             (MASTERPW(IND2MRPW) -
             UPDATEPW(IND2UPPW) -
             READPW(IND2RDPW) -
             RECORDS(300 300) -
             VOLUMES(VSER01) ) -
          CATALOG(USERCAT/USERUPPW)
 /*
```

The DEFINE CLUSTER command builds a cluster entry, a data entry, and an index entry to define the key sequenced cluster, EXAMPLE.KSDS2. The DEFINE CLUSTER command also obtains space for the cluster from one of the VSAM data spaces on volume VSER01, and allocates space separately for the cluster's data and index components. Because the cluster is being defined into a recoverable catalog, an attempt will be made to dynamically allocate the catalog recovery area on VSER01.

The command's parameter that applies to the cluster is:

- NAME specifies that the cluster's name is EXAMPLE.KSDS2.

The command's parameters that apply only to the cluster's data component are enclosed in the parentheses following the DATA keyword:

- MASTERPW, UPDATEPW, and READPW specify the data component's master password, DAT2MRPW, update password, DAT2UPPW, and read password, DAT2RDPW.
- RECORDS specifies that an amount of tracks equal to at least 500 records is to be allocated for the data component's space. When the data component is extended, it is to be extended in increments of tracks equal to 100 records.
- EXCEPTIONEXIT specifies the name of the exception exit routine, DATEXIT that is to be processed if an I/O error occurs while a data record is being processed.

- ERASE specifies that the cluster's data is to be erased (overwritten with binary zeros) when the cluster is deleted.
- FREESPACE specifies the amounts of free space to be left in the data component's control intervals (20%) and the control areas (10% of the control intervals in the control area) when data records are loaded into the cluster.
- KEYS specifies the location and length of the key field in each data record. The key field is 6 bytes long and begins in the 5th byte (byte 4) of each data record.
- RECORDSIZE specifies that the cluster's records are variable length, with an average size of 80 bytes and a maximum size of 100 bytes.
- VOLUMES specifies that the cluster is to reside on volume VSER01. This example assumes that the volume is already cataloged in the catalog, USERCAT.

The command's parameters that apply only to the cluster's index component are enclosed in the parentheses following the INDEX keyword:

- MASTERPW, UPDATEPW, and READPW specifies the index component's master password, IND2MRPW, update password, IND2UPPW, and read password, IND2RDPW.
- RECORDS specifies that an amount of tracks equal to at least 300 records is to be allocated for the index component's space. When the index component is extended, it is to be extended in increments of tracks equal to 300 records.
- VOLUMES specifies that the index component is to reside on volume VSER01.

The CATALOG parameter supplies the catalog's update password.

Define an Entry-Sequenced Cluster Using a Model: Example 7

In this example, two entry-sequenced clusters are defined. The attributes of the second cluster defined are modeled from the first cluster.

```
//DEFCLU7    JOB    ...
//STEP1      EXEC   PGM=IDCAMS
//STEPCAT    DD     DSNAME=USERCAT4,DISP=SHR
//SYSPRINT   DD     SYSOUT=A
//SYSIN      DD     *
    DEFINE CLUSTER -
              (NAME(GENERIC.A.BAKER) -
              VOLUMES(VSER02) -
              RECORDS(100 100) -
              RECORDSIZE(80 80) -
              NONINDEXED ) -
         CATALOG(USERCAT4/USERMRPW)
    DEFINE CLUSTER -
              (NAME(GENERIC.B.BAKER) -
              MODEL(GENERIC.A.BAKER USERCAT4)) -
         CATALOG(USERCAT4/USERMPRW)
/*
```

Job control language statement:

- STEPCAT DD makes a catalog available for this job step: USERCAT4.

The first DEFINE CLUSTER command defines an entry-sequenced cluster, GENERIC.A.BAKER. Its parameters are:

- NAME specifies the name of the entry-sequenced cluster, GENERIC.A.BAKER.
- VOLUMES specifies that the cluster is to reside on volume VSER02.
- RECORDS specifies that the cluster's space allocation is 100 records. When the cluster is extended, it is extended in increments of 100 records.
- RECORDSIZE specifies that the cluster's records are fixed-length (the average record size equals the maximum record size) and 80 bytes long.
- NONINDEXED specifies that the cluster is entry sequenced.
- CATALOG specifies that the cluster is to be defined in the USERCAT4 catalog. The master password of USERCAT4 is USERMRPW.

The second DEFINE CLUSTER command uses the attributes and specifications of the previously defined cluster, GENERIC.A.BAKER, as a model for the cluster still to be defined, GENERIC.B.BAKER. Its parameters are:

- NAME specifies the name of the entry-sequenced cluster, GENERIC.B.BAKER.
- MODEL identifies GENERIC.A.BAKER, cataloged in user catalog D27UCAT1, as the cluster to use as a model for GENERIC.B.BAKER. The attributes and specifications of GENERIC.A.BAKER that are not otherwise specified with the DEFINE command's parameters are used to define the attributes and specifications of GENERIC.B.BAKER.
- CATALOG specifies that the cluster is to be defined in the USERCAT4 catalog. The master password of USERCAT4 is USERMRPW.

DEFINE GENERATIONDATAGROUP

The DEFINE GENERATIONDATAGROUP command creates a catalog entry for a generation data group (GDG). The syntax of this command is:

DEFINE	**GENERATIONDATAGROUP** **(NAME(***entryname***)** **LIMIT(***limit***)** **[EMPTY‘NOEMPTY]** **[OWNER(***ownerid***)]** **[SCRATCH‘NOSCRATCH]** **[TO(***date***)‘FOR(***days***)])** **[CATALOG(***catname***[***/password***])]**

DEFINE can be abbreviated: DEF

DEFINE GENERATIONDATAGROUP Parameters

Required Parameters

GENERATIONDATAGROUP
specifies that a generation data group entry is to be defined.

Note: A generation data set (GDS), which is a data set that is a member of a GDG, can not be a VSAM data set.

Abbreviation: GDG

NAME(*entryname***)**
specifies the name of the generation data group that is being defined.

LIMIT(*limit***)**
specifies the maximum number, from 1 to 255, of generation data sets that can be associated with the generation data group to be defined.

Abbreviation: LIM

Optional Parameters

CATALOG(*catname***[***/password***])**
identifies the catalog in which the generation data group is to be defined. If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved. For information about the order in which a catalog is selected when the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

catname
specifies the name of the catalog.

password
specifies the catalog's password. If the catalog is password protected, you must supply the update- or higher-level password. Update or higher RACF authority to the catalog is required.

Abbreviation: CAT

EMPTY‘NOEMPTY

specifies what action is to be taken when the maximum number of generation data sets for the generation data group has been reached and another generation data set is to be cataloged. The disposition of the data set's DSCB in the volume's VTOC is determined with the SCRATCH‘NOSCRATCH parameter.

EMPTY

specifies that all the generation data sets are to be uncataloged when the maximum is reached (each data set's non-VSAM entry is automatically deleted from the catalog).

Abbreviation: EMP

NOEMPTY

specifies that only the oldest generation data set is to be uncataloged when the maximum is reached.

Abbreviation: NEMP

OWNER(*ownerid***)**

identifies the generation data set's owner.

Note to TSO users: If the owner is not identified with the OWNER parameter, the TSO userid is the default ownerid.

SCRATCH‘NOSCRATCH

specifies whether a generation data set's DSCB is to be deleted from the volume's VTOC when the data set is uncataloged (that is, when its entry is deleted from the catalog automatically, as described under EMPTY‘NOEMPTY, or explicitly, as a result of a user issued DELETE request). You can override the SCRATCH‘NOSCRATCH attribute when issuing the DELETE command.

SCRATCH

specifies that the generation data set's DSCB is to be deleted from the volume's VTOC when the generation data set is uncataloged. Direct access device space management (DADSM) removes the data set's DSCB from the VTOC, erases the data set's space on the volume, and makes the space available to other system users. The generation data set ceases to exist.

Abbreviation: SCR

NOSCRATCH

specifies that the generation data set's DSCB is not to be removed from the volume's VTOC when the generation data set is uncataloged. The data set's DSCB in the volume's VTOC is left intact and can be used to locate the data set. However, your program can process the data set as it processes any other non-VSAM data sets—that is, by using a JCL DD statement to describe the data set and allocate it.

Abbreviation: NSCR

TO(*date***)‘FOR(***days***)**

specifies the retention period for the generation data group being defined.

TO(*date*)
specifies the date, in the form yyddd, where yy is the year and ddd is the number (001 through 365) of the day through which the generation data group being defined is to be kept.

FOR(*days*)
specifies the number of days for which the generation data group being defined is to be kept. The maximum number that can be specified is 9999. If the number specified is 0 through 1830, the generation data group is retained for the number of days specified; if the number is between 1831 and 9999, the generation data group is retained through the year 1999. If neither TO nor FOR is specified, the generation data group can be deleted at any time.

DEFINE GENERATIONDATAGROUP Example

Define a Generation Data Group and a Generation Data Set Within It

A generation data group is defined in the master catalog. Next, a generation data set is defined within the generation data group by using JCL statements.

```
//DEFGDG1  JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//GDGMOD   DD     DSNAME=GDG01,DISP=(,KEEP),
//         SPACE=(TRK,(0)),UNIT=3380,VOL=SER=VSER03,
//         DCB=(RECFM=FB,BLKSIZE=2000,LRECL=100)
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
    DEFINE GENERATIONDATAGROUP -
         (NAME(GDG01) -
         EMPTY -
         NOSCRATCH -
         LIMIT(255) )
/*
//DEFGDG2  JOB    ...
//STEP1    EXEC   PGM=IEFBR14
//GDGDD1   DD     DSNAME=GDG01(+1),DISP=(NEW,CATLG),
//         SPACE=(TRK,(10,5)),VOL=SER=VSER03,
//         UNIT=3380
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
/*
```

Job control language statement:

- GDGMOD DD, which describes the generation data group. When the scheduler processes the DD statement, no space is allocated to GDG01.

  The model DSCB must exist on the generation data group's catalog volume.

The DEFINE GENERATIONDATAGROUP command defines a generation data group base catalog entry, GDG01. Its parameters are:

- NAME names the generation data group, GDG01. Each generation data set in the group will have the name GDG01.GxxxxVyy, where “xxxx” is the generation number and “yy” is the version number.

- EMPTY specifies that all data sets in the group are to be uncataloged by VSAM when the group reaches the maximum number of data sets (as specified by the LIMIT parameter) and one more generation data set is added to the group.
- NOSCRATCH specifies that when a data set is uncataloged, its DSCB is not to be removed from its volume's VTOC. Therefore, even if a data set is uncataloged, its records can be accessed when it is allocated to a job step with the appropriate JCL DD statement.
- LIMIT specifies that the maximum number of generation data sets in the group is 255. The LIMIT parameter is required.

The second job, DEFGDG2, is used to allocate space and catalog a generation data set in the newly defined generation data group. The job control statement GDGDD1 DD specifies a generation data set in the generation data group.

DEFINE NONVSAM

The DEFINE NONVSAM command defines a catalog entry for a non-VSAM data set. The syntax of this command is:

```
DEFINE    NONVSAM
            (NAME(entryname)
            DEVICETYPES(devtype[ devtype...])
            VOLUMES(volser[ volser...])
            [FILESEQUENCENUMBERS(number[ number...])]
            [OWNER(ownerid)]
            [TO(date)|FOR(days)])
          [CATALOG(catname[/password])]
```

DEFINE can be abbreviated: DEF

DEFINE NONVSAM Parameters

Required Parameters

NONVSAM

specifies that a non-VSAM data set is to be defined.

Abbreviation: NVSAM

NAME(*entryname*)

names the non-VSAM data set being defined. The entryname is the name that appears in the catalog; it is the name used in all future references to the data set. The entryname must be unique within the catalog in which it is defined.

You identify a generation data set with its generation data group name followed by the data set's generation and version numbers (GDGname.GxxxxVyy). Relative generation numbers (that is, GDGname(+1)) cannot be used with the entryname when you use the DEFINE NONVSAM command to catalog a generation data set and attach it to a generation data group. If the containing catalog is RACF defined, then the update or higher RACF authority to the generation data group is required.

DEVICETYPES(*devtype*[*devtype*...])

specifies the device types of the volumes containing the non-VSAM data set being defined. If the non-VSAM data set resides on different device types, the device types must be specified in the same order as the volume serial numbers listed in the VOLUMES parameter.

You can specify a generic device name that is supported by your system, for example, 3380.

Note: Do not specify an esoteric device group such as SYSDA, because allocation might fail if:

- Input/output configuration is changed by adding or deleting one or more esoteric devices.
- The esoteric definitions on the creating and using systems do not match when the catalog is shared between the two systems.

- The data set was cataloged on a system not defined with the Hardware Configuration Definition (HCD), but used on a system that is defined with HCD.

If you expect to change the device type of the system residence volume, you can code DEVICETYPES(0000) and this field will be resolved at LOCATE and DELETE time to the device type. This will allow you to use the non-VSAM data sets without having to recatalog them to point to the new volume. When you code DEVICETYPES(0000) you must also code VOLUMES(******), or an error will result.

Abbreviation: DEVT

VOLUMES(*volser***[** *volser***...])**

specifies the volumes to contain the non-VSAM data set.

If you expect to change the serial number of the system residence volumes, you can code VOLUMES(******) and this field will be resolved dynamically to that number. This will allow you to use the non-VSAM data sets without recataloging them to point to the new volume.

If the data set resides on magnetic tape and more than one file belongs to the data set on a single tape volume, you must repeat the volume's serial number to maintain a one-to-one correspondence between the volume serial numbers and the file sequence numbers.

Abbreviation: VOL

RACF commands can be used to specify an ERASE attribute in a generic or discrete profile for a non-VSAM data set. Use of this attribute renders all allocated DASD tracks unreadable before space on the volume is made available for reallocation. Refer to the appropriate RACF publications for information about specifying and using this facility.

Optional Parameters

CATALOG(*catname***[***/password***])**

identifies the catalog in which the non-VSAM data set is to be defined. See “Catalog Selection Order for DEFINE” on page 17. for the order in which a catalog is selected when the catalog's name is not specified,

catname

specifies the name of the catalog in which the entry is to be defined.

password

specifies the catalog's password. If the catalog is password protected, you must supply the update- or higher-level password. Update or higher RACF authority to the catalog is required.

Abbreviation: CAT

FILESEQUENCENUMBERS(*number***[** *number***...])**

specifies the file sequence number of the non-VSAM data set being defined. This number indicates the position of the file being defined with respect to other files of the tape. If the data set spans volumes, the file sequence number on each volume may be specified. The numbers must be specified in the same order as the volumes in the VOLUMES parameter. Multivolume tape data sets are normally the first file on each volume after the first volume.

Abbreviation: FSEQN

OWNER(*ownerid*)

identifies the owner of the non-VSAM data set.

Note to TSO users: If OWNER is not specified, the TSO userid is the default ownerid.

TO(*date*)|FOR(*days*)

specifies the retention period for the non-VSAM data set being defined. The non-VSAM data set is not automatically deleted when the expiration date is reached. When you do not specify a retention period, the non-VSAM data set can be deleted at any time. The expiration date will be placed in the catalog, but not in the format-1 DSCB.

TO(*date*)

specifies the date, in the form yyddd, where yy is the year and ddd is the Julian date (001, for January 1, through 365, for December 31), through which the non-VSAM data set is to be kept before it is allowed to be deleted.

FOR(*days*)

specifies the number of days for which the non-VSAM data set is to be kept before it is allowed to be deleted. The maximum number that can be specified for days is 9999. If the number specified is 0 through 1830, the retention period is the number of days specified. If the number specified is between 1831 and 9999, the retention period is through the year 1999.

DEFINE NONVSAM Example

Define a Non-VSAM Data Set

Two existing non-VSAM data sets are defined in a catalog, USERCAT4. The DEFINE NONVSAM command cannot be used to create a new non-VSAM data set because the command does not allocate space.

```
//DEFNVS   JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
    DEFINE NONVSAM -
              (NAME(EXAMPLE.NONVSAM) -
              DEVICETYPES(3380) -
              VOLUMES(VSER02) ) -
         CATALOG(USERCAT4/USERMRPW)
    DEFINE NONVSAM -
              (NAME(EXAMPLE.NONVSAM2) -
              DEVICETYPES(3380) -
              VOLUMES(VSER02) ) -
         CATALOG(USERCAT4/USERMRPW)
/*
```

Both DEFINE NONVSAM commands define a non-VSAM data set in catalog USERCAT4. The DEFINE NONVSAM commands' parameters are:

- NAME names the non-VSAM data sets, EXAMPLE.NONVSAM and EXAMPLE.NONVSAM2.
- DEVICETYPES specifies the type of device that contains the non-VSAM data sets, an IBM 3380-1 Direct Access Storage.

- VOLUMES specifies the volume that contains the non-VSAM data sets, VSER02.
- CATALOG names the catalog that is to contain the non-VSAM entries, USERCAT4, and its update- or higher-level password, USERMRPW.

DEFINE PAGESPACE

The DEFINE PAGESPACE command defines an entry for a page space data set. The syntax of this command is:

```
DEFINE     PAGESPACE
             (NAME(entryname)
             {CYLINDERS(primary)‘
               RECORDS(primary)‘
               TRACKS(primary)}
             VOLUME(volser)
             [ATTEMPTS(number‘2)]
             [AUTHORIZATION(entrypoint[   string])]
             [CODE(code)]
             [CONTROLPW(password)]
             [FILE(ddname)]
             [MASTERPW(password)]
             [MODEL(entryname[/password]
               [   catname[/password]])]
             [OWNER(ownerid)]
             [READPW(password)]
             [SWAP‘NOSWAP]
             [TO(date)‘FOR(days)]
             [UNIQUE‘SUBALLOCATION]
             [UPDATEPW(password)])
           [CATALOG(catname[/password])]
```

DEFINE can be abbreviated: DEF

DEFINE PAGESPACE Parameters

Required Parameters

PAGESPACE

specifies that a page space is to be defined.

Abbreviation: PGSPC

NAME(*entryname*)

specifies the name of the page space being defined.

CYLINDERS(*primary*)‘
RECORDS(*primary*)‘
TRACKS(*primary*)

specifies the amount of space that is to be allocated by tracks, cylinders, or number of records. If RECORDS or TRACKS is specified, the quantity specified is rounded up to the nearest cylinder and the space is allocated in cylinders.

To determine the exact amount of space allocated, list the page space's catalog entry, using the LISTCAT command.

If you do not specify the MODEL parameter, you must specify one, and only one, of the following parameters: CYLINDERS, RECORDS, or TRACKS.

When you specify UNIQUE, and the page space's data space is the first data space on the volume that belongs to a recoverable catalog, an additional amount (the equivalent of one cylinder) is allocated for the recovery area data space.

primary

specifies the amount of space that is to be allocated to the page space. After the primary extent is full, the page space is full. The page space cannot extend onto secondary extents. The maximum number of paging slots for each page space is 16 MB.

Abbreviations: CYL, REC, and TRK

VOLUMES(*volser***)**

specifies the volume that contains the page space.

Unless you specify the MODEL parameter, you must specify the VOLUMES parameter.

The VOLUMES parameter interacts with other DEFINE PAGESPACE parameters. You should ensure that the volume(s) you specify for the page space are consistent with the page space's other attributes:

- SUBALLOCATION: If suballocation is specified, the volume must contain a VSAM data space.
- CYLINDERS, RECORDS, TRACKS: The volume must contain enough unallocated space to satisfy the page space's space requirement.
- FILE: The volume information supplied with the DD statement pointed to by FILE must be consistent with the information specified for the page space.
- CATALOG: If the page space is suballocated, the data space on the volume must have been defined in the same catalog as the page space, and must be owned by the catalog.

Abbreviation: VOL

Optional Parameters

CATALOG(*catname***[/***password***])**

specifies the name and password of the catalog in which the page space is to be defined.

When the CATALOG parameter identifies a user catalog, you must also supply a STEPCAT or JOBCAT DD statement to describe and allocate the user catalog. For information about the order in which catalogs are selected, see “Catalog Selection Order for DEFINE” on page 17.

catname

specifies the name of the catalog.

password

specifies a password. If the catalog is password-protected, you must supply the catalog's update- or higher-level password. If no password is specified, VSAM may ask the operator or TSO terminal user for the correct password. Update or higher RACF authority to the catalog is required.

Abbreviation: CAT

ATTEMPTS(*number***|2)**

specifies the maximum number of times the operator or TSO terminal user can try to enter a correct password in response to a prompting message. A prompting message is issued only when the user has not already supplied the appropriate password. When you define a page space, you should specify ATTEMPTS(0), so that the operator is not prompted and is not allowed to enter a password from the console. This parameter only has effect when the entry's master password is not null.

number
can be any number from 0 to 7.

Note to TSO users: At a TSO terminal, the logon password is checked first before the user is prompted to supply a password for the page space. Checking the logon password counts as one attempt to obtain a password. If ATTEMPTS is not specified, the user has one attempt to supply the page space's password, because the default is 2.

Abbreviation: ATT

AUTHORIZATION(*entrypoint***[** *string***])**
specifies that a user-security-verification routine (USVR) is available for additional security verification. When a protected page space is accessed and the user supplies a correct password other than the page space's master password, the USVR receives control. For details on the USVR, see *DFSMS/MVS Installation Exits*.

If a USVR is loaded from an unauthorized library during access method services processing, an abnormal termination will occur. See *DFSMS/MVS Installation Exits*.

This parameter only has effect when the entry's master password is not null.

entrypoint
specifies the name of the user's-security-verification routine.

string
specifies information to be passed on to the USVR when it receives control to verify authorization. The length defined for the authorization verification record must be from 1 to 256 characters.

Abbreviation: AUTH

CODE(*code***)**
specifies a code name for the page space. If an attempt is made to access a password-protected entry without a password, the code name is used in a prompting message; the code enables the operator or TSO terminal user to be prompted for the password without disclosing the name of the entry. If code is not specified and an attempt is made to access a page space entry that is password-protected without supplying a password, the operator or TSO terminal user will be prompted with the name of the entry.

This parameter only has effect when the cluster's or component's master password is not null.

CONTROLPW(*password***)**
specifies a control-level password for the page space. Because the page space is a system data set, it cannot be opened or used by a user's program. If a read or update password is the only password specified for the page space, it (the highest-level password) propagates upward and becomes the password for all higher unspecified levels.

The passwords are cataloged in both the page space entry and its data component's entry.

Abbreviation: CTLPW

FILE(*ddname***)**
specifies the name of the DD statement that identifies the device and volume to be allocated to the page space.

If the page space is unique, and if the FILE parameter is not specified and the volume is physically mounted, the volume identified with the VOLUME parameter is dynamically allocated. The volume must be mounted as permanently resident or reserved.

MASTERPW(*password***)**
specifies a master password for the page space. The master password allows all operations against the page space entry. The AUTHORIZATION, CODE, and ATTEMPTS parameters have no effect unless the entry has a master password associated with it. If MASTERPW is not specified, the highest level password specified becomes the password for all higher levels. Because the page space is a system data set, it cannot be opened or used by a user's program.

The passwords are cataloged in both the page space entry and its data component's entry. The system automatically prevents users from accessing page spaces and their data components.

Abbreviation: MRPW

MODEL(*entryname***[/***password***]**
[*catname***[/***password***]])**
specifies that an existing page space entry is to be used as a model for the entry being defined. It is possible to use an already defined page space as a model for another page space. When one entry is used as a model for another, its attributes are copied as the new entry is defined.

You may use some attributes of the model and override others by explicitly specifying them in the definition of the page space. If you do not want to add or change any attributes, specify only the entry type (page space) of the model to be used and the name of the entry to be defined.

entryname
specifies the name of the page space entry to be used as a model.

password
specifies a password. If the entry to be used as a model is password-protected and is cataloged in a password-protected catalog, a password is required.

If the protection attributes are to be copied, substitute the master password of either the entry being used as a model (following *entryname*) or the catalog in which the entry being used as a model is defined (following *catname*).

If you specify both passwords, the catalog's password is used. If protection attributes are not to be copied, any password can be used. Alter RACF authority to the model or catalog is required.

catname

specifies the name of the catalog in which the entry to be used as a model is defined. You identify the catalog that contains the model entry for either of these cases:

- You specify the catalog's password instead of the model entry's password.
- The model entry's catalog is not identified with a JOBCAT or STEPCAT DD statement, and is not the master catalog.

OWNER(*ownerid***)**

specifies the identification of the owner of the page space.

READPW(*password***)**

specifies a read-level password for the page space. Because the page space is a system data set, it cannot be opened or used by a user's program. The passwords are cataloged in both the page space entry and its data component's entry. The system automatically prevents users from accessing page spaces and their data components.

Abbreviation: RDPW

SWAP‘NOSWAP

specifies whether page space will be defined for local system queue area (LSQA) pages or for pageable private area pages. (Auxiliary storage management separates private area address space pages into LSQA pages and pageable private area pages.)

SWAP

specifies that the page space is a high-speed data set used during a swap operation to store and retrieve the set of LSQA pages owned by an address space.

NOSWAP

indicates that the page space is a conventional page space used to record pageable private area pages.

Abbreviation: NSWAP

TO(*date***)‘FOR(***days***)**

specifies the retention period for the page space. If neither TO nor FOR is specified, the page space can be deleted at any time.

TO(*date***)**

specifies the date, in the form yyddd, where yy is the year and ddd is the number (001 through 365) of the day through which the cluster being defined is to be kept.

FOR(*days***)**

specifies the number of days for which the page space is to be kept. The maximum number that can be specified is 9999. If the number specified is 0 through 1830, the page space is retained for the number of days specified; if the number is between 1831 and 9999, the page space is retained through the year 1999.

UNIQUE‘SUBALLOCATION

specifies whether the page space is allocated an amount of space from the volume's available space (UNIQUE) or from a previously defined VSAM data space (SUBALLOCATION).

UNIQUE

specifies that the page space is to be allocated a VSAM data space of its own. VSAM generates a name for the data space and builds a format-1 DSCB in the volume's VTOC to describe it.

Auxiliary storage management recommends that UNIQUE be used for page space data sets. This will cause VSAM to allocate a single nonshared data space for the page data set. Space from another data space will not be used, eliminating one of the possibilities for multiple extent data sets that will cause auxiliary storage management performance degradation.

Abbreviation: UNQ

SUBALLOCATION

specifies that the name of the data space, not of the page space, is to appear in the VTOC. A data space must have been defined on the volume on which the page space is defined.

Abbreviation: SUBAL

UPDATEPW(*password***)**

specifies an update-level password for the page space. Because the page space is a system data set, it cannot be opened or used by a user's program.

If a read password is the only password specified for the page space (that is, it is the highest-level password), it propagates upward and becomes the password for all higher levels. If you specify a higher-level password and do not specify an update password, the update password is null.

The passwords are cataloged in both the page space entry and its data component's entry. The system automatically prevents users from accessing page spaces and their data components.

Abbreviation: UPDPW

DEFINE PAGESPACE Examples

Define a NOSWAP Page Space: Example 1

```
//DEFPGSP1 JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//VOLUME   DD     VOL=SER=VSER05,UNIT=3380,DISP=OLD
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *

    DEFINE PAGESPACE -
         (NAME(SYS1.PAGE2) -
         CYLINDERS(10) -
         VOLUMES(VSER05) -
         CONTROLPW(PASSWD1) -
         UPDATEPW(PASSWD2) -
         READPW(PASSWD3))
/*
```

Job control language statement:

- VOLUME DD, the volume on which to define the data space.

DEFINE PAGESPACE command parameters:

- NAME names the page space, SYS1.PAGE2.
- CYLINDERS specifies that the page space is to occupy 10 cylinders. The page spaces are never extended.
- VOLUMES specifies that the page space is to reside on volume VSER05.
- CONTROLPW specifies the control password for the page space is PASSWD1.
- UPDATEPW specifies the update password for the page space is PASSWD2.
- READPW specifies the read password for the page space is PASSWD3.

The page space defaults to UNIQUE (a new data space will be created for its exclusive use), and NOSWAP.

Define a SWAP Page Space in a Catalog: Example 2

```
//DEFPGSP2 JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *

    DEFINE PAGESPACE -
         (NAME(SYS1.PAGE1) -
         CYLINDERS(10) -

         VOLUMES(VSER05) -
         SWAP -
         CONTROLPW(PASSWD1) -
         UPDATEPW(PASSWD2) -
         READPW(PASSWD3))
/*
```

DEFINE PAGESPACE command parameters:

- NAME specifies the name for the page space: SYS1.PAGE1. Because the page space is unique, the page space's name is put into the DSCB (in the volume's VTOC) that describes the space allocated to the page space.
- CYLINDERS specifies that the page space occupies 10 cylinders and cannot be extended.
- VOLUMES identifies the volume on which the page space is to reside. Because no DD statement describes the volume, an attempt is made to dynamically allocate the volume. Volume VSER05 must be mounted as permanently resident or reserved.
- SWAP specifies the page space will be used to store local system queue area (LSQA) pages.
- CONTROLPW specifies the control password (PASSWD1) for the page space.
- UPDATEPW specifies the update password (PASSWD2) for the page space.
- READPW specifies the read password (PASSWD3) for the page space.

The page space defaults to UNIQUE.

DEFINE PATH

The DEFINE PATH command defines a path directly over a base cluster or over an alternate index and its related base cluster. The syntax of this command is:

DEFINE	**PATH** **(NAME(***entryname***)** **PATHENTRY(***entryname***[/***password***])** **[ATTEMPTS(***number***‘2)]** **[AUTHORIZATION(***entrypoint***[** *string***])]** **[CODE(***code***)]** **[CONTROLPW(***password***)]** **[FILE(***ddname***)]** **[MASTERPW(***password***)]** **[MODEL(***entryname*[/*password*] **[** *catname***[/***password***]])]** **[OWNER(***ownerid***)]** **[READPW(***password***)]** **[TO(***date***)‘FOR(***days***)]** **[UPDATE‘NOUPDATE]** **[UPDATEPW(***password***)])** **[CATALOG(***catname***[/***password***])]**

DEFINE can be abbreviated: DEF

DEFINE PATH Parameters

Required Parameters

PATH
specifies that a path is to be defined.

NAME(*entryname***)**
specifies the path's name.

PATHENTRY(*entryname***[/***password***])**
when the path consists of an alternate index and its base clusters, entryname identifies the alternate index entry. When the path is opened to process data records, both the alternate index and the base cluster are opened.

When the path consists of a cluster without an alternate index, entryname identifies the cluster. You can define the path as though it were an alias for the cluster. This allows you to specify no-update access to the cluster, so that the upgrade set will not be required or updated when the cluster is opened (provided the open does not cause sharing of a control block structure specifying UPDATE). You can also establish protection attributes for the alternate name, separate from the protection attributes of the cluster.

password
If the cluster or alternate index entry is password-protected, you must supply the entry's master password. When you identify the catalog with the CATALOG parameter, you can supply the catalog's master password instead of the entry's password. Alter RACF authority to the cluster, alternate index entry or catalog is required.

Abbreviation: PENT

Optional Parameters

ATTEMPTS(*number*‘**2)**

specifies the maximum number of times the operator can try to enter a correct password in response to a prompting message. This parameter only has effect when the path's master password is not null. A prompting message is issued only when the user has not already supplied the appropriate password. *number* is an integer from 0 to 7.

Note to TSO users: At a TSO terminal, the logon password is checked first, before the user is prompted to supply a password for the path. Checking the logon password counts as one attempt to obtain a password. If ATTEMPTS is not specified, the user has one attempt to supply the path's password, because the default is 2.

Abbreviation: ATT

AUTHORIZATION(*entrypoint***[** *string***])**

specifies that a user-security-verification routine (USVR) is available for additional security verification. When a protected path is accessed and the user supplies a correct password other than the cluster's master password, the USVR receives control. For details on the USVR, see *DFSMS/MVS Installation Exits*.

If a USVR is loaded from an unauthorized library during access method services processing, an abnormal termination will occur. See *DFSMS/MVS Installation Exits*.

This parameter only has effect when the path's master password is not null.

entrypoint

specifies the name of the USVR.

string

specifies information to be passed on to the USVR when it receives control to verify authorization. The length defined for the authorization verification record must be from 1 to 256 characters.

Abbreviation: AUTH

CATALOG(*catname***[/***password***])**

identifies the catalog that contains the entry of the cluster or alternate index named in the PATHENTRY parameter. For information about the order in which a catalog is selected if the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

If the cluster's or alternate index's entry is password-protected and its catalog is also password-protected, you must specify the master password for either the entry or the catalog.

catname

specifies the catalog's name.

password

specifies the catalog's master password. Alter RACF authority to the catalog is required.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved.

Abbreviation: CAT

CODE(*code***)**
specifies a code name for the path.

If an attempt is made to access a password-protected path without first supplying an appropriate password, a prompting message is issued to the operator's console. The prompting message includes the code name, which identifies the path without revealing its entryname.

This parameter only has effect when the path's master password is not null. When code is not specified, the prompting message identifies the path with its entryname.

CONTROLPW(*password***)**
specifies a control password for the path. Control interval processing is not permitted through a path; the control password will permit read and write operations against the base cluster. If a read or update password is the only password specified for the object, it (the highest-level password) propagates upward and becomes the password for all higher unspecified levels.

Abbreviation: CTLPW

FILE(*ddname***)**
specifies the name of a DD statement that identifies the recovery volume of the alternate index or cluster named with the PATHENTRY parameter. FILE is only used when the path is defined in a recoverable catalog.

The recovery volume is the first volume of the base cluster's index component when PATHENTRY names a key-sequenced cluster or an alternate index over a key-sequenced cluster.

The recovery volume is the first volume of the base cluster's data component when PATHENTRY names an entry-sequenced cluster or an alternate index over an entry-sequenced cluster.

When FILE is not specified, an attempt is made to dynamically allocate the cluster's recovery volume. The volume must be mounted as permanently resident or reserved.

MASTERPW(*password***)**
specifies a master password for the path. The master password allows all operations against the path. If the master password is not specified, the path's highest-level password propagates upward and becomes the password for all higher levels, including the master password. If all passwords are null, ATTEMPTS, AUTHORIZATION, and CODE have no effect until the master password is specified.

Abbreviation: MRPW

MODEL(*entryname***[/***password***]**
[*catname***[/***password***]])**
specifies an existing path entry that is to be used as a model for the path being defined. You can use some attributes of the model and override others by explicitly specifying them in the definition of the path. When you do not want to add or change any attributes, you specify only the entry type (PATH), the path's name, its alternate index's or cluster's name, and the model entry's name.

entryname

names the entry to be used as a model. The *entryname* must name a path entry.

password

specifies a password. If the model entry is password-protected and it is cataloged in a password-protected catalog, you must supply the read (or higher level) password of either the model entry or its catalog. If you specify both passwords, the catalog's password is used. Read or higher RACF authority to the model or catalog is required.

If you are not specifying new protection attributes for the path (that is, the model's passwords and protection attributes are being copied), you must supply the master password of either the model entry or its catalog. Alter RACF authority to the model or catalog is required.

catname

names the model entry's catalog. You must identify the catalog that contains the model entry for either of these cases:

- If you specify the catalog's password instead of the model entry's password.
- If the model entry's catalog is not identified with a JOBCAT or STEPCAT DD statement, and is not the master catalog.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved. For information about the order in which a catalog is selected when the catalog's name is not specified, see “Catalog Selection Order for DEFINE” on page 17.

OWNER(*ownerid***)**

specifies the identification of the path's owner.

Note to TSO users: If the owner is not identified with the OWNER parameter, the TSO user's userid becomes the ownerid.

READPW(*password***)**

specifies a read password for the path. The read password permits read operations against the base cluster's data records.

Abbreviation: RDPW

TO(*date***)‘FOR(***days***)**

specifies the retention period for the path. The path is not automatically deleted when the expiration date is reached. When a retention period is not specified, the path can be deleted at any time.

TO(*date***)**

specifies the date, in the form yyddd, where yy is the year and ddd is the Julian date (001, for January 1, through 365, for December 31), through which the path is to be kept before it is allowed to be deleted.

FOR(*days***)**

specifies the number of days for which the entry is to be kept before it is allowed to be deleted.

The maximum number that can be specified for days is 9999. If the number specified is 0 through 1830, the retention period is the number of days specified. If the number specified is between 1831 and 9999, the retention period is through the year 1999.

UPDATE‘NOUPDATE

specifies whether the base cluster's upgrade set is to be allocated when the path is opened for processing.

The upgrade set is a group of alternate indexes associated with the base cluster. The alternate indexes are opened whenever the base cluster is opened.

UPDATE

specifies that when records in the base cluster are modified or deleted, or when records are added to the base cluster, each alternate index in the base cluster's upgrade set is modified to reflect the change in the cluster's data, just as a key-sequenced cluster's index is modified each time the cluster's data changes.

Abbreviation: UPD

NOUPDATE

specifies that, when opening the path, the path's base cluster is to be allocated and the base cluster's upgrade set is not to be allocated.

You can specify the NOUPDATE attribute for the path even though the UPGRADE attribute is set for one of the base cluster's alternate indexes.

When a path points to a base cluster that has a large upgrade set (that is, many alternate indexes are associated with the base cluster), and the path is defined with the NOUPDATE attribute, you can open the path, and consequently the base cluster, and none of the alternate indexes will be opened.

Note: NOUPDATE will be overridden by opening the path, allowing sharing of a control block structure that permits UPDATE.

Abbreviation: NUPD

UPDATEPW(*password***)**

specifies the update password for the path. The update password permits read and write operations against the base cluster's data records. If a read password is the only password specified for the object (that is, it is the highest-level password), it propagates upward and becomes the password for all higher levels. If you specify a higher-level password and do not specify an update password, the update password is null.

Abbreviation: UPDPW

DEFINE PATH Example

Define a Path

Previous examples illustrate the definition of the path's alternate index, EXAMPLE.AIX, and the alternate index's base cluster, EXAMPLE.KSDS2. The alternate index, path, and base cluster are defined in the same catalog, USERRCAT.

```
//DEFPATH  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DEFINE PATH -
             (NAME(EXAMPLE.PATH) -
             PATHENTRY(EXAMPLE.AIX/AIXMRPW) -
             READPW(PATHRDPW) ) -
         CATALOG(USERRCAT/USERUPPW)
/*
```

The DEFINE PATH command builds a path entry to define the path EXAMPLE.PATH. Because the path entry is being defined into a recoverable catalog, a copy of the path entry is placed in the catalog recovery area. An attempt is made to dynamically allocate the catalog recovery area on volume VSER01. The command's parameters are:

- NAME specifies that the path's name is EXAMPLE.PATH.
- PATHENTRY identifies the alternate index, EXAMPLE.AIX, that the path provides access to.
- READPW specifies the path's read password, PATHRDPW.
- CATALOG, in this example, supplies the catalog's update password, USERUPPW.

DEFINE SPACE

The DEFINE SPACE command defines a VSAM data space in a VSAM catalog. The syntax of this command is:

```
DEFINE    SPACE
            ({CANDIDATE‘
              CYLINDERS(primary[  secondary])‘
              RECORDS(primary[  secondary])
                RECORDSIZE(average   maximum)‘
              TRACKS(primary[  secondary])}
            VOLUMES(volser[  volser...])
            [FILE(ddname)])
          [CATALOG(catname[/password])]
```

DEFINE can be abbreviated: DEF

DEFINE SPACE Parameters

Required Parameters

SPACE

specifies that a data space is to be defined. You can also use the DEFINE SPACE command to reserve a volume for VSAM's future use.

Abbreviation: SPC

CANDIDATE‘
CYLINDERS(*primary*[*secondary*])‘
RECORDS(*primary*[*secondary*]) RECORDSIZE(*average* *maximum*)‘
TRACKS(*primary*[*secondary*])

specifies the volume(s) to be reserved for VSAM's future use or specifies the amount of space to be allocated in terms of cylinders, number of records, or tracks.

You must specify only one of the following parameters: CANDIDATE, CYLINDERS, TRACKS, or RECORDS. When you specify RECORDS, you must also specify RECORDSIZE. When you specify CYLINDERS or TRACKS, you cannot specify RECORDSIZE.

CANDIDATE

specifies that the volumes listed in the VOLUMES parameter are reserved for future use by VSAM. An ownership indicator is set in the volume's table of contents (VTOC). The volumes are reserved for use by the catalog, but no space is allocated (other than the primary CRA allocation if the catalog is recoverable). Each volume so reserved is called a candidate volume. If CANDIDATE is not specified, you must specify one of the following parameters: CYLINDERS, TRACKS, or RECORDS.

If a VSAM data space already exists on the volume, you cannot specify CANDIDATE. (You can, however, use the ALTER command to identify the volume as a candidate volume for a VSAM object other than the volume's catalog.)

Abbreviation: CAN

CYLINDERS(*primary***[** *secondary***])‘**
RECORDS(*primary***[** *secondary***]) RECORDSIZE(***average* *maximum***)‘**
TRACKS(*primary***[** *secondary***])**

specifies the amount of space to be allocated in terms of tracks, cylinders, or number of records.

If RECORDS is specified, the space required is calculated in terms of the number of records, but the space is allocated by tracks. However, if you specify TRACKS or RECORDS and the minimum number of tracks exceeds a cylinder, space is allocated in terms of cylinders.

primary

specifies the initial amount of space (primary extent) to be allocated to the data space. primary can be expressed in decimal (n), hexadecimal (`X'n'`), or binary (`B'n'`) form.

secondary

specifies the amount of space that is to be allocated to the data space each time it is extended. Once the primary extent is filled, the data space can expand to include a maximum of 15 secondary extents if you have specified a secondary extent amount. secondary can be expressed in decimal (n), hexadecimal (`X'n'`), or binary (`B'n'`) form.

The secondary space allocation is rounded upward to the nearest whole cylinder regardless of your specification in terms of TRACKS or RECORDS. Consequently, the total amount of space allocated to the data space might exceed the predicted limit.

When the data space is the first data space on a volume that belongs to a recoverable catalog, the primary amount is increased by one cylinder.

Abbreviations: CYL, REC, and TRK

RECORDSIZE(*average* *maximum***)**

specifies the average and maximum lengths, in bytes, of the records.

average and maximum can be any integer value between 1 and 32,761, expressed in decimal (n), hexadecimal (`X'n'`), or binary (`B'n'`) form. When you specify the RECORDS parameter, you must also specify RECORDSIZE; otherwise, you cannot specify RECORDSIZE.

Abbreviation: RECSZ

VOLUMES(*volser***[** *volser***...])**

specifies the volumes on which data spaces are to be defined or volumes to be reserved as candidate volumes for VSAM's future use. If two or more volumes are specified and an amount of space is specified (that is, TRACKS, CYLINDERS, or RECORDS and RECORDSIZE is specified) the amount specified for the primary allocation is allocated on each volume. The specified volumes must all be of the same device type. When the volume already has a data space on it, subsequent data spaces can be defined and must be cataloged in the catalog that owns the volume. A data space can be defined on a mass storage volume.

Abbreviation: VOL

Optional Parameters

CATALOG(*catname***[/***password***])**

identifies the catalog in which the data space is to be defined. The CATALOG parameter supplies the name and password, when required, of the catalog that contains the volume entry that describes the volume on which the data space is to be allocated.

If the DEFINE SPACE command is used to allocate the volume's first VSAM data space or to identify the volume as a candidate volume, the CATALOG parameter identifies the catalog that is to contain the volume's catalog entry and is to own the volume. (For more information about VSAM volume ownership, see *DFSMS/MVS Managing Catalogs*.)

If the catalog's volume is physically mounted, it is dynamically allocated. For information about the order in which catalogs are selected, see "Catalog Selection Order for DEFINE" on page 17.

catname

specifies the name of the catalog.

password

specifies a password. If the catalog is password protected, you must supply the update- or higher-level password. Update or higher RACF authority to the catalog is required.

Abbreviation: CAT

FILE(*ddname***)**

specifies the name of the DD statement that identifies the device type and volumes to be used for space allocation. You cannot use concatenated DD statements to describe more than one volume.

If FILE is not specified and the volume is physically mounted, the volume(s) identified with the VOLUMES parameter is dynamically allocated. Each dynamically allocated volume must be mounted as permanently resident or reserved.

DEFINE SPACE Example

Define a Data Space

The data space is to be used to allocate space for VSAM clusters that are subsequently defined.

```
//DEFSPC1  JOB    ...
//JOBCAT   DD     DSN=D27UCAT1,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
    DEFINE SPACE -
         (CYLINDERS(30 10) -
         VOLUMES(VSER05)) -
         CATALOG(D27UCAT1/USERMRPW)
/*
```

Access method services defines the data space and allocates its space on volume VSER05. The data space is cataloged in D27UCAT1, because a JOBCAT DD statement is specified. All future data spaces and clusters on volume VSER05 must also be cataloged in the same catalog. Non-VSAM data sets on the volume reside in areas that are not allocated to a VSAM data space.

The DEFINE SPACE command defines a VSAM data space. Its parameters are:

- CYLINDERS specifies that 30 cylinders are to be allocated for the data space. When the data space is extended, it is to be extended in increments of 10 cylinders.
- VOLUMES specifies the volume serial number of the volume on which the data space is to be defined, VSER05.
- In this example, CATALOG supplies the user catalog's name, D27UCAT1, and its master password, USERMRPW.

DEFINE USERCATALOG

The DEFINE USERCATALOG‘MASTERCATALOG command defines a VSAM user or master catalog. When you use this command, you can specify attributes for the catalog as a whole and for the components of the catalog. For information about using an alias to define a user catalog, see *DFSMS/MVS Managing Catalogs*.

The syntax of this command is:

```
DEFINE     USERCATALOG‘MASTERCATALOG
             (NAME(entryname)
             {CYLINDERS(primary[ secondary])‘
               RECORDS(primary[ secondary])‘
               TRACKS(primary[ secondary])}
             VOLUME(volser)
             VSAMCATALOG
             [ATTEMPTS(number‘2)]
             [AUTHORIZATION(entrypoint[ string])]
             [BUFFERSPACE(size‘3072)]
             [CODE(code)]
             [CONTROLPW(password)]
             [FILE(ddname)]
             [MASTERPW(password)]
             [MODEL(entryname[/password][ catname[/password]])]
             [OWNER(ownerid)]
             [READPW(password)]
             [RECOVERABLE‘NOTRECOVERABLE]
             [TO(date)‘FOR(days)]
             [UPDATEPW(password)]
             [WRITECHECK‘NOWRITECHECK])

           [DATA (
             ([BUFFERSPACE(size)]
             [CYLINDERS(primary[ secondary])‘
               RECORDS(primary[ secondary])‘
               TRACKS(primary[ secondary])]
             [RECOVERABLE‘NOTRECOVERABLE]
             [WRITECHECK‘NOWRITECHECK])]

           [INDEX (
             [CYLINDERS(primary[ secondary])‘
               RECORDS(primary[ secondary])‘
               TRACKS(primary[ secondary])]
             [WRITECHECK‘NOWRITECHECK])]

           [CATALOG(mastercatname[/password])]
```

DEFINE can be abbreviated: DEF

DEFINE USERCATALOG Parameters

Required Parameters

USERCATALOG‘MASTERCATALOG
specifies that a catalog is to be defined.

USERCATALOG
specifies that a user catalog is to be defined. USERCATALOG is followed by the parameters specified for the catalog as a whole. Update or higher RACF authority to the master catalog is required.

Abbreviation: UCAT

MASTERCATALOG
This keyword parameter is provided for compatibility with OS/VS1. Processing is identical for the MASTERCATALOG and USERCATALOG parameters. When you specify MASTERCATALOG, a user catalog is created. You can, however, establish a user catalog as a master catalog at IPL time. For a description of this procedure, see *DFSMS/MVS Managing Catalogs*.

Abbreviation: MCAT

NAME(*entryname***)**
specifies the name of the catalog being defined.

CYLINDERS(*primary***[** *secondary***])‘**
RECORDS(*primary***[** *secondary***])‘**
TRACKS(*primary***[** *secondary***])**
specifies the amount of space to be allocated in terms of cylinders, tracks, or number of records. You can specify the amount of space as a parameter of USERCATALOG, as a parameter of USERCATALOG and DATA, or as a parameter of USERCATALOG, DATA, and INDEX.

If you specify less than one cylinder of space for a recoverable catalog, your DEFINE command will fail.

For a description of the difference in space allocation depending on which parameters you specify, see *DFSMS/MVS Managing Catalogs*. This guide also provides information about estimating the amount of space to be specified for a catalog.

*primary***[** *secondary***]**
specify the size of the primary and secondary extents to be allocated. Once the primary extent is filled, the space can expand to include a maximum of 13 additional secondary extents if you have specified a secondary allocation amount. Secondary allocation should be specified in case the catalog has to be extended.

Abbreviations: CYL, REC, and TRK

VOLUME(*volser***)**
specifies the volume that is to contain the catalog. The volume cannot be currently owned by any other VSAM catalog.

The VOLUME parameter interacts with other DEFINE CATALOG parameters. You should ensure that the volume you specify for the catalog is consistent with the catalog's other attributes:

- CYLINDERS, RECORDS, TRACKS: The volume contains enough space to satisfy the catalog's primary space requirement. (Space on the volume might already be allocated to non-VSAM data sets and system data sets.)
- FILE: The volume information supplied with the DD statement is consistent with the information specified for the catalog and its components.

A user catalog can be defined on a mass storage volume.

Abbreviation: VOL

| **VSAMCATALOG**
| specifies that the type of catalog to be defined is a VSAM catalog. For infor-
| mation on other catalog types, see *DFSMS/MVS Managing Catalogs*.

Optional Parameters

ATTEMPTS(*number*‘**2)**

specifies the maximum number of times the operator can try to enter a correct password in response to a prompting message.

number

is an integer from 0 to 7. If 0 is specified, the operator is not prompted and is not allowed to enter a password from the console.

Note to TSO users: At a TSO terminal the logon password is checked first, before the user is prompted to supply a password for the catalog. Checking the logon password counts as one attempt to obtain a password. If ATTEMPTS is not specified, the user has one attempt to supply the catalog's password, because the default is 2.

Abbreviation: ATT

AUTHORIZATION(*entrypoint***[** *string***])**

specifies that a user-security-verification routine (USVR) is available for additional security verification. When a protected catalog is accessed and the user supplies a correct password other than the catalog's master password, the USVR receives control. For information on the user-security-verification routine, see *DFSMS/MVS Using Data Sets*.

entrypoint

specifies the name of the USVR.

string

specifies information to be passed on to the USVR when it receives control to verify authorization. The length defined for the authorization verification record must be from 1 to 256 characters.

Abbreviation: AUTH

BUFFERSPACE(*size*‘**3072)**

specifies the minimum space, in bytes, to be provided for buffers when using the catalog (one not residing on a 3380). Decimal values you can specify are 3072, 4096, 5120, 6144, 7168, and 8192.

size

is the amount of space, in bytes, to be provided for buffers. Size can be expressed in decimal (n), hexadecimal (X'n'), or binary (B'n') form, but must not exceed 16776704.

Abbreviation: BUFSP

CATALOG(*mastercatname***[/***password***])**

specifies the name and password of a master catalog. If the master catalog is password protected, its update- or higher-level password must be provided in this parameter or in response to prompting.

mastercatname
is the name of the master catalog.

password
specifies the update- or higher-level password of the master catalog that is required when a user catalog is being defined, if the master catalog is password protected.

Abbreviation: CAT

Note: The DEFINE USERCATALOG command only allows user catalogs to be defined into the master catalog.

CODE(*code***)**
specifies a code name for the catalog being defined. If an attempt is made to access a password-protected catalog without a password, the code name is used in a prompting message; the code enables the operator to be prompted for the password without disclosing the name of the catalog. If CODE is not specified, the operator will be prompted with the name of the catalog.

CONTROLPW(*password***)**
specifies a control password for the catalog being defined. The control password permits the same operations as the update password.

If a read or update password is the only password specified for the catalog, it (the highest-level password) propagates upward and becomes the password for all higher levels. When the master password is specified but the control password is not specified, the control password is null.

Abbreviation: CTLPW

FILE(*ddname***)**
specifies the name of the DD statement that identifies the device and volume to be used for the catalog. The DD statement should specify DISP=OLD to prevent premature space allocation on the volume.

If FILE is not specified and the catalog's volume is physically mounted, the volume identified with the VOLUME parameter is dynamically allocated. The volume must be mounted as permanently resident or reserved.

MASTERPW(*password***)**
specifies a master password for the catalog being defined. A catalog must have a master password in order for VSAM data sets cataloged in it to be password-protected. The AUTHORIZATION, CODE, and ATTEMPTS parameters have no effect unless the catalog has a master password associated with it. The master password allows all operations; it is required to open the catalog as a data set.

If a master password is not specified for the catalog, the catalog's highest-level password propagates upward and becomes the password for all higher levels, including the master password. The master password is null when no other passwords are specified.

Abbreviation: MRPW

MODEL(*entryname***[/***password***][** *catname***[/***password***]])**
specifies that an existing master or user catalog is to be used as a model for the user catalog being defined.

It is possible to use an already defined master or user catalog as a model for another user catalog.

When one entry is used as a model for another, its attributes are copied as the new entry is defined. You may use some attributes of the model and override others by explicitly specifying them in the definition of the user catalog.

If a model is used, you must specify certain parameters even though no attributes are to be changed or added. The name of the user catalog to be defined and volume and space information must always be specified as parameters of USERCATALOG.

entryname

specifies the name of the master or user catalog to be used as a model.

password

specifies a password. If the catalog to be used as a model is password-protected, a password is required.

If you specify both passwords (that is, the password following entryname and the password following catname), the password following catname is used for authorization.

If the protection attributes are to be copied, enter the master password of the catalog being used as a model. Alter RACF authority to the catalog is required. If passwords are not to be copied, any password except the master can be used.

catname

specifies the name of the catalog to be used as a model. This parameter is required if the model catalog is neither the master catalog nor a catalog identified by a JOBCAT or STEPCAT DD statement.

OWNER(*ownerid***)**

specifies the identification of the owner of the catalog being defined.

READPW(*password***)**

specifies a read password for the catalog being defined. The read password permits the user to list the catalog's entries. (Passwords and protection attributes are listed only when the master-level password is supplied.)

Abbreviation: RDPW

RECOVERABLE‘<u>NOTRECOVERABLE</u>

specifies whether a catalog recovery space is to be created on each volume owned by the catalog.

RECOVERABLE

specifies that a catalog recovery space is to be created.

On the catalog's volume, the catalog recovery space is allocated from the catalog's data space. On subsequent volumes owned by the catalog, the catalog recovery space is allocated from the first data space defined on the volume.

Primary allocation for a CRA is one cylinder. Once a primary extent is filled, the CRA can expand to include a maximum of 15 additional extents. Allocation for each secondary extent is one cylinder.

The number of records a CRA can contain varies with the device type (for example, for a 3330 with 20 control intervals per track, each extent will accommodate approximately 370 records).

Abbreviation: RVBL

NOTRECOVERABLE

specifies that no catalog recovery space is to be created.

Abbreviation: NRVBL

TO(*date***)‘FOR(***days***)**

specifies the retention period for the catalog being defined. If no value is coded, the catalog can be deleted whenever it is empty.

TO(*date***)**

specifies the date, in the form yyddd, where yy is the year and ddd is the number (001 through 365) of the day through which the catalog being defined is to be kept.

FOR(*days***)**

specifies the number of days for which the catalog being defined is to be kept. The maximum number that can be specified is 9999. If the number specified is 0 through 1830, the catalog is retained for the number of days specified; if the number is between 1831 and 9999, the catalog is retained through the year 1999.

UPDATEPW(*password***)**

specifies an update password for the catalog being defined. The update password permits entries to be added to the catalog being defined. The catalog must be update password-protected to prevent unauthorized users from cataloging data sets.

If a read password is the only password specified for the catalog (that is, it is the highest-level password), it propagates upward and becomes the password for all higher levels. If you specify a higher-level password and do not specify an update or read password, the update password is null.

When you anticipate using the catalog to contain many non-VSAM entries, you should consider allowing the catalog's update password to be null (that is, to specify a master password but not an update password). A null update password allows you to alter and delete non-VSAM entries without having to supply the catalog's password.

Abbreviation: UPDPW

WRITECHECK‘NOWRITECHECK

specifies whether the catalog is to be checked by a direct access device operation called write check when a record is written to the device.

WRITECHECK

specifies that a record is to be written and then read, without data transfer.

Abbreviation: WCK

NOWRITECHECK

specifies that the catalog is not to be checked by a write check when a record is written to the device.

Abbreviation: NWCK

Data and Index Components of Usercatalog

Attributes can be specified separately for the catalog's data and index components. The DATA and INDEX parameters are listed at the beginning of this section. These parameters are described in detail as parameters of the catalog as a whole. Restrictions are noted with each parameter's description.

DEFINE USERCATALOG Examples

Defining a VSAM User Catalog: Example 1

A user catalog is defined in this example. The user catalog's data space is not available to contain other VSAM objects.

```
 //DEFCAT2  JOB    ...
 //STEP1    EXEC  PGM=IDCAMS
 //SYSPRINT DD     SYSOUT=A
 //SYSIN    DD     *

      DEFINE USERCATALOG( -
           NAME(USERCAT3) -
           VOLUME(VSER04) -
           VSAMCATALOG -
           TRACKS(153 18) )
/*
```

The DEFINE USERCATALOG command defines a user catalog. Its parameters are:

- NAME specifies the name of the catalog, USERCAT3.
- VOLUME specifies that the catalog is to reside on the volume whose serial number is VSER04.
- TRACKS specifies that the catalog's data space is to be 153 tracks. When the user catalog is extended, VSAM extends it in increments of 18 tracks.
- Values and attributes that apply by default to the catalog are:

  BUFFERSPACE = 3072 bytes,
  ATTEMPTS = 2,
  NOWRITECHECK, and
  NOTRECOVERABLE.

Define a User Catalog Leaving Available Suballocatable Space: Example 2

A user catalog is defined. The catalog will actually occupy only a portion of the space defined, leaving the remainder of the space available for the suballocation of other VSAM data sets.

```
//DEFCAT3  JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
     DEFINE USERCATALOG( -
               NAME(D27UCAT1) -
               MASTERPW(USERMRPW) -
               UPDATEPW(USERUPPW) -
               FOR(365) -
               CYLINDERS(10 1) -
               VSAMCATALOG -
               VOLUME(VSER02) ) -
          DATA( -
               CYLINDERS(3 1) ) -
          INDEX( -
               CYLINDERS(1) ) -
          CATALOG(AMAST1/MASTUPW1)
/*
```

The DEFINE USERCATALOG command defines a user catalog, D27UCAT1. Its parameters are:

- NAME names the user catalog, D27UCAT1.
- MASTERPW and UPDATEPW specify master and update passwords for the catalog: USERMRPW and USERUPPW.
- FOR specifies that the user catalog is to be retained for 365 days.
- CYLINDERS specifies that 10 cylinders are to be allocated for the user catalog's data space. When the user catalog's data space is extended, it is to be extended in increments of 1 cylinder.
- VOLUME specifies that the catalog is to reside on volume VSER02. Volume VSER02 will be dynamically allocated.
- DATA and INDEX specify that VSAM is to allocate 4 cylinders for the catalog itself. VSAM determines the proportion of space that is allocated to the catalog's data and index components. The remainder of the catalog's data space (6 cylinders) is available to contain VSAM objects that reside in a nonunique data space. If the catalog's data component is extended, it is to be extended in increments of 1 cylinder. The catalog's index component is never extended.
- CATALOG specifies that the user catalog connector entry is to be defined in the master catalog, AMAST1. CATALOG provides the catalog's update password, MASTUPW1, so that the operator is not prompted to provide it.
- Values and attributes that apply by default to the catalog are:

  BUFFERSPACE = 3072 bytes,
  ATTEMPTS = 2,
  NOTRECOVERABLE, and
  NOWRITECHECK.

Define a User Catalog Using the MODEL Parameter: Example 3

The user catalog defined previously, D27UCAT1, is used as a model for the user catalog being defined, D27UCAT2.

```
//DEFCAT4  JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//STEPCAT  DD     DSNAME=D27UCAT1,DISP=SHR
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
     DEFINE USERCATALOG( -
               NAME(D27UCAT2) -
               MASTERPW(USERMRPW) -
               UPDATEPW(USERUPPW) -
               CYLINDERS(15 5) -
               VOLUME(VSER03) -
               VSAMCATALOG -
               MODEL(D27UCAT1/MRPWD27 -
                 D27UCAT1/MRPWD27)  ) -
          CATALOG(AMAST1/MASTUPW1)
/*
```

Job control language statement:

- STEPCAT DD makes a catalog available for this job step: D27UCAT1.

The DEFINE USERCATALOG command defines catalog D27UCAT2. Its parameters are:

- NAME names the catalog, D27UCAT2.
- MASTERPW and UPDATEPW specify master and update passwords for the catalog: USERMRPW and USERUPPW.
- CYLINDERS specifies that 15 cylinders are to be allocated for the catalog's data space. The catalog itself will reside within this data space. When the catalog's data space is extended, it is to be extended in increments of 5 cylinders.
- VOLUME specifies that the catalog is to reside on volume VSER03. Volume VSER03 will be dynamically allocated.
- MODEL identifies D27UCAT1 as the catalog to use as a model for D27UCAT2. The attributes and specifications of D27UCAT1 that are not otherwise specified with the previous parameters are used to define the attributes and specifications of D27UCAT2. The master catalog, AMAST1, contains a user catalog connector entry which points to D27UCAT1. This is why D27UCAT1 is specified as MODEL's catname subparameter. Values and attributes that apply to D27UCAT2 as a result of using D27UCAT1 as a model are:

  FOR = 365 days,

  CYLINDERS = 3 (primary) and 1 (secondary) for the data component and 1 (primary) for the index component,

  BUFFERSPACE = 3072 bytes,

  ATTEMPTS = 2, and

  NOWRITECHECK.

- CATALOG specifies that the user catalog connector is to be defined in the AMAST1 catalog. The update password of AMAST1 is MASTUPW1.

Define a VSAM Recoverable User Catalog: Example 4

A recoverable user catalog is defined.

```
//DEFCAT5  JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//VOL1     DD     VOL=SER=VSER01,UNIT=3380,DISP=OLD
//SYSPRINT DD     SYSOUT=A
//SYSIN    DD     *
    DEFINE USERCATALOG( -
              NAME(USERRCAT) -
              MASTERPW(USERMRPW) -
              UPDATEPW(USERUPPW) -
              TO(99365) -
              ATTEMPTS(3) -
              CODE(BEQUIET) -
              RECOVERABLE -
              TRACKS(100) -
              FILE(VOL1) -
              VSAMCATALOG -
              VOLUME(VSER01)   ) -
         DATA( -
              RECORDS(500 100)) -
              CATALOG(AMAST1/MASTUPW1)
/*
```

Job control language statement:

- VOL1 DD describes the volume on which the catalog is to be defined.

The DEFINE USERCATALOG command defines a user catalog, USERRCAT. Its parameters are:

- NAME names the user catalog, USERRCAT.
- MASTERPW and UPDATEPW specify master and update passwords for the catalog: USERMRPW and USERUPPW.
- TO specifies that the user catalog is to be retained until 31 December 1999.
- ATTEMPTS specifies that the operator may be prompted for the correct password up to three times.
- CODE specifies that the catalog is identified, in the prompting message to the operator, with the name “BEQUIET.”
- RECOVERABLE specifies that the catalog's volumes contain catalog recovery areas and the LISTCRA, EXPORTRA, IMPORTRA, and RESETCAT commands can be used to restore entries in the catalog.
- TRACKS specifies that 100 tracks are to be allocated for the user catalog's data space. No secondary allocation is specified. If additional VSAM space is required on the volume, it can be explicitly defined using the DEFINE SPACE command.
- FILE points to the VOL1 DD statement. The VOL1 DD statement directs the operating system scheduler to mount and allocate the volume on which the user catalog is to reside. In this example, the volume is not dynamically allocated.
- VOLUME specifies that the user catalog is to reside on volume VSER01.

- DATA specifies that VSAM is to allocate space to accommodate 500 records for the user catalog. VSAM determines the total amount of space that is allocated to the catalog's data and index components. The remainder of the catalog's data space is available to contain the catalog recoverable area (CRA) and other VSAM objects that reside in a nonunique data space. If the catalog's data component is extended, it is extended in increments to accommodate 100 records.

  You may wish to estimate the amount of space which VSAM will actually allocate to the catalog to:

  – Ensure that the total amount of space specified via TRACKS is large enough.

  – Determine how much suballocatable space will be available.

- CATALOG specifies that the user catalog connector is to be defined in the AMAST1 catalog. The update password of AMAST1 is MASTUPW1.

- Values and attributes that apply by default to the catalog are:

  BUFFERSPACE = 3072 bytes, and
  NOWRITECHECK.

DELETE

The DELETE command deletes catalogs, VSAM data sets, and non-VSAM data sets. The syntax of this command is:

DELETE	**(***entryname***[/***password***][** *entryname***[/***password***] ...])** **[ALIAS‘** **ALTERNATEINDEX‘** **CLUSTER‘** **GENERATIONDATAGROUP‘** **NONVSAM‘** **PAGESPACE‘** **PATH‘** **SPACE‘** **USERCATALOG** **[ERASE‘NOERASE]** **[FILE(***ddname***)]** **[FORCE‘NOFORCE]** **[PURGE‘NOPURGE]** **[SCRATCH‘NOSCRATCH]** **[CATALOG(***catname***[/***password***])]**

DELETE can be abbreviated: DEL

DELETE Parameters

Required Parameters

(*entryname***[/***password***][** *entryname***[/***password***]...])**

names the entries to be deleted. If more than one entry is to be deleted, the list of entrynames must be enclosed in parentheses.

This parameter must be the first parameter following DELETE.

entryname

is the name of the entry to be deleted or the volume serial number of the volume that contains a data space to be deleted. A generic name may be coded to delete multiple entries with one entryname. (For example, GENERIC.*.BAKER is a generic name where * is any 1- to 8-character simple name.)

If you are deleting a member of a non-VSAM partitioned data set, the entryname must be specified in the syntax: pdsname(membername). If you are deleting a non-VSAM data set that was defined by coding DEVICETYPES(0000) and VOLUMES(******), then DELETE only uncatalogs the data set. It does not scratch it from the SYSRES volume.

password

specifies a password for a password-protected entry. Passwords may be specified for each entryname, or the catalog's password may be specified through the CATALOG parameter for the catalog that contains the entries to be deleted. Only certain types of catalog entries can be password protected, as follows:

To delete:

- Alias of a user catalog—specify the catalog's update-level or higher-level password. One of the following is required: RACF alter authority to the master catalog in which the user catalog is cataloged, or RACF alter authority to the user catalog itself.
- Alias of a data set—specify the data set's update-level or higher-level password. One of the following is required: RACF alter authority to the user catalog in which the data set is cataloged, or RACF alter authority to the data set itself.
- Alternate index—specify the entry's master password, or the catalog's master password. RACF alter authority to the alternate index or to the catalog is required.
- Cluster—specify either the entry's master password or the catalog's master password. One of the following is required: RACF alter authority to the catalog in which the cluster is cataloged, or RACF alter authority to the cluster itself.
- Data space—specify the catalog's update- or higher-level password. RACF alter authority to the catalog is required.
- Generation data group—specify the catalog's update- or higher-level password. RACF alter authority to the GDG base or to the catalog is required.
- Non-VSAM entry—specify the catalog's update- or higher-level password. RACF alter authority to the non-VSAM data set or to the catalog is required.
- Page space—specify the entry's master password, or the catalog's master password. RACF alter authority to the page space or to the catalog is required.
- Path—specify the entry's master password, or the catalog's master password. RACF alter authority to the path or to the catalog is required.
- User catalog—specify the entry's master password with the *entryname* so that access method services does not issue a prompting message to the operator or TSO terminal user. One of the following is required: update authority to the master catalog in which the user catalog is cataloged, or RACF alter authority to the user catalog itself.

Optional Parameters

ALIAS‘ALTERNATEINDEX‘CLUSTER‘GENERATIONDATAGROUP‘ NONVSAM‘PAGESPACE‘PATH‘SPACE‘USERCATALOG

specifies the type of object or entry to be deleted. If the object to be deleted is a system data set, see the DELETE SCRATCH‘NOSCRATCH section in *DFSMS/MVS Managing Catalogs* for additional information.

ALIAS

specifies that the entry to be deleted is an alias entry.

ALTERNATEINDEX

specifies that the object to be deleted is an alternate index and its data and index entries. When a path entry is associated with the alternate index, the path entry is also deleted.

When the alternate index has the attribute that is still to be upgraded and it is the only such alternate index associated with the base cluster, the base cluster's upgrade set entry is also deleted.

Abbreviation: AIX

CLUSTER
specifies that the object to be deleted is a cluster, its associated data and index entries, and any related paths and alternate indexes.

If the cluster is defined in a recoverable catalog, DELETE requires the catalog recovery volume for the cluster to be mounted. If the CRA volume is not available, then any volume with the required CRA volume serial number satisfies DELETE's requirements.

Abbreviation: CL

GENERATIONDATAGROUP
specifies that the entry to be deleted is a generation data group entry. To delete a generation data group that is not empty, you must specify the FORCE parameter.

Abbreviation: GDG

NONVSAM
specifies that the entry to be deleted is a non-VSAM data set entry.

If the non-VSAM data set has aliases, all of its alias entries are deleted.

If the non-VSAM data set is partitioned, you can delete one of its members by specifying pdsname(membername).

RACF alter authority to the non-VSAM data set is required.

RACF commands can be used to specify an ERASE attribute in a generic or discrete profile for a non-VSAM data set. Use of this attribute renders all allocated DASD tracks unreadable before space on the volume is made available for reallocation. Refer to the appropriate RACF publications for information about how to specify and use this facility.

Abbreviation: NVSAM

PAGESPACE
specifies that an inactive page space is to be deleted. A page space is identified as “active” during the operator's IPL procedure.

Abbreviation: PGSPC

PATH
specifies that a path entry is to be deleted. No entries associated with the path are deleted.

SPACE
specifies that all empty VSAM data spaces on a volume are to be deleted. This parameter is required when you want to delete the volume's empty data spaces.

To delete a data space that is not empty, you must specify both the SPACE parameter and the FORCE parameter.

If all data spaces on a volume have been deleted and the volume is not a candidate or catalog volume, its volume entry is also deleted.

Note: When a volume entry in the catalog is deleted, VSAM's ownership of the volume is relinquished. When the catalog that owns the volume is recoverable, the data space that contains the volume's recovery area is not deleted unless all other data spaces on the volume have been deleted. CRAs must be deleted in a separate command.

Abbreviation: SPC

USERCATALOG

specifies that the object to be deleted is a user catalog.

The catalog connector entry in the master catalog is deleted. If the user catalog has aliases, all the catalog's alias entries in the master catalog are deleted.

To delete a user catalog when it is empty (that is, it contains only its self-describing entries and its volume's volume entry), you must specify USERCATALOG. To delete a user catalog that is not empty, you must specify both USERCATALOG and FORCE.

Note: The JOBCAT/STEPCAT DD statement is ignored for this command. EXPORT DISCONNECT must be used to delete a user catalog entry from a user catalog. A master catalog for another system is considered to be a user catalog by the processing system.

Abbreviation: UCAT

CATALOG(*catname***[/***password***])**

specifies the name of the catalog that contains the entries to be deleted. For information about the order in which catalogs are searched, see “Catalog Search Order for DELETE” on page 17.

Note: This parameter cannot be used to delete a user catalog.

catname

identifies the catalog that contains the entry to be deleted.

password

specifies the password of the catalog that contains the entries to be deleted. If entries to be deleted are password-protected and the catalog is also password-protected, a password must be supplied either through CATALOG or with the name of each entry to be deleted. The password that must be specified for each entry type is given under the description of the *entryname* parameter.

If a password is supplied through the CATALOG parameter, it takes precedence over any password supplied with the *entryname* parameter and is used for all entries to be deleted.

A JOBCAT or STEPCAT DD statement may be needed when dynamic allocation is required, because the name of the catalog cannot be passed to dynamic allocation via the CATALOG parameter.

Abbreviation: CAT

ERASE‘NOERASE

specifies whether the data component of a cluster or alternate index to be deleted is to be erased (overwritten with binary zeros).

This parameter will override whatever was coded when the cluster or alternate index was defined or last altered. This parameter should be specified only when a cluster or an alternate index entry is to be deleted. When you specify ERASE, you must identify the catalog of the entry that is still to be deleted with a JOBCAT or STEPCAT DD statement unless

- The entry is in the master catalog, or
- The first qualifier in the entry's qualified name is the catalog's name or alias.

ERASE
specifies that the data component is to be overwritten with binary zeros when the cluster or alternate index is deleted. If ERASE is specified, the volume that contains the data component must be mounted.

Abbreviation: ERAS

NOERASE
specifies that the data component is not to be overwritten with binary zeros when the cluster or alternate index is deleted.

Abbreviation: NERAS

FILE(*ddname*)
specifies the name of the DD statement that identifies:

- The volume that contains a unique data set to be deleted.
- The partitioned data set from which a member (or members) is to be deleted.
- The data set to be deleted if ERASE is specified.
- The volume that contains the data space to be deleted.
- The catalog recovery volume(s) when the entry being deleted is in a recoverable catalog. If the volumes are of a different device type, concatenated DD statements must be used. The catalog recovery volume is the volume whose recovery space contains a copy of the entry being deleted. For more details on catalog recovery volume mounting requirements, see *DFSMS/MVS Managing Catalogs*.
- The volume(s) owned by the catalog when you delete a catalog using the FORCE option.

If you do not specify FILE and VSAM requires access to a volume or volumes during the delete processing, VSAM will attempt to dynamically allocate the volumes. When ERASE is specified and FILE is not specified, the entryname will attempt to be dynamically allocated. Dynamic allocation requires that the volume(s) must be mounted as permanently resident or reserved.

When more than one volume is to be identified (for example, a multivolume data set), FILE identifies the DD statement that specifies all volumes. If in any of the previous cases the volumes are of a different device type, concatenated DD statements must be used. All volumes that contain associations to a cluster being deleted must also be included on the DD statement referenced by the FILE parameter.

When deleting multivolume non-VSAM data sets with the SCRATCH option, DELETE SCRATCH processing requires access to each volume in the entry's catalog record before the scratch can be issued. This requires either all volumes to be mounted, online, and allocable to the job, or the use of the FILE parameter specifying a DD statement allocating at least one mountable unit (not permanently resident or reserved). Deferred mount must be specified on the DD statement so that allocation will flag the UCB to allow demount/mount requests to be issued for the unit as required during delete processing. If access to the volumes cannot be provided, then DELETE NOSCRATCH can be used to uncatalog the non-VSAM data set and the user will assume the responsibility of scratching the format-1 DSCBs from all the volumes.

FORCE‘NOFORCE

specifies whether objects that are not empty should be deleted.

FORCE

allows you to delete data spaces, generation data groups, and user catalogs without first ensuring that these objects are empty.

Warning: The FORCE parameter deletes all clusters in the catalog.

If you delete a data space using FORCE:

- All VSAM data spaces on the volume(s) are scratched from the VTOC. VSAM's ownership of the volume(s) is given up.
- Before the data spaces are scratched, VSAM verifies that no VSAM clusters on the volume are open. The clusters remain cataloged, but their entries are marked unusable. Subsequently, you can delete the cluster from the catalog.
- You cannot specify FORCE to delete the space on a volume that contains the VSAM master catalog or a user catalog.
- You must supply the master password of the catalog that contains the volume's entry.

If you delete a generation data group using FORCE:

- The GDG entry is deleted even though it might point to non-VSAM entries in the catalog.
- Each non-VSAM data set entry pointed to by the GDG base entry is deleted before the GDG base entry is deleted. However, the non-VSAM data set's space and contents on the volume are undisturbed.

If you delete a user catalog using FORCE:

- The catalog is deleted even though it contains catalog entries for objects that have not been deleted. All cataloged objects are automatically deleted, but the contents of each cluster and alternate index are not erased.
- All data sets cataloged in the user catalog as well as the catalog data set itself are deleted. All volumes on which these data sets reside must be included with the FILE parameter.
- Before data spaces are deleted, VSAM verifies that no VSAM clusters on the volume are open. All data spaces are deleted from each volume owned by the catalog. The volumes are then available to be used by the system or to be assigned to other VSAM catalogs.

- VSAM clusters and alternate indexes, even though they might reside in unique data spaces, cannot be located, because the data space's DSCB is scratched when the catalog is deleted.
- Non-VSAM data set entries in the catalog are deleted, but the non-VSAM data set's space on the volume is undisturbed. The non-VSAM data set can be located with its DSCB in the volume's VTOC.
- You must supply the master password of the catalog being deleted.

Abbreviation: FRC

NOFORCE

causes the DELETE command to terminate when you request the deletion of a data space, generation data group, or catalog that is not empty.

Abbreviation: NFRC

PURGE‘NOPURGE

specifies whether the entry is to be deleted regardless of the retention period specified. This parameter cannot be used if a data space entry is to be deleted.

PURGE

specifies that the entry is to be deleted even if the retention period, specified in the TO or FOR parameter, has not expired.

Abbreviation: PRG

NOPURGE

specifies that the entry is not to be deleted if the retention period has not expired.

Abbreviation: NPRG

SCRATCH‘NOSCRATCH

specifies whether a data set is to be removed from the VTOC of the volume on which it resides. This parameter can only be specified for a cluster, an alternate index, a page space, or a non-VSAM data set.

SCRATCH

specifies that a non-VSAM data set or a data space is to be removed from the VTOC of the volume on which it resides.

When SCRATCH is specified for a cluster, alternate index, or page space defined with the UNIQUE attribute, the entry for the data set is removed from the VTOC. For a cluster, alternate index, or page space defined with the SUBALLOCATE attribute, the entry is deleted from the catalog and thus removed from the data space. The entry is not removed from the VTOC.

When you specify SCRATCH, you must identify the catalog of the entry to be deleted with a JOBCAT or STEPCAT DD statement, unless the entry is in the master catalog, the first qualifier in the entry's qualified name is the catalog's name or alias, or the FILE parameter is specified.

To remove the format-1 DSCB from the VTOC you should use the SCRATCH function of the IEHPROGM utility.

Note: If you specify SCRATCH when deleting a non-VSAM data set defined with an esoteric device type (for example SYSDA), the DELETE may fail under the following circumstances:

- Input/output configuration is changed resulting in addition or deletion of one or more esoteric device types.
- The esoteric device type definitions on the creating and using systems do not match when the catalog is shared between the two systems.
- The data set was cataloged on a system not defined with HCD, but used on a system that is defined with HCD.

Abbreviation: SCR

NOSCRATCH
specifies that the entry is to be deleted from the catalog only, without mounting the volume that contains the object defined by the entry.

You should specify NOSCRATCH for the following:

- If the format-1 DSCB of a non-VSAM data set has already been scratched from the VTOC.
- If you are deleting a non-VSAM data set that was defined with a device type named by the user (for example, SYSDA) and the device type is invalid.

NOSCRATCH cannot be specified for VSAM clusters, alternate indexes, or page spaces in VSAM recoverable catalogs.

For more detailed information about the use of DELETE NOSCRATCH, see *DFSMS/MVS Managing Catalogs*.

Abbreviation: NSCR

DELETE Examples

Deleting a Non-VSAM Data Set's Entry: Example 1

A non-VSAM data set's entry, EXAMPLE.NONVSAM, is deleted. The SCRATCH parameter is the default. A FILE parameter and its associated DD statement are provided to allocate the data set's volume. Dynamic allocation is not used to provide catalog or volume allocation.

```
//DELET4   JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//DD1      DD    VOL=SER=VSER02,UNIT=3380,DISP=OLD,
//   DSNAME=EXAMPLE.NONVSAM
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DELETE -
         EXAMPLE.NONVSAM -
         FILE (DD1) -
         PURGE -
         CATALOG(USERCAT4/USERUPPW)
/*
```

Command parameters:

- EXAMPLE.NONVSAM is the entryname of the object to be deleted.
- FILE specifies the ddname of a DD statement that describes the non-VSAM data set's volume and causes it to be mounted. When the data set is deleted, its DSCB entry in the volume's VTOC is removed.
- PURGE specifies that the non-VSAM data set's retention period or date is to be ignored.
- CATALOG identifies the catalog that contains the entries, USERCAT4, and its update password, USERUPPW.

Deleting a Key-Sequenced VSAM Cluster in a Catalog: Example 2

A key-sequenced VSAM cluster is deleted from the D27UCAT2 catalog. Alternate indexes and paths related to the key-sequenced cluster are deleted automatically by access method services. Access method services dynamically allocates the key-sequenced data set so that the data can be overwritten (as specified by the ERASE option).

```
//DELET1   JOB   ...
//JOBCAT   DD    DSN=D27UCAT2,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DELETE -
         D40.EXAMPLE.KSDS1 -
         PURGE -
         ERASE -
         CATALOG(D27UCAT2/USERMRPW)
/*
```

Job control language statement:

- JOBCAT DD makes a catalog available for the job: D27UCAT2.

Command parameters:

- D40.EXAMPLE.KSDS1 is the entryname of the object being deleted. D40.EXAMPLE.KSDS1 is a key-sequenced VSAM cluster.
- PURGE specifies that the cluster is to be deleted regardless of its retention period or date.
- ERASE specifies that the cluster's data component is to be overwritten with binary zeros, regardless of a NOERASE attribute that might have been specified when the cluster was defined or altered.
- CATALOG identifies the catalog that contains the cluster's entries, D27UCAT2. The catalog's master password is required, unless the entry's master password is specified with the entryname.

Deleting an Entry-Sequenced VSAM Cluster in a VSAM Catalog and All Empty Data Spaces On a Volume: Example 3

An entry-sequenced VSAM cluster is deleted. Alternate indexes and paths related to the entry-sequenced cluster are automatically deleted by access method services. All empty VSAM data spaces on volume VSER03 are then deleted, and the volume's volume entry is deleted.

```
//DELET2     JOB  ...
//JOBCAT     DD   DSNAME=D27UCAT2,DISP=OLD
//STEP1      EXEC  PGM=IDCAMS
//DD2        DD  VOL=SER=VSER03,UNIT=3380,DISP=OLD
//SYSPRINT DD  SYSOUT=A
//SYSIN      DD  *
    DELETE -
         EXAMPLE.ESDS2/ESD2MRPW -
         PURGE -
         CLUSTER
    DELETE -
         VSER03 -
         SPACE -
         FILE (DD2)
/*
```

Job control language statement:

- JOBCAT DD makes a catalog available for the job: D27UCAT2.

The first DELETE command deletes the only VSAM cluster on volume VSER03.

DELETE command parameters:

- EXAMPLE.ESDS2 is the entryname of the cluster to be deleted, and ESD2MRPW is the cluster's master password.
- PURGE specifies that the cluster is to be deleted regardless of its retention period or date. Alternate indexes and paths related to the entry-sequenced cluster are also deleted, regardless of their retention periods or dates.
- CLUSTER specifies that the entryname EXAMPLE.ESDS2 identifies a VSAM cluster entry.

The second DELETE command causes VSAM to examine each data space cataloged in the volume's entry. If the data space is empty, it is deleted. VSAM deletes the volume entry when there are no data spaces cataloged in it, and when there are no data sets identified that specify the volume as a candidate volume. VSAM also updates the volume's VTOC to reflect the deleted data spaces. The DD2 DD statement ensures that volume VSER03 is mounted when its data spaces are deleted.

In this example, JCL has been used instead of allowing access method services to dynamically allocate the volume. If the volume were to be mounted as permanently resident or reserved, access method services could dynamically allocate the volume without the need of JCL or the FILE parameter.

DELETE command parameters:

- VSER03 identifies the volume that contains empty VSAM data spaces.
- SPACE specifies that the entryname identifies a volume entry. When a volume's data spaces are to be deleted, the SPACE parameter is required.
- FILE specifies the ddname of a DD statement that describes the VSAM volume and causes it to be mounted.

Deleting Two Key-Sequenced Clusters in a Catalog: Example 4

Two key-sequenced clusters, EXAMPLE.KSDS01 and EXAMPLE.KSDS02, are deleted from a catalog. This illustrates deleting more than one cataloged object with a single DELETE command.

```
//DELET3   JOB   ...
//JOBCAT   DD    DSNAME=USERCAT3,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DELETE -
         (EXAMPLE.KSDS01 -
         EXAMPLE.KSDS02) -
         PURGE -
         CLUSTER
/*
```

Job control language statement:

- JOBCAT DD makes the catalog USERCAT3 available for the job.

The DELETE command deletes the key-sequenced clusters EXAMPLE.KSDS01 and EXAMPLE.KSDS02. Both entries will be dynamically allocated so that their respective catalog recovery areas can be updated.

DELETE command parameters:

- EXAMPLE.KSDS01 and EXAMPLE.KSDS02 identify the objects to be deleted. These are the entrynames of two key-sequenced clusters. It is assumed neither cluster is password-protected at this time. If either cluster is password-protected, the operator is prompted to supply the cluster's master password.
- PURGE specifies that the cluster is to be deleted regardless of its retention period or date.
- CLUSTER specifies that EXAMPLE.KSDS01 and EXAMPLE.KSDS02 identify cluster catalog records.

Deleting Nonempty VSAM Data Spaces on a Volume for a VSAM Catalog: Example 5

All of the data spaces on volume VSER05 are deleted, whether or not they are empty. All VSAM data spaces on the volume are scratched from the VTOC and the ownership of the volume is surrendered by the catalog, AMASTCAT. Any clusters or alternate indexes contained within the data spaces on volume VSER05 are marked unusable in the catalog. Because all VSAM data spaces on the volume are deleted, the volume's catalog entry is also deleted.

```
//DELET5  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DELETE -
         VSER05 -
         SPACE -
         FORCE -
         CATALOG(AMASTCAT/USERUPPW)
/*
```

DELETE command parameters:

- VSER05 identifies the volume with its serial number. Because the volume's VTOC must be updated, access method services will dynamically allocate the volume.
- SPACE specifies that a volume entry is to be modified or deleted. When a volume's data space is to be deleted, the SPACE parameter is required.
- FORCE specifies that all VSAM data spaces on the volume are to be deleted, whether or not they are empty, and that volume ownership is to be released.
- CATALOG identifies the catalog that owns the volume, AMASTCAT. The catalog's update- or higher-level password is required.

Deleting a User Catalog: Example 6

A user catalog is deleted. A user catalog can be deleted when it is empty—that is, when no objects except the catalog's volume cataloged in it. If the catalog is not empty, it can be deleted only if the FORCE parameter is specified.

Warning: The FORCE parameter deletes all clusters in the catalog.

```
//DELET6  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
     DELETE -
          D27UCAT1/USERMRPW -
          PURGE -
          USERCATALOG
/*
```

The DELETE command deletes the catalog. If a VSAM catalog is deleted, the volume that contained the catalog is now available for ownership by another VSAM catalog. The DELETE command also deletes the catalog's user catalog connector entry in the master catalog.

DELETE command parameters:

- D27UCAT1 is the name of the user catalog. The catalog's update (or higher level) password is required.
- PURGE specifies that the user catalog's retention period or date is to be ignored. If PURGE is not specified and the catalog's retention period has not yet expired, the catalog will not be deleted.
- USERCATALOG identifies D27UCAT1 as a user catalog.

Deleting an Alias Entry in a Catalog: Example 7

An alias entry, EXAMPLE.NONVSAM1, is removed from catalog USERCAT4.

```
//DELET7    JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
    DELETE -
         EXAMPLE.NONVSAM1 -
         ALIAS -
         CATALOG(USERCAT4/USERMRPW)
/*
```

DELETE command parameters:

- EXAMPLE.NONVSAM1 is the entry name of the object to be deleted. EXAMPLE.NONVSAM1 identifies an alias entry.
- ALIAS specifies the type of entry to be deleted. VSAM verifies that EXAMPLE.NONVSAM1 is an alias entry, then deletes it. If EXAMPLE.NONVSAM1 identified another entry by mistake, VSAM would not delete the entry, but would note the discrepancy with a message to the programmer.
- CATALOG identifies the catalog that contains the entry, USERCAT4, and its master password, USERMRPW.

Deleting Generically Named Entries in a Catalog: Example 8

Each catalog entry with the name GENERIC.*.BAKER (where * is any 1- to 8-character simple name) is deleted. The name GENERIC.*.BAKER is a generic name, and this example shows how all catalog entries (and their associated entries) with the same generic name are deleted from catalog USERCAT4.

```
//DELET8   JOB  ...
//JOBCAT   DD   DSNAME=USERCAT4,DISP=OLD
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    DELETE -
         GENERIC.*.BAKER -
         PURGE -
         CATALOG(USERCAT4/USERMRPW)
/*
```

Job control language statement:

- JOBCAT DD makes a catalog available for this job: USERCAT4.

DELETE command parameters:

- GENERIC.*.BAKER, a generic name, identifies all catalog entries with the high-level qualifier GENERIC and the low-level qualifier BAKER.
- PURGE specifies that each entry is to be purged regardless of the retention period or date specified when it was defined.
- CATALOG identifies the catalog that contains the entries, USERCAT4, and its master password, USERMRPW.

List a Generation Data Group's Entries, Then Delete the Group and Its Data Sets in a Catalog: Example 9

A generation data group, GDG01, and its associated (generation data set) entries are listed. Next, the only generation data set in the group is deleted. Finally, the generation data group base catalog entry is deleted.

```
//DELET9    JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
    LISTCAT -
         ENTRIES(GDG01) -
         ALL
    DELETE -
         GDG01.G0001V00 -
         PURGE
    DELETE -
         GDG01 -
         GENERATIONDATAGROUP -
         PURGE
/*
```

Because no catalog was specified in a CATALOG parameter or with a JOBCAT or STEPCAT DD statement, VSAM assumes all entries required for this command sequence are in the master catalog.

The LISTCAT command lists the generation data group GDG01 and its associated generation data set entries.

LISTCAT command parameters:

- ENTRIES specifies that the entry GDG01 is to be listed. Because the entry GDG01 is a generation data group entry, its associated generation data set's (non-VSAM) entries are also listed. In addition, if one of the generation data sets has aliases, the alias entries associated with the generation data set's entry are listed.
- ALL specifies that all fields are to be listed.

The first DELETE command removes the non-VSAM data set entry for the only generation data set in the generation data group: GDG01.G0001V00.

DELETE command parameters:

- GDG01.G0001V00 is the entryname of the object being deleted. GDG01.G0001V00 identifies the only generation data set in the generation data group GDG01.
- PURGE specifies that the generation data set's retention period or date is to be ignored.

The second DELETE command removes the catalog entry of the generation data group base from the catalog.

DELETE command parameters:

- GDG01 is the entry name of the object being deleted. GDG01 identifies the generation data group base entry.
- GENERATIONDATAGROUP specifies the type of entry to be deleted. VSAM verifies that GDG01 is a generation data group entry, then deletes it. If GDG01 incorrectly specified another type of entry, VSAM would not delete the entry, but would note the discrepancy with a message to the programmer.
- PURGE specifies that the generation data group's retention period or date is to be ignored.

Deleting a Member of a Partitioned (Non-VSAM) Data Set in a Catalog: Example 10

The MEM1 member of partitioned data set EXAMPLE.NONVSAM2 is deleted, then the non-VSAM data set itself is deleted.

```
//DELET10    JOB   ...
//JOBCAT    DD    DSNAME=USERCAT4,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
    DELETE -
         EXAMPLE.NONVSAM2(MEM1) -
         CATALOG(USERCAT4/USERMRPW)
    DELETE -
         EXAMPLE.NONVSAM2 -
         PURGE -
         CATALOG(USERCAT4/USERMRPW)
/*
```

Job control language statement:

- JOBCAT DD makes a catalog available for this job: USERCAT4.

The first DELETE command deletes one of the members of a partitioned data set, EXAMPLE.NONVSAM2(MEM1), from the user catalog, USERCAT4.

Command parameters:

- EXAMPLE.NONVSAM2(MEM1) is the entryname of one of the members of the partitioned (non-VSAM) data set, EXAMPLE.NONVSAM2. The entryname identifies the object to be deleted.
- CATALOG identifies the catalog that contains the entry, USERCAT4, and its master password, USERMRPW.

The second DELETE command deletes all remaining members, as well as the data set itself, of the partitioned non-VSAM data set EXAMPLE.NONVSAM2.

Command parameters:

- EXAMPLE.NONVSAM2 is the entryname of the object to be deleted.
- PURGE specifies that the non-VSAM data set's retention period or date is to be ignored. If PURGE had not been specified and the non-VSAM data set's retention period has not yet expired, VSAM would not delete its entry.
- CATALOG identifies the catalog that contains the entry, USERCAT4, and its master password, USERMRPW.

In the second part of this example, the DSCB entry in the volume's VTOC is removed. Dynamic allocation is used to allocate the data set's volume.

Deleting a Page Space: Example 11

Page space SYS1.PAGE2 is deleted. The page space entry, SYS1.PAGE2, is removed from the master catalog.

```
//DELET11    JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
    DELETE -
         SYS1.PAGE2/MASTMPW1 -
         PURGE -
         PAGESPACE
/*
```

Command parameters:

- SYS1.PAGE2 is the entryname of the object to be deleted. SYS1.PAGE2 identifies a page space entry. The catalog's update- or higher-level password is also required.
- PURGE specifies that the page space entry is to be deleted regardless of the retention period or date specified when it was defined.
- PAGESPACE specifies the type of entry to be deleted. VSAM verifies that SYS1.PAGE2 is a page space entry, then deletes it. If SYS1.PAGE2 incorrectly identified another type of entry, VSAM would not delete it, but would send an error message to the programmer.

EXAMINE

The EXAMINE command analyzes and reports on the structural integrity of the index component and/or data component of a key-sequenced data set (KSDS) cluster. The syntax of the EXAMINE command is:

EXAMINE	**NAME(***clustername***[***/password***])** **[INDEXTEST‘NOINDEXTEST]** **[DATATEST‘NODATATEST]** **[ERRORLIMIT(***value***)]**

EXAMINE Parameters

Required Parameters

NAME(*clustername***[***/password***])**

specifies which user cluster is to be analyzed for structural integrity by EXAMINE. EXAMINE expects the user to have specified a particular key-sequenced data set by its cluster name. The appropriate cluster component is then selected dynamically during program execution. When analyzing a VSAM catalog, use a STEPCAT DD statement to point to that catalog and apply a VERIFY DATASET command before using the EXAMINE command. A STEPCAT DD statement is not required for the master catalog.

clustername

specifies the identification of the key-sequenced data set cluster to be analyzed.

password

specifies, optionally, the master password associated with a catalog or the control password for a data set.

Optional Parameters

INDEXTEST‘NOINDEXTEST

specifies whether or not EXAMINE is to perform tests associated with the index component of the cluster. INDEXTEST is the default.

INDEXTEST

performs tests on the index component of a key-sequenced data set cluster.

Abbreviation: ITEST

NOINDEXTEST

does not perform any testing on the index component of a key-sequenced data set cluster.

Abbreviation: NOITEST

DATATEST‘NODATATEST

specifies whether or not EXAMINE is to perform tests associated with the data component of the cluster. NODATATEST is the default.

DATATEST

performs tests on the data component of a key-sequenced data set cluster. NOINDEXTEST and DATATEST are specified when **only** a DATATEST is desired.

Abbreviation: DTEST

NODATATEST
does not perform any testing on the data component of a key-sequenced data set cluster.

Abbreviation: NODTEST

ERRORLIMIT(*value*)
specifies a numeric limit (value) to the number of errors for which detailed EXAMINE error messages are to be printed during program execution. ERRORLIMIT is designed to prevent runaway message output. The default value for ERRORLIMIT is 2147483647 errors, but you can specify any number between 0 and 2147483647. Note that testing continues even though the error limit is reached.

Abbreviation: ELIMIT

EXAMINE Examples

Examine Both Components of a Key-Sequenced Data Set: Example 1

Obtain list of data set structural errors to be used in problem resolution. This command is used to analyze both components of a key-sequenced data set.

```
//EXAMEX2   JOB
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD      SYSOUT=A
//SYSIN     DD      *
    EXAMINE -
       NAME(KSDS01) -
       INDEXTEST -
       DATATEST
/*
```

Command parameters:

- NAME specifies the cluster name only. The data set has no control level password protection.
- INDEXTEST causes the index component to be examined.
- DATATEST causes the data component to be examined.
- Taking the ERRORLIMIT default allows detailed error messages to be printed.

Examine the Data Component of a VSAM User Catalog: Example 2

Analyze the data component of a VSAM catalog to determine if your VSAM catalog has structural errors.

```
//EXAMEX3   JOB
//STEP1     EXEC   PGM=IDCAMS
//STEPCAT   DD     DSN=VCAT01.VCAT,DISP=SHR
//SYSPRINT  DD     SYSOUT=A
//SYSIN     DD     *
    VERIFY DATASET(VCAT01.VCAT)
    EXAMINE -
       NAME(VCAT01.VCAT) -
       NOINDEXTEST -
       DATATEST -
       ERRORLIMIT(1000)
/*
```

Command parameters:

- NAME specifies the catalog name. The catalog must be connected to the master catalog.
- NOINDEXTEST specifies that the index component not be examined.
- DATATEST causes the data component to be examined.
- ERRORLIMIT(1000) restricts the printing of detailed error messages to 1000 errors.

Note: The STEPCAT DD statement and the VERIFY DATASET command are required when you use EXAMINE against a VSAM user catalog.

EXPORT

The EXPORT command exports a VSAM cluster or an alternate index. An empty candidate volume cannot be exported. The syntax of this command is:

EXPORT	*entryname***[/***password***]** **{OUTFILE(***ddname***)‘OUTDATASET(***entryname***)}** **[ERASE‘NOERASE]** **[INFILE(***ddname***)]** **[INHIBITSOURCE‘NOINHIBITSOURCE]** **[INHIBITTARGET‘NOINHIBITTARGET]** **[PURGE‘NOPURGE]** **[TEMPORARY‘PERMANENT]**

EXPORT can be abbreviated: EXP

EXPORT Parameters

Required Parameters

*entryname***[/***password***]**

names the cluster or alternate index to be exported. This parameter must be the first parameter following EXPORT.

password

If you are exporting:

- A cluster or alternate index, you must supply the object's master password. RACF alter authority to the cluster or alternate index is required.
- A cluster or alternate index with any password-protected paths defined over them, you must supply the master password of the catalog containing the objects to export the protection attributes of all the paths. Alter RACF authority to the catalog is required.

OUTFILE(*ddname***)‘OUTDATASET(***entryname***)**

specifies the name of the DD statement or the data set that is to receive the data being exported.

OUTFILE(*ddname***)**

specifies the name of the DD statement of the target data set.

Only the block size for the DCB parameter should be specified in the DD statement. The default for block size for EXPORT is 2048. Block size may be specified in the DD statement to override this default and improve performance.

Abbreviation: OFILE

OUTDATASET(*entryname***)**

specifies the name of the target data set. If OUTDATASET is specified, an attempt is made to dynamically allocate the target data set. The characteristics of the target data set are described in “For a Target Data Set” on page 11.

Abbreviation: ODS

Optional Parameters

ERASE‘NOERASE

specifies whether the data component of the cluster or alternate index to be exported is to be erased (overwritten with binary zeros). This parameter overrides whatever was specified when the object was defined or last altered.

Only specify this parameter if you want the object to be deleted from the original system.

ERASE

specifies that the data component is to be overwritten with binary zeros when the cluster or alternate index is deleted. If ERASE is specified, the volume that contains the data component must be mounted.

Abbreviation: ERAS

NOERASE

specifies that the data component is not to be overwritten with binary zeros when the cluster or alternate index is deleted.

Abbreviation: NERAS

INFILE(*ddname*)

specifies the name of the DD statement that identifies the cluster or alternate index to be exported. If the cluster or alternate index has been defined with a maximum logical record length greater than 32760 bytes, EXPORT processing terminates with an error message.

In addition to the DD statement for INFILE, you must identify the entry's catalog with a JOBCAT or STEPCAT DD statement unless:

- The object's entry is in the master catalog, or
- The first qualifier of the object's name is the catalog's name or alias.

When INFILE and its DD statement are not specified for an object that is to be exported, an attempt is made to dynamically allocate it with a disposition of OLD.

Abbreviation: IFILE

INHIBITSOURCE‘<u>NOINHIBITSOURCE</u>

specifies whether the original data records (the data records of the source cluster or alternate index) can be accessed for any operation other than retrieval after a copy is exported. This specification can later be altered through the ALTER command.

INHIBITSOURCE

specifies that the source object in the original system cannot be accessed for any operation other than retrieval. This parameter can be specified only when the object is to be temporarily exported. (A backup copy of the object is made and the object itself remains in the original system.)

Abbreviation: INHS

NOINHIBITSOURCE

specifies that the original data records in the original system can be accessed for any kind of operation.

Abbreviation: NINHS

INHIBITTARGET‘NOINHIBITTARGET

specifies how the data records copied into the target alternate index or cluster can be accessed after they have been imported to another system. Use the ALTER command to alter this parameter.

INHIBITTARGET

specifies that the target object cannot be accessed for any operation other than retrieval after it has been imported into another system.

Abbreviation: INHT

NOINHIBITTARGET

specifies that the target object can be accessed for any type of operation after it has been imported into another system.

Abbreviation: NINHT

PURGE‘NOPURGE

specifies whether the cluster or alternate index to be exported is to be deleted from the original system with regard to the retention period specified in a TO or FOR parameter when the object was defined. Only specify this parameter if the object is to be deleted from the original system.

PURGE

specifies that the object is to be deleted even if the retention period has not expired.

Abbreviation: PRG

NOPURGE

specifies that the object is not to be deleted unless the retention period has expired.

Abbreviation: NPRG

TEMPORARY‘PERMANENT

specifies whether the cluster or alternate index to be exported is to be deleted from the original system.

TEMPORARY

specifies that the cluster or alternate index is not to be deleted from the original system. The object in the original system is marked as temporary to indicate that another copy exists and that the original copy can be replaced.

To replace the original copy, a portable copy created by an EXPORT command must be imported to the original system. The IMPORT command deletes the original copy, defines the new object, and copies the data from the portable copy into the newly defined object.

Note: Be sure to properly protect the file of the temporary object if you want to deny unauthorized access to that file.

Abbreviation: TEMP

PERMANENT

specifies that the cluster or alternate index is to be deleted from the original system. Its storage space is freed. If its retention period has not yet expired, you must also code PURGE.

Abbreviation: PERM

EXPORT Examples

Exporting a Key-Sequenced Cluster: Example 1

A key-sequenced cluster, D40.EXAMPLE.KSDS1, is exported from a user catalog, D27UCAT1. The cluster is copied to a portable file, TAPE2, and its catalog entries are modified to prevent the cluster's data records from being updated, added to, or erased. Access Method services attempts to dynamically allocate D40.EXAMPLE.KSDS1. Because the high-level qualifier of the cluster name is the name of the alias of D27UCAT2, the cluster can be allocated without specifying a JOBCAT or STEPCAT DD statement.

```
//EXPORT1  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//RECEIVE  DD    DSNAME=TAPE2,UNIT=(TAPE,,DEFER),
//         DISP=NEW,VOL=SER=003030,
//         DCB=(BLKSIZE=6000,DEN=3),LABEL=(1,SL)
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    EXPORT -
         D40.EXAMPLE.KSDS1 -
         OUTFILE(RECEIVE) -
         TEMPORARY -
         INHIBITSOURCE
/*
```

Job control language statement:

- RECEIVE DD describes the portable file, a magnetic tape file, that is to receive a copy of the cluster's records. The DCB BLKSIZE parameter overrides the EXPORT default of 2048 to improve performance.

EXPORT command parameters:

- D40.EXAMPLE.KSDS1 identifies the cluster to be exported. Because the cluster is not password-protected, no password is provided with the cluster's entryname.
- OUTFILE points to the RECEIVE DD statement. The RECEIVE DD statement describes the portable file, TAPE2, that is to contain a copy of the cluster.
- TEMPORARY specifies that the cluster is not to be deleted. The cluster's catalog entry is marked “temporary” to indicate that another copy of the cluster exists and that the original copy can be replaced. (See “Importing a Key-Sequenced Cluster: Example 1” on page 189.)
- INHIBITSOURCE specifies that the copy of the cluster that remains in the original system, as a result of TEMPORARY, cannot be modified. User programs are allowed only to read the cluster's records.

Exporting an Entry-Sequenced Cluster: Example 2

An entry-sequenced cluster, D50.EXAMPLE.ESDS1, is exported to a portable file, TAPE1. After the cluster is copied into the portable file, it is deleted from the system. Access method services attempts to dynamically allocate D50.EXAMPLE.ESDS1. Because the high-level qualifier of the cluster is the name of the alias of the catalog D27UCAT2, neither JOBCAT nor STEPCAT DD statements need to be specified in order to dynamically allocate the cluster.

```
//EXPORT2  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//RECEIVE  DD    DSNAME=TAPE1,UNIT=(TAPE,,DEFER),
//    VOL=SER=001147,LABEL=(1,SL),DISP=NEW
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    EXPORT -
         D50.EXAMPLE.ESDS1 -
         OUTFILE(RECEIVE) -
         PURGE
/*
```

Job control language statement:

- RECEIVE DD describes the portable file (TAPE1) that is to contain a copy of the exported entry-sequenced cluster.

EXPORT command parameters:

- D50.EXAMPLE.ESDS1 identifies the entry-sequenced cluster to be exported.
- OUTFILE points to the RECEIVE DD statement. The RECEIVE DD statement describes the portable data set, TAPE1, that is to receive a copy of the cluster.
- PURGE allows the cluster to be deleted regardless of its retention period or date.
- Because PERMANENT is the default, access method services assumes the cluster is to be deleted after TAPE1 contains a copy of it.
- Because NOINHIBITTARGET is the default, access method services assumes the cluster can be updated by users of another system when it is imported to another system.

EXPORT DISCONNECT

The EXPORT DISCONNECT command disconnects a user catalog. The syntax of this command is:

EXPORT	*usercatname*[/*password*] **DISCONNECT**

EXPORT DISCONNECT Parameters

Required Parameters

usercatname[/*password*]

names the user catalog to be disconnected. This parameter must be the first parameter following EXPORT. When you are disconnecting a user catalog, you must supply the update- or higher-level password of the master catalog. Update or higher RACF authority for the master catalog is required.

DISCONNECT

specifies that a user catalog is to be disconnected. The connector entry for the user catalog is deleted from the master catalog. Also, the user catalog's alias entries are deleted from the master catalog.

If EXPORT is coded to remove a user catalog connector entry, DISCONNECT is a required parameter. The volume that contains a VSAM user catalog can be physically moved to the system to which the catalog will be connected.

A JOBCAT/STEPCAT DD statement can be used to delete a user catalog connector entry from a user catalog. Any alias entries will also be deleted. In this case, the password should be the master password of the user catalog specified in the JOBCAT/STEPCAT.

Note: To make a user catalog available in other systems and in the original system, code the IMPORT CONNECT command to connect the user catalog to each system to which it is to be available, but do not EXPORT DISCONNECT the user catalog.

Abbreviation: DCON

EXPORT DISCONNECT Example

Export Disconnect of a User Catalog

The user catalog D27UCAT1 is exported and disconnected from the system. The user catalog connector entry for D27UCAT1 is removed from the master catalog. The catalog becomes unavailable to system users until the system programmer reconnects it to the system using an IMPORT CONNECT command.

```
//EXPORT3  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    EXPORT -
         D27UCAT1/MASTMPW1 -
         DISCONNECT
/*
```

EXPORT command parameters:

- D27UCAT1 identifies the object to be disconnected. When a user catalog is disconnected, the master catalog's master password is required.
- DISCONNECT identifies the object as a user catalog. When a user catalog's connector entry is to be deleted, DISCONNECT is required.

EXPORTRA

The EXPORTRA command recovers VSAM and non-VSAM catalog entries from catalog recovery areas, and recovers data for VSAM clusters and alternate indexes by means of catalog recovery areas. This command is for use with **recoverable catalogs only**.

The syntax of the EXPORTRA command is:

EXPORTRA	**OUTFILE(***ddname***)**
	CRA((*ddname1***{ALL[INFILE(***ddname2***)]‘**
	  ENTRIES((*entryname***[***ddname3***])[(***entryname***[***ddname3***])...])‘**
	  NONE})
	  [(*ddname1***...)...])**
	[FORCE‘NOFORCE]
	[MASTERPW(*password***)]**

EXPORTRA can be abbreviated: XPRA

EXPORTRA Parameters

Required Parameters

OUTFILE(*ddname***)**

identifies the DD statement that describes the data set (usually a movable disk pack or magnetic tape reel) that is to contain a copy of the VSAM objects and catalog entries identified with the CRA parameter.

With the exception of block size, the data set characteristics of the target data set that is to contain the cluster to be exported should not be specified. Block size is defaulted by the EXPORTRA command to 2048. Block size may be specified in the DD statement to override this default and improve performance.

The characteristics of the target data set are described in “For a Target Data Set” on page 11.

Abbreviation: OFILE

CRA((*ddname1***{ALL[INFILE(***ddname2***)]‘**
ENTRIES((*entryname***[***ddname3***])[(***entryname***[***ddname3***])...])‘**
NONE})
[(*ddname1***...)...])**

The CRA parameter and its subparameters describe the catalog recovery area(s) being referred to, identify the specific entries to be copied from the catalog recovery area, and specify the volumes that contain the entries' data. A separate set of subparameters is used to describe each catalog recovery area.

ddname1

identifies the DD statement that describes a volume containing the referenced catalog recovery area. Each ddname1 you specify is followed by one of the following subparameters that define the action to be taken regarding the catalog recovery area:

ALL

specifies that each entry in ddname1's catalog recovery area is to be copied to the OUTFILE data set. In addition, the contents (that is, data records in logical sequential order) of each VSAM cluster and alternate index are copied, following the copy of the catalog recovery area entry.

If any of these VSAM clusters or alternate indexes has data that resides on volumes other than the one identified via ddname1, use INFILE to describe all the volumes.

INFILE(*ddname2***)**

identifies the DD statement that describes multiple volumes to be used in the recovery process. INFILE is required if the VSAM clusters and/or alternate indexes whose entries are contained in ddname1's catalog recovery area reside on multiple volumes. The ddname2 DD statement should include all volumes containing the data set, including the recovery area volume.

Abbreviation: IFILE

ENTRIES(
(*entryname***[** *ddname3***])**
[(*entryname***[** *ddname3***])...])**

names each entry in the catalog recovery area that is to be copied to the OUTFILE data set. All other entries in the catalog recovery area are not copied.

entryname

names an object whose catalog entry is contained in the ddname1 volume's catalog recovery area. You can specify the entryname of the following entry types: alternate index, cluster, and non-VSAM.

When you specify a cluster entry, the cluster's data and index entries and all associated path entries are also copied. In addition, the cluster's contents (that is, its data records, in logical sequential order) are copied, following the copies of the cluster's catalog entries.

When you specify an alternate index entry, the alternate index's entries and contents and all associated path entries are copied as though it were a key-sequenced cluster.

ddname3

identifies the DD statement that describes each volume that contains part of the cluster or alternate index. ddname3 is ignored when specified for a non-VSAM entry.

ddname3 is required when the entry is a VSAM cluster or alternate index whose data resides on volumes other than the volume identified with the ddname1 DD statement. The ddname3 DD statement must also include the volume referenced by the ddname1 DD statement.

Abbreviation: ENT

NONE

specifies that no object in the volume's catalog recovery area is to be copied. You must specify ddname1 NONE for each volume referenced in a ddname2 or ddname3 DD statement if you do not want the entries in its catalog recovery area to be copied.

Note: If ddname2 contains both multiple volume and single volume entries, a NONE statement is required to prevent processing of the single volume entries that exist on the second and subsequent volumes. The

NONE parameter must be specified before the ALL parameter. (See "Using EXPORTRA for All Entries on Multiple Volumes: Example 2" on page 179.)

Optional Parameters

FORCE‘NOFORCE

specifies whether the catalog entry's copy is to be copied from the catalog recovery area, even though the copy itself might be inaccurate.

FORCE

specifies that the object's catalog entry copy is copied from the volume's catalog recovery area, even though a loss of data integrity might result. Time stamp and extent mismatches are ignored.

Abbreviation: FRC

NOFORCE

specifies that the catalog recovery area's copy is not copied if it is not accurate, and the EXPORTRA command terminates with an error message.

Abbreviation: NFRC

MASTERPW(*password***)**

specifies the master catalog's master password. The master catalog's master password is required when the master catalog is password-protected. Alter RACF authority to the master catalog is required.

Abbreviation: MRPW

EXPORTRA Examples

Using EXPORTRA for All Entries on One Volume: Example 1

The EXPORTRA function for one volume, V0, is owned by the VSAM master catalog. All the entries contained in the catalog recovery area on V0 and the data sets themselves are copied to a SAM data set on another disk volume. All the data sets reside entirely within the one volume.

```
//EXPORTRA JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//VLV0     DD   UNIT=3380,VOL=SER=V0,AMP='AMORG',DISP=OLD
//VOLOUT   DD   UNIT=3380,VOL=SER=333003,DSN=OUT.FILE,
//         DISP=(NEW,KEEP),SPACE=(CYL,(5,1)),DCB=BLKSIZE=6000
//SYSIN    DD   *
    EXPORTRA -
       OUTFILE(VOLOUT) -
           CRA ((VLV0 ALL))
/*
```

Job control language statements:

- VLV0 DD identifies and allocates the volume whose catalog recovery area contents are to be copied. The data sets reside wholly within the one volume.
- VOLOUT DD identifies the sequential file that is to receive the copied data sets and catalog recovery records. The DCB BLKSIZE parameter overrides the EXPORTRA default of 2048 to improve performance.

EXPORTRA command parameters:

- OUTFILE is required and identifies the sequential access method (SAM) non-VSAM data set that is to receive the copied information.
- CRA is required and identifies the catalog recovery area and volume from which the copy is to take place. VLV0 identifies the DD statement for the catalog recovery volume. The ALL subparameter specifies that all entries are to be copied from the catalog recovery area. The INFILE subparameter is not required, because the data sets are contained completely within the one volume.

Using EXPORTRA for All Entries on Multiple Volumes: Example 2

This example shows the EXPORTRA function for one volume owned by the VSAM master catalog. All data sets contained on the volume, V0, and their corresponding CRA entries describing the data sets are copied to a sequential (SAM) data set on a tape volume. The catalog recovery area contains data sets which reside on volumes V1 and V2 in addition to the recovery volume, V0. The entries in the catalog recovery areas of the additional volumes are not to be recovered.

```
//EXPORTRA   JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT   DD    SYSOUT=A
//VLV0       DD    UNIT=3380,VOL=SER=V0,AMP='AMORG',DISP=OLD
//VLV1       DD    UNIT=3380,VOL=SER=V1,AMP='AMORG',DISP=OLD
//VLV2       DD    UNIT=3380,VOL=SER=V2,AMP='AMORG',DISP=OLD
//VOLA       DD    UNIT=(DISK,3),VOL=SER=(V0,V1,V2),
//                 AMP='AMORG',DISP=OLD
//VOLOUT     DD    DSN=OUT.FILE,LABEL=(1,SL),
//                 DISP=(NEW,KEEP),
//                 UNIT=3480,VOL=SER=TAPE01,
//                 DCB=(BLKSIZE=8192,DEN=3)
//SYSIN      DD    *
    EXPORTRA -
       OUTFILE(VOLOUT) -
       CRA -
           ((VLV0 ALL INFILE(VOLA)) -
           (VLV1 NONE) -
           (VLV2 NONE) -
           (VLV1 ALL))-
       MASTERPW(MCATMRPW)
/*
```

Job control language statements:

- VLV0 DD identifies the volume whose catalog recovery area contents are to be exported.
- VLV1 DD identifies a volume containing part of a multiple volume data set to be exported and single volume data sets to be exported.
- VLV2 DD identifies a volume containing part of a multivolume data set to be exported. The catalog recovery area contents are not to be exported.
- VOLA DD identifies all the volumes containing the data sets to be exported.
- VOLOUT DD identifies the sequential tape file that is to receive the exported data sets and catalog recovery records. The DCB BLKSIZE parameter overrides the default of 2048 to improve performance.

EXPORTRA command parameters:

- OUTFILE is required and identifies the sequential (SAM) non-VSAM data set that is to receive the exported information.
- CRA is required and identifies the catalog recovery area and volumes from which the entries are to be copied. VLV0 identifies the DD statement of the recovery volume. The ALL subparameter specifies that all entries in the catalog recovery area of the volume identified by VLV0 are to be copied.

  INFILE is required because the data sets to be copied are contained on multiple volumes. VOLA refers to the DD statement that identifies these multiple volumes, including the recovery volume.

  VLV1 NONE is required to prevent processing of single volume entries that exist on this volume that is referenced in the INFILE subparameter. This subparameter must precede VLV1 ALL.

  VLV2 NONE is required because the volume it identifies is referenced in the INFILE subparameter.

  VLV1 ALL is required and identifies the single volume data sets. This subparameter must come after VLV1 NONE.
- MASTERPW specifies the master password of the master catalog. This parameter is required when the master catalog is password protected.

Using EXPORTRA for Selected Entries: Example 3

This example shows the EXPORTRA function for selected entries from the catalog recovery area of one volume owned by the VSAM master catalog.

```
//EXPORTRA   JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT   DD    SYSOUT=A
//VLV0       DD    UNIT=3380,AMP='AMORG',DISP=OLD,VOL=SER=V0
//VLV1       DD    UNIT=3380,AMP='AMORG',DISP=OLD,VOL=SER=V1
//VLV2       DD    UNIT=3380,AMP='AMORG',DISP=OLD,VOL=SER=V2
//VOLA       DD    UNIT=(DISK,3),AMP='AMORG',DISP=OLD,
//           VOL=SER=(V0,V1,V2)
//VOLB       DD    UNIT=(DISK,2),AMP='AMORG',DISP=OLD,
//           VOL=SER=(V0,V1)
//VOLOUT     DD    UNIT=3380,VOL=SER=333003,DSN=OUT.FILE,
//           DISP=(NEW,KEEP),SPACE=(CYL,(5,1))
//SYSIN      DD    *
    EXPORTRA -
       OUTFILE(VOLOUT) -
       CRA ( -
           (VLV0 ENTRIES ( -
              (LARGE.DATASET.A VOLA) -
              (LARGE.DATASET.B VOLB) -
              (LARGE.DATASET.C))) -
           (VLV1 NONE) -
           (VLV2 NONE)) -
           FORCE
/*
```

Three data sets and their corresponding entries from the catalog recovery area on volume V0 are copied to a sequential (SAM) data set on another disk volume. The remainder of the data sets and the catalog recovery area entries are not copied. Two of the selected data sets are multivolume VSAM data sets. The data sets and their corresponding entries in the catalog recovery areas of the additional volumes are not recovered.

Job control language statements:

- VLV0 DD identifies the volume whose catalog recovery area contains the entries for the three VSAM data sets to be copied.
- VLV1 and VLV2 DD each identify a volume containing part of a multivolume data set but whose catalog recovery area contents are not to be copied.
- VOLA DD identifies the multivolumes of LARGE.DATASET.A.
- VOLB DD identifies the multivolumes of LARGE.DATASET.B.
- VOLOUT DD identifies the sequential file that is to receive the copied data sets and catalog recovery records.

EXPORTRA command parameters:

- OUTFILE is required and identifies the non-VSAM data set that is to receive the exported information.
- CRA is required and identifies the catalog recovery area and volumes from which the export is to take place. VLV0 identifies the DD statement of the recovery volume. The ENTRIES subparameter identifies the three entries which are to be copied.

  LARGE.DATASET.A requires the VOLA subparameter because the VSAM data set is contained on three volumes. Similarly, LARGE.DATASET.B requires the VOLB subparameter. However, LARGE.DATASET.C is contained wholly within the catalog recovery volume, and, therefore, does not require an additional ddname3 subparameter.

  The VLV1 NONE and VLV2 NONE subparameters are necessary because the volumes they identify are referenced in previous ddname3 subparameters (VOLA and VOLB); however, the contents of their catalog recovery areas are not to be copied.
- FORCE specifies that timestamp mismatches are to be ignored.

IMPORT

The IMPORT command restores a VSAM cluster or alternate index from a portable data set created by the EXPORT command. An empty candidate volume cannot be imported. The syntax of this command is:

IMPORT	**{INFILE(**_ddname_**)‘INDATASET(**_entryname_**)}** **{OUTFILE(**_ddname_**[/**_password_**])‘** **OUTDATASET(**_entryname_**[/**_password_**])}** **[ERASE‘NOERASE]** **[INTOEMPTY]** **[OBJECTS((**_entryname_ **[FILE(**_ddname_**)]** **[(KEYRANGES((**_lowkey highkey_**)**] **[(**_lowkey highkey_**)...])]** **[NEWNAME(**_newname_**)]** **[ORDERED‘UNORDERED]** **[VOLUMES(**_volser_**[** _volser_**...])])** **[(**_entryname_**...)...])]** **[PURGE‘NOPURGE]** **[SAVRAC‘NOSAVRAC]** **[CATALOG(**_catname_**[/**_password_**])]**

IMPORT may be abbreviated: IMP

IMPORT Parameters

Required Parameters

INFILE(_ddname_**)‘INDATASET(**_entryname_**)**

specifies the name of a DD statement or names the portable data set that contains a copy of the cluster or alternate index to be imported.

INFILE(_ddname_**)**

specifies the name of a DD statement that identifies the portable copy of the cluster or alternate index to be imported.

If a nonlabeled tape or a direct access data set created by DOS/VS access method services contains the copy, the following DCB parameters must be specified on the referenced DD statement:

- BLKSIZE. If you specified BLKSIZE when the cluster or alternate index was exported, you must specify the same block size value for IMPORT. If you did not specify a block size for EXPORT, a default value of 2048 was used. Consequently, if you do not specify BLKSIZE for IMPORT, IMPORT sets the block size to 2048.
- LRECL. LRECL is based on the maximum record size of the exported VSAM data set. Maximum record size is determined by the value specified via the maximum subparameter of the RECORDSIZE parameter of the DEFINE CLUSTER or DEFINE ALTERNATEINDEX command when the data set was defined.
- RECFM. Must be VBS.

Abbreviation: IFILE

INDATASET(*entryname*)

specifies the name of the portable data set that contains a copy of the cluster or alternate index to be imported.

If INDATASET is specified, the portable data set is dynamically allocated. The entryname must be cataloged in a catalog that is accessible by the system into which the entry is to be imported.

Abbreviation: IDS

OUTFILE(*ddname*[/*password*])‘OUTDATASET(*entryname*[/*password*])

specifies the name of a DD statement or the name of a cluster or alternate index to be imported.

When you use OUTFILE or OUTDATASET to describe the data set, you must identify the data set's catalog with a JOBCAT or STEPCAT DD statement unless:

- The data set's entry is in the master catalog, or
- The first qualifier of the data set's qualified name is the catalog's name or alias.

Notes:

1. When importing a cluster that was permanently exported, the OUTFILE parameter should be used.
2. If a concatenated JOBCAT or STEPCAT DD statement is used, the catalog to be imported must be identified in the first DD statement, unless the catalog is specified with the CATALOG parameter.

Note: If you are importing to a volume other than the original volume, the OBJECTS (VOLUMES) parameter must also be specified.

OUTFILE(*ddname*[/*password*])

specifies the name of a DD statement that identifies the data set name and volume(s) of the cluster or alternate index to be imported.

If the object was permanently exported and/or you are importing to a volume other than the original volume, the DD statement specifies the name of the cluster or alternate index as DSNAME, the volume serial number(s), the device type, DISP=OLD, and AMP='AMORG'.

If the object has its data and index components on different device types, do not specify OUTFILE—use OUTDATASET.

If NEWNAME is specified for the cluster or alternate index entry, the data set name on the DD statement must be the same as the new name. The volume that is to receive the imported cluster or alternate index must be owned by a VSAM catalog. Also, this should be the same name declared on the NEWNAME parameter. Failure to do so will result in the deletion of the original cluster.

password

is the update- or higher-level password of the target object. You must supply the password when the target data set is empty. (See the VOLUMES parameter for more information about importing into an empty data set.) Otherwise, IMPORT obtains the required VSAM data set passwords from the portable data set. Update or higher RACF authority to the target object is required.

Abbreviation: OFILE

OUTDATASET(*entryname***[/***password***])**

specifies the name of the cluster or alternate index that is to be imported. When you specify OUTDATASET, the VSAM data set you identify is dynamically allocated.

You may use concatenated DD statements if the object was permanently exported and its data and index components are on different device types. The first DD statement specifies the name of the cluster or alternate index as the DSNAME, the volume serial numbers and device type of the data component, DISP=OLD, and AMP='AMORG'. The second DD statement specifies the name of the index component as the DSNAME, the volume serial numbers and device type of the index component, DISP=OLD, and AMP='AMORG'.

If NEWNAME is specified for the cluster or alternate index entry, entryname must be the same as the new name. Also, this should be the same name declared on the NEWNAME parameter. Failure to do so will result in the deletion of the original cluster.

password

is the update- or higher-level password of the target object. (See *password* under OUTFILE for password requirements of the target data set.) Update or higher RACF authority to the target object is required.

Abbreviation: ODS

Optional Parameters

CATALOG(*catname***[/***password***])**

specifies the name of the catalog in which the imported object is to be cataloged. This parameter is required when the catalog is password-protected.

catname

specifies the name of the catalog in which the entry to be imported is to be defined.

password

specifies the catalog's update- or higher-level password. Update or higher RACF authority to the catalog is required. When you import an alternate index whose base cluster is password-protected, you should supply the catalog's master password. Alter RACF authority to the catalog is required. Otherwise, you (or the operator) will be prompted to supply the base cluster's master password. Alter RACF authority to the base cluster is required. When you import an integrated catalog facility user catalog and INTOEMPTY is not specified, the master password of the master catalog is required. Alter RACF authority to the master catalog is required.

Abbreviation: CAT

ERASE‘NOERASE

specifies whether the data component of the cluster or alternate index is to be erased (that is, overwritten with binary zeros). This parameter can be used only when you are importing the object into the system from which it was previously exported with the TEMPORARY option. This parameter overrides whatever was specified when the object was defined or last altered.

ERASE

specifies that the data component is to be overwritten with binary zeros when the cluster or alternate index is deleted. If ERASE is specified, the volume that contains the data component must be mounted.

Abbreviation: ERAS

NOERASE

specifies that the data component is not to be overwritten with binary zeros when the cluster or alternate index is deleted.

Abbreviation: NERAS

INTOEMPTY

specifies that you are importing from the portable data set into an empty data set. If this parameter is not specified, an attempt to import into an empty data set will fail. The password and RACF profiles associated with the empty data set will be retained.

When importing into an empty data set, the SAVRAC‘NOSAVRAC parameter applies only to the paths imported and successfully defined over the empty data set. If the define of an exported path fails because a catalog entry with the same name already exists, the path on the portable data set is ignored.

Abbreviation: IEMPTY

OBJECTS((*entryname*
 [FILE(*ddname***)]**
 {KEYRANGES((*lowkey highkey***){(***lowkey highkey***)...})**
 [NEWNAME(*newname***)]**
 [ORDERED‘UNORDERED]
 [VOLUMES(*volser***[** *volser***...])])**
 [(*entryname***...)...])]**

specifies the new or changed attributes for the cluster, alternate index, or any associated paths to be imported. Access method services matches each *entryname* against the name of each object on the portable data set. When a match is found, the information specified by OBJECTS overrides the information on the portable data set.

Abbreviation: OBJ

entryname

specifies the name of the data component, index component, cluster, alternate index, or path for which attributes are being specified. The entryname must appear on the portable data set; otherwise, the parameter list is ignored.

FILE(*ddname***)**

specifies the name of a DD statement that identifies the volumes allocated to the data and index components of a key-sequenced cluster or an alternate index. This parameter is used when the components are defined as unique and when the data and index components reside on different device types. FILE can be coded twice within the OBJECTS parameter: once in the parameter set for the index component and once in a second parameter set for the data component. If you do not specify FILE, the required volumes are dynamically allocated. The volumes must be mounted as permanently resident and reserved.

KEYRANGES((*lowkey highkey***)[(***lowkey highkey***)...])**

specifies portions of a key-sequenced cluster or alternate index to be placed on separate volumes.

The data is divided, by key, among the volumes as contained in the portable data set or as specified in the VOLUMES parameter.

If a volume serial number is duplicated on the portable data set or in VOLUMES, multiple key ranges of an alternate index or cluster attribute are placed on that volume.

If the number of volumes is greater than the number of key ranges, the excess volumes are used for overflow records from any key range without consideration of range boundaries. If there are fewer volumes than key ranges, the excess key ranges are placed on the last volume specified.

By using the KEYRANGE parameter, you may specify key range pairs for a key-sequenced data set that previously was not divided by key or that was divided in different key range groups.

The maximum number of key range pairs is 20. Key ranges must be in ascending order, and may not overlap. Gaps may exist within a specified set of ranges, but records cannot be inserted within a gap.

When you specify KEYRANGES, the entryname can be either the cluster or alternate index name or the name of the data component. If you specify KEYRANGES with the cluster or alternate index name, the values specified are defined for the data component. If you specify KEYRANGES with the data component name, the values are defined for the data component, and any specification of KEYRANGES with the cluster or alternate index name is overridden.

Keys can contain 1 to 64 characters; if coded in hexadecimal, they can contain 1 to 128 hexadecimal characters. All EBCDIC characters are allowed.

lowkey

specifies the low key of the key range. If lowkey is shorter than the actual keys, it will be padded with binary zeros.

highkey

specifies the high key of the key range. If highkey is shorter than the actual keys, it will be padded with binary ones.

Abbreviation: KRNG

NEWNAME(*newname***)**

specifies the new name of an imported cluster or alternate index or its components, or an associated path. When you specify NEWNAME, only the name specified as *entryname* is changed.

If you are specifying a new name for a cluster or alternate index that was exported with the TEMPORARY option and it is being imported back into the original system, you must also rename each of its components.

Abbreviation: NEWNM

ORDERED‘UNORDERED

specifies whether volumes are to be used in the order in which they were listed when the data set was originally defined (as contained on the portable data set) or in the VOLUMES parameter.

If the data set is divided into key ranges, all the records within the range specified by the first low-key high-key pair are placed on the first volume; all the records within the second range are placed on the second volume, and so on.

If it is impossible to allocate volumes in the given order and ORDERED is specified, the command is terminated.

When you specify ORDERED‘UNORDERED, you can specify the cluster or alternate index name, the data component name or the index component name as entryname with the following results:

- If ORDERED‘UNORDERED is specified with the cluster or alternate index name, the specified attribute is defined for the data component. For a key-sequenced cluster or alternate index, the specified attribute is also defined for the index component.
- If ORDERED‘UNORDERED is specified with the data component name, the specified attribute is defined for the data component. Any specification of ORDERED‘UNORDERED with the cluster or alternate index name is overridden.
- For a key-sequenced cluster and for an alternate index, if ORDERED‘UNORDERED is specified with the index component name, the specified attribute is defined for the index component. Any specification of ORDERED‘UNORDERED with the cluster or alternate index name is overridden.

If OBJECTS is specified and neither ORDERED or UNORDERED is specified, then UNORDERED is the default.

Abbreviations: ORD and UNORD

VOLUMES(*volser***[** *volser***...])**

specifies the volumes on which the cluster or alternate index is to reside. If VOLUMES is not coded, the original volume is the receiving volume.

When you specify VOLUMES, you can specify the cluster or alternate index name, the data component name or the index component name as entryname with the following results:

- If VOLUMES is specified with the cluster or alternate index name, the specified volume list is defined for the data component. For a key-sequenced cluster or alternate index, the specified volume list is also defined for the index component.
- If VOLUMES is specified with the data component name, the specified volume list is defined for the data component. Any specification of VOLUMES with the cluster or alternate index name is overridden.
- For a key-sequenced cluster or alternate index, if VOLUMES is specified with the index component name, the specified volume list is defined for the index component. Any specification of VOLUMES with the cluster or alternate index name is overridden.

For clusters or alternate indexes, if multiple volumes are specified, they must be of the same device type. By repeating the OBJECTS parameter set for each component and including VOLUMES in each parameter set, you can have the data and index components on different volumes.

Although the index and data components may reside on different device types, each volume of a multivolume component must be of the same type.

If the receiving volume is of a type different from that which originally contained the cluster or alternate index, the job may be terminated because of allocation problems. Each space allocation quantity is recorded in a catalog entry as an amount of cylinders or tracks even if RECORDS was specified in the DEFINE command.

When a cluster or alternate index is imported, the number of cylinders or tracks in the catalog entry is not modified, even though the object may be imported to reside on a device type other than what it was exported from. If an object is exported from a smaller DASD and imported to a larger DASD, more space is allocated than the object needs. Conversely, if an attempt is made to import an object that previously resided on a larger DASD to a smaller DASD, it may fail.

You can avoid space allocation problems by defining an empty cluster or alternate index and identifying it as the target for the object being imported as follows:

- Using the DEFINE command, define a new entry for the cluster or alternate index in the catalog to which it is to be moved. If space was allocated in RECORDS, you may specify the same quantity; if it was allocated in TRACKS or CYLINDERS, you must adjust the quantity for the new device type. If an entry already exists in the catalog for the object, you must delete that entry or use a different name in the DEFINE command.
- Using the IMPORT command, load the portable data set into the newly defined cluster or alternate index. When IMPORT encounters an empty target data set, the exported catalog information is bypassed and only the data records are processed.

Abbreviation: VOL

PURGE‘NOPURGE
specifies whether the original cluster or alternate index is to be deleted and replaced, regardless of the retention time specified in the TO or FOR parameter. This parameter can be used only when you are importing the object into the original system from which it was exported with the TEMPORARY option.

PURGE
specifies that the object is to be deleted even if the retention period has not expired.

Abbreviation: PRG

NOPURGE
specifies that the object is not to be deleted unless the retention period has expired.

Abbreviation: NPRG

SAVRAC‘NOSAVRAC
specifies, for a RACF-protected object, whether existing profiles are to be used or whether new profiles are to be created.

Note: The SAVRAC|NOSAVRAC parameters are ignored if the INTOEMPTY parameter has been specified and the target data set exists and is empty.

SAVRAC

specifies that RACF data set profiles already existing for objects being imported from the portable data set are to be used. Typically, you would specify this option when replacing a data set with a portable copy made with an EXPORT TEMPORARY operation. SAVRAC will cause the existing profiles to be saved and used, rather than letting the system delete old profiles and create new, default profiles.

The profiles will actually be redefined by extracting information from existing profiles and adding caller attributes. You should ensure that these added attributes are acceptable.

The ownership creation group and access list will be altered by the caller of the SAVRAC option.

Warning: Check that valid profiles exist for clusters being imported when SAVRAC is specified. If this is not done, an invalid and possibly improper profile may be “saved” and used inappropriately.

NOSAVRAC

specifies that new RACF data set profiles are to be created. This is usually the situation when importing a permanently exported cluster.

A profile will be defined for the imported cluster if either the automatic data set protection option has been specified for you or if the exported cluster had a RACF indication in the catalog when it was exported.

If you import into a catalog in which there is a component with a duplicate name that is marked as having been temporarily exported, it and any associated profiles will be deleted before the portable data set is imported.

IMPORT Examples

Importing a Key-Sequenced Cluster: Example 1

A key-sequenced cluster, D40.EXAMPLE.KSDS1, that was previously exported, is imported. (See the previous EXPORT example, “Exporting a Key-Sequenced Cluster: Example 1” on page 172) OUTFILE and its associated DD statement are provided to allocate the data set.

The IMPORT command copies the portable data set, TAPE2, into the system and assigns it the name D40.EXAMPLE.KSDS1. When TAPE2 is copied, access method services reorganizes the data records so that deleted records are removed and control intervals and control areas contain the specified free space percentages. The original copy of the cluster is deleted and replaced with the data records from the TAPE2 portable file.

```
//IMPORT2  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SOURCE   DD    DSNAME=TAPE2,UNIT=(TAPE,,DEFER),
//   VOL=SER=003030,DISP=OLD,
//   DCB=(BLKSIZE=6000,LRECL=479,DEN=3),LABEL=(1,SL)
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
```

```
    IMPORT -
         INFILE(SOURCE) -
         OUTDATASET(D40.EXAMPLE.KSDS1) -
         CATALOG(D27UCAT1/USERMRPW)
/*
```

Job control language statement:

- SOURCE DD describes the portable data set TAPE2, which resides on a magnetic tape file that is not mounted by the operator until access method services opens TAPE2 for processing. The block size parameter is included (even though it need not be, because the tape has a standard label and the information is contained in the data set header label) to illustrate the fact that the information specified when the data set is imported is required to be the same as was specified when the data set was exported. The LRECL parameter is not required, because the maximum record size is 475 bytes and the default (block size minus 4) is adequate. However, by specifying a record size, the default is overridden and virtual storage is more efficiently used. To specify a record size, specify the size of the largest record plus 4.

IMPORT command parameters:

- INFILE points to the SOURCE DD statement which describes the portable file, TAPE2, to be imported.
- OUTDATASET gives the name of the data set being imported. Because the high-level qualifier of the data set is the name of the alias of the user catalog D27UCAT2, access method services can dynamically allocate the cluster without specifying a JOBCAT or STEPCAT DD statement.
- CATALOG identifies the catalog, D27UCAT1, in which the imported cluster is to be defined. The catalog's update- or higher-level password is required.

Importing an Entry-Sequenced Cluster in a VSAM Catalog: Example 2

An entry-sequenced cluster, D50.EXAMPLE.ESDS1, is imported from a portable file, TAPE1. This example is associated with EXPORT example, “Exporting an Entry-Sequenced Cluster: Example 2” on page 173. The cluster is defined in a different catalog than that from which it was exported, assigned a new name, and imported to a different volume. When TAPE1 is moved, access method services reorganizes the data records.

```
//IMPORT3  JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SOURCE   DD   DSNAME=TAPE1,UNIT=(TAPE,,DEFER),DISP=OLD,
//         VOL=SER=001147,LABEL=(1,SL)
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
```

```
    IMPORT -
         INFILE(SOURCE) -
         OUTDATASET(D40.EXAMPLE.ESDS3) -
         OBJECTS( -
               (D50.EXAMPLE.ESDS1 -
                  NEWNAME(D40.EXAMPLE.ESDS3) -
                  VOLUMES(VSER02) ) -
                ) -
         CATALOG(D27UCAT1/USERUPPW)
/*
```

Job control language statement:

- SOURCE DD describes the portable file, TAPE1. TAPE1 resides on a magnetic tape file that will not be mounted by the operator until access method services opens TAPE1 for processing.

IMPORT command parameters:

- INFILE points to the SOURCE DD statement. The SOURCE DD statement describes the data set to be imported, TAPE1.
- OUTDATASET gives the name of the data set that is being imported; the name is the renamed cluster. Because the high-level qualifier of the data set name is the name of the alias of the catalog, D27UCAT1, the data set can be dynamically allocated without specifying a JOBCAT or STEPCAT DD statement.
- OBJECTS changes some of the attributes for the object being imported:
  - D50.EXAMPLE.ESDS1 identifies the entry-sequenced cluster as it is currently named on TAPE1.
  - NEWNAME specifies that the cluster's entryname is to be changed to D40.EXAMPLE.ESDS3.
  - VOLUMES identifies the new volume on which the cluster is to reside.
- CATALOG identifies the catalog, D27UCAT1, that is to contain the cluster's catalog entry. The catalog's update- or higher-level password is required.

IMPORT CONNECT

The IMPORT CONNECT command connects a user catalog. The syntax of this command is:

IMPORT	**CONNECT** **OBJECTS((***usercatname* **DEVICETYPE(***devtype***)** **VOLUMES(***volser***)))** **[CATALOG(***mastercatname***[/***password***])]**

IMPORT CONNECT Parameters

Required Parameters

CONNECT
specifies that a user catalog is to be connected. The user catalog is connected to the master catalog in the receiving system. When CONNECT is coded, OBJECTS must also be coded to name the catalog and to identify the volume serial number and device type of the volume that contains the user catalog.

Abbreviation: CON

OBJECTS((*usercatname*
DEVICETYPE(*devtype***)**
VOLUMES(*volser***)))**
specifies the user catalog to be connected.

usercatname
specifies the name of the user catalog being connected.

DEVICETYPE(*devtype***)**
specifies the device type of the volume that contains a user catalog that is to be connected. You can specify a device type for any direct access device that is supported.

Abbreviation: DEVT

VOLUMES(*volser***)**
specifies the volume on which the user catalog resides.

Abbreviation: VOL

Optional Parameters

CATALOG(*catname***[/***password***])**
specifies the name of the catalog in which the catalog you are connecting is to be defined. This parameter is required when the catalog is password-protected or when you want to direct the catalog's entry to a particular catalog other than the master catalog.

catname

is the name of the catalog in which the catalog you are connecting is to be defined. If the specified catalog is not the master catalog, the catalog must be identified by a JOBCAT or STEPCAT DD statement. If you are import connecting a user catalog, the specified catalog is usually the master catalog.

password

specifies the master catalog's update- or higher-level password. Update or higher RACF authority to the master catalog is required.

Abbreviation: CAT

Import Connect Example

Importing to Connect a User Catalog

A user catalog, D27UCAT1, is connected to the system's master catalog, AMAST1. This example reconnects the user catalog, D27UCAT1, that was disconnected in the EXPORT DISCONNECT example.

```
//IMPORT1  JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *

    IMPORT -
         OBJECTS( -
               (D27UCAT1 -
               VOLUME(VSER02) -
               DEVICETYPE(3380) ) -
               ) -
         CONNECT -
         CATALOG(AMAST1/MASTMPW1)
/*
```

Command parameters:

- OBJECTS is required when a user catalog is being imported. The subparameters of OBJECTS identify the user catalog, D27UCAT1; the user catalog's volume, VSER02; and the device type of the user catalog's volume, 3380.
- CONNECT specifies that the user catalog connector entry is to be built and put in the master catalog to connect the user catalog to the master catalog. CONNECT is required when a user catalog is being reconnected.
- CATALOG identifies the master catalog, AMAST1, and specifies its update- or higher-level password, MASTMPW1.

IMPORTRA

The IMPORTRA command restores catalog entries from a portable data set created by the EXPORTRA command. This command is for use with **recoverable catalogs only**. The syntax of the IMPORTRA command is:

IMPORTRA	**{INFILE(***ddname***)‘INDATASET(***entryname***)}** **[OUTFILE(***ddname***)]** **[OBJECTS((***entryname* **[DEVICETYPES(***devtype***[** *devtype***...])]** **[FILE(***ddname***)]** **[VOLUMES(***volser***[** *volser***...])])** **[(***entryname***...)...])]** **[SAVRAC‘NOSAVRAC]** **[CATALOG(***catname***[/***password***])]**

IMPORTRA can be abbreviated: MPRA

IMPORTRA Parameters

Required Parameters

INFILE(*ddname***)**
names the DD statement that describes the portable data set (the data set that resulted when you issued the EXPORTRA command). If the portable data set resides on a nonlabeled tape or in a direct access data set created by DOS/VS access method services, the DCB BLKSIZE parameter must be specified on the referenced DD statement.

If you specified BLKSIZE for the portable data set that was created when you executed your EXPORTRA job, you must specify the same block size for your IMPORTRA job.

Note: If you did not specify a block size for EXPORTRA, a default value of 2048 was used. Consequently, if you do not specify BLKSIZE for IMPORTRA, IMPORTRA sets the block size to 2048.) All other characteristics of the portable data set are established by IMPORTRA.

Abbreviation: IFILE

INDATASET(*entryname***)**
specifies the data set name of the portable data set (the data set that resulted when you issued the EXPORTRA command). When you specify INDATASET instead of INFILE, the portable data set is dynamically allocated.

Abbreviation: IDS

Optional Parameters

CATALOG(*catname***[/***password***])**
identifies the target catalog.

If you do not include the CATALOG parameter, the catalog specified in the JOBCAT or STEPCAT DD statement is used. If you have not specified a catalog with the JOBCAT or STEPCAT DD statement, the VSAM master catalog is used. If you do not specify the CATALOG parameter when the target catalog is password-protected, the system operator will be prompted to supply the correct password.

catname
names the catalog. When you specify a user catalog, you must describe and allocate the catalog with a JOBCAT or STEPCAT DD statement.

password
is the target catalog's update- or higher-level password, if the catalog is password protected. If any of the data sets being imported is an alternate index whose base cluster is password-protected, you should supply the catalog's master password. Update or higher RACF authority to the catalog is required.

Abbreviation: CAT

OBJECTS(*entryname*
[DEVICETYPES(*devtype***[** *devtype***...])]**
[FILE(*ddname***)]**
[VOLUMES(*volser***[** *volser***...])])**
[(*entryname***...)...])**

The OBJECTS parameter group specifies new or changed attributes for objects on the portable data set.

OBJECTS
specifies new or changed attributes for a cluster, an alternate index, or a non-VSAM data set that is being imported. By specifying the OBJECTS parameter, you may override certain attributes contained on the portable data set.

Access method services matches each entryname you specify against the name of each object on the portable data set. When a match is found, the information specified by OBJECTS overrides the information on the portable data set.

Abbreviation: OBJ

entryname
specifies the object's entryname. You can specify the entryname and associated attributes for up to 255 objects.

You can specify the entryname of these types of objects only: VSAM cluster or an alternate index, non-VSAM data set, user catalog, and a VSAM object's data or index component.

DEVICETYPES(*devtype***[** *devtype***...])**
specifies the device type on which a user catalog being imported resides or the device type(s) on which a non-VSAM data set being imported resides.

If entryname names a user catalog, you may specify only one device type. If entryname names a non-VSAM data set that resides on different device types, the device types listed in the DEVICETYPES parameter must be specified in the same order as the volume serial numbers listed in the VOLUMES parameter.

This parameter can be specified only when the entryname names a non-VSAM data set or user catalog. For a non-VSAM data set or user catalog, if DEVICETYPES is not coded, the data set or user catalog must still reside on the same device type(s) as contained in the entry in the portable data set.

Abbreviation: DEVT

FILE(*ddname*)

specifies the name of a DD statement that identifies the volumes allocated to the data and index components of a key-sequenced cluster or an alternate index.

This parameter is required when the components are defined as unique and when the data and index components reside on different device types.

When components reside on different device types, FILE must be coded twice within the OBJECTS parameter; once in the parameter set for the index component and once in a second parameter set for the data component. If you do not specify FILE, the required volumes are dynamically allocated.

VOLUMES(*volser*[*volser*...])

specifies the volume(s) on which a cluster or alternate index is to reside, the volume on which a user catalog resides, or the volume(s) on which a non-VSAM data set resides. If entryname names a user catalog, you may specify only one volume serial number as a subparameter of VOLUMES.

For a cluster or an alternate index, if VOLUMES is not coded, the original volume is the receiving volume. For a user catalog or a non-VSAM data set, if VOLUMES is not coded, the data set or user catalog must still reside on the same volume(s) as it did in the portable data set.

When you specify VOLUMES for a cluster or alternate index, you can specify the cluster or alternate index name, the data component name or the index component name as entryname with the following results:

- If VOLUMES is specified with the cluster or alternate index name, the specified volume list is defined for the data component. For a key-sequenced cluster or alternate index, the specified volume list is also defined for the index component.
- If VOLUMES is specified with the data component name, the specified volume list is defined for the data component. Any specification of VOLUMES with the cluster or alternate index name is overridden.
- For a key-sequenced cluster or alternate index, if VOLUMES is specified with the index component name, the specified volume list is defined for the index component. Any specification of VOLUMES with the cluster or alternate index name is overridden.

For clusters or alternate indexes, if multiple volumes are specified, they must be of the same device type. By repeating the OBJECTS parameter set for each component and including VOLUMES in each parameter set, you can have the data and index components on different volumes. (See also the description of the FILE parameter.)

Although the index and data components may reside on different device types, each volume of a multivolume component must be of the same type.

Abbreviation: VOL

OUTFILE(*ddname*)

names the DD statement that contains a data set name and the volume serial number of each volume that is to contain the imported VSAM clusters and alternate indexes. You must use concatenated DD statements if the data sets are on different device types. If the OUTFILE parameter is not supplied, the required data sets are dynamically allocated as needed.

The dsname specified with the DD statement cannot be one of the names cataloged in the target catalog (that is, the catalog that is to contain the imported catalog entries) and it cannot be one of the entrynames within the portable data set.

DFSMS/MVS Managing Catalogs describes how this dsname is used by IMPORTRA processing. The DD statement(s) also specify the volume serial number(s), device type, DISP=OLD, and AMP='AMORG'.

Abbreviation: OFILE

SAVRAC‘NOSAVRAC

specifies, for a RACF-protected object, whether existing profiles are to be used or whether new profiles are to be created.

SAVRAC‘NOSAVRAC applies to all VSAM components being imported back into the system.

SAVRAC

specifies that existing RACF data set profiles are to be saved and used, rather than letting the system delete old profiles and create new default profiles. The profiles will actually be redefined by extracting information from existing profiles and adding caller attributes. You should ensure that these added attributes are acceptable. SAVRAC should be specified when RACF data set profiles already exist for objects being imported from the portable data set.

The ownership creation group and access list will be altered by the caller of the SAVRAC option.

Warning: You should ensure that valid profiles do exist for all components (for example, cluster, data, index) being imported when SAVRAC is specified. If this is not done, an invalid and possibly improper profile may be saved and used inappropriately.

Remember that paths are imported with their corresponding cluster or alternate index, and the same warning applies to these entries. In particular, keep in mind that additional paths may be brought in during the import.

NOSAVRAC

specifies that a profile will be defined for the imported components if either the RACF Automatic Data Set Protection option has been specified for you or if the exported component had a RACF indication in the catalog at the time it was exported. NOSAVRAC should be specified when you wish new profiles to be created.

There may be situations in which neither the SAVRAC nor NOSAVRAC mode would be suitable for all entities restored from the catalog recovery area. In such cases, the following procedure is suggested:

- Issue two separate EXPORTRA commands, resulting in two portable data sets. One EXPORTRA will create a portable data set containing entities to which SAVRAC should apply, the other to which NOSAVRAC should apply.
- Issue two IMPORTRA commands, one specifying SAVRAC and the other NOSAVRAC.

IMPORTRA Examples

Recovering a VSAM Catalog: Example 1—Part 1 (EXPORTRA)

The EXPORTRA function is performed against the VSAM master catalog, AMASTCAT, and all the volumes it owns. All the data sets listed in the catalog recovery areas on the catalog volume and on the other volumes owned by AMASTCAT are exported to a SAM data set on another disk volume. Use of FORCE causes EXPORTRA to ignore time stamp mismatches between the volumes and the catalog.

```
//RECOVER  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//CRAVOL1  DD   DISP=OLD,VOL=SER=VSER01,UNIT=3380,
//     AMP='AMORG'
//CRAVOL2  DD   DISP=OLD,VOL=SER=VSER04,UNIT=3380,
//     AMP='AMORG'
//PORT     DD   DSNAME=PORT,DISP=(NEW,KEEP),
//     SPACE=(CYL,(3,3)),VOL=SER=231401,
//     UNIT=3380,DCB=BLKSIZE=8000
//SYSIN    DD   *
    EXPORTRA -
         CRA -
           ((CRAVOL1 ALL) -
           (CRAVOL2 ALL)) -
         FORCE -
         OUTFILE(PORT) -
         MASTERPW(MCATMRPW)
/*
```

Job control language statements:

- CRAVOL1 DD identifies and allocates the first volume whose catalog recovery area contents is to be exported.
- CRAVOL2 DD identifies and allocates the second volume whose catalog recovery area contents is to be exported.
- PORT DD identifies the sequential file that is to receive the exported data sets and catalog recovery records. The DCB BLKSIZE parameter overrides the EXPORTRA default of 2048 to improve performance.

The EXPORTRA command exports everything appearing in the catalog recovery areas of volumes VSER01 and VSER04.

EXPORTRA command parameters:

- CRA is required and identifies the catalog recovery areas and volumes from which the export is to take place. The ddnames of the DD statements for these objects must be identical to the names specified for this parameter. The ALL subparameter specifies that everything is to be exported from each catalog recovery area.
- FORCE specifies that timestamp mismatches are to be ignored.
- OUTFILE is required and identifies the sequential (SAM) non-VSAM data set that is to receive the exported information. The ddname of the DD statement for this object must be identical to the name specified with this parameter.

- MASTERPW specifies the master password of the master catalog. This parameter is required to export information from catalog recovery areas controlled by a recoverable catalog.

Recovering a VSAM Catalog: Example 1—Part 2 (IMPORTRA)

This example imports all the data sets that were exported using EXPORTRA in the previous example. The receiving catalog is the VSAM master catalog, and the CATALOG parameter is used to supply its master password.

```
//RESTORE   JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//PORT      DD    DSNAME=PORT,DISP=OLD,UNIT=3380,
//     VOL=SER=333333,DCB=BLKSIZE=8000
//VSAMIN    DD    DSNAME=DUMMY.NAME,DISP=OLD,UNIT=DSIK,
//     VOL=SER=VSER01,AMP='AMORG'
//          DD    VOL=SER=VSER04,UNIT=3380,DISP=OLD
//SYSIN     DD    *

    IMPORTRA -
         INFILE(PORT) -
         OUTFILE(VSAMIN) -
         CATALOG(AMASTCAT/MCATMRPW)
/*
```

Job control language statements:

- PORT DD identifies and allocates the portable data set created previously by EXPORTRA. The DCB BLKSIZE parameter is included (even though it need not be, because the information is contained in the DSCB for the data set) to illustrate the fact that the block size specified in the IMPORTRA job must be the same as that specified in the EXPORTRA job that created the portable data set.
- VSAMIN DD identifies and allocates the volumes of the objects to be imported. This permits them to be reloaded from the portable data set. The dsname appearing on the DD statement is required. It is a dummy name that must not appear either in the catalog or among the names on the portable data set. Because the volumes are of different device types, concatenated DD statements must be used.

IMPORTRA command parameters:

- INFILE is required and identifies the portable data set.
- OUTFILE identifies each VSAM volume involved in the import. The DD statement identified by OUTFILE also identifies the dummy data set, DUMMY.NAME.
- CATALOG specifies the name of the master catalog. The master password of the target catalog is required to import catalog information.

LISTCAT

The LISTCAT command lists catalog entries. The syntax of this command is:

LISTCAT	**[ALIAS]** **[ALTERNATEINDEX]** **[CLUSTER]** **[DATA]** **[GENERATIONDATAGROUP]** **[INDEX]** **[NONVSAM]** **[PAGESPACE]** **[PATH]** **[SPACE]** **[USERCATALOG]** **[CREATION(**_days_**)]** **[ENTRIES(**entry name**[/**_password_**]** **[** _entryname_**[/**_password_**]...])‘** **LEVEL(**_level_**)]** **[EXPIRATION(**_days_**)]** **[NAME‘** **HISTORY‘** **VOLUME‘** **ALLOCATION‘** **ALL]** **[NOTUSABLE]** **[OUTFILE(**_ddname_**)]** **[CATALOG(**_catname_**[/**_password_**])]**

LISTCAT can be abbreviated: LISTC

LISTCAT Parameters

Required Parameters

The LISTCAT command has no required parameters.

When the LISTCAT command is issued as a job step (not through TSO) and no parameters are specified; an entire catalog is listed. See the section “Catalog Search Order for LISTCAT” on page 18 for a description of how the catalog to be listed is selected.

Note to TSO users: When LISTCAT is invoked from a TSO terminal and no operands are specified, the prefix of the TSO user becomes the highest level of entryname qualification and only those entries with a matching highest level of qualification are listed. It is as if you specified: **LISTCAT LEVEL(**TSO user prefix**)**

Optional Parameters

[ALIAS][ALTERNATEINDEX][CLUSTER][DATA][GENERATIONDATAGROUP] [INDEX][NONVSAM][PAGESPACE][PATH][SPACE][USERCATALOG]
specifies that certain types of entries are to be listed. Only those entries whose type is specified are listed. For example, when you specify CLUSTER but not DATA or INDEX, the cluster's entry is listed and its associated data and index entries are not listed.

When you specify ENTRIES and also specify an entry type, the entryname is not listed unless it is of the specified type. You can specify as many entry types as desired. When you want to completely list a catalog, do not specify any entry type.

ALIAS
specifies that alias entries are to be listed.

ALTERNATEINDEX
specifies that entries for alternate indexes are to be listed. If ALTERNATEINDEX is specified and DATA and INDEX are not also specified, entries for the alternate index's data and index components are not listed.

Abbreviation: AIX

CLUSTER
specifies that cluster entries are to be listed. If CLUSTER is specified and DATA and INDEX are not also specified, entries for the cluster's data and index components are not listed.

Abbreviation: CL

DATA
specifies that entries for data components of clusters and alternate indexes are to be listed.

If a VSAM object's name is specified and DATA is coded, only the object's data component entry is listed. When DATA is the only entry type parameter coded, the catalog's data component is not listed.

GENERATIONDATAGROUP
specifies that entries for generation data groups are to be listed.

Abbreviation: GDG

INDEX
specifies that entries for index components of key-sequenced clusters and alternate indexes are to be listed. If a VSAM object's name is specified and INDEX is coded, only the object's index component entry is listed. When INDEX is the only entry type parameter coded, the catalog's index component is not listed.

Abbreviation: IX

NONVSAM
specifies that entries for non-VSAM data sets are to be listed. If a generation data group's name and non-VSAM are specified, the generation data sets associated with the generation data group are listed.

Abbreviation: NVSAM

PAGESPACE
specifies that entries for page spaces are to be listed.

Abbreviation: PGSPC

PATH
specifies that entries for paths are to be listed.

SPACE
specifies that entries for volumes containing data spaces defined in this catalog are to be listed. Candidate volumes are included. If entries are identified by entryname, SPACE can be coded only when no other entry type parameter is coded.

Abbreviation: SPC

USERCATALOG
specifies that catalog connectors are to be listed. The user catalog connector entries are in the master catalog. (User catalog connector entries can also be in a user catalog, but the operating system does not recognize them when searching for a user catalog.)

Abbreviation: UCAT

CATALOG(*catname***[/***password***])**
specifies the name of the catalog that contains the entries that are to be listed. If CATALOG is coded, only entries from that catalog are listed. See "Catalog Search Order for LISTCAT" on page 18 for information about the order in which catalogs are searched.

catname
is the name of the catalog.

password
specifies the read- or higher-level password of the catalog that contains entries to be listed. Read or higher RACF authority to the catalog is required. If the entries to be listed are password protected, a password must be supplied either through this parameter or through the ENTRIES parameter. If passwords are to be listed, you must specify the master password. Alter RACF authority to the catalog is required.

If the catalog's volume is physically mounted, it is dynamically allocated. The volume must be mounted as permanently resident or reserved.

Abbreviation: CAT

CREATION(*days***)**
specifies that entries of the indicated type, such as CLUSTER and DATA, are to be listed only if they were created the specified number of days ago or earlier.

days
specifies the number of days ago. The maximum number that can be specified is 9999; zero indicates that all entries are to be listed.

Abbreviation: CREAT

ENTRIES(*entryname***[/***password***][** *entry name***[/***password***]...])'**
LEVEL(*level***)**
specifies the names of entries to be listed.

Entries are only listed from an OS CVOL if the ENTRIES or LEVELS parameter is specified and:

- The CATALOG parameter is not specified.
- No JOBCAT or STEPCAT DD is specified.
- The higher-level qualifier of the name specified using ENTRIES or LEVELS is the alias of the OS CVOL.

When a LISTCAT LEVEL of a CVOL is made, a maximum of 1456 entries can be listed.

Note to TSO users: TSO will prefix the userid to the specified data set name when the ENTRIES parameter is unqualified. The userid is not prefixed when the LEVEL parameter is specified.

ENTRIES(*entryname***[/***password***]**
 [*entryname***[/***password***]...])**
specifies the name or generic name of each entry to be listed. (See the generic examples following the description of the LEVEL parameter.)
When you want to list the entries that describe a user catalog, the catalog's volume must be physically mounted. You then specify the catalog's name as the entryname. If you want data space information, you must specify the volume serial number (as the entryname) of the volume containing the data space; you must also specify SPACE and no other entry type parameters.

password
specifies a password when the entry to be listed is password protected and a password is not specified with the CATALOG parameter. The password can be any of the entry's passwords. The entry's protection attributes are listed only when you specify the entry's (or its catalog's) master password. Alter RACF authority to the catalog or entry is required.

When you do not supply a password for a password-protected entry, the operator or TSO terminal user is prompted for the entry's password. You cannot supply a password for these types of entries: alias, data space, generation data group, non-VSAM data set, or user catalog connector.

Abbreviation: ENT

LEVEL(*level***)**
specifies that all entries that match the level of qualification specified by (level) are to be listed, irrespective of the number of additional qualifiers. If a generic level name is specified, only one qualifier replaces the *. The * must not be the last character specified in the LEVEL parameter. LEVEL(A.*) will give you an error message.

Abbreviation: LVL

Examples of ENTRIES and LEVEL specifications: Suppose a catalog contains the following names:

1. A.A.B
2. A.B.B
3. A.B.B.C
4. A.B.B.C.C
5. A.C.C
6. A.D
7. A.E
8. A

If ENTRIES(A.*) is specified, entries 6 and 7 will be listed. If ENTRIES(A.*.B) is specified, entries 1 and 2 will be listed. If LEVEL(A.*.B) is specified, entries

1, 2, 3, and 4 will be listed. If LEVEL(A) is specified, entries 1, 2, 3, 4, 5, 6, and 7 will be listed.

When using a generic name with the ENTRIES parameter, entries must have one qualifier in addition to those specified in the command.

When using the LEVEL parameter, associated entries (for example, data and index entries associated with a cluster) are not listed unless their names match the level of qualification.

EXPIRATION(*days*)
specifies that entries of the indicated type, such as CLUSTER and DATA, are to be listed only if they will expire in the specified number of days or earlier.

days
specifies the number of days. The maximum number that can be specified is 9999 and it indicates that all entries are to be listed. Any value that exceeds the year 2000 will default to 99.999 (in the format yyddd). Zero indicates that only entries that have already expired are to be listed.

Abbreviation: EXPIR

<u>NAME</u>‘HISTORY‘VOLUME‘ALLOCATION‘ALL
specifies the fields to be included for each entry listed. Appendix A, “Interpreting LISTCAT Output Listings” on page 249, shows the listed information that results when you specify nothing (which defaults to NAME), HISTORY, VOLUME, ALLOCATION, and ALL.

NAME
specifies that the name and entry type of the entries are to be listed. Some entry types are listed along with their associated entries. The entry type and name of the associated entry follow the listed entry's name. For details, see “ASN: Associations Group” in Appendix A, “Interpreting LISTCAT Output Listings” on page 249.

Note to TSO users: Only the name of each entry associated with the TSO user's prefix is listed when no other parameters are coded.

HISTORY
specifies that only the following information is to be listed for each entry: name, entry type, ownerid, creation date, expiration date, and for a recoverable catalog's entries, the catalog recovery area's volume, device type, and control interval number. It can be specified for ALTERNATEINDEX, CLUSTER, DATA, GENERATIONDATAGROUP, INDEX, NONVSAM, PAGESPACE, and PATH.

Abbreviation: HIST

VOLUME
specifies that the information provided by specifying HISTORY plus the volume serial numbers and device types allocated to the entries, are to be listed. Volume information is only listed for data and index component entries, data space (volume) entries, non-VSAM data set entries, and user catalog connector entries.

Note to TSO users: Only the name and volume serial numbers associated with the TSO user's prefix are listed when no other parameters are coded.

Abbreviation: VOL

ALLOCATION

specifies that the information provided by specifying VOLUME plus detailed information about the allocation are to be listed. The information about allocation is listed only for data and index component entries.

Abbreviation: ALLOC

ALL

specifies that all fields are to be listed.

NOTUSABLE

specifies that only those data and index entries with the notusable indicator on are to be listed. A data or index component is marked “unusable” when a system failure occurs that results in damage to the entry's cataloged information.

When the cataloged information is reset, the damaged entry and its backup copy (in the catalog recovery area) might not match when the space allocation information is compared. VSAM marks the catalog entry “unusable” until the space allocation information is corrected. See *DFSMS/MVS Managing Catalogs* for more details.

Abbreviation: NUS

OUTFILE(*ddname*)

specifies a data set, other than the SYSPRINT data set, to receive the output produced by LISTCAT (that is, the listed catalog entries). Completion messages produced by access method services are sent to the SYSPRINT data set, along with your job's JCL and input statements.

ddname

identifies a DD statement that describes the alternate target data set. If OUTFILE is not specified, the entries are listed in the SYSPRINT data set. If an alternate data set is specified, it must meet the requirements in “For an Alternate Target Data Set” on page 12.

Abbreviation: OFILE

LISTCAT Examples

Listing a Key-Sequenced Cluster's Entry in a Catalog: Example 1

```
//LISTCAT1 JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    LISTCAT -
         ENTRIES(D40.EXAMPLE.KSDS1) -
         CLUSTER -
         ALL
/*
```

The LISTCAT command lists the cluster's catalog entry. It is assumed that the high level of the qualified cluster name is the same as the alias of the catalog D27UCAT1; this naming convention directs the catalog search to the appropriate catalog.

LISTCAT command parameters:

- ENTRIES identifies the entry to be listed.
- CLUSTER specifies that only the cluster entry is to be listed. If CLUSTER had not been specified, the cluster's data and index entries would also be listed.
- ALL specifies that all fields of the cluster entry are to be listed.

Alter a Catalog Entry, Then List the Modified Entry: Example 2

The free space attributes for the data component (KSDATA) of cluster MYDATA are modified. Next, the cluster entry, data entry, and index entry of MYDATA are listed to determine the effect, if any, the modification has on the cluster's other attributes and specifications.

```
//LISTCAT2 JOB   ...
//JOBCAT   DD    DSNAME=D27UCAT1,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    ALTER -
         D40.KSDATA -
         FREESPACE(10 10)
    IF LASTCC = 0 -
         THEN -
         LISTCAT -
               ENTRIES(D40.MYDATA) -
               ALL
/*
```

JOBCAT DD makes catalog D27UCAT1 available for this job.

ALTER command parameters:

- D40.KSDATA is the *entryname* of the data component being altered. D40.KSDATA identifies the data component of a key-sequenced VSAM cluster, D40.MYDATA. To alter a value that applies only to the cluster's data component, as done by FREESPACE, you must specify the data component's entryname.
- FREESPACE specifies the new free space percentages for the data component's control intervals and control areas.

The IF ... THEN command sequence verifies that the ALTER command completed successfully before the LISTCAT command executes.

LISTCAT command parameters:

- ENTRIES specifies the *entryname* of the object being listed. Because D40.MYDATA is a key-sequenced cluster, the cluster entry, its data entry, and its index entry are listed.
- ALL specifies that all fields of each entry are to be listed.

List Catalog Entries: Example 3

All catalog entries with the same generic name, GENERIC.*.BAKER (where “*” is any 1- to 8-character simple name), are listed.

```
//LISTCAT3   JOB   ...
//JOBCAT     DD    DSNAME=USERCAT4,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT   DD    SYSOUT=A
//SYSIN      DD    *
    LISTCAT -
         ENTRIES(GENERIC.*.BAKER) -
         ALL
/*
```

JOBCAT DD makes catalog USERCAT4 available for this job.

LISTCAT command parameters:

- ENTRIES specifies the *entryname* of the object to be listed. Because GENERIC.*.BAKER is a generic name, more than one entry may be listed.
- ALL specifies that all fields of each entry are to be listed.

LISTCRA

The LISTCRA command lists or compares the contents of a given catalog recovery area (CRA). This command is for use with **recoverable catalogs only**. The syntax of the LISTCRA command is:

LISTCRA	**INFILE(***ddname***[** *ddname***...])** **[CATALOG(***catname***[/***password***]** *ddname***)]** **[COMPARE‘NOCOMPARE]** **[DUMP‘NAME‘SEQUENTIALDUMP]** **[MASTERPW(***password***)]** **[OUTFILE(***ddname***)]**

LISTCRA can be abbreviated: LISTR

LISTCRA Parameters

Required Parameters

INFILE(*ddname***[** *ddname***...])**

identifies the DD statement(s) that describes the catalog recovery area's volume. You can list or compare more than one catalog recovery area. However, if COMPARE is specified, all volumes whose catalog recovery areas are listed must be owned by the same VSAM catalog.

Note: The ddname list for the INFILE parameter is limited to 9 ddnames.

Optional Parameters

CATALOG(*catname***[/***password***]** *ddname***)**

identifies the catalog that owns the volume(s) identified with the INFILE parameter. The CATALOG parameter is required when you specify the COMPARE option either with the DUMP or NAME output format. CATALOG cannot be specified with SEQUENTIALDUMP.

password

When the catalog is password protected, you must supply the catalog's master password. The password is required, even though the master catalog's password may have been supplied in the MASTERPW parameter. Alter RACF authority to the catalog is required.

ddname

When CATALOG is specified, you must describe and allocate the catalog to be compared with a DD statement. ddname identifies the catalog's DD statement, and is required when you specify the CATALOG parameter. You cannot specify JOBCAT or STEPCAT as the ddname. However, if the catalog being compared is not the VSAM master catalog, you must also identify the catalog by a STEPCAT or JOBCAT DD statement in addition to the DD statement referenced by ddname.

If the catalog information is entered incorrectly, the NOCOMPARE default is taken, and all the CRA records are listed.

Abbreviation: CAT

COMPARE‘NOCOMPARE

specifies whether the list is to be limited to those entries in the catalog recovery area that do not match their corresponding catalog entries.

COMPARE

When you specify COMPARE, only those entries that do not match are listed. All the catalog's entries are compared, except the catalog's self-describing records. You must identify the catalog (that contains the catalog entries that are still to be compared) with the CATALOG parameter.

The COMPARE parameter cannot be specified if you specify SEQUENTIALDUMP.

Note: If you specify the COMPARE option, page space entries will always result in a mismatch. This is a normal condition and does not require any corrective action. The mismatch is caused by the OPEN indicator not being set in the page space record in the CRA, whereas it is set in the catalog.

Abbreviation: CMPR

NOCOMPARE

When you specify NOCOMPARE (or allow it to default), all the catalog recovery area's records are listed.

Abbreviation: NCMPR

See Appendix B, “Interpreting LISTCRA Output Listings” on page 287 for examples of each type of output listing.

DUMP‘NAME‘SEQUENTIALDUMP

specifies the amount of cataloged information to be listed.

DUMP

specifies that each listed entry is printed in its entirety in both hexadecimal and character form. Records are listed alphanumerically and grouped by components.

NAME

specifies that each listed entry includes only the entry's name, its volume serial numbers, and the name and entry type of each associated entry. All listed entries are sorted alphanumerically and grouped.

SEQUENTIALDUMP

specifies that each listed entry is to be printed in its entirety in both hexadecimal and character form. Records are listed in the sequence in which they appear in the catalog recovery area.

Abbreviation: SDUMP

The DUMP, NAME, SEQUENTIALDUMP, COMPARE, and NOCOMPARE options can be specified to produce five different kinds of output listing. See Appendix B, “Interpreting LISTCRA Output Listings” on page 287, for examples of each type of listing.

MASTERPW(*password*)

specifies the master catalog's master password. This parameter is required when the master catalog is password-protected.

Abbreviation: MRPW

OUTFILE(*ddname*)

identifies the DD statement that describes an alternate target data set. See "For an Alternate Target Data Set" on page 12 for more details about alternate target data sets.

When OUTFILE is not specified, the listing is printed on the output device described with the SYSPRINT DD statement. When OUTFILE is specified, the listing produced by LISTCRA is sent to the alternate target data set; the remainder of the access method services output is printed on the output device described with the SYSPRINT DD statement. Refer to Appendix B, "Interpreting LISTCRA Output Listings" on page 287, for an example of the use of the OUTFILE parameter.

Abbreviation: OFILE

LISTCRA Example

Listing a Catalog Recovery Area

The catalog recovery areas for the volumes (SG2001 and VSER04) owned by VSAM master catalog (AMASTCAT) are listed in dump format and the catalog recovery areas are compared with the actual catalog records.

```
//LISTAREA  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//CRAVOL1   DD    DISP=OLD,VOL=SER=SG2001,UNIT=3380
//CRAVOL2   DD    DISP=OLD,VOL=SER=VSER04,UNIT=3380
//CATVOL    DD    DSNAME=AMASTCAT,DISP=OLD
//SYSIN     DD    *

    LISTCRA -
         INFILE( -
           CRAVOL1 -
           CRAVOL2) -
         MASTERPW(MCATMRPW) -
         COMPARE -
         DUMP -
         CATALOG(AMASTCAT/MCATMRPW CATVOL)
/*
```

Job control language statements:

- CRAVOL1 DD identifies and allocates the volume that contains the first catalog recovery area to be listed.
- CRAVOL2 DD identifies and allocates the volume that contains the second catalog recovery area to be listed.
- CATVOL DD identifies and allocates the catalog to be compared against, and makes the catalog available to LISTCRA as a data set. Because this example is listing the master catalog, no STEPCAT or JOBCAT DD statement is required. However, if the example were listing a user catalog, a STEPCAT or JOBCAT DD statement would be required in addition to the CATVOL DD statement to describe the user catalog as a catalog.

LISTCRA command parameters:

- INFILE is required and specifies the catalog recovery areas to be listed by identifying the DD statement that describes each CRA's volume.
- MASTERPW specifies the master password of the master catalog. This parameter is required to open the catalog recovery areas for LISTCRA processing.
- COMPARE specifies that the catalog records are to be compared with their copies in the catalog recovery areas.
- DUMP specifies that the results of the record comparison (the LISTCRA output listing) are to be printed in dump format.
- CATALOG is required because the COMPARE option was specified. This parameter identifies the catalog to be compared against by identifying the DD statement that describes and allocates the catalog as a data set.

PRINT

The PRINT command prints VSAM data sets, non-VSAM data sets, and catalogs. The syntax of this command is:

PRINT	**{INFILE(***ddname***[/***password***])|** **INDATASET(***entryname***[/***password***])}** **[CHARACTER|DUMP|HEX]** **[FROMKEY(***key***)|FROMADDRESS(***address***)|** **FROMNUMBER(***number***)|SKIP(***number***)]** **[OUTFILE(***ddname***)]** **[TOKEY(***key***)|TOADDRESS(***address***)|** **TONUMBER(***number***)|COUNT(***number***)]**

PRINT Parameters

Required Parameters

INFILE(*ddname***[/***password***])|**
INDATASET(*entryname***[/***password***])**

identifies the data set or component to be printed. If the logical record length of a non-VSAM source data set is greater than 32760 bytes, your PRINT command will terminate with an error message.

INFILE(*ddname***[/***password***])**

specifies the name of the DD statement that identifies the data set or component to be printed. You can list a base cluster in alternate-key sequence by specifying a path name as the data set name in the DD statement.

Abbreviation: IFILE

INDATASET(*entryname***[/***password***])**

specifies the name of the data set or component to be printed. If INDATASET is specified, the *entryname* is dynamically allocated. You can list a base cluster in alternate-key sequence by specifying a path name as *entryname*.

password

Passwords apply only to VSAM data sets and their components. If a VSAM data set or component is password protected, you must supply:

- The master password of the catalog if you are listing a catalog. Alter authority to the catalog is required.
- The read- or higher-level password of the data set or component if the data set or component is not a catalog. Read or higher authority to the data set or component is required.
- The master password of the cluster if you are listing a component of a password-protected cluster. Alter authority to the cluster is required.

Abbreviation: IDS

Optional Parameters

CHARACTER|DUMP|HEX

specifies the format of the listing.

Note: For the CHARACTER and DUMP parameters, setting the GRAPHICS parameter of the PARM command determines which bit patterns print as characters. See "PARM Command" on page 24 for more information.

CHARACTER

specifies that each byte in the logical record is to be printed as a character. Bit patterns not defining a character are printed as periods. Key fields are listed in character format (see Figure 3).

Abbreviation: CHAR

```
IDCAMS   SYSTEM SERVICES                      TIME:  19:26:13     03/08/88  PAGE 6
LISTING OF DATA SET -EXAMPLE.LISTC.DATA
RBA OF RECORD - 0

ABCD000000000001ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ012345
6789ABCDEFGHIJKLMNOPQRSTRUVWYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGH
IJKLMNOPQRSTUVWYZY0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRST
UVWXYZ0123456789ABCDEFGHIJKLMNOPQRST....
```

Figure 3. Example of Character Format of PRINT Command

DUMP

specifies that each byte in the logical record is to be printed in both hexadecimal and character format. In the character portion of the listing, bit patterns not defining a character are printed as periods. Key fields are listed in hexadecimal format (see Figure 4).

```
IDCAMS   SYSTEM SERVICES                      TIME:  19:26:13     03/08/88  PAGE 2
LISTING OF DATA SET -EXAMPLE.LISTC
KEY OF RECORD - F0F0F0F0F0F0F0F0F0F0F0F1
0000   C1C2C3C4 F0F0F0F0 F0F0F0F0 F0F0F0F1  C1C2C3C4 C5C6C7C8 C9D1D2D3 D4D5D6D7   *ABCD000000000001ABCDEFGHIJKLMNOP*
0020   D8D9E2E3 D4D5D6D7 D8D9F0F1 F2F3F4F5  F6F7F8F9 C1C2C3C4 C5C6C7C8 C9D1D2D3   *QRSTRUVWYZ0123456789ABCDEFGHIJKL*
0040   D4D5D6D7 D8D9E2E3 E4E5E6E7 F8F9F0F1  F2F3F4F5 F6F7F8F9 C1C2C3C4 C5C6C7C8   *MNOPQRSTRUVWXYZ0123456789ABCDEFG*
0060   C9D1D2D3 D4D5D6D7 D8D9E2E3 E4E5E6E7  E8E9F0F1 F2F3F4F5 F6F7F8F9 C1C2C3C4   *IJKLMNOPQRSTUVWXYZ0123456789ABCD*
0080   C5C6C7C8 C9D1D2D3 D4D5D6D7 D8D9E2E3  E4E5E6E7 E8E9F0F1 F2F3F4F5 F6F7F8F9   *EFGHIJKLMNOPQRSTUVWXYZ0123456789*
00A0   C1C2C3C4 C5C6C7C8 C9D1D2D3 D4D5D6D7  D8D9E2E3 E4E5E6E7 E8E9F0F1 F2F3F4F5   *ABCDEFGHIJKLMNOPQRSTUVWXYZ012345*
00C0   F6F7F8F9 C1C2C3C4 C5C6C7C8 C9D1D2D3  D4D5D6D7 D8D9E2E3 E4E5E6E7 E8E9F0F1   *6789ABCDEFGHIJKLMNOPQRSTUVWXYZ01*
00E0   F2F3F4F5 F6F7F8F9 C1C2C3C4 C5C6C7C8  C9D1D2D3 D4D5D6D7 D8D9E2E3 E4E5E6E7   *23456789ABCDEFGHIJKLMNOPQRSTUVWX*
0100   E8E9F0F1 F2F3F4F5 F6F7F8F9 C1C2C3C4  C5C6C7C8 C9D1D2D3 D4D5D6D7 D8D9E2E3   *YZ0123456789ABCDEFGHIJKLMNOPQRST*
0120   E4E5E6E7 E8E9F0F1 F2F3F4F5 F6F7F8F9  C1C2C3C4 C5C6C7C8 C9D1D2D3 D4D5D6D7   *UVWXYZ0123456789ABCDEFGHIJKLMNOP*
0140   D8D9E2E3 E4E5E6E7 E8E9F0F1 F2F3F4F5  F6F7F8F9 C1C2C3C4 C5C6C7C8 C9D1D2D3   *QRSTRVWXYZ0123456789ABCDEFGHIJKL*
0160   D4D5D6D7 D8D9E2E3 E4E5E6E7 E8E9F0F1  F2F3F4F5 F6F7F8F9 C1C2C3C4 C5C6C7C8   *MNOPQRSTUVWXYZ0123456789ABCDEFGH*
0180   C9D1D2D3 D4D5D6D7 D8D9E2E3 00000000                                        *IJKLMNOPQRST....                *
```

Figure 4. Example of Dump Format of PRINT Command

HEX

specifies that each byte in the logical record is to be printed as two hexadecimal digits. Key fields are listed in hexadecimal format (see Figure 5).

```
IDCAMS   SYSTEM SERVICES                      TIME:  19:26:13     03/08/88  PAGE 4
LISTING OF DATA SET -EXAMPLE.LISTC.DATA
RBA OF RECORD - 0
C1C2C3C4F0F0F0F0F0F0F0F0F0F0F0F1C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3E4E5E5E6E7E8F9F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8
C9D1D2D3D4D5D6D7D8D9E2D3D4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5
F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3
E4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8
C9D1D2D3D4D5D6D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C7C7C8C9D1D2D3D4D5D6D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5
F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3E4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E3
E4E5E6E7E8E9F0F1F2F3F4F5F6F7F8F9C1C2C3C4C5C6C7C8C9D1D2D3D4D5D6D7D8D9E2E300000000
```

Figure 5. Example of Hexadecimal Format of PRINT Command

FROMKEY(*key*)|FROMADDRESS(*address*)|
FROMNUMBER(*number*)|SKIP(*number*)

specifies the location in the data set being listed from which listing is to start. If you do not specify a value, the listing begins with the first logical record in the data set or component. The only value that can be specified for a SAM data set is SKIP.

The starting delimiter must be consistent with the ending delimiter. For example, if FROMADDRESS is specified for the starting location, use TOADDRESS to specify the ending location. The same is true for FROMKEY and TOKEY, and FROMNUMBER and TONUMBER.

FROMKEY(*key*)

specifies the key of the first record you want listed. You can specify generic keys (that is, a portion of the key followed by *). If you specify generic keys, listing begins at the first record whose key matches that portion of the key you specified.

You cannot specify a key longer than that defined for the data set. If you do, the listing is not performed. If the specified key is not found, the next higher key is used as the starting point for the listing.

FROMKEY can be specified only when an alternate index, a key-sequenced VSAM data set, a catalog, or an indexed sequential (ISAM) non-VSAM data set is being printed.

key

can contain 1 to 255 EBCDIC characters.

Abbreviation: FKEY

FROMADDRESS(*address*)

specifies the relative byte address (RBA) of the first record you want listed. The RBA value must be the beginning of a logical record. If you specify this parameter for a key-sequenced data set, the listing will be in physical sequential order instead of in logical sequential order.

FROMADDRESS can be specified only for VSAM key-sequenced or entry-sequenced data sets or components. FROMADDRESS cannot be specified when the data set is accessed through a path or for a key-sequenced data set with spanned records if any of those spanned records are to be accessed.

Abbreviation: FADDR

FROMNUMBER(*number*)

specifies the relative record number of the first record you want printed. FROMNUMBER can only be specified for VSAM relative record data sets.

Abbreviation: FNUM

SKIP(*number*)

specifies the number of logical records you want to skip before the listing of records begins. For example, if you want the listing to begin with record number 500, you specify SKIP(499). SKIP should not be specified when you are accessing the data set through a path; the results are unpredictable.

address, *number*

can be specified in decimal (n), hexadecimal (X'n'), or binary (B'n'). The specification cannot be longer than one fullword.

OUTFILE(*ddname*)

identifies a target data set other than SYSPRINT. For ddname, substitute the name of the JCL statement that identifies the alternate target data set.

The access method services target data set for listings, which is identified by the ddname SYSPRINT, is the default. The target data set must meet the requirements stated in "For a Target Data Set" on page 11.

Abbreviation: OFILE

TOKEY(*key*)|TOADDRESS(*address*)|
TONUMBER(*number*)|COUNT(*number*)

specifies the location in the data set being listed at which you want the listing to stop. If no value is specified, the listing ends with the logical end of the data set or component. The only value that can be specified for a SAM data set is COUNT. The location at which the listing is to stop must follow the location at which the listing is to begin.

The ending delimiter must be consistent with the starting delimiter. For example, if FROMADDRESS is specified for the starting location, use TOADDRESS to specify the ending location. The same is true for FROMKEY and TOKEY, and FROMNUMBER and TONUMBER.

TOKEY(*key*)

specifies the key of the last record to be listed. You can specify generic keys (that is, a portion of the key followed by *). If you specify generic keys, listing stops after the last record is listed whose key matches that portion of the key you specified. If you specify a key longer than that defined for the data set, the listing is not performed.

If the specified key is not found, the next lower key is used as the stopping point for the listing.

TOKEY can be specified only when an alternate index, a key-sequenced VSAM data set, a catalog, or an indexed sequential (ISAM) non-VSAM data set is being printed.

key

can contain 1 to 255 EBCDIC characters.

TOADDRESS(*address*)

specifies the relative byte address (RBA) of the last record you want listed.

Unlike FROMADDRESS, the RBA value does not need to be the beginning of a logical record. The entire record containing the specified RBA is printed. If you specify this parameter for a key-sequenced data set, the listing will be in physical sequential order instead of in logical sequential order.

TOADDRESS can be specified only for VSAM key-sequenced or entry-sequenced data sets or components. TOADDRESS cannot be specified when the data set is accessed through a path. TOADDRESS cannot be specified for a key-sequenced data set with spanned records if any of those spanned records are to be accessed.

Abbreviation: TADDR

TONUMBER(*number*)
specifies the relative record number of the last record you want printed. TONUMBER can only be specified for a VSAM relative record data set.

Abbreviation: TNUM

COUNT(*number*)
specifies the number of logical records to be listed. COUNT should not be specified when you are accessing the data set through a path; the results are unpredictable.

address, number
can be specified in decimal (n), hexadecimal (X'n'), or binary (B'n'); the specification cannot be longer than one fullword.

PRINT Examples

Print a Catalog: Example 1

This example shows various ways of printing a catalog. This function of the PRINT command may prove helpful when you have a problem with your catalog.

```
//PRINT3   JOB  ...
//JOBCAT   DD   DSNAME=D27UCAT1,DISP=OLD
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
/* PRINT THE LOW KEY RANGE OF THE CATALOG */
   PRINT -
     INDATASET(D27UCAT1) -
     TOKEY(X'3F')
/* PRINT THE HIGH KEY RANGE OF THE CATALOG */
    PRINT -
      INDATASET(D27UCAT1) -
      FROMKEY(X'40')
/* PRINT A SPECIFIC RECORD FROM THE LOW KEY RANGE */
   PRINT -
     INDATASET(D27UCAT1) -
     FROMKEY(X'0000000E') -
     COUNT (1)

/* PRINT THE ENTIRE CATALOG */
   PRINT -
     INDATASET(D27UCAT1)
/*
```

Job control language statements:

- JOBCAT DD is required and describes and allocates the user catalog to be printed.

The first PRINT command prints the low-key range of the catalog.

Command parameters:

- INDATASET specifies the name of the catalog to be printed.
- TOKEY specifies that printing is to terminate after reaching a record whose key is greater than X'3F' (in its first byte). The low-key range of a VSAM catalog contains records with a key range of X'00' to X'3F' in the first byte.

The second PRINT command prints the high-key range of the catalog.

Command parameters:

- INDATASET specifies the name of the catalog to be printed.
- FROMKEY specifies that printing is to begin at the first record whose key is X'40' or greater (in its first byte). The high-key range of a VSAM catalog contains records with a key range of X'40' to X'FF' in the first byte.

The third PRINT command prints one catalog record from the low-key range of the catalog.

Command parameters:

- INDATASET specifies the name of the catalog to be printed.
- FROMKEY specifies that printing is to begin with the record whose key is X'0000000E' in the first 4 bytes. Records in the low-key range of a VSAM catalog have the number of the containing control interval as the first 4 bytes of their key. Records are 505 bytes long and a 512-byte control interval contains each record.
- COUNT specifies that only one record is to be printed.

The fourth PRINT command prints the entire catalog (no delimiting parameters are specified).

Print a Key-Sequenced Cluster's Data Records in a Catalog: Example 2

The data records of a key-sequenced cluster, D40.EXAMPLE.KSDS1, are printed in dump format (each character of the record is printed in its hexadecimal and alphanumeric forms).

```
//PRINT1   JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    PRINT -
         INDATASET(D40.EXAMPLE.KSDS1)
/*
```

The PRINT command parameters, INDATASET, names the data set to be printed.

Access method services prints all the cluster's data records because none of the delimiting parameters (COUNT, FROMADDRESS, FROMKEY, SKIP, TOKEY, or TOADDRESS) are specified. Each record is printed in the DUMP format because neither HEX nor CHAR is specified. An example of the printed record is shown in Figure 6 on page 218.

```
KEY OF RECORD - 00F0F0F0F0F1C9E240C4C1405CC6C9
0000 00F0F0F0 F0F1C9E2 40C4C140 5CC6C9D3 C549C8F0 C6F8F05C 40F5F040 D9C5C3D6 *.000011S DA *FILE 10380* 50 RECD*
0020 D9C4E240 D6C640F6 F940C3C8 C1D9E240 E6C9E3C8 40D2C5E8 40C9D540 D7D6E240 *RDS OF 69 CHARS WITH KEY IN POS *
0040 F160F1F1 4B000000 00000000 00000000                                     *1-11...........
```

Figure 6. Example of the Printed Record in DUMP Format (Result of Print Command)

Copy Records from a Non-VSAM Data Set into an Entry-Sequenced VSAM Cluster, Then Print the Records: Example 3

The first 15 records from a non-VSAM data set, EXAMPLE.NONVSAM, are copied into an entry-sequenced cluster, D50.EXAMPLE.ESDS1. If the records are copied correctly, the cluster's records are printed in hexadecimal format. Even if the records are not copied correctly, the non-VSAM data set's first 15 records are printed in character format.

```
//PRINT2   JOB  ...
//JOBCAT   DD   DSNAME=USERCAT4,DISP=SHR
//         DD   DSNAME=D27UCAT2,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//VSDSET2  DD   DSNAME=D50.EXAMPLE.ESDS1,DISP=OLD
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INDATASET(EXAMPLE.NONVSAM) -
         OUTFILE(VSDSET2) -
         COUNT(15)
    IF LASTCC = 0 -
         THEN -
         PRINT -
              INFILE(VSDSET2) -
              HEX
    PRINT -
         INDATASET(EXAMPLE.NONVSAM) -
         COUNT(15) -
         CHARACTER
/*
```

Job control language statements:

- JOBCAT DD makes two catalogs available for this job: USERCAT4 and D27UCAT2. Concatenated JOBCAT DD statements were used to identify both catalogs.
- VSDSET2 DD identifies the entry-sequenced VSAM cluster, D50.EXAMPLE.ESDS1, that the records are copied into.

  Note: If the AMP=(BUFND=n) parameter was specified, performance would improve when the data set's records are accessed. BUFND was allowed to default in this example because only 15 records are being processed.

REPRO command parameters:

- INDATASET identifies the source data set, EXAMPLE.NONVSAM.
- OUTFILE points to the VSDSET2 DD statement. The VSDSET2 DD statement identifies the output data set, D50.EXAMPLE.ESDS1.
- COUNT specifies that 15 records are to be copied. Because the SKIP parameter was not specified, access method services assumes that the first 15

records are to be copied. The records are always added after the last record in the output data set.

The IF ... THEN command sequence verifies that the REPRO command completes successfully before the first PRINT command executes.

The first PRINT command prints the records in the entry-sequenced cluster, D50.EXAMPLE.ESDS1.

PRINT command parameters:

- INFILE points to the VSDSET2 DD statement. The VSDSET2 DD statement identifies the cluster, D50.EXAMPLE.ESDS1. VSAM assumes that the cluster is cataloged either in the USERCAT4 or D27UCAT2 user catalog, or in the master catalog.
- HEX specifies that each record is to be printed as a group of hexadecimal characters. An example of the printed record follows:

```
RBA OF RECORD = 0
C2D6E8C5D94040404040404040404040404040404040404040404040404040404040404040404040404040404040404040404040404040404040404040
4040404040404040404040404040404040404040
```

Figure 7. Example of the Printed Record in Hexadecimal (Result of PRINT Command)

Note: The IF ... THEN command sequence ends with the HEX parameter because no continuation character follows. If you want two or more access method services commands to execute only when the IF statement is satisfied, enclose the commands in a DO...END command sequence. For a description of IF-THEN-ELSE commands, see “IF-THEN-ELSE Command Sequence” on page 21.

The second PRINT command executes even if the REPRO command fails and prints the first 15 records of the non-VSAM data set, EXAMPLE.NONVSAM.

PRINT command parameters:

- INDATASET identifies the non-VSAM data set EXAMPLE.NONVSAM. VSAM will search for the catalog entry in either the USERCAT4 or D27UCAT2 user catalog, or in the master catalog.
- COUNT specifies that 15 records are to be printed. Because SKIP was not specified, access method services assumes the first 15 records are to be printed.
- CHARACTER specifies that each record is to be printed as a group of alphanumeric characters. An example of the printed record follows:

```
RECORD SEQUENCE NUMBER - 3
CLARK
```

Figure 8. Example of a Printed Alphanumeric Character Record (Result of PRINT Command)

REPRO

The REPRO command copies VSAM and non-VSAM data sets, copies catalogs, and unloads and reloads VSAM catalogs. The syntax of this command is:

```
REPRO    {INFILE(ddname[/password]
           [  ENVIRONMENT(DUMMY)])‘
             INDATASET(entryname[/password]
               [  ENVIRONMENT(DUMMY)])}
           {OUTFILE(ddname[/password])‘
             OUTDATASET(entryname[/password])}
           [FROMKEY(key)‘FROMADDRESS(address)‘
             FROMNUMBER(number)‘SKIP(count)]
           [REPLACE‘NOREPLACE]
           [REUSE‘NOREUSE]
           [TOKEY(key)‘TOADDRESS(address)‘
             TONUMBER(number)‘COUNT(count)]

           [ENCIPHER
              ({EXTERNALKEYNAME(key name)‘
               INTERNALKEYNAME(key name)‘PRIVATEKEY}
              [CIPHERUNIT(number‘1)]
              [DATAKEYFILE(ddname)‘DATAKEYVALUE(value)]
              [SHIPKEYNAMES(key name[  key name...])]
              [STOREDATAKEY‘NOSTOREDATAKEY]
              [STOREKEYNAME(key name)]
              [USERDATA(value)])]

           [DECIPHER
              ({DATAKEYFILE(ddname)‘
               DATAKEYVALUE(value)‘SYSTEMKEY}
              [SYSTEMDATAKEY(value)]
              [SYSTEMKEYNAME(key name)])]
```

Note: The parameters ENCIPHER and DECIPHER apply only with the IBM Programmed Cryptographic Facility (5740-XY5) or the IBM Cryptographic Unit Support (5740-XY6). (For more information, see *DFSMS/MVS Using Data Sets*.)

REPRO Parameters

Required Parameters

INFILE(*ddname*[/*password*][ENVIRONMENT(DUMMY)])‘
INDATASET(*entryname*[/*password*][ENVIRONMENT(DUMMY)])

identifies the source data set to be copied. If the logical record length of a non-VSAM source data set is greater than 32760 bytes, your REPRO command will terminate with an error message.

The keys in the source data set must be in ascending order.

INFILE(*ddname*[/*password*])

specifies the name of the DD statement that identifies the data set to be copied. You can copy a base cluster in alternate-key sequence by specifying a path name as the data set name in the DD statement.

Abbreviation: IFILE

INDATASET(*entryname***[/***password***])**

specifies the name of the entry to be copied. If INDATASET is specified, the entryname is dynamically allocated.

You can copy a base cluster in alternate-key sequence by specifying a path name for entryname.

Abbreviation: IDS

password

is the read- or higher-level password of the data to be copied. If the data set is password-protected, the read password must be supplied. If a catalog is to be copied, the master password is required. Passwords are applicable only to VSAM data sets.

ENVIRONMENT (DUMMY)

specifies that dummy ISAM records are to be copied. Dummy records are records with hexadecimal 'FF' in the first byte.

If you do not code the ENVIRONMENT parameter, dummy records will be ignored during the copy operation and will not be copied. (See *DFSMS/MVS Using Data Sets* for further information.)

Abbreviations: ENV and DUM

OUTFILE(*ddname***[/***password***])‘OUTDATASET(***entryname***[/***password***])**

identifies the target data set. ISAM data sets cannot be specified as target data sets. If a VSAM data set defined with a record length greater than 32760 bytes is to be copied to a sequential data set, your REPRO command will terminate with an error message.

OUTFILE(*ddname***[/***password***])**

specifies the name of a DD statement that identifies the target data set. For VSAM data sets, the data set name can be that of a path. If the DD statement identifies a SYSOUT data set, the attributes must match those specified in “For a Target Data Set” on page 11.

Abbreviation: OFILE

OUTDATASET(*entryname***[/***password***])**

specifies the name of the target data set. If OUTDATASET is specified, the entryname is dynamically allocated. For VSAM data sets, *entryname* can be that of a path.

password

specifies the update- or higher-level password for a password-protected target data set or path.

Abbreviation: ODS

Optional Parameters

FROMKEY(*key***)‘FROMADDRESS(***address***)‘**
FROMNUMBER(*number***)‘SKIP(***number***)**

specifies the location in the source data set from which copying is to start. If no value is coded, the copying begins with the first logical record in the data set. You can use only one of the four choices.

SKIP is the only parameter that can be used for a SAM data set.

When copying a catalog, none of these parameters can be specified; the entire catalog must be copied.

The starting delimiter must be consistent with the ending delimiter. For example, if FROMADDRESS is specified for the starting location, use TOADDRESS to specify the ending location.

FROMKEY(*key*)

specifies the key of the first record you want copied. If you specify generic keys (a portion of the key followed by *), copying begins at the first record with a key matching the portion of the key you specified. You cannot specify a key longer than that defined for the data set. If you do, the data set is not copied. If the specified key is not found, the next higher key is used as the starting point for copying.

FROMKEY may be specified only when an alternate index, a key-sequenced VSAM data set, or an indexed-sequential (ISAM) non-VSAM data set is being copied.

key

can contain 1 to 255 EBCDIC characters.

Note: A hexadecimal key ending in `X'5C'` processes as a generic key.

Abbreviation: FKEY

FROMADDRESS(*address*)

specifies the relative byte address (RBA) of the first record you want copied. The RBA value must be the beginning of a logical record. If you specify this parameter for key-sequenced data, the records will be copied in physical sequential order instead of logical sequential order.

FROMADDRESS:

- Can be coded only for key-sequenced or entry-sequenced data sets or components.
- Cannot be specified when the data set is being accessed through a path.
- Cannot be specified for a key-sequenced data set with spanned records if any of those spanned records are to be accessed.

Abbreviation: FADDR

FROMNUMBER(*number*)

specifies the relative record number of the first record you want copied. FROMNUMBER can be specified only when you copy a relative record data set.

Abbreviation: FNUM

SKIP(*number*)

specifies the number of logical records you want to skip before beginning to copy records. For example, if you want to copy beginning with record number 500, you specify SKIP(499).

SKIP should not be specified when you access the data set through a path; the results are unpredictable.

*address***,** *number*

can be specified in decimal (n), hexadecimal (X'n'), or binary (B'n') form; the specification cannot be longer than one fullword.

REPLACE‘NOREPLACE

specifies whether a record in the source cluster (INFILE or INDATASET) is to replace a record in the target cluster (OUTFILE or OUTDATASET) when the source cluster is copied into the target cluster.

Because the catalog reload function automatically performs a REPLACE function, REPLACE‘NOREPLACE is ignored if the target data set is a VSAM catalog.

When the source cluster is copied, its records might have keys or relative record numbers identical to the keys or relative record numbers of data records in the target cluster. When this is the case, the source record replaces the target record.

REPLACE

When a key-sequenced data set, other than a catalog, is copied, each source record whose key matches a target record's key replaces the target record. Otherwise, the source record is inserted into its appropriate place in the target cluster.

When a relative record data set is copied, each source record whose relative record number identifies a data record (rather than an empty slot) in the target data set replaces the target data record. Otherwise, the source data record is inserted into the empty slot its relative record number identifies.

REPLACE cannot be used if the target data set is identified as a path through an alternate index, or if the target data set is a base cluster whose upgrade data set includes an alternate index defined with the unique key attribute.

Abbreviation: REP

NOREPLACE

When a key-sequenced data set, other than a catalog, is copied, target records are not replaced by source records. For each source record whose key matches a target record's key, a “duplicate record” message is issued.

When a relative record data set is copied, target records are not replaced by source records. For each source record whose relative record number identifies a target data record instead of an empty slot, a “duplicate record” message is issued.

Abbreviation: NREP

REUSE‘NOREUSE

specifies whether the target data set is to be opened as a reusable data set. This parameter is valid only for VSAM data sets.

REUSE

specifies that the target data set, specified with OUTFILE or OUTDATASET, is opened as a reusable data set regardless of whether or not it was defined as reusable with the REUSE parameter. (See the DEFINE CLUSTER command description.) If the data set was defined with REUSE, its high-used relative byte address (RBA) is reset to zero (that is, the data set is effectively empty) and the operation proceeds.

If REUSE is specified and the data set was originally defined with the NOREUSE option, the data set must be empty; otherwise, the REPRO command terminates with an error message.

Abbreviation: RUS

NOREUSE
specifies that records are to be written at the end of an entry-sequenced data set when OUTFILE or OUTDATASET identifies a nonempty data set.

Abbreviation: NRUS

TOKEY(*key*)‘TOADDRESS(*address*)‘ TONUMBER(*number*)‘COUNT(*number*)
specifies the location in the data set being copied at which copying is to end. The location at which the copying is to end must follow the location at which it is to begin. If no value is coded, the copying ends with the logical end of the data set or component. You can use only one of the four choices.

COUNT is the only parameter that can be specified for a SAM dataset.

If you are copying a catalog, none of these parameters can be specified; the entire catalog must be copied.

The ending delimiter must be consistent with the starting delimiter. For example, if FROMADDRESS is specified for the starting location, use TOADDRESS to specify the ending location. The same is true for FROMKEY and TOKEY, and FROMNUMBER and TONUMBER.

TOKEY(*key*)
specifies the key of the last record you want copied. You can specify generic keys (that is, a portion of the key followed by *). If you specify generic keys, copying stops after the first record encountered that matches your key specifications. You cannot specify a key longer than that defined for the data set. If you do, the data set is not copied. If the specified key is not found, the next lower key is used as the end point for copying. TOKEY can be specified only when an alternate index, a key-sequenced data set, or an indexed-sequential (ISAM) non-VSAM data set is being copied.

key
can contain 1 to 255 EBCDIC characters.

Note: A hexadecimal key ending in `X'5C'` processes as a generic key.

TOADDRESS(*address*)
specifies the relative byte address (RBA) of the last record you want copied. Unlike FROMADDRESS, the RBA value does not need to be the beginning of a logical record. The entire record containing the specified RBA is copied.

If you specify this parameter for a key-sequenced data set, the records will be copied in physical sequential order instead of in logical sequential order.

TOADDRESS can be used only with VSAM key-sequenced or entry-sequenced data sets or components. TOADDRESS cannot be specified when the data set is accessed through a path. TOADDRESS cannot be specified for a key-sequenced data set with spanned records if any of those spanned records are to be accessed.

Abbreviation: TADDR

TONUMBER(*number***)**

specifies the relative record number of the last record you want copied. TONUMBER can be specified only when you copy a relative record data set.

Abbreviation: TNUM

COUNT(*number***)**

specifies the number of logical records you want copied. COUNT should not be specified when you access the data set through a path; the results are unpredictable.

address **or** *number*

can be expressed in decimal (n), hexadecimal (X'n'), or binary (B'n') form; the expression cannot be longer than one fullword.

Cryptographic Parameters

ENCIPHER

specifies that the source data set is to be enciphered as it is copied to the target data set.

Abbreviation: ENCPHR

EXTERNALKEYNAME(*key name***) ‘**
INTERNALKEYNAME(*key name***) ‘PRIVATEKEY**

specifies whether keys are managed privately by you, by the Programmed Cryptographic Facility, or by the Cryptographic Unit Support.

EXTERNALKEYNAME(*key name***)**

specifies that keys are to be managed by the Programmed Cryptographic Facility or by the Cryptographic Unit Support and supplies the 1- to 8-character key name of the external file key to be used to encipher the data encrypting key. The key is only known by the system deciphering it. The key name and its corresponding enciphered data encrypting key will only be listed in SYSPRINT if NOSTOREDATAKEY is specified.

Abbreviation: EKN

INTERNALKEYNAME(*key name***)**

specifies that keys are to be managed by the Programmed Cryptographic Facility or the Cryptographic Unit Support and supplies the 1- to 8-character key name of the internal file key to be used to encipher the data encrypting key. The key is retained by the system creating the key. The key name and its corresponding enciphered data encrypting key will only be listed in SYSPRINT if NOSTOREDATAKEY is specified.

Abbreviation: IKN

PRIVATEKEY

specifies that the key is to be managed by you.

Abbreviation: PRIKEY

CIPHERUNIT(*number* **‘1)**

specifies that multiple logical source records are to be enciphered as a unit.

number

specifies the number of records that are to be enciphered together. By specifying that multiple records are to be enciphered together, you can improve your security (chaining is performed across logical record boundaries) and also improve your performance. However, there is a corresponding increase in main storage requirements. The remaining records in the data set, after the last complete group of multiple records, will be enciphered as a group. For example if *number* is 5 and there are 22 records in that data set, the last 2 records will be enciphered as a unit. The value for *number* may range from 1 to 255.

Abbreviation: CHPRUN

DATAKEYFILE(*ddname***)‘DATAKEYVALUE(***value***)**

specifies that you are supplying a plaintext (not enciphered) data encrypting key. If one of these parameters is not specified, REPRO will generate the data encrypting key. These parameters are only valid when EXTERNALKEYNAME or PRIVATEKEY is specified. If INTERNALKEYNAME and DATAKEYVALUE or DATAKEYFILE are specified, REPRO will generate the data encrypting key and DATAKEYVALUE or DATAKEYFILE will be ignored by REPRO.

The plaintext data encrypting key will not be listed in SYSPRINT unless PRIVATEKEY is specified and REPRO provides the key.

DATAKEYFILE(*ddname***)**

identifies a data set that contains the plaintext data encrypting key. For ddname, substitute the name of the JCL statement that identifies the data encrypting key data set.

Abbreviation: DKFILE

DATAKEYVALUE(*value***)**

specifies the 8-byte value to be used as the plaintext data encrypting key to encipher the data.

value

consists of 1 to 8 EBCDIC characters or 1 to 16 hexadecimal characters coded (`X'n'`). *value* must be enclosed in single quotation marks if it contains commas, semicolons, blanks, parentheses, or slashes. A single quotation mark must be coded as two single quotation marks. With either EBCDIC or hexadecimal representation, *value* is padded on the right with blanks (`X'40'`) if it is fewer than 8 characters.

Abbreviation: DKV

SHIPKEYNAME(*key name* **[***key name***...])**

supplies the 1- to 8-character key name of one or more external file key(s) to be used to encipher the data encrypting key. Each key name and its corresponding enciphered data encrypting key will be listed in SYSPRINT, but will not be stored in the target data set header. The primary use for this parameter is to establish multiple enciphered data encrypting keys to be transmitted to other locations for use in deciphering the target enciphered data set. This parameter is only valid when INTERNALKEYNAME or EXTERNALKEYNAME is specified.

Abbreviation: SHIPKN

STOREDATAKEY‘NOSTOREDATAKEY

specifies whether the enciphered data encrypting key is to be stored in the target data set header. The key used to encipher the data encrypting key will be that identified by INTERNALKEYNAME or EXTERNALKEYNAME. This parameter is only valid when INTERNALKEYNAME or EXTERNALKEYNAME is specified. If the enciphered data encrypting key is stored in the data set header, it does not have to be supplied by the user when the data is deciphered.

Note: A data encrypting key enciphered under the keys identified by SHIPKEYNAME cannot be stored in the header. Therefore, you may want to avoid using STOREDATAKEY and SHIPKEYNAME together, because this could result in storing header information that is unusable at some of the locations involved.

STOREDATAKEY

specifies that the enciphered data encrypting key is to be stored in the target data set header.

Abbreviation: STRDK

NOSTOREDATAKEY

specifies that the enciphered data encrypting key is not to be stored in the target data set header. The key name and its corresponding enciphered data encrypting key will be listed in SYSPRINT.

Abbreviation: NSTRDK

STOREKEYNAME(*key name***)**

specifies whether a key name for the key used to encipher the data encrypting key is to be stored in the target data set header. The key name specified must be the name by which the key is known on the system on which the REPRO DECIPHER is to be performed. This key name must be the same one that was specified in INTERNALKEYNAME if REPRO DECIPHER is to be run on the same system, but can be a different key name than that specified in INTERNALKEYNAME or EXTERNALKEYNAME if REPRO DECIPHER is to be run on a different system.

This parameter is only valid when INTERNALKEYNAME or EXTERNALKEYNAME is specified. If the key name is stored in the data set header, it does not have to be supplied by the user when the data is deciphered.

Note: Key name values identified by the SHIPKEYNAME parameter cannot be stored in the header. Therefore, you may want to avoid using STOREKEYNAME and SHIPKEYNAME together, because this could result in storing header information that is unusable at some of the locations involved.

Abbreviation: STRKN

USERDATA(*value*)

specifies 1 to 32 characters of user data to be placed in the target data set header. This information could be used, for example, to identify the security classification of the data.

value

consists of 1 to 32 EBCDIC characters. If *value* contains a special character, enclose the value in single quotation marks (for example, USERDATA('*CONFIDENTIAL*')). If the value contains a single quotation mark, code the embedded quotation mark as two single quotation marks (for example, USERDATA('COMPANY''S')).

You can code *value* in hexadecimal form, where two hexadecimal characters represent one EBCDIC character. For example, USERDATA(X'C3D6D4D7C1D5E8') is the same as USERDATA(COMPANY). The string can contain up to 64 hexadecimal characters when expressed in this form, resulting in up to 32 bytes of information.

Abbreviation: UDATA

DECIPHER

specifies that the target data set is to contain a plaintext (deciphered) copy of the enciphered source data set.

The DECIPHER parameter indicates that the source data set is to be deciphered as it is copied to the target data set. The information from the source data set header is used to verify the plaintext data encrypting key supplied, or deciphered from the information supplied, as the correct plaintext data encrypting key for the decipher operation.

Abbreviation: DECPHR

DATAKEYFILE(*ddname*)‘DATAKEYVALUE(*value*)‘SYSTEMKEY

specifies whether keys are to be managed by you, by the Programmed Cryptographic Facility, or by the Cryptographic Unit Support.

DATAKEYFILE(*ddname*)

specifies that the key is to be managed by you and identifies a data set that contains the private data encrypting key used to encipher the data. For ddname, substitute the name of the JCL statement that names the data set containing the private data encrypting key.

Abbreviation: DKFILE

DATAKEYVALUE(*value*)

specifies that the key is to be managed by you, and supplies the 1- to 8-byte value that was used as the plaintext private data encrypting key to encipher the data. For a discussion of how the method of supplying the data encrypting key relates to the security of the key, see *DFSMS/MVS Using Data Sets*.

value

consists of 1 to 8 EBCDIC characters. *value* must be enclosed in single quotation marks if it contains commas, semicolons, blanks, parentheses, or slashes. A single quotation mark contained within value must be coded as two single quotation marks. You can code value in hexadecimal form, (X'n'). value can contain 1 to 16 hexadecimal characters, resulting in 1 to 8 bytes of information.

With either EBCDIC or hexadecimal representation, value is padded on the right with blanks (X'40') if it is less than 8 characters.

Abbreviation: DKV

SYSTEMKEY
specifies that keys are to be managed by the Programmed Cryptographic Facility or by the Cryptographic Unit Support.

Abbreviation: SYSKEY

SYSTEMDATAKEY(*value*)
specifies the 1- to 8-byte value representing the enciphered system data encrypting key used to encipher the data. This parameter is only valid if SYSTEMKEY is specified. If SYSTEMDATAKEY is not specified, REPRO will obtain the enciphered system data encrypting key from the source data set header, in which case, STOREDATAKEY must have been specified when the data set was enciphered.

value
consists of 1 to 8 EBCDIC characters. value must be enclosed in single quotation marks if it contains commas, semicolons, blanks, parentheses, or slashes. A single quotation mark must be coded as two single quotation marks. You can code value in hexadecimal form, (X'n'). value can contain 1 to 16 hexadecimal characters, resulting in 1 to 8 bytes of information. With either EBCDIC or hexadecimal representation, value is padded on the right with blanks (X'40') if it is fewer than 8 characters.

Abbreviation: SYSDK

SYSTEMKEYNAME(*key name*)
specifies the 1- to 8-character key name of the internal key that was used to encipher the data encrypting key. This parameter is only valid if SYSTEMKEY is specified. If SYSTEMKEYNAME is not specified, REPRO will obtain the key name of the internal key from the source data set header, in which case, STOREKEYNAME must have been specified when the data set was enciphered.

Abbreviation: SYSKN

REPRO Examples

Copy Records into a Key Sequenced Data Set: Example 1

Records from an indexed-sequential data set, ISAMDSET, are copied into key-sequenced VSAM cluster, D40.EXAMPLE.KSDS1.

```
//REPRO1   JOB    ...
//STEP1    EXEC  PGM=IDCAMS
//INDSET1  DD   DSNAME=ISAMDSET,DISP=OLD,
//         DCB=(DSORG=IS,BUFNO=6)
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INFILE(INDSET1) -
         OUTDATASET(D40.EXAMPLE.KSDS1)
/*
```

Job control language statement:

- INDSET1 DD describes the indexed-sequential data set, ISAMDSET, that contains the source records. The BUFNO parameter specifies the number of buffers assigned to the ISAM data set. This improves performance when the ISAM data set's records are accessed.

REPRO command parameters:

- INFILE points to the INDSET1 DD statement, which identifies the source data set, ISAMDSET.
- OUTDATASET identifies the key-sequenced VSAM cluster into which the source records are to be copied. This data set is dynamically allocated by access method services.

Copy Records into a VSAM Data Set: Example 2

Data records are copied from the non-VSAM sequential data set SEQ.D27V into a key-sequenced VSAM data set, D40.MYDATA. Next, records are copied from the key-sequenced data set, D40.MYDATA, into an entry-sequenced data set, ENTRY.

```
//REPRO2   JOB  ...
//JOBCAT   DD   DSNAME=USERCAT3,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//INPUT    DD   DSNAME=SEQ.D27V,DISP=SHR,DCB=(BUFNO=6)
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INFILE(INPUT) -
         OUTDATASET(D40.MYDATA)
/*
//STEP2    EXEC  PGM=IDCAMS
//INPUT    DD   DSNAME=D40.MYDATA,DISP=OLD
//OUTPUT   DD   DSNAME=ENTRY,DISP=OLD
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INFILE(INPUT) -
         OUTFILE(OUTPUT) -
         FROMKEY(DEAN) -
         TOKEY(JOHNSON)
/*
```

STEP1: Access method services copies records from a sequential data set, SEQ.D27V, into a key-sequenced data set, D40.MYDATA. STEP1's job control language statements:

- JOBCAT DD makes the catalog USERCAT3 available for this job.
- INPUT DD identifies the sequential data set, SEQ.D27V, that contains the source records. The BUFNO parameter specifies the number of buffers assigned to the sequential data set. This improves performance when the data set's records are accessed.

STEP1's REPRO command copies all records from the source data set, SEQ.D27V, to the target data set, D40.MYDATA. STEP1's REPRO command parameters:

- INFILE points to the INPUT DD statement. The INPUT DD statement identifies the source data set.

- OUTDATASET identifies the key-sequenced data set into which the source records are to be copied. The data set is dynamically allocated by access method services.

STEP2: Access method services copies some of the records of the key-sequenced data set D40.MYDATA into an entry-sequenced data set, ENTRY. STEP2's job control language statements:

- INPUT DD identifies the key-sequenced cluster, D40.MYDATA, that contains the source records.
- OUTPUT DD identifies the entry-sequenced cluster, ENTRY, into which the records are to be copied.

STEP2's REPRO command copies records from the source data set, D40.MYDATA, to the target data set, ENTRY. Only those records with key values from DEAN to, and including, JOHNSON are copied. STEP2's REPRO command parameters:

- INFILE points to the INPUT DD statement. The INPUT DD statement identifies the source key-sequenced data set.
- OUTFILE points to the OUTPUT DD statement. The OUTPUT DD statement identifies the entry-sequenced data set into which the source records are to be copied.
- FROMKEY and TOKEY specify the lower and upper key boundaries. Only those records with key values from DEAN to, and including, JOHNSON are copied.

If ENTRY already contains records, VSAM merges the copied records with ENTRY's records. A subsequent job step could resume copying the records into ENTRY, beginning with the records with key greater than JOHNSON. If you subsequently copied records with key values less than DEAN into ENTRY, VSAM merges them with ENTRY's records.

Copy a Catalog: Example 3

A catalog is copied, illustrating the catalog copying procedure.

```
//COPYCAT  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
         DEFINE USERCATALOG -
         (NAME(COPYUCAT) -
               MASTERPW(UCATMPW) -
               UDATEPW(UCATUPW) -
               FOR(365) -
               VOLUME(VSER06) -
               VSAMCATALOG -
               CYLINDERS(100 10) ) -
          DATA -
               (CYLINDERS(20 10) ) -
          INDEX -
               (CYLINDERS(10) ) -
          CATALOG -
                (AMASTCAT/MRCATPW2)
/*
//STEP2    EXEC  PGM=IDCAMS
//STEPCAT  DD    DSNAME=COPYUCAT,DISP=OLD
//         DD    DSNAME=MYCAT,DISP=OLD
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    REPRO -
         INDATASET(MYCAT) -
         OUTDATASET(COPYUCAT/UCATMPW)
    EXPORT -
         MYCAT -
         DISCONNECT
/*
//STEP3    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
     EXPORT -
          MYCAT -
          DISCONNECT
/*
//STEP4    EXEC  PGM=IDCAMS
//STEPCAT  DD    DSNAME=COPYUCAT,DISP=SHR
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
     LISTCAT
/*
//STEP5    EXEC  PGM=IDCAMS
//STEPCAT  DD    DSNAME=COPYUCAT,DISP=OLD
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DELETE -
         MYCAT -
         CLUSTER PURGE -
         CATALOG(COPYUCAT/UCATMPW)
```

```
/*
//STEP6    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    DEFINE ALIAS -
         (NAME(MYCAT) -
         RELATE(COPYUCAT) )
/*
```

STEP1: A user catalog, COPYUCAT, is defined on volume VSER06. The catalog entries in MYCAT will be copied into COPYUCAT.

The DEFINE USERCATALOG command defines the user catalog, COPYUCAT.

STEP1's DEFINE USERCATALOG command parameters:

- NAME specifies the name of the new catalog, COPYUCAT.
- MASTERPW and UPDATEPW specify the master and update level passwords for the catalog.
- FOR specifies that the catalog is to be retained for 365 days.
- VOLUME specifies that the catalog is to reside on volume VSER06.
- CYLINDERS specifies that the catalog's data space is initially to be 100 cylinders. When the data space is extended, it is to be extended in increments of 10 cylinders. Part of the data space contains the catalog, COPYUCAT. The rest of the data space is available for suballocated VSAM data sets.
- DATA(CYLINDERS) and INDEX(CYLINDERS) specify that the catalog itself is initially to occupy 30 cylinders. When the catalog's data component is extended, it is to be extended in increments of 10 cylinders.
- CATALOG specifies that a user catalog connector entry is to be built and written into the AMASTCAT catalog. The user catalog connector entry points to COPYUCAT.

STEP2: Access method services copies the contents of MYCAT into COPYUCAT.

STEP2's job control statement:

- STEPCAT DD makes two catalogs available for this job step: COPYUCAT and MYCAT. The DD statements that identify the catalogs are concatenated.

The REPRO command copies all records from MYCAT into COPYUCAT. Access method services treats each catalog as a key-sequenced data set and copies each catalog record. Consequently, the first 13 catalog records of MYCAT, which describe MYCAT as a key-sequenced data set, are also copied into COPYUCAT. Entries from MYCAT are written into COPYUCAT beginning with catalog record 14 (that is, after the 13 self-describing records of COPYUCAT).

STEP2's REPRO command parameters:

- INDATASET identifies the source data set, MYCAT. VSAM assumes that MYCAT is cataloged in either MYCAT or COPYUCAT.
- OUTDATASET identifies the receiving data set, COPYUCAT. VSAM assumes that COPYUCAT is cataloged in either COPYUCAT or MYCAT.

STEP3: The EXPORT command removes MYCAT's user catalog connector entry from the master catalog. MYCAT's cataloged objects are now not available to the system. (STEP6 builds an alias entry that relates MYCAT to COPYUCAT, making the cataloged objects available to the system again.)

The EXPORT is in a separate step with a STEPCAT, instead of being part of STEP2, so that the entry is deleted from the master catalog.

STEP4: Access method services lists the name of each entry in the new catalog, COPYUCAT. The STEPCAT DD statement identifies the catalog to be listed.

LISTCAT cannot run in a job step where the catalog is empty when it is opened. To ensure that the LISTCAT correctly reflects the contents of the catalog, the LISTCAT was run as a separate job step.

STEP5: Access method services removes the entries in COPYUCAT that describe MYCAT as a key-sequenced data set. (See STEP2 description.)

STEP4's DELETE command parameters:

- MYCAT identifies the object to be deleted.
- CLUSTER specifies that MYCAT is cataloged as a cluster in COPYUCAT. MYCAT's cluster, data, and index entry are removed from COPYUCAT.
- PURGE specifies that MYCAT is to be deleted regardless of a specified retention period or date.
- CATALOG specifies that MYCAT is cataloged in COPYUCAT. COPYUCAT's master password, UCATMPW, is required to delete its catalog entries.

STEP6: Access method services builds an alias entry that relates MYCAT to COPYUCAT. Because no CATALOG parameter or JOBCAT or STEPCAT DD statement identifies the catalog that is to contain the alias entry, VSAM assumes the entry is to be written into the master catalog.

When MYCAT was defined, it was defined on volume VSER04. Its catalog entries describe VSAM objects on that volume. COPYUCAT is defined on volume VSER06. Because MYCAT was copied into COPYUCAT (and MYCAT no longer exists as a user catalog), COPYUCAT entries now describe VSAM objects on volumes VSER04 and VSER06.

Unload a VSAM User Catalog: Example 4

A VSAM user catalog is unloaded to tape using the catalog unload/reload feature of the REPRO command.

```
//UNLOAD   JOB   ...
//JOBCAT   DD    DSNAME=D27UCAT2,DISP=OLD
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//CATIN    DD    DSNAME=D27UCAT2,DISP=OLD
//CATOUT   DD    DSNAME=PORTABLE.TAPE,LABEL=(1,SL),
//     DISP=NEW,UNIT=3480,VOL=SER=TAPE01,
//     DCB=(DEN=3,RECFM=VB,LRECL=516,BLKSIZE=5164)
//SYSIN    DD    *
    REPRO -
         INFILE(CATIN/USERMRPW) -
         OUTFILE(CATOUT)
/*
```

Job control language statements:

- JOBCAT DD is required and identifies and allocates the user catalog as the job catalog.
- CATIN DD describes and allocates the user catalog, D27UCAT2, as a VSAM data set to be opened and used by the REPRO command as the source data set for the unload operation.
- CATOUT DD describes and allocates a magnetic tape file to contain the copy of the catalog. The DCB parameters must be specified as shown. The BLKSIZE parameter can be any multiple of LRECL plus 4, where LRECL=516.

REPRO command parameters:

- INFILE is required and identifies the user catalog as a source VSAM data set. The catalog's master password is required to open it as a data set.
- OUTFILE is required and describes the magnetic tape file or target data set that is to contain the catalog's copy.

Reload an Unloaded VSAM User Catalog: Example 5

A VSAM user catalog is reloaded from the backup copy (created in the previous example), using the catalog unload/reload feature of the REPRO command.

```
//RELOAD   JOB   ...
//JOBCAT   DD    DSNAME=D27UCAT2,DISP=OLD
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD    SYSOUT=A
//CATIN    DD    DSNAME=PORTABLE.TAPE,LABEL=(1,SL),
//     DISP=OLD,UNIT=3480,VOL=SER=TAPE01,DCB=DEN=3
//CATOUT   DD    DSNAME=D27UCAT2,DISP=OLD
//SYSIN    DD    *
    REPRO -
         INFILE(CATIN) -
         OUTFILE(CATOUT/USERMRPW)
/*
```

Job control language statements:

- JOBCAT DD is required and describes and allocates the user catalog to be reloaded. The JOBCAT statement specifies that D27UCAT2 is the job catalog.
- CATIN DD describes and allocates the magnetic tape file that contains the unloaded copy of the catalog. Because a standard label tape is used, DCB parameters of record format, record size, and block size need not be specified.

For an unlabeled tape, the same parameters as in the previous example must be specified.

- CATOUT DD describes the user catalog as a VSAM data set to be opened and used by REPRO as the target data set for the reload operation.

REPRO command parameters:

- INFILE is required and identifies the magnetic tape file that contains the unloaded, or backup, copy of the user catalog.
- OUTFILE is required and identifies the user catalog as a VSAM data set to be opened for record processing. The master password allows opening the catalog as a data set.

Encipher Using System Keys: Example 6

An enciphered copy of part of a VSAM relative record data set is produced using a tape as output. The enciphered data set is to be deciphered at a remote installation. Four source records at a time will be enciphered as a unit. The keys are managed by the Programmed Cryptographic Facility or the Cryptographic Unit Support.

```
//ENSYS    JOB    ...
//JOBCAT   DD   DSN=D27UCAT,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//CLEAR    DD   DSN=RRDS1,DISP=SHR
//CRYPT    DD   DSN=RRDSEN,LABEL=(1,SL),DISP=NEW,
//              UNIT=3480,VOL=SER=TAPE01,
//              DCB=(DEN=3,RECFM=FB,LRECL=516,BLKSIZE=5160)
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *

     REPRO -
          INFILE(CLEAR/RDPW) -
          OUTFILE(CRYPT) -
          COUNT(50) -
          ENCIPHER -
           (EXTERNALKEYNAME(AKEY27) -
            STOREDATAKEY -
            CIPHERUNIT(4) -
            USERDATA(CONF))
/*
```

Job control language statements:

- JOBCAT DD makes the catalog D27UCAT available.
- CLEAR DD describes the relative record data set.
- CRYPT DD describes and allocates a magnetic tape file. LRECL is the relative record data set record size plus 4.

The REPRO command copies 50 records enciphered from a generated data encrypting key, from the source data set, RRDS1, to the output tape. The source records are enciphered in units of 4 records, except for the last 2 records which are enciphered together. The enciphered data encrypting key will be stored in the header of the target data set; REPRO will not list the key name or enciphered data encrypting key in SYSPRINT.

REPRO command parameters:

- INFILE points to the CLEAR DD statement identifying the source data set to be enciphered, RRDS1. The read password for the source data set is RDPW.
- OUTFILE points to the CRYPT DD statement, identifying the target data set on tape.
- COUNT indicates that 50 records are to be copied.
- ENCIPHER indicates that the target data set is to contain an enciphered copy of the source data set.
- EXTERNALKEYNAME supplies the name, AKEY27, of the external file key to be used to encipher the data encrypting key.
- STOREDATAKEY indicates that the data encrypting key enciphered under the secondary file key is to be stored in the header of the target data set.
- CIPHERUNIT indicates that 4 source records at a time are to be enciphered as a unit.
- USERDATA specifies a character string, CONF, to be stored in the header of the target data set as user data.

Decipher Using System Keys: Example 7

The enciphered data set produced in the previous example is deciphered using a VSAM relative record data set as the target for the plaintext (deciphered) data. The empty slots in the original data set will be reestablished. Keys are managed by the Programmed Cryptographic Facility or the Cryptographic Support Unit.

```
//DESYS    JOB    ...
//JOBCAT   DD   DSN=D27UCATR,DISP=SHR
//STEP2    EXEC  PGM=IDCAMS
//CRYPT    DD   DSN=RRDSEN,LABEL=(1,SL),DISP=OLD,
//              UNIT=3480,VOL=SER=TAPE01,
//              DCB=DEN=3
//CLEAR    DD   DSN=RRDS2,DISP=SHR
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INFILE(CRYPT) -
         OUTFILE(CLEAR/UPPW2) -
         DECIPHER -
          (SYSTEMKEY -
           SYSTEMKEYNAME(BKEY27))
/*
```

Job control language statements:

- JOBCAT DD makes the catalog D27UCATR available.
- CRYPT DD describes and allocates the magnetic tape containing the enciphered data.
- CLEAR DD describes the relative record data set.

The REPRO command copies and deciphers the enciphered data set from the source tape to the target data set RRDS2. The enciphered data encrypting key is obtained from the header of the source data set. The internal file key (BKEY27) is used to decipher the enciphered data encrypting key, which is then used to decipher the data.

REPRO command parameters:

- INFILE points to the CRYPT DD statement, identifying the tape containing the enciphered source data.
- OUTFILE points to the CLEAR DD statement, identifying the data set to contain the deciphered data, RRDS2. The defined record size must be the same as that of the original relative record data set. The update password for the target data set is UPPW2.
- DECIPHER indicates that the source data set is to be deciphered as it is copied to the target data set.
- SYSTEMKEY indicates that keys are to be managed by the Program Cryptographic Facility or the Cryptographic Unit Support.
- SYSTEMKEYNAME supplies the key name, BKEY27, of the internal file key that was used to encipher the system data encrypting key. The file key must be an internal file key in this system.

Encipher Using Private Keys: Example 8

An enciphered copy of a SAM data set is produced by using an entry-sequenced data set as the target data set. The enciphered data set resides on a volume that is to be stored offline at the local installation. Each record in the target data set will be enciphered separately, using a data encrypting key supplied by the user via a data encrypting key data set. Keys are managed privately by the user.

```
//ENPRI    JOB    ...
//JOBCAT   DD   DSN=D27UCAT,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//CLEAR    DD   DSN=SAMDS1,DISP=OLD,
//              VOL=SER=VOL005,UNIT=3380
//CRYPT    DD   DSN=ESDS1,DISP=OLD
//KEYIN    DD   *
        X'53467568503A7C29'
/*
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INFILE(CLEAR) -
         OUTFILE(CRYPT/UPPW) -
         REUSE -
         ENCIPHER -
          (PRIVATEKEY -
           DATAKEYFILE(KEYIN))
/*
```

Job control language statements:

- JOBCAT DD makes the catalog D27UCAT available.
- CLEAR DD describes the SAM data set.
- CRYPT DD describes the entry-sequenced data set.
- KEYIN DD describes the data encrypting key data set consisting of a single record containing the data encrypting key.

REPRO command parameters:

- INFILE points to the CLEAR DD statement that identifies the source data set to be enciphered, SAMDS1.

- OUTFILE points to the CRYPT DD statement that identifies the target data set, ESDS1. The defined maximum record size of the entry-sequenced data set must be large enough to accommodate the largest SAM record.
- REUSE indicates that the target data set is to be opened as a reusable data set. If the data set was defined as REUSE, it is reset to empty; otherwise, the REPRO command will terminate.
- ENCIPHER indicates that the target data set is to contain an enciphered copy of the source data set.
- PRIVATEKEY indicates that the key is to be managed by the user.
- DATAKEYFILE points to the KEYIN DD statement that supplies the plaintext data encrypting key, X'53467568503A7C29', to be used to encipher the data.

Decipher Using Private Keys: Example 9

The enciphered data set produced in the previous example is deciphered at the same location using an entry-sequenced data set as the target for the plaintext (deciphered) data. Keys are managed privately by the user.

```
//DEPRI    JOB    ...
//JOBCAT   DD   DSN=D27UCAT,DISP=SHR
//STEP1    EXEC  PGM=IDCAMS
//CRYPT    DD   DSN=ESDS1,DISP=OLD
//CLEAR    DD   DSN=ESDS3,DISP=OLD
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
    REPRO -
         INFILE(CRYPT/RDPW1) -
         OUTFILE(CLEAR/UPPW3) -
         DECIPHER -
          (DATAKEYVALUE(X'53467568503A7C29') )
/*
```

Job control language statements:

- JOBCAT DD makes the catalog D27UCAT available.
- CRYPT DD describes the enciphered source entry-sequenced data set.
- CLEAR DD describes the target entry-sequenced data set.

REPRO command parameters:

- INFILE points to the CRYPT DD statement that identifies the source data set to be enciphered, ESDS1. The read password for the source data set is RDPW1.
- OUTFILE points to the CLEAR DD statement that identifies the target data set, ESDS3, which must be empty. The defined maximum record size of the target entry-sequenced data set must be large enough to accommodate the largest source entry-sequenced data set record. The update password for the target data set is UPPW3.
- DECIPHER indicates that the source data set is to be deciphered as it is copied to the target data set.
- DATAKEYVALUE indicates that keys are to be managed by the user and supplies the plaintext private data encrypting key, X'53467568503A7C29', used to encipher the data.

RESETCAT

The RESETCAT command compares catalog entries with catalog recovery area (CRA) entries to regain access to catalog data. Note, however, that this command is for use with recoverable catalogs only. The syntax of the RESETCAT command is:

RESETCAT	**CATALOG(***catname***[/***password***][** *ddname***])** **{CRAFILES((***ddname1***[** **ALL‘** **NONE])** **[(***ddname1***[** **ALL‘** **NONE])...])‘** **CRAVOLUMES((***volser***[** *devtype***])** **[(***volser***[** *devtype***])...])}** **[IGNORE‘NOIGNORE]** **[MASTERPW(***password***)]** **[WORKCAT(***catname***[/***password***])]** **[WORKFILE(***ddname***[/***password***])]**

RESETCAT may be abbreviated: RCAT

RESETCAT Parameters

Required Parameters

CATALOG(*catname***[/***password***][***ddname***])**

identifies the catalog to be reset. The catalog specified by catname must have the RECOVERABLE attribute.

Exclusive control of the catalog is required for the duration of the command. Also, no VSAM data sets cataloged in the catalog may be open. The master catalog may not be reset while it is in use as a master catalog.

password

specifies the catalog's master password. If the catalog is password protected, you must specify the master password of the catalog. Alter RACF authority to the catalog is required.

ddname

specifies the name of the DD statement for the catalog being reset. If ddname is not specified, the catalog will be dynamically allocated. ddname must also be specified in a JOBCAT or STEPCAT.

Abbreviation: CAT

CRAFILES((*ddname1***[ALL‘ NONE])...)**

specifies a list of DD statements that identify the volumes and devices to be used to reset the catalog. Each volume contains a CRA that has a copy of the catalog records describing the VSAM objects on that volume. ALL specifies that the catalog records in the CRA on the volume specified by ddname1 are to be reset.

If a volume contains a multivolume data set whose catalog entry is being reset, other volumes of that multivolume data set may be needed during the reset operation; you should specify these via additional ddname1 parameters. Use the NONE subparameter if you do not want the entries in these additional volumes to be used to reset the catalog.

If a volume is needed and you do not specify the DD statements provided by CRAFILES, it will be allocated dynamically, and will assume the NONE attribute.

CRAVOLUMES((*volser***[** *devtype***])...)**
specifies the volume serial numbers and corresponding device types of the volumes used in resetting the catalog. Each volume contains a catalog recovery area (CRA) that has a copy of the catalog records that describe the objects on the volume. The volume is allocated dynamically.

volser
specifies the volume serial number used in resetting the catalog.

devtype
specifies the device type for the associated volume serial number. If you do not specify devtype, the volume must be mounted and on a unit marked permanently resident or reserved. If you specify a generic name for devtype, the volume need not be mounted.

If a volume contains a multivolume data set whose catalog entry is being reset, other volumes of that multivolume data set may be needed during the reset operation; if needed and not specified for reset, these volumes will be allocated dynamically. Dynamically allocated volumes assume the NONE attribute as described for the CRAFILES parameter.

Abbreviation: CRAVOL

Optional Parameters

IGNORE‘NOIGNORE
specifies whether RESETCAT should continue processing and force the reset when certain errors are encountered. These errors may be:

- I/O error in the catalog.
- I/O error in the CRA.
- The volume record or its extensions in the CRA are in error.

IGNORE
specifies that the RESETCAT command will try to recover as much information as possible and reset the catalog's description of those data sets on the specified volumes.

For example, if IGNORE is specified and an I/O error occurs while processing a record from a CRA, that record will be ignored. In the process, data sets that could not be recovered on a particular volume would be marked unusable on that volume, and the space that was assigned to them would be freed.

Abbreviation: IGN

NOIGNORE
specifies that I/O errors result in immediate termination.

Abbreviation: NIGN

MASTERPW(*password***)**
specifies the master catalog's master password when the master catalog is password protected.

WORKCAT(*catname***[/***password***])**

specifies the name of the catalog in which RESETCAT defines the WORKFILE. This catalog must not be the same as the catalog being reset. The catalog must be specified in a JOBCAT or STEPCAT DD statement.

If you do not specify the WORKCAT parameter, the catalog will be chosen using existing rules for "Catalog Selection Order for DEFINE" on page 17.

If you do not specify the WORKCAT parameter, the catalog must be the first DD statement in the JOBCAT or STEPCAT DD statement concatenation. However, if the work file catalog is the master catalog, then you must specify the WORKCAT parameter and it must be the last DD statement in the JOBCAT or STEPCAT DD statement concatenation. The resultant catalog must not be the same as the one being reset.

password

If the catalog is password protected, the update- or higher-level password is required. Update or higher RACF authority to the catalog is required.

Abbreviation: WCAT

WORKFILE(*ddname***[/***password***])**

specifies the name of a DD statement that identifies a VSAM data set name and a list of volume serial numbers of volumes containing VSAM data spaces and units to be used by RESETCAT for a work file. These volumes must be owned by the catalog in which the work file is defined.

This data set will be defined by RESETCAT and used as temporary storage while processing the command; it will be deleted at the end of the command. The data set must not be already defined.

See *DFSMS/MVS Managing Catalogs* for more information on space requirements for the data set. If you do not specify WORKFILE, IDCUT1 is used as a default ddname.

password

If you require one, you may specify a password to be used by RESETCAT to password protect the work file. Because the work file will contain a copy of the catalog records, it may contain security-sensitive information. The password you specify will become the work file's master password. You may specify the password only if ddname is explicitly specified.

Abbreviation: WFILE

RESETCAT Examples

Resetting a Catalog: Example 1

RESETCAT is used to reset a catalog (USERCAT1), one of whose owned volumes (VSER01) has been restored. The other volume owned by USERCAT1 is VSER02.

```
//RECOVER  JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//STEPCAT  DD   DSN=USERCAT1,DISP=OLD
//         DD   DSN=AMASTCAT,DISP=OLD
//IDCUT1   DD   DSN=WORKFILE,DISP=OLD,
//          VOL=SER=333333,UNIT=DISK,AMP='AMORG'
//CRAVOL1  DD   DISP=OLD,VOL=SER=VSER01,UNIT=3380
//CRAVOL2  DD   DISP=OLD,VOL=SER=VSER02,UNIT=3380
//DDCAT    DD   DSN=USERCAT1,DISP=OLD
//SYSIN    DD   *
   RESETCAT -
     CATALOG(USERCAT1/MASTER DDCAT) -
     CRAFILES((CRAVOL1 ALL) (CRAVOL2 NONE)) -
     WORKCAT(AMASTCAT/MCATMRPW) -
     MASTERPW(MCATMRPW) -
     IGNORE
/*
```

Job control language statements:

- STEPCAT DD makes the user catalog, USERCAT1, and the master catalog, AMASTCAT, available for the step. These catalogs must be available for the catalog to be reset and for the work file to be defined, respectively. Note that, when the work file is to be defined in the master catalog, the master catalog must be last in the concatenation and the catalog name is supplied via the WORKCAT parameter.
- IDCUT1 DD identifies the data set to be used for the work file.
- CRAVOL1 DD identifies and allocates a volume whose catalog recovery area is to be used to reset the catalog.
- CRAVOL2 DD identifies and allocates a volume whose catalog recovery area may change as a result of resetting the catalog recovery area on volume VSER01. This volume is not reset in the catalog.
- DDCAT DD allocates the catalog to be reset.

RESETCAT command parameters:

- CATALOG identifies the catalog to be reset. The master password of the catalog is required to update the catalog. The DD statement for the catalog is also identified.
- CRAFILES specifies a list of DD statements that identify the volumes to be used to reset the catalog. ALL specifies that the catalog records in the CRA on the volume specified by the CRAVOL1 DD statement are to be reset (in the catalog). NONE allows the CRAVOL2 DD statement to be specified for a CRA volume that is not to be used for reset, but that may be needed as a result of the reset (for example, a multivolume data set resides on a reset volume and on a nonreset volume).
- WORKCAT specifies the name of the catalog in which to define the work file. WORKCAT must be specified if the work file is to be defined in the master catalog.
- IGNORE specifies that RESETCAT should force the reset of the catalog despite certain errors that may be encountered during the RESETCAT processing.

Resetting a Catalog: Example 2

RESETCAT is used to reset a catalog (USERCAT1) after the volume (VSER00) containing the catalog has been restored. The volumes owned by USERCAT1, VSER01, and VSER02 have been determined to be out of synchronization with the catalog by running a LISTCRA with the COMPARE option for all volumes owned by USERCAT1.

```
//RECOVER  JOB  ...
//JOBCAT   DD   DSN=USERCAT2,DISP=OLD
//         DD   DSN=USERCAT1,DISP=OLD
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//WORKF    DD   DSN=WORKFILE,DISP=OLD,UNIT=(DISK,2),
//           VOL=SER=(333333,333334),AMP='AMORG'
//SYSIN    DD   *
   RESETCAT -
    CATALOG(USERCAT1) -
    CRAVOLS((VSER01 3330-1)(VSER02 3330-1)) -
    WORKFILE(WORKF/WRKPSW) -
    NOIGNORE
/*
```

Job control language statements:

- JOBCAT DD makes the user catalogs USERCAT2 and USERCAT1 available for the job. These catalogs must be available for the work file to be defined and for the catalog to be reset, respectively.
- WORKF DD identifies the data set to be used for the work file.

  Note: All other required volumes will be dynamically allocated by RESETCAT.

RESETCAT command parameters:

- CATALOG identifies the catalog to be reset.
- CRAVOLS specifies a list of volumes and their device types to be used to reset the catalog.
- WORKFILE specifies the DD statement for the work file and a password to be used as the work file's master password.
- NOIGNORE specifies that RESETCAT should not force the reset of the catalog if certain errors are encountered.

Resetting a Catalog: Example 3

In this three-part example, RESETCAT is used to reset a catalog (USERCAT1 on volume VSER00) that must be reallocated on a different volume (VSER03). This situation may occur when irreparable physical damage has occurred to the catalog. The catalog recovery area for the damaged catalog volume is assumed to be accessible and valid, thus included for reset in the newly defined catalog. Note that the newly defined catalog bears the same name as the damaged catalog. The other volumes owned by USERCAT1 are VSER01 and VSER02. The catalog is first disconnected, then redefined.

```
//DISC      JOB  ...
//STEP1    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//STEPCAT  DD   DSN=USERCAT1,DISP=OLD
//SYSIN    DD   *
   EXPORT USERCAT1 DISCONNECT
//STEP2    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//UCATDD   DD   VOL=SER=VSER03,UNIT=3380,DISP=OLD
//CRAVOL1  DD   VOL=SER=VSER01,UNIT=3380,DISP=OLD
//CRAVOL2  DD   VOL=SER=VSER02,UNIT=3380,DISP=OLD
//SYSIN    DD   *
   DEFINE UCAT -
     (NAME (USERCAT1) FILE(UCATDD) VOL(VSER03) -
     VSAMCATALOG -
     RECOVERABLE CYL(20 1)) -
     DATA(CYL(10  1)) INDEX(CYL(1))
//STEP3    EXEC  PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//STEPCAT  DD   DSN=USERCAT1,DISP=OLD
//         DD   DSN=AMASTCAT,DISP=OLD
//IDCUT1   DD   DSN=WORKFILE,DISP=OLD,UNIT=3380,
//         VOL=SER=333333,AMP='AMORG'
//SYSIN    DD   *
   RESETCAT -
       CATALOG(USERCAT1) -
       WORKCAT(AMASTCAT) -
       CRAVOLS((VSER00 3380)(VSER01 3380)(VSER02 3380))
/*
```

STEP1: The user catalog, USERCAT1, is disconnected from the system by using the EXPORT command.

STEP2: The user catalog, USERCAT1, is redefined on the volume VSER03.

STEP3: The user catalog USERCAT1 is reset from the previous catalog's owned volumes.

Job control language statements:

- STEPCAT DD makes the user catalog, USERCAT1, and the master catalog, AMASTCAT, available for the step. These catalogs must be available for the catalog to be reset, and for the work file to be defined, respectively.
- IDCUT1 DD, which identifies the data set to be used for the work file.

RESETCAT command parameters:

- CATALOG identifies the catalog to be reset.
- WORKCAT specifies the name of the catalog in which to define the work file. WORKCAT must be specified if the work file is to be defined in the master catalog.
- CRAVOLS specifies a list of volumes and their device types to be used to reset the catalog.

VERIFY

The VERIFY command causes a catalog to correctly reflect the end of a data set after an error has occurred while closing a VSAM data set. The error may have caused the catalog to be incorrect. The syntax of the VERIFY command is:

VERIFY	**{FILE(**_ddname_**[**_/password_**])‘** **DATASET(**_entryname_**[**_/password_**])}**

VERIFY can be abbreviated: VFY

VERIFY Parameters

Required Parameters

FILE(_ddname_**[**_/password_**])**

ddname specifies the name of a DD statement that identifies the cluster or alternate index to be verified. For further information on using VERIFY to fix improperly closed data sets, see *DFSMS/MVS Using Data Sets*.

password

is either the control or master password of a password-protected object (control or alter RACF authority to the object is required), or the master password of the object's password-protected catalog (alter RACF authority to the catalog is required).

DATASET(_entryname_**[**_/password_**])**

specifies the name and password of the object to be verified. If DATASET is specified, the object is dynamically allocated.

password

is either the control or master password of a password-protected object (control or alter RACF authority to the object is required), or the master password of the object's password-protected catalog (alter RACF authority to the catalog is required).

Abbreviation: DS

The VERIFY command can be used following a system failure that caused a component opened for update processing to be improperly closed. It can also be used to verify an entry-sequenced data set defined with RECOVERY that was open in create mode when the system failure occurred. However, the entry-sequenced data set must contain records (not be empty) to successfully verify.

Note: When sharing data sets between different processors, it is recommended that you run VERIFY as the first step of a job stream to prevent job termination caused by an open ACB error code, if the other processor already has the data set open.

VERIFY Example

Upgrading a Data Set's End-of-File Information

When a data set that was improperly closed due to a system failure is opened, the VSAM OPEN routines set a return code to indicate that the data set's cataloged information may be inaccurate. You can upgrade the end of data (EOD) and end of key range (EOKR) information, so that it is accurate when the data set is next opened, by closing the data set[1] and issuing the VERIFY command:

```
//VERIFY   JOB  ...
//JOBCAT   DD   DSNAME=D27UCAT1,DISP=SHR
//FIXEOD   EXEC PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
           LISTCAT   ENTRIES(FAROUT) -
                     ALL
           VERIFY    DATASET(FAROUT)
           LISTCAT   ENTRIES(FAROUT) -
                     ALL
/*
```

The first LISTCAT command lists the data set's cataloged information, showing the data set's parameters as they were when the data set was last closed properly.

The VERIFY command updates the data set's cataloged information to show the data set's real EOD and EOKR values.

The second LISTCAT command lists the data set's cataloged information again. This time, the EOD and EOKR information show the point at which processing stopped due to system failure. This information should help the user determine how much data was added correctly before the system failed.

Note: VERIFY will only update the high-used RBA fields for the data set, and not any record counts.

See Appendix A, “Interpreting LISTCAT Output Listings” on page 249, for details on the order in which catalog records are to be listed and the meanings of the listed records.

[1] At the first OPEN after system failure, VSAM OPEN sets a “data set improperly closed” return code. When the data set is closed properly, VSAM CLOSE resets the “data set improperly closed” indicator but does not upgrade erroneous catalog information resulting from the system failure. When the data set is next opened, its EOD and EOKR information may still be erroneous (until VERIFY is issued to correct it), but VSAM OPEN sets the “data set opened correctly” return code.

Appendix A. Interpreting LISTCAT Output Listings

The LISTCAT command options allow you to select the type of output that provides the type of information you want. This appendix describes the structure of LISTCAT output when you specify these options. Fields that can be printed for each type of catalog entry are listed and described.

Each entry is identified by its type (cluster, non-VSAM, data, and so forth) and by its entryname. Entries are listed in alphabetic order by entryname unless the ENTRIES parameter is used. When ENTRIES is specified, the entries are listed in the order specified by the ENTRIES parameter.

An entry with associated entries is immediately followed by the listing of each associated entry. That is, a cluster's data component (and its index component if the cluster is key-sequenced), is listed immediately following the cluster. The associated entry is excluded if type options (CLUSTER, DATA, SPACE, etc.) or a generic entryname list is specified.

There are three parts to this appendix:

- “LISTCAT Output Keywords” lists all field names that can be listed for each type of entry.
- “Description of Keyword Fields” on page 253 describes each field name within a group of related field names.
- “Examples of LISTCAT Output Listings” on page 266 describes and illustrates the LISTCAT output that results when various LISTCAT options are specified.

LISTCAT Output Keywords

This section lists the field names associated with each type of catalog entry. Each field name is followed by an abbreviation that points to a group of related field descriptions in the next section. Keywords are listed in alphabetic order and not in the order they appear in the LISTCAT output.

The abbreviations and group names are:

Abbreviations	**Group Names**
ALC	allocation group
ASN	associations group
ATT	attributes group
DSP	data space group
GDG	generation data group base entry, special fields
HIS	history group
NVS	non-VSAM entry, special field
PRT	protection group
STA	statistics group
VLS	volumes group
VOL	volume entry, special fields

Alias Entry Keywords

- ASSOCIATIONS (ASN)
- *entryname* (HIS)
- HISTORY (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)

Alternate-Index Entry Keywords

- ASSOCIATIONS (ASN)
- ATTEMPTS (PRT)
- ATTRIBUTES (ATT)
- CLUSTER (ASN)
- CODE (PRT)
- CONTROLPW (PRT)
- DATA (ASN)
- *entryname* (HIS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT(HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- INDEX (ASN)
- MASTERPW (PRT)
- NOUPGRADE (ATT)
- PATH (ASN)
- PROTECTION (PRT)
- RACF (PRT)
- READPW (PRT)
- UPDATEPW (PRT)
- UPGRADE (ATT)
- USAR (PRT)
- USVR (PRT)

Cluster Entry Keywords

- AIX (ASN)
- ASSOCIATIONS (ASN)
- ATTEMPTS (PRT)
- CODE (PRT)
- CONTROLPW (PRT)
- DATA (ASN)
- *entryname* (HIS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- INDEX (ASN)
- MASTERPW (PRT)
- PATH (ASN)
- PROTECTION (PRT)
- RACF (PRT)
- READPW (PRT)
- UPDATEPW (PRT)
- USAR (PRT)
- USVR (PRT)

Data Entry Keywords

- AIX (ASN)
- ALLOCATION (ALC)
- ASSOCIATIONS (ASN)
- ATTEMPTS (PRT)
- ATTRIBUTES (ATT)
- AVGLRECL (ATT)
- AXRKP (ATT)
- BUFSPACE (ATT)
- BYTES/TRACK (VLS)
- CI/CA (ATT)
- CISIZE (ATT)
- CLUSTER (ASN)
- CODE (PRT)
- CONTROLPW (PRT)
- DEVTYPE (VLS)
- *entryname* (HIS)
- ERASE (ATT)
- EXCPEXIT (ATT)
- EXCPS (STA)
- EXTENT-NUMBER (VLS)
- EXTENT-TYPE (VLS)
- EXTENTS (STA)
- EXTENTS (VLS)
  - HIGH-CCHH (VLS)
  - HIGH-RBA (VLS)
  - LOW-CCHH (VLS)
  - LOW-RBA (VLS)
  - TRACKS (VLS)
- FREESPACE-%CI (STA)
- FREESPACE-%CA (STA)
- FREESPC-BYTES (STA)
- HIGH-KEY (VLS)
- HI-ALLOC-RBA (ALC)
- HI-ALLOC-RBA (VLS)
- HI-KEY-RBA (VLS)
- HI-USED-RBA (ALC)
- HI-USED-RBA (VLS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- IMBED (ATT)
- INDEX (ASN)
- INDEXED (ATT)
- INH-UPDATE (ATT)
- KEYLEN (ATT)
- LOW-KEY (VLS)
- MASTERPW (PRT)
- MAXLRECL (ATT)
- MAXRECS (ATT)
- NOERASE (ATT)
- NOIMBED (ATT)
- NONINDEXED (ATT)
- NONSPANNED (ATT)
- NONUNIQKEY (ATT)
- NOREPLICAT (ATT)
- NOREUSE (ATT)
- NOSWAP (ATT)
- NOTRKOVFL (ATT)
- NOTUSABLE (ATT)
- NOWRITECHK (ATT)

- NUMBERED (ATT)
- ORDERED (ATT)
- PGSPC (ASN)
- PHYRECS/TRK (VLS)
- PHYREC/SIZE (VLS)
- PROTECTION (PRT)
- RACF (PRT)
- READPW (PRT)
- RECOVERY (ATT)
- REC-DELETED (STA)
- REC-INSERTED (STA)
- REC-RETRIEVED (STA)
- REC-TOTAL (STA)
- REC-UPDATED (STA)
- RECORDS/CI (ATT)
- REPLICATE (ATT)
- RKP (ATT)
- REUSE (ATT)
- RECVABLE (ATT)
- SHROPTNS (ATT)
- SPACE-PRI (ALC)
- SPACE-SEC (ALC)
- SPACE-TYPE (ALC)
- SPEED (ATT)
- SPLITS-CA (STA)
- SPLITS-CI (STA)
- SPANNED (ATT)
- STATISTICS (STA)
- SUBALLOC (ATT)
- SWAP (ATT)
- SYSTEM-TIMESTAMP (STA)
- TEMP-EXP (ATT)
- TRACKS/CA (VLS)
- TRKOVFL (ATT)
- UNIQUE (ATT)
- UNIQUEKEY (ATT)
- UNORDERED (ATT)
- UPDATEPW (PRT)
- USAR (PRT)
- USVR (PRT)
- VOLFLAG (VLS)
- VOLSER (VLS)
- VOLUMES (VLS)
- WRITECHECK (ATT)

Index Entry Keywords

- AIX (ASN)
- ALLOCATION (ALC)
- ASSOCIATIONS (ASN)
- ATTEMPTS (PRT)
- ATTRIBUTES (ATT)
- AVGLRECL (ATT)
- BUFSPACE (ATT)
- CI/CA (ATT)
- CISIZE (ATT)
- CLUSTER (ASN)
- CODE (PRT)
- CONTROLPW (PRT)
- DEVTYPE (VLS)
- *entryname* (HIS)
- ERASE (ATT)
- EXCPEXIT (ATT)
- EXCPS (STA)
- EXTENT-NUMBER (VLS)
- EXTENT-TYPE (VLS)
- EXTENTS (STA)
- EXTENTS (VLS)
  - HIGH-CCHH (VLS)
  - HIGH-RBA (VLS)
  - LOW-CCHH (VLS)
  - LOW-RBA (VLS)
  - TRACKS (VLS)
- FREESPACE-%CI (STA)
- FREESPACE-%CA (STA)
- FREESPC-BYTES (STA)
- HI-ALLOC-RBA (ALC)
- HI-ALLOC-RBA (VLS)
- HI-USED-RBA (ALC)
- HI-USED-RBA (VLS)
- HIGH-KEY (VLS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- IMBED (ATT)
- INDEX (STA)
  - ENTRIES/SECT (STA)
  - HI-LEVEL-RBA (STA)
  - LEVELS (STA)
  - SEQ-SET-RBA (STA)
- INH-UPDATE (ATT)
- KEYLEN (ATT)
- LOW-KEY (VLS)
- MASTERPW (PRT)
- MAXLRECL (ATT)
- NOERASE (ATT)
- NOIMBED (ATT)
- NOREPLICAT (ATT)
- NOREUSE (ATT)
- NOTUSABLE (ATT)
- NOWRITECHK (ATT)
- ORDERED (ATT)
- PHYRECS/TRK (VLS)
- PHYREC-SIZE (VLS)
- PROTECTION (PRT)
- RACF (PRT)
- READPW (PRT)
- REC-DELETED (STA)
- REC-INSERTED (STA)
- REC-RETRIEVED (STA)
- REC-TOTAL (STA)
- REC-UPDATED (STA)
- RECOVERY (ATT)
- REPLICATE (ATT)
- REUSE (ATT)
- RKP (ATT)
- SHROPTNS (ATT)
- SPACE-PRI (ALC)
- SPACE-SEC (ALC)
- SPACE-TYPE (ALC)
- SPEED (ATT)
- SPLITS-CA (STA)
- SPLITS-CI (STA)
- STATISTICS (STA)
- SUBALLOC (ATT)
- SYSTEM-TIMESTAMP (STA)
- TEMP-EXP (ATT)
- TRACKS/CA (VLS)
- UNIQUE (ATT)
- UNORDERED (ATT)
- UPDATEPW (PRT)
- USAR (PRT)
- USVR (PRT)
- VOLFLAG (VLS)
- VOLSER (VLS)
- VOLUME (VLS)
- WRITECHECK (ATT)

Generation Data Group Base Entry Keywords

- ASSOCIATIONS (ASN)
- ATTRIBUTES (GDG)
  - EMPTY (GDG)
  - LIMIT (GDG)
  - NOEMPTY (GDG)
  - NOSCRATCH (GDG)
  - SCRATCH (GDG)
- *entryname* (HIS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- NONVSAM (ASN)

Non-VSAM Entry Keywords

- ALIAS (ASN)
- ASSOCIATIONS (ASN)
- DEVTYPE(VLS)
- *entryname* (HIS)
- FSEQN (NVS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- VOLSER(VLS)

Page Space Entry Keywords

- ASSOCIATIONS (ASN)
- ATTEMPTS (PRT)
- CODE (PRT)
- CONTROLPW (PRT)
- DATA (ASN)
- *entryname* (HIS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- INDEX (ASN)
- MASTERPW (PRT)
- PROTECTION (PRT)
- RACF (PRT)
- READPW (PRT)
- UPDATEPW (PRT)
- USAR (PRT)
- USVR (PRT)

Path Entry Keywords

- AIX (ASN)
- ASSOCIATIONS (ASN)
- ATTEMPTS (PRT)
- ATTRIBUTES (ATT)
- CLUSTER (ASN)
- CODE (PRT)
- CONTROLPW (PRT)
- DATA (ASN)
- *entryname* (HIS)
- HISTORY (HIS)
  - CREATION (HIS)
  - EXPIRATION (HIS)
  - OWNER-IDENT (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- INDEX (ASN)
- MASTERPW (PRT)
- NOUPDATE (ATT)
- PROTECTION (PRT)
- RACF (PRT)
- READPW (PRT)
- UPDATE (ATT)
- UPDATEPW (PRT)
- USAR (PRT)
- USVR (PRT)

User Catalog Entry Keywords

- ALIAS (ASN)
- ASSOCIATIONS (ASN)
- DEVTYPE(VLS)
- *entryname* (HIS)
- HISTORY (HIS)
  - RCVY-CI (HIS)
  - RCVY-DEVT (HIS)
  - RCVY-VOL (HIS)
  - RELEASE (HIS)
- VOLFLAG (VLS)
- VOLSER (VLS)

Volume Entry Keywords

- ATTRIBUTES (DSP)
  - AUTOMATIC (DSP)
  - EXPLICIT (DSP)
  - MASTERCAT (DSP)
  - SUBALLOC (DSP)
  - UNIQUE (DSP)
  - USERCAT (DSP)
- BYTES/TRK (VOL)
- CHARACTERISTICS (VOL)
- CYLS/VOL (VOL)
- DATASET-DIRECTORY (DSP)
  - ATTRIBUTES (DSP)
  - DSN (DSP)
  - EXTENTS (DSP)
- DATASETS (DSP)
- DATASETS-ON-VOL (VOL)
- DATASPACE (DSP)
- DATASPCS-ON-VOL (VOL)
- DEVTYPE (VOL)
- EXTENT-DESCRIPTOR (DSP)
  - BEG-CCHH (DSP)
  - SPACE-MAP (DSP)
  - TRACKS-TOTAL (DSP)
  - TRACKS-USED (DSP)
- EXTENTS (DSP)
- FORMAT-1-DSCB (DSP)
  - CCHHR (DSP)

TIMESTAMP (DSP)
MAX-PHYREC-SZ (VOL)
MAX-EXT/ALLOC (VOL)
HISTORY (HIS)
RCVY-CI (HIS)
RCVY-DEVT (HIS)
RCVY-VOL (HIS)
RELEASE (HIS)
SEC ALLOC (DSP)
TRKS/CYL (VOL)
TYPE (DSP)
CYLINDER (DSP)
TRACK (DSP)
volume serial number (HIS)
VOLUME-TIMESTAMP (VOL)

Description of Keyword Fields

This section contains a description of each field name. The field names are in the following groups of related information:

Abbreviations	**Group Names**
ALC	allocation group
ASN	associations group
ATT	attributes group
DSP	data space group
GDG	generation data group base entry, special fields
HIS	history group
NVS	non-VSAM entry, special field
PRT	protection group
STA	statistics group
VLS	volumes group
VOL	volume entry, special fields

Groups are in alphabetic order. Field names within each group are in alphabetic order, not the order of appearance in the listed entry.

ALC: Allocation Group

The fields in this group describe the space allocated to the data or index component defined by the entry.

HI-ALLOC-RBA—The highest RBA (plus 1) available within allocated space to store data.

HI-USED-RBA—The highest RBA (plus 1) within allocated space that actually contains data.

SPACE-PRI—Gives the number of units (indicated under TYPE) of space allocated to the data or index component when the cluster (that is, its data or index component) was defined. This amount of space is to be allocated whenever a data component (or key range within it) is extended onto a candidate volume.

SPACE-SEC—Gives the number of units (indicated under TYPE) of space to be allocated whenever a data set (or key range within it) is extended on the same volume.

SPACE-TYPE—Indicates the unit of space allocation:

CYLINDER—Cylinders
TRACK—Tracks

ASN: Associations Group

This group lists the type, such as cluster or data, and entrynames of the objects associated with the present entry. A cluster or alternate index entry will indicate its associated path entries and data and index (if a key-sequenced data set) entries. Similarly, an index or data entry will indicate its associated cluster or the alternate index of which it is a component.

- An alias entry points to:
  - Its associated non-VSAM data set entry.
  - A user catalog entry. (All alias entries for a non-VSAM data set entry are chained together, as are alias entries for a user catalog entry.)
- An alternate index entry points to:
  - Its associated data and index entries.
  - Its base cluster's cluster entry.
  - Each associated path entry.
- An alternate index's data entry points to:
  - Its associated alternate index entry.
- An alternate index's index entry points to:
  - Its associated alternate index entry.
- A cluster entry points to:
  - Its associated data entry.
  - Each associated path entry.
  - For a key-sequenced cluster, its associated index entry.
  - For a cluster with alternate indexes, each associated alternate index entry.
- A cluster's data entry points to:
  - Its associated cluster entry.
- A cluster's index entry points to:
  - Its associated cluster entry.
- A generation data group base entry points to:
  - Its associated non-VSAM data set entries.
- A non-VSAM data set entry points to:
  - Its associated alias entry.
  - Its associated generation data group (for a G0000V00 non-VSAM).
- A page space entry points to:
  - Its associated data entry. (The page space is cataloged as an entry-sequenced cluster with a cluster entry and an associated data entry.)
- A path entry (that establishes the connection between a base cluster and an alternate index) points to:
  - Its associated alternate index entry, and the alternate index's associated data and index entries.
  - The data entry of its associated base cluster.
  - For a key-sequenced base cluster, the index entry of its associated base cluster.

- Path entry (that is an alias for a cluster entry) points to:
  - Its associated base cluster entry.
  - The data entry of its associated base cluster.
  - For a key-sequenced cluster, the index entry of its associated base cluster.
- A user catalog entry points to:
  - Its associated alias entry.

AIX	identifies an alternate index entry.
ALIAS	identifies an alias entry.
CLUSTER	identifies a cluster entry.
DATA	identifies a data entry.
GDG	identifies a generation data group (GDG) base entry.
INDEX	identifies an index entry.
NONVSAM	identifies a non-VSAM data set entry.
PGSPC	identifies a page space entry.
PATH	identifies a path entry.
UCAT	identifies a user catalog entry.

ATT: Attributes Group

The fields in this group describe the miscellaneous attributes of the entry. See the DEFINE command for further discussion of most of these attributes.

AVGLRECL—The average length of data records. Set AVGLRECL equal to MAXLRECL to indicate that the records are fixed length, but do not set AVGLRECL equal to MAXLRECL for variable-length relative records.

Note: For variable-length relative record data sets, the AVGLRECL shown in the LISTCAT output will be four greater than the user-specified length, reflecting the system-increased record size.

AXRKP—Indicates, for an alternate index, the offset, from the beginning of the base cluster's data record, at which the alternate-key field begins.

BUFSPACE—The minimum buffer space in virtual storage to be provided by a processing program.

CI/CA—The number of control intervals per control area.

CISIZE—The size of a control interval.

ERASE—Records are to be erased (set to binary zeros) when deleted.

EXCPEXIT—The name of the object's exception exit routine.

IMBED—The sequence-set index record is stored along with its associated data control area.

Attention: IMBED is no longer supported. If it is specified, it will be ignored and no message will be issued.

INH-UPDATE—The data component cannot be updated. Either the data component was exported with INHIBITSOURCE specified, or its entry was modified by way of ALTER, with INHIBIT specified.

INDEXED—The data component has an index; it is key sequenced.

KEYLEN—The length of the key field in a data record.

MAXLRECL—The maximum length of data or index records. Set MAXLRECL equal to AVGLRECL to indicate that the records are fixed-length, but do not set MAXLRECL equal to AVGLRECL for variable-length relative records.

Note: For variable-length relative record data sets, the MAXLRECL shown in the LISTCAT output will be four greater than the user-specified length, reflecting the system-increased record size.

MAXRECS—Identifies the highest possible valid relative record number, for a relative record data set. This value is calculated as follows:

2^{32}/CISIZE x number of records slots per control interval.

NOERASE—Records are not to be erased (set to binary 0's) when deleted.

NOIMBED—The sequence-set index record is not stored along with its associated data control area.

NONINDEXED—The data component has no index; it is entry sequenced.

NONSPANNED—Data records cannot span control intervals.

NONUNIQKEY—Indicates, for an alternate index, that more than one data record in the base cluster can contain the same alternate-key value.

NOREPLICAT—Index records are not replicated.

NOREUSE—The data set cannot be reused.

NOSWAP—The page space is a conventional page space and cannot be used as a high-speed swap data set.

NOTRKOVFL—The physical blocks of a page space data set cannot span a track boundary.

NOUPDATE—When the path is opened for processing, its associated base cluster is opened but the base cluster's upgrade set is not opened.

NOUPGRADE—The alternate index is not upgraded unless it is opened and being used to access the base cluster's data records.

NOTUSABLE—The entry is not usable because (1) the catalog could not be correctly recovered by RESETCAT, or (2) a DELETE SPACE FORCE was issued for a volume(s) in the entry's volume list.

NOWRITECHK—Write operations are not checked for correctness.

NUMBERED—The cluster is a relative record data set.

ORDERED—Volumes are used for space allocation in the order they were specified when the cluster was defined.

RECOVERY—A temporary CLOSE is issued as each control area of the data set is loaded, so the whole data set won't have to be reloaded if a serious error occurs during loading.

RECORDS/CI—Specifies the number of records, or slots, in each control interval of a relative record data set.

RECVABLE—This attribute is set in the data entry of a recoverable catalog, and each of the catalog's volumes contains a catalog recovery area.

REPLICATE—Index records are replicated (that is, each is duplicated around a track of the index's direct access device).

REUSE—The data set can be reused (that is, its contents are temporary and its high-used RBA can be reset to 0 when it is opened).

RKP—The relative key position—the displacement from the beginning of a data record to its key field.

SHROPTNS—(n,m) The numbers n and m identify the types of sharing permitted. See SHAREOPTIONS in the DEFINE CLUSTER section for more details.

SPANNED—Data records can be longer than control interval length, and can cross, or span, control interval boundaries.

SPEED—CLOSE is not issued until the data set has been loaded.

SUBALLOC—More than one VSAM cluster can share the data space. A VSAM catalog might also occupy the data space.

SWAP—The page space is a high-speed swap data set used by Auxiliary Storage Management during a swap operation to store and retrieve the set of LSQA pages owned by an address space.

TEMP-EXP—The data component was temporarily exported.

TRKOVFL—The physical blocks of a page space data set can span a track boundary.

UNIQUE—Only one VSAM cluster or catalog can occupy the data space—the cluster or catalog is unique.

UNIQUEKEY—Indicates, for an alternate index, that the alternate-key value identifies one, and only one, data record in the base cluster.

UNORDERED—Volumes specified when the cluster was defined can be used for space allocation in any order.

UPDATE—When the path is opened, the upgrade set's alternate indexes (associated with the path's base cluster) are also opened and are updated when the base cluster's contents change.

UPGRADE—When the alternate index's base cluster is opened, the alternate index is also opened and will be updated to reflect any changes to the base cluster's contents.

WRITECHECK—Write operations are checked for correctness.

DSP: Data Space Group

The fields in this group are included by LISTCAT, as part of a volume entry, for each data space on the volume. If a volume contains no data spaces, it is a candidate volume.

ATTRIBUTES—Describes the attributes of the data space.

AUTOMATIC—The data space was created automatically by a secondary allocation operation. If a VSAM cluster must be given additional space on a volume and all existing data spaces are full, an existing data space will be extended, or a new one allocated on the volume, using catalog DADSM. A new data space so allocated is known as an implicit or automatic data space.

EXPLICIT—The data space was created explicitly by a DEFINE MASTERCATALOG or USERCATALOG command, or a DEFINE ALTERNATEINDEX or DEFINE CLUSTER command with the UNIQUE attribute specified or by a DEFINE SPACE command.

MASTERCAT—The data space contains the master catalog.

SUBALLOC—The data space might contain several VSAM clusters.

USERCAT—The data space contains a user catalog.

UNIQUE—The data space contains a single (unique) VSAM cluster or catalog.

DATASET DIRECTORY—Lists the VSAM data sets that can be stored (see CANDIDATE that follows) or actually are stored, in whole or in part, in the data space.

ATTRIBUTES—Describes the relation between the named data set and the data space.

CANDIDATE—The volume is a candidate for storing the data set

(NULL)—The data set is stored (in whole or in part) in the data space

DSN—The data set name of the object that can be stored or is stored on the volume.

EXTENTS—The number of data set extents for the data set within the data space.

DATASETS—The number of VSAM data sets stored (in whole or in part) in the data space. (The number includes data sets for which the volume is a candidate.)

EXTENT-DESCRIPTOR—Describes the data space extent.

BEG-CCHH—The device address (that is, CC = cylinder and HH = track) of the extent.

SPACE-MAP—A hexadecimal number that tells what tracks are used and what tracks are free in the extent. The number consists of one or more run length codes (RLCs). The first RLC gives the number of contiguous used tracks, starting at the beginning of the extent; if all the tracks in the extent are used, there is only one RLC. The second RLC gives the number of contiguous free tracks, beyond the used tracks. A third RLC gives used tracks again, a fourth gives free tracks, and so on.

A 1-byte RLC gives the number of tracks less than or equal to 250; a 3-byte RLC gives the number of tracks greater than 250. That is, if the first byte of an RLC is X'FA' (250) or less, it is the only byte of the RLC and gives the number of tracks. If the first byte of an RLC is X'FB' (251) or more, the byte is followed by two more bytes that give the number of tracks (the first byte indicates merely to look at the next two bytes).

TRACKS-TOTAL—Allocated to the data space altogether.

TRACKS-USED—Used to store data.

EXTENTS—The number of data space extents in the data space.

FORMAT-1-DSCB—Identifies the format-1 DSCB that describes the data space.

CCHHR—The device address (that is, CC = cylinder, HH = track, and R = record number) of the DSCB in the VTOC.

TIMESTAMP—The time the data space was allocated (system time-of-day clock value). The DSCB contains the timestamp as part of the VSAM-generated name.

SEC-ALLOC—Gives the number of units (indicated under TYPE) of space to be allocated whenever the data space is extended.

TYPE—Indicates the unit of space allocation:

CYLINDERS—Cylinders

TRACK—Tracks

GDG: Generation Data Group Base Entry, Special Fields

The special fields for a generation data group base entry describe attributes of the generation data group.

ATTRIBUTES
This field includes the following fields:

EMPTY
All generation data sets in the generation data group will be uncataloged when the maximum number (given under LIMIT) is reached and one more data set is to be added to the group.

LIMIT
The maximum number of generation data sets allowed in the generation data group.

NOEMPTY
Only the oldest generation data set in the generation data group will be uncataloged when the maximum number (given under LIMIT) is reached and one more data set is to be added to the group.

NOSCRATCH

Generation data sets are not to be scratched (see SCRATCH that follows) when uncataloged.

SCRATCH

Generation data sets are to be scratched (that is, the DSCB that describes each one is removed from the VTOC of the volume on which it resides) when uncataloged.

HIS: History Group

The fields in this group identify the object's owner, identify its catalog recovery volume and release level, and give the object's creation and expiration dates.

entryname—The name of the cataloged object. The entryname can be specified with the ENTRIES parameter of LISTCAT to identify a catalog entry.

HISTORY—This field includes the following fields:

CREATION—The Julian date (yy.ddd) on which the entry was created. This field will always contain 00.000 for a non-VSAM data set entry in an OS CVOL.

EXPIRATION—The Julian date (yy.ddd) after which the entry can be deleted without specifying the PURGE parameter in the DELETE command. Julian date 99.999 indicates that PURGE is always required to delete the object. This field will always contain 00.000 for a non-VSAM data set entry in an OS CVOL.

OWNER-IDENT—The identity of the owner of the object described by the entry.

RCVY-CI—If the entry is in a recoverable catalog, this field contains the control interval number in the catalog recovery area where a duplicate of the entry can be found.

RCVY-DEVT—If the entry is in a recoverable catalog, this field identifies the recovery volume's device type. (See “Device Type Translation” on page 265 for a translation of the hexadecimal device type to its equivalent EBCDIC value.)

RCVY-VOL—If the entry is in a recoverable catalog, this field contains the recovery volume's serial number.

RELEASE—The release of VSAM under which the entry was created:

1 = OS/VS2 Release 3 and releases preceding Release 3
2 = OS/VS2 Release 3.6 and any later releases

NVS: Non-VSAM Entry, Special Field

The special field for a non-VSAM data set describes a non-VSAM data set stored on magnetic tape.

FSEQN—The sequence number (for the tape volume indicated under the “VOLUMES group” keyword VOLSER) of the file in which the non-VSAM data set is stored.

PRT: Protection Group

The fields in this group describe how the alternate index, cluster, data component, index component, or path defined by the entry is password protected or RACF protected. NULL or SUPPRESSED might be listed under password protection and YES or NO might be listed under RACF protection.

NULL indicates that the object defined by the entry has no passwords.

SUPP indicates that the master password of neither the catalog nor the entry was specified, so authority to list protection information is not granted.

RACF—Indicates whether or not the entry is protected by the Resource Access Control Facility.

YES—Entry is RACF protected.
NO—Entry is not RACF protected.

ATTEMPTS—Gives the number of times the console operator is allowed to attempt to enter a correct password.

CODE—Gives the code used to tell the console operator what alternate index, catalog, cluster, path, data component, or index component requires him to enter a password. NULL is listed under CODE if a code is not used—the object requiring the password is identified with its full name.

CONTROLPW—The control interval password (that is, the password for control interval access). NULL indicates no control interval password.

MASTERPW—The master password.

READPW—The read-only password. NULL indicates no read-only password.

UPDATEPW—The update password. NULL indicates no update password.

USAR—The contents (1 to 255 bytes, in character format) of the USAR (user-security-authorization record). This is the information specified in the string subparameter of the AUTH subparameter of the DEFINE command.

USVR—The name of the USVR (user-security-verification routine) which is to be invoked to verify authorization of any access to the entry.

STA: Statistics Group

The fields in this group give numbers and percentages that indicate how much activity has taken place in the processing of a data or index component. The statistics in the catalog are updated when the data set is closed. Therefore, if a failure occurs during CLOSE, the statistics may not be valid. Because a VSAM catalog remains open from job to job, its statistics are not updated.

Statistic values can be any value from a minus to a large number, if a failure occurs before or during close processing. VERIFY will not correct these statistics.

FREESPACE-%CI—Percentage of space to be left free in a control interval for subsequent processing.

FREESPACE-%CA—Percentage of control intervals to be left free in a control area for subsequent processing.

FREESPC-BYTES—Actual number of bytes of free space in the total amount of space allocated to the data or index component. Free space in partially used control intervals is not included in this statistic.

INDEX—This field appears only in an index entry. The fields under it describe activity in the index component.

> **ENTRIES/SECT**—The number of entries in each section of entries in an index record.
>
> **HI-LEVEL-RBA**—The relative byte address (RBA) of the highest-level index record.
>
> **LEVELS**—The number of levels of records in the index. The number is 0 if no records have been loaded into the key-sequenced data set to which the index belongs.
>
> **SEQ-SET-RBA**—The RBA, in decimal, of the first sequence-set record. The sequence set might be separated from the index set by some quantity of RBA space.

The remaining fields in the statistics group (except for the system timestamp field), are updated only when the data set is closed.

EXCPS—EXCP (execute channel program—SVC 0) macro instructions issued by VSAM against the data or index component.

EXTENTS—Extents in the data or index component.

REC-DELETED—The number of records that have been deleted from the data or index component. Statistics for records deleted are not maintained when the data set is processed in control interval mode.

REC-INSERTED—For a key-sequenced data set, the number of records that have been inserted into the data component before the last record; records originally loaded and records added to the end are not included in this statistic. For relative record data sets, it is the number of records inserted into available slots; the number of records originally loaded are included in this statistic. Statistics for records inserted are not maintained when the data set is processed in control interval mode.

REC-RETRIEVED—The number of records that have been retrieved from the data or index component, whether for update or not for update. Statistics for records retrieved are not maintained when the data set is processed in control interval mode.

REC-TOTAL—The total number of records actually in the data or index component. This statistic is not maintained when the data set is processed in control interval mode.

REC-UPDATED—The number of records that have been retrieved for update and rewritten. This value does not reflect those records that were deleted, but a record that is updated and then deleted is counted in the update statistics. Statistics for records updated are not maintained when the data set is processed in control interval mode.

SPLITS-CA—Control area splits. Half the data records in a control area were written into a new control area and then were deleted from the old control area.

SPLITS-CI—Control interval splits. Half the data records in a control interval were written into a new control interval and then were deleted from the old control interval.

SYSTEM-TIMESTAMP—The time (system time-of-day clock value) the data or index component was last closed (after being opened for operations that might have changed its contents).

VLS: Volumes Group

The fields in this group identify the volume(s) on which a data component, index component, user catalog, or non-VSAM data set is stored. It also identifies candidate volume(s) for a data or index component. The fields describe the type of volume and give, for a data or index component, information about the space the object uses on the volume.

- If an entry-sequenced or relative record cluster's data component has more than one VOLUMES group, each group describes the extents that contain data records for the cluster on a specific volume.
- If a key-sequenced cluster's data component has more than one VOLUMES group, each group describes the extents that contain data records for the cluster, or one of its key ranges, on a specific volume.
- If a key-sequenced cluster's index component has more than one VOLUMES group, each group describes the extents that contain index records for the cluster, or one of its key ranges, on a specific volume. The first VOLUMES group describes the extent that contains the high-level index records (that is, index records in levels above the sequence set level). Each of the next groups describe the extents that contain sequence-set index records for the cluster, or one of its key ranges, on a specific volume.

BYTES/TRACK—The number of bytes that VSAM can write on a track (listed for page spaces only).

DEVTYPE—The type of device to which the volume belongs. For a list of device types and their corresponding LISTCAT code, see “Device Type Translation” on page 265.

EXTENT-NUMBER—The number of extents allocated for the data or index component on the volume.

EXTENT-TYPE—The type of extents:

00—The extents are contiguous
40—The extents are not preformatted
80—A sequence set occupies a track adjacent to a control area.

EXTENTS—Gives the physical and relative byte addresses of each extent.

HIGH-CCHH—The device address (that is, CC = cylinder and HH = track) of the end of the extent.

HIGH-RBA—The RBA (relative byte address), in decimal, of the end of the extent.
LOW-CCHH—The device address (that is, CC = cylinder and HH = track) of the beginning of the extent.
LOW-RBA—The RBA (relative byte address), in decimal, of the beginning of the extent.
TRACKS—The number of tracks in the extent, from low to high device addresses.

HIGH-KEY[2]—For a key-sequenced data set with the KEYRANGE attribute, the highest hexadecimal value allowed on the volume in the key field of a record in the key range. A maximum of 64 bytes can appear in HIGH-KEY.

HI-KEY-RBA[2]—For a key-sequenced data set, the RBA (relative byte address), in decimal, of the control interval on the volume that contains the highest keyed record in the data set or key range.

LOW-KEY[2]—For a key-sequenced data set with the KEYRANGE attribute, the lowest hexadecimal value allowed on the volume in the key field of a record in the key range. A maximum of 64 bytes can appear in LOW-KEY.

PHYRECS/TRK—The number of physical records (of the size indicated under PHYRECS-SIZE) that VSAM can write on a track on the volume.

PHYREC-SIZE—The number of bytes that VSAM uses for a physical record in the data or index component.

HI-ALLOC-RBA—The highest RBA (plus 1) available within allocated space to store data component, its key range, the index component, or the sequence set records of a key range.

HI-USED-RBA—The highest RBA (plus 1) within allocated space that actually contains data component, its key range, the index component, or the sequence set records of a key range.

TRACKS/CA—The number of tracks in a control area in the data component. (This value is computed when the entry is defined, and reflects the optimum size of the control area for the given device type and the nature of the entry—whether indexed, nonindexed, or numbered.)

VOLFLAG—Indicates whether the volume is a candidate volume, the first, or a subsequent volume on which data in a given key range is stored.

CANDIDATE—The volume is a candidate for storing the data or index component.

CARD-SPACE—The volume is a candidate for storing the data or index component, and it has a primary extent preallocated (the data set was defined with a guaranteed space storageclass).

OVERFLOW—The volume is an overflow volume on which data records in a key range are stored. The KEYRANGE begins on another (PRIME) volume.

[2] Multiple key ranges may reside on a single volume; the volumes group is repeated for each such key range field.

PRIME—The volume is the first volume on which data records in a key range are stored.

VOLSER—The serial number of the volume.

VOL: Volume Entry, Special Fields For

The special fields for a volume entry describe the characteristics of the space that VSAM uses on the volume.

volume serial number—The name of the cataloged volume entry. The volume serial number can be specified with the ENTRIES parameter of LISTCAT to identify the volume entry.

BYTES/TRK—The number of bytes that VSAM can use on each track on the volume.

CYLS/VOL—The number of cylinders that VSAM can use on the volume, including alternate track cylinders.

DATASETS-ON-VOL—The number of VSAM clusters that reside, in whole or in part, on the volume. This includes candidate volumes.

DATASPCS-ON-VOL—The number of VSAM data spaces on the volume. Should the number of data spaces be zero, then this is a candidate volume only, and the data space group is omitted.

DEVTYPE—The type of device to which the volume belongs. (See “Device Type Translation” for a translation of the hexadecimal device type to its equivalent EBCDIC value.)

MAX-PHYREC-SZ—The size of the largest physical record that VSAM can write on the volume.

MAX-EXT/ALLOC—The maximum number of extents that can be allocated per each allocation request for a single data set on the volume.

TRKS/CYL—The number of tracks in each cylinder on the volume.

VOLUME-TIMESTAMP—The time (system time-of-day clock value) VSAM last changed the contents of the volume.

Device Type Translation

The following table lists the LISTCAT codes for supported device types.

Figure 9 (Page 1 of 2). Device Type Translation Table

Generic Name	LISTCAT Code	Device Type
3330	3050 2009	3330, all models
3380	3010 200E	3380, all models
3390	3010 200F	3390, all models
9345	3010 2004	9345, all models

Figure 9 (Page 2 of 2). Device Type Translation Table

Generic Name	LISTCAT Code	Device Type
3400-2	30C0 8003	3420 Models 3, 5, and 7
3400-5	3200 8003	3420 Models 4, 6, and 8 (9 track, 6250 BPI)
3400-6	3210 8003	3420 Models 4, 6, and 8 (9 track, 1600/6250 BPI)
3400-9	3300 8003	3420C (3480 compatibility mode)
3400-3	3400 8003	3430, 9 track, 1600/6250 BPI tape
3480	7800 8080	3480 Magnetic Tape Unit
3480	7800 8080	3490 Magnetic Tape Subsystem Models A01, A02, B02, B04, D31, and D32
3480X	7804 8080	3480 Magnetic Tape Unit with IDRC enabled
3480X	7804 8080	3490 Magnetic Tape Subsystem Models A01, A02, B02, B04, D31, and D32 with IDRC enabled
3490	7804 8081	3490 Magnetic Tape Subsystem Enhanced Capability Models A10, A20, B20, B40, D41, and D42
3590-1	7804 8083	IBM 3590 High Performance Tape Subsystem Models A00, 3591 A01, A14, B11, B1A, C12

Examples of LISTCAT Output Listings

This section illustrates the kind of output you can get when you specify LISTCAT parameters. It also describes the job control language you can specify and the output messages you receive when the LISTCAT procedure executes successfully.

Job Control Language (JCL) for LISTCAT Jobs

The job control language (JCL) statements that can be used to list a catalog's entries are:

```
//LISTCAT  JOB   ...
//STEP1    EXEC  PGM=IDCAMS
//STEPCAT  DD    DSN=YOURCAT,DISP=SHR
//OUTDD    DD    DSN=LISTCAT.OUTPUT,UNIT=3480,
//         VOL=SER=TAPE10,LABEL=(1,NL),DISP=(NEW,KEEP),
//         DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
    LISTCAT -
       CATALOG(YOURCAT/PASSWORD) -
       OUTFILE(OUTDD) -
       ...
/*
```

The JOB statement contains user and accounting information required for your installation.

The EXEC statement identifies the program to be executed, IDCAMS (that is, the access method services program). STEPCAT is used to allocate the user catalog. Although this option is supported, its use is not recommended.

- STEPCAT DD allocates your catalog. The catalog can be allocated dynamically if the STEPCAT and JOBCAT are omitted. If the catalog is dynamically allocated, its volume must be mounted as permanently RESIDENT or RESERVED.
- OUTDD specifies an alternate output file, so that the LISTCAT output can be written onto an auxiliary storage device. The LISTCAT command's OUTFILE parameter points to the OUTDD DD statement. Only the LISTCAT output is written to the alternate output device. JCL statements, system messages, and job statistics are written to the SYSPRINT output device.
  - DSN=LISTCAT.OUTPUT specifies the name for the magnetic tape file.
  - UNIT=2400-3 and VOL=SER=TAPE10 specifies that the file is to be contained on magnetic tape volume TAPE10.
  - LABEL=(1,NL) specifies that this is the first file on a nonlabeled tape. You can also use a standard labeled tape by specifying LABEL=(1,SL). If subsequent job steps produce additional files of LISTCAT output on the same tape volume, you should increase the file number in each job step's LABEL subparameter (that is, LABEL=(2,NL) for the second job step, LABEL=(3,NL) for the third job step, and so on.)
  - DISP=(NEW,KEEP) specifies that this is a new tape file and is to be rewound when the job finishes. If a subsequent job step prints the tape, DISP=(NEW,PASS) should be specified. If your job step contains more than one LISTCAT command, DISP=(MOD,KEEP) or DISP=(MOD,PASS) can be used to concatenate all of the LISTCAT output in one sequential file.
  - DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629) specifies that the LISTCAT output records are variable-length, blocked 5-to-1, and are preceded by an ANSI print control character.
- SYSPRINT DD is required for each access method services job step. It identifies the output queue, SYSOUT=A, on which all LISTCAT output and system output messages are printed (unless the OUTFILE parameter and its associated DD statement is specified—see the preceding OUTDD).

Note: If you want *all* output to be written to an auxiliary storage device, replace `'OUTDD'` with `'SYSPRINT'` in the OUTDD DD statement and omit the SYSPRINT DD SYSOUT=A statement.

- SYSIN DD specifies, with an asterisk (*), that the statements that follow are the input data statements. A `'/*'` terminates the input data statements.

The preceding LISTCAT command parameters are common to the LISTCAT examples that follow. Other LISTCAT parameters are coded with each example and the output that results is illustrated. These two parameters are optional:

- CATALOG identifies the catalog, YOURCAT, whose entries are to be listed. If the catalog is password protected, its read- or higher-level password, PASSWORD, is required. If the passwords and protection attributes of each entry are to be listed, the catalog's master password is required.
- OUTFILE points to the OUTDD DD statement. The OUTDD DD statement allocates an alternate output file for the LISTCAT output.

If you want to print the LISTCAT output that is contained on an alternate output file, you can use the IEBGENER program. The following shows the JCL required to print the alternate output file, LISTCAT.OUTPUT, that was allocated previously:

```
//PRINTOUT  JOB   ...
//STEP1     EXEC  PGM=IEBGENER
//SYSUT1    DD    DSN=LISTCAT.OUTPUT,UNIT=2400-3,
//          VOL=SER=TAPE10,LABEL=(1,NL),DISP=(OLD,KEEP),
//          DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSUT2    DD    SYSOUT=A
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    DUMMY
/*
```

LISTCAT and Access Method Services Output Messages

When the LISTCAT job completes, access method services provides messages and diagnostic information. An analysis of any error messages received can be found in *OS/390 MVS System Messages, Vol 3 (GDE-IEB)*. When your LISTCAT job completes successfully, access method services provides messages that follow the entry listing (see Figure 10):

```
                                                                LISTING FROM CATALOG -- MJKCAT

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------1
                   ALIAS -----------------2
                   CLUSTER ---------------5
                   DATA ------------------6
                   GDG -------------------1
                   INDEX -----------------3
                   NONVSAM ---------------2
                   PAGESPACE -------------0
                   PATH ------------------2
                   SPACE -----------------0
                   USERCATALOG -----------0
                   TOTAL ----------------22

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE, MAXIMUM CONDITION CODE WAS 0
```

Figure 10. Messages That Follow the Entry Listing

The first line identifies the catalog that contains the listed entries.

The next group of lines specify the number of each entry type and the total number of entries that were listed. This statistical information can help you determine the approximate size, in records, of your catalog.

The next line specifies the number of entries that could not be listed because the appropriate password was not specified.

The last two messages indicate that the LISTCAT command (FUNCTION) and the job step (IDCAMS) completed successfully. When LISTCAT is invoked from a TSO terminal, IDC0001I is not printed.

LISTCAT Output Listing

When you specify LISTCAT with no parameters, the entryname and type of each entry are listed (see Figure 11). The same listing would result if the NAMES parameter were specified.

You can use this type of listing to list the name of each cataloged object and to determine the number of entries in the catalog. The total number of entries is an approximate size, in records, of your catalog.

```
                                                               LISTING FROM CATALOG -- MJKCAT
LISTCAT -
     CATALOG (MJKCAT)

AIX ----------- MJK.ALT.INDEX1
   DATA ------- MJK.ALT.INDEX1.DATA
   INDEX ------ MJK.ALT.INDEX1.INDEX
   PATH ------- MJK.AIX1.PATH

CLUSTER ------- MJK.CLUSTER1
   DATA ------- MJK.CLUSTER.DATA
   INDEX ------ MJK.CLUSTER1.INDEX

GDG BASE ------ MJK.GDG1
   NONVSAM ---- MJK.GDG1.G0001V00

ALIAS --------- MJK.GDG1.ALIAS

NONVSAM ------- MJK.NONVSAM1

CLUSTER ------- MJKCAT
   DATA ------- VSAM.CATALOG.BASE.DATA.RECORD
   INDEX ------ VSAM.CATALOG.BASE.INDEX.RECORD

VOLUME -------- 333001

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------1
                   ALIAS -----------------1
                   CLUSTER ---------------2
                   DATA ------------------3
                   GDG -------------------1
                   INDEX -----------------3
                   NONVSAM ---------------2
                   PAGESPACE -------------0
                   PATH ------------------1
                   SPACE -----------------0
                   USERCATALOG -----------0
                   TOTAL ----------------14

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 11. Example of LISTCAT Output When No Parameters Are Specified

LISTCAT VOLUME Output Listing

When the LISTCAT command is specified with the VOLUME parameter, the volume serial number and device type of each volume that contains part or all of the cataloged object are listed (see Figure 12).

```
LISTCAT -
      VOLUME
      CATALOG(MJKCAT)
                                                                      LISTING FROM CATALOG -- MJKCAT

AIX ----------- MJK.ALT.INDEX1
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000010'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
  DATA -------- MJK.ALT.INDEX1.DATA
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000011'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
  INDEX ------- MJK.ALT.INDEX1.INDEX
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000012'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
  PATH -------- MJK.AIX1.PATH
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000014'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
CLUSTER ------- MJK.CLUSTER1
    HISTORY
      OWNER-IDENT-----OWNCLUST     CREATION----------87.213     RCVY-VOL----------333001     RCVY-CI----------X'00000E'
      RELEASE----------------2     EXPIRATION--------87.313     RCVY-DEVT----X'30502009'
  DATA -------- MJK.CLUSTER1.DATA
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'00000D'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
  INDEX ------- MJK.CLUSTER1.INDEX
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'00000F'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
GDG BASE ------ MJK.GDG1
    HISTORY
      OWNER-IDENT-------OWNGDG     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000015'
      RELEASE----------------2     EXPIRATION--------99.365     RCVY-DEVT----X'30502009'
  NONVSAM ----- MJK.GDG1.G0001V00
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000016'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
      VOLSER------------333002     DEVTYPE------X'30502009'
NONVSAM ------- MJK.NONVSAM1
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI----------X'000018'
      RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
CLUSTER ------- MJKCAT
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION--------87.313
      RELEASE----------------2     EXPIRATION------99.999
```

Figure 12 (Part 1 of 2). Example of LISTCAT VOLUME Output

```
                                                                      LISTING FROM CATALOG -- MJKCAT

  DATA -------- VSAM.CATALOG.BASE.DATA.RECORD
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------00.000
      RELEASE----------------2     EXPIRATION--------00.000
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
  INDEX ------- VSAM.CATALOG.BASE.INDEX.RECORD
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------00.000
      RELEASE----------------2     EXPIRATION--------00.000
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'
VOLUME ------ 333001
    HISTORY
      RELEASE----------------2     RCVY-VOL----------333001     RCVY-DEVT-----X'30502009'     RCVY-CI--------X'000009'
    VOLUMES
      VOLSER------------333001     DEVTYPE------X'30502009'

        THE NUMBER OF ENTRIES PROCESSED WAS:
                  AIX -------------------1
                  ALIAS -----------------0
                  CLUSTER ---------------2
                  DATA ------------------3
                  GDG -------------------1
                  INDEX -----------------3
                  NONVSAM ---------------2
                  PAGESPACE -------------0
                  PATH ------------------1
                  SPACE -----------------1
                  USERCATALOG------------0
                  TOTAL-----------------14

        THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 12 (Part 2 of 2). Example of LISTCAT VOLUME Output

LISTCAT SPACE ALL Output Listing

When the LISTCAT command is specified with the SPACE and ALL parameters, all the information for each volume entry in the catalog is listed (see Figure 13). You can use this type of listing to determine how space on each cataloged volume is allocated to VSAM data spaces. You may have to list the volume's table of contents (VTOC) to determine how all of the volume's space is allocated.

```
LISTCAT -
   SPACE -
   ALL -
   CATALOG(MJKCAT)
                                                                      LISTING FROM CATALOG -- MJKCAT

VOLUME ------ 333001
    HISTORY
      RELEASE----------------2     RCVY-VOL----------333001     RCVY-DEVT-----X'30502009'     RCVY-CI--------X'000009'
    CHARACTERISTICS
      BYTES/TRK----------13165     DEVTYPE------X'30502009'     MAX-PHYREC-SZ-------13030     DATASETS-ON-VOL--------5
      TRKS/CYL--------------19     VOLUME-TIMESTAMP:            MAX-EXT/ALLOC-----------5     DATASPCS-ON-VOL--------1
      CYLS/VOL-------------411          X'8A51B6A76850E000'
```

Figure 13 (Part 1 of 2). Example of LISTCAT SPACE ALL Output

```
                                                                     LISTING FROM CATALOG -- MJKCAT

    DATASPACE
      DATASETS---------------5     FORMAT-1-DSCB:              ATTRIBUTES:
      EXTENTS----------------1     CCHHR------X'0000000103'    SUBALLOC
      SEC-ALLOC-------------40     TIMESTAMP                   EXPLICIT
      TYPE---------------TRACK          X'8A51B61D97804000'    USERCAT
      EXTENT-DESCRIPTOR:
      TRACKS-TOTAL---------160     BEC-CCHH---X'0000000002'    SPACE-MAP------------5947
      TRACKS-USED-----------89
      DATASET-DIRECTORY:
        DSN----MJKCAT                                          ATTRIBUTES---------(NULL)    EXTENTS----------------3
        DSN----MJK.CLUSTER.DATA                                ATTRIBUTES---------(NULL)    EXTENTS----------------1
        DSN----MJK.CLUSTER1.INDEX                              ATTRIBUTES---------(NULL)    EXTENTS----------------1
        DSN----MJK.ALT.INDEX1.DATA                             ATTRIBUTES---------(NULL)    EXTENTS----------------1
        DSN----MJK.ALT.INDEX1.INDEX                            ATTRIBUTES---------(NULL)    EXTENTS----------------1

        THE NUMBER OF ENTRIES PROCESSED WAS:
                  AIX -------------------0
                  ALIAS -----------------0
                  CLUSTER ---------------0
                  DATA ------------------0
                  GDG -------------------0
                  INDEX -----------------0
                  NONVSAM ---------------0
                  PAGESPACE -------------0
                  PATH ------------------0
                  SPACE -----------------1
                  USERCATALOG------------0
                  TOTAL------------------1

        THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

 IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 13 (Part 2 of 2). Example of LISTCAT SPACE ALL Output

LISTCAT ALL Output Listing

When you specify LISTCAT and the ALL parameter, all the information for each catalog entry is listed. The example in Figure 14 on page 274 shows the LISTCAT output for each type of catalog entry. With this type of listing, you can obtain all cataloged information about each listed entry except for password and security information. If you want to list an entry's passwords, you must provide the catalog's master password (this lists the passwords of each password-protected entry) or each entry's master password.

Note: When ENTRIES is specified, list only the entrynames that identify catalog entries that are not volume entries. If you specify a volume serial number with the ENTRIES parameter, you cannot specify entrynames of other entry types. However, if you do not specify the ENTRIES parameter and you do not specify entry types (CLUSTER, SPACE, DATA, etc.), all entries in the catalog, including volume entries, are listed.

```
 LISTCAT -
         ALL
         CATALOG(MJKCAT)
                                                                      LISTING FROM CATALOG -- MJKCAT

AIX ----------- MJK.ALT.INDEX1
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000010'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
     ASSOCIATIONS
       DATA-----MJK.ALT.INDEX1.DATA
       INDEX----MJK.ALT.INDEX1.INDEX
       CLUSTER--MJK.ATL.CLUSTER1
       PATH-----MJK.AIX1.PATH
     ATTRIBUTES
       UPGRADE
   DATA ------- MJK.ALT.INDEX1.DATA
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000011'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
     ASSOCIATIONS
       AIX------MJK.ALT.INDEX1
     ATTRIBUTES
       KEYLEN-----------------5     AVGLRECL------------4086     BUFSPACE------------8704     CISIZE--------------4096
       RKP--------------------5     MAXLRECL-----------32600     EXCPEXIT----------(NULL)     CI/CA-----------------18
       AXRKP-----------------45
       SHROPTNS(1,3)   RECOVERY     SUBALLOC         NOERASE     INDEXED       NOWRITECHK     NOIMBED       NOREPLICAT
       UNORDERED        NOREUSE     SPANNED       NONUNIQKEY
     STATISTICS
       REC-TOTAL--------------4     SPLITS-CI--------------0     EXCPS------------------7
       REC-DELETED------------0     SPLITS-CA--------------0     EXTENTS----------------1
       REC-INSERTED-----------0     FREESPACE-%CI----------0     SYSTEM-TIMESTAMP:
       REC-UPDATED------------0     FREESPACE-%CA----------0          X'8A51B6C0C87CF000'
       REC-RETRIEVED----------0     FREESPC-BYTES------69632
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------73728
       SPACE-PRI--------------6     HI-USED-RBA--------73728
       SPACE-SEC--------------6
     VOLUME
       VOLSER------------333001     PHYREC-SIZE---------4096     HI-ALLOC-RBA-------73728     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK------------3     HI-USED-RBA--------73728     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------6
       EXTENTS:
       LOW-CCHH-----X'00040008'     LOW-RBA----------------0     TRACKS-----------------6
       HIGH-CCHH----X'0004000D'     HIGH-RBA-----------73727
   INDEX --------- MJK.ALT.INDEX1.INDEX
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000012'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
     ASSOCIATIONS
       AIX--------MJK.ALT.INDEX1
     ATTRIBUTES
       KEYLEN-----------------5     AVGLRECL---------------0     BUFSPACE---------------0     CISIZE---------------512
       RKP--------------------5     MAXLRECL-------------505     EXCPEXIT----------(NULL)     CI/CA-----------------20
       SHROPTNS(1,3)   RECOVERY     SUBALLOC         NOERASE     NOWRITECHK       NOIMBED     NOREPLICAT     UNORDERED
       NOREUSE
     STATISTICS
       REC-TOTAL--------------1     SPLITS-CI--------------0     EXCPS------------------3     INDEX:
       REC-DELETED------------0     SPLITS-CA--------------0     EXTENTS----------------1     LEVELS-----------------1
       REC-INSERTED-----------0     FREESPACE-%CI----------0     SYSTEM-TIMESTAMP:            ENTRIES/SECT-----------4
       REC-UPDATED------------0     FREESPACE-%CA----------0          X'8A51B6C0C87CF000'     SEQ-SET-RBA------------0
       REC-RETRIEVED----------0     FREESPC-BYTES-------9728                                  HI-LEVEL-RBA-----------0
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------10240
       SPACE-PRI--------------1     HI-USED-RBA----------512
       SPACE-SEC--------------1
```

Figure 14 (Part 1 of 5). Example of LISTCAT ALL Output

```
                                                                       LISTING FROM CATALOG -- MJKCAT

     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------10240     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA----------512     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------1
       EXTENTS:
       LOW-CCHH-----X'0004000E'     LOW-RBA----------------0     TRACKS-----------------1
       HIGH-CCHH----X'0004000E'     HIGH-RBA-----------10239
   PATH--------- MJK.AIX1.PATH
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI---------X'000014'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
     ASSOCIATIONS
       AIX------MJK.ALT.INDEX1
       DATA-----MJK.ALT.INDEX1.DATA
       INDEX----MJK.ALT.INDEX1.INDEX
       DATA-----MJK.CLUSTER.DATA
       INDEX----MJK.CLUSTER1.INDEX
     ATTRIBUTES
       UPDATE
CLUSTER ------- MJK.CLUSTER1
     HISTORY
       OWNER-IDENT-----OWNCLUST     CREATION--------87.213     RCVY-VOL----------333001     RCVY-CI---------X'00000E'
       RELEASE----------------2     EXPIRATION------87.313     RCVY-DEVT----X'30502009'
       STATUS----------DEFERRED
     PROTECTION
       MASTERPW----------MASTCL     UPDATEPW---------UPDCL     CODE--------------CODECL     RACF-----------------(NO)
       CONTROLPW---------CNTLCL     READPW----------READCL     ATTEMPTS---------------3     USVR---------------(NULL)
       USAR--------------(NONE)
     ASSOCIATIONS
       DATA-----MJK.CLUSTER1.DATA
       INDEX----MJK.CLUSTER1.INDEX
       AIX------MJK.ALT.INDEX1
   DATA ------- MJK.CLUSTER.DATA
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI---------X'00000D'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
     ASSOCIATIONS
       CLUSTER--MJK.CLUSTER1
     ATTRIBUTES
       KEYLEN-----------------5     AVGLRECL--------------80     BUFSPACE-----------25088     CISIZE-------------12288
       RKP--------------------5     MAXLRECL-------------100     EXCPEXIT---------EXITCLUS    CI/CA------------------2
       SHROPTNS(1,3)   RECOVERY     SUBALLOC         NOERASE     INDEXED       NOWRITECHK     NOIMBED       NOREPLICAT
       UNORDERED        NOREUSE     NONSPANNED
     STATISTICS
       REC-TOTAL-------------20     SPLITS-CI--------------0     EXCPS------------------4
       REC-DELETED------------0     SPLITS-CA--------------0     EXTENTS----------------1
       REC-INSERTED-----------0     FREESPACE-%CI---------15     SYSTEM-TIMESTAMP:
       REC-UPDATED------------0     FREESPACE-%CA---------20          X'8A51B6ACD5B92000'
       REC-RETRIEVED---------20     FREESPC-BYTES------12288
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------24576
       SPACE-PRI--------------2     HI-USED-RBA--------24576
       SPACE-SEC--------------2
     VOLUME
       VOLSER------------333001     PHYREC-SIZE---------4096     HI-ALLOC-RBA-------24576     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK------------3     HI-USED-RBA--------24576     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------2
       EXTENTS:
       LOW-CCHH-----X'00040005'     LOW-RBA----------------0     TRACKS-----------------2
       HIGH-CCHH----X'00040006'     HIGH-RBA-----------24576
   INDEX --------- MJK.CLUSTER1.INDEX
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-CI---------X'00000F'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
     ASSOCIATIONS
       CLUSTER--MJK.CLUSTER1
```

Figure 14 (Part 2 of 5). Example of LISTCAT ALL Output

```
                                                                      LISTING FROM CATALOG -- MJKCAT

     ATTRIBUTES
       KEYLEN-----------------5     AVGLRECL---------------0     BUFSPACE---------------0     CISIZE---------------512
       RKP--------------------5     MAXLRECL-------------505     EXCPEXIT--------EXITCLUS     CI/CA-----------------20
       SHROPTNS(1,3)   RECOVERY     SUBALLOC         NOERASE     NOWRITECHK       NOIMBED     NOREPLICAT     UNORDERED
       NOREUSE
     STATISTICS
       REC-TOTAL--------------1     SPLITS-CI--------------0     EXCPS------------------4     INDEX:
       REC-DELETED------------0     SPLITS-CA--------------0     EXTENTS----------------1     LEVELS-----------------1
       REC-INSERTED-----------0     FREESPACE-%CI----------0     SYSTEM-TIMESTAMP:
       REC-UPDATED------------0     FREESPACE-%CA----------0          X'8A51B6ACD5B92000'     SEQ-SET-RBA------------0
       REC-RETRIEVED----------0     FREESPC-BYTES-------9728                                  HI-LEVEL-RBA-----------0
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------10240
       SPACE-PRI--------------1     HI-USED-RBA----------512
       SPACE-SEC--------------1
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------10240     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA----------512     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------1
       EXTENTS:
       LOW-CCHH-----X'00040007'     LOW-RBA----------------0     TRACKS-----------------1
       HIGH-CCHH----X'00040007'     HIGH-RBA-----------10239
GDG BASE ------ MJK.GDG1
     HISTORY
       OWNER-IDENT-------OWNGDG     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000015'
       RELEASE----------------2     EXPIRATION--------99.365     RCVY-DEVT----X'30502009'
     ATTRIBUTES
       LIMIT----------------250     SCRATCH            EMPTY
     ASSOCIATIONS
       NONVSAM--MJK.GDG1.G0001V00
   NONVSAM ------- MJK.GDG1.G0001V00
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000016'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     VOLUMES
       VOLSER------------333001     DEVTYPE------X'30502009'     FSEQN------------------0
       VOLSER------------333002     DEVTYPE------X'30502009'     FSEQN------------------0
     ASSOCIATIONS
       GDG-------MJK.GDG1
       ALIAS-----MJK.GDG1.ALIAS
ALIAS -----------MJK.GDG1.ALIAS
     HISTORY
       RELEASE----------------2     RCVY-VOL----------333001     RCVY-DEVT----X'30502009'     RCVY-C1---------X'000017'
     ASSOCIATIONS
       NONVSAM---MJK.GDG1.G0001V00
NONVSAM --------- MJK.NONVSAM
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000018'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     VOLUMES
       VOLSER------------333001     DEVTYPE------X'30502009'     FSEQN------------------0
     ASSOCIATIONS--------(NULL)
CLUSTER -------- MJKCAT
     HISTORY
      OWNER-IDENT--------(NULL)     CREATION----------87.313
      RELEASE-----------------2     EXPIRATION--------99.999
    PROTECTION-PSWD------(NULL)     RACF----------------(NO)
    ASSOCIATIONS
      DATA-----VSAM.CATALOG.BASE.DATA.RECORD
      INDEX----VSAM.CATALOG.BASE.INDEX.RECORD
DATA ---------- VSAM.CATALOG.BASE.DATA.RECORD
    HISTORY
      OWNER-IDENT--------(NULL)     CREATION----------00.000
      RELEASE-----------------2     EXPIRATION--------00.000
    PROTECTION-PSWD------(NULL)     RACF----------------(NO)
    ASSOCIATIONS
      CLUSTER--MJKCAT
```

Figure 14 (Part 3 of 5). Example of LISTCAT ALL Output

```
                                                                       LISTING FROM CATALOG -- MJKCAT

    ATTRIBUTES
      KEYLEN-----------------44     AVGLRECL-------------505     BUFSPACE------------3072     CISIZE---------------512
      RKP---------------------0     MAXLRECL-------------505     EXCPEXIT----------(NULL)     CI/CA-----------------40
      SHROPTNS(3,3)    RECOVERY     UNIQUE           NOERASE     INDEXED       NOWRITECHK     IMBED         NOREPLICAT
      UNORDERED         NOREUSE     NONSPANNED          BIND     RECVABLE
    STATISTICS
      REC-TOTAL--------------15     SPLITS-CI--------------0     EXCPS-----------------24
      REC-DELETED-------------0     SPLITS-CA--------------0     EXTENTS----------------2
      REC-INSERTED------------0     FREESPACE-%CI----------0     SYSTEM-TIMESTAMP:
      REC-UPDATED-------------0     FREESPACE-%CA----------0          X'8A51B6244C1B1000'
      REC-RETRIEVED-----------0     FREESPC-BYTES-----381952
    ALLOCATION
      SPACE-TYPE----------TRACK     HI-ALLOC-RBA------389120
      SPACE-PRI--------------57     HI-USED-RBA-------389120
      SPACE-SEC--------------18
    VOLUME
      VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA------368640     EXTENT-NUMBER----------1
      DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA--------20480     EXTENT-TYPE--------X'00'
      VOLFLAG------------PRIME     TRACKS/CA--------------3
      LOW-KEY---------------00
      HIGH-KEY--------------3F
      HI-KEY-RBA----------6144
      EXTENTS:
      LOW-CCHH-----X'00000002'     LOW-RBA----------------0     TRACKS----------------54
      HIGH-CCHH----X'00020011'     HIGH-RBA----------368639
    VOLUME
      VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA------389120     EXTENT-NUMBER----------1
      DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA-------389120     EXTENT-TYPE--------X'00'
      VOLFLAG------------PRIME     TRACKS/CA--------------3
      LOW-KEY---------------40
      HIGH-KEY--------------FF
      HI-KEY-RBA--------386640
      EXTENTS:
      LOW-CCHH-----X'00030002'     LOW-RBA-----------368640     TRACKS-----------------3
      HIGH-CCHH----X'00030004'     HIGH-RBA----------389119
INDEX --------- VSAM.CATALOG.BASE.INDEX.RECORD
    HISTORY
      OWNER-IDENT-------(NULL)     CREATION----------00.000
      RELEASE----------------2     EXPIRATION--------00.000
    PROTECTION-PSWD-----(NULL)     RACF----------------(NO)
    ASSOCIATIONS
      CLUSTER--MJK.CAT
    ATTRIBUTES
      KEYLEN----------------44     AVGLRECL---------------0     BUFSPACE---------------0     CISIZE---------------512
      RKP--------------------0     MAXLRECL-------------505     EXCPEXIT----------(NULL)     CI/CA-----------------20
      SHROPTNS(3,3)   RECOVERY     SUBALLOC         NOERASE     NOWRITECHK         IMBED     NOREPLICAT     UNORDERED
      NOREUSE             BIND
    STATISTICS
      REC-TOTAL--------------3     SPLITS-CI--------------0     EXCPS-----------------13     INDEX:
      REC-DELETED------------0     SPLITS-CA--------------0     EXTENTS----------------3     LEVELS-----------------2
      REC-INSERTED-----------0     FREESPACE-%CI----------0     SYSTEM-TIMESTAMP:            ENTRIES/SECT-----------7
      REC-UPDATED------------0     FREESPACE-%CA----------0          X'8A51B6244C1B1000'     SEQ-SET-RBA--------30720
      REC-RETRIEVED----------0     FREESPC-BYTES------38912                                  HI-LEVEL-RBA-----------0
    ALLOCATION
      SPACE-TYPE---------TRACK
      SPACE-PRI--------------3     HI-ALLOC-RBA-------40448
      SPACE-SEC--------------3     HI-USED-RBA--------40448
    VOLUME
      VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------30720     EXTENT-NUMBER----------1
      DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA----------512     EXTENT-TYPE--------X'00'
      VOLFLAG------------PRIME     TRACKS/CA--------------1
      EXTENTS:
      LOW-CCHH-----X'00020012'     LOW-RBA----------------0     TRACKS-----------------1
      HIGH-CCHH----X'00030001'     HIGH-RBA-----------30719
```

Figure 14 (Part 4 of 5). Example of LISTCAT ALL Output

```
                                                                        LISTING FROM CATALOG -- MJKCAT

     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------39936     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA--------31232     EXTENT-TYPE--------X'80'
       VOLFLAG------------PRIME     TRACKS/CA--------------3
       LOW-KEY---------------00
       HIGH-KEY--------------3F
       EXTENTS:
       LOW-CCHH-----X'00000002'     LOW-RBA------------30720     TRACKS----------------54
       HIGH-CCHH----X'00020011'     HIGH-RBA-----------39935
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------40448     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA--------40448     EXTENT-TYPE--------X'80'
       VOLFLAG------------PRIME     TRACKS/CA--------------3
       LOW-KEY---------------40
       HIGH-KEY--------------FF
       EXTENTS:
       LOW-CCHH-----X'00030002'     LOW-RBA------------39936     TRACKS-----------------3
       HIGH-CCHH----X'00030004'     HIGH-RBA-----------30447
 VOLUME -------- 333001
     HISTORY
       RELEASE----------------2     RCVY-VOL-----------33301     RCVY-DEVT----X'30502009'     RCVY-CI---------X'000009'
     CHARACTERISTICS
       BYTES/TRK----------13165     DEVTYPE------X'30502009'     MAX-PHYREC-SZ------13030     DATASETS-ON-VOL---------5
       TRKS/CYL--------------19     VOLUME-TIMESTAMP:            MAX-EXT/ALLOC----------5     DATASPCS-ON-VOL---------1
       CYLS/VOL-------------411          X'8A51B6A76850E000'
     DATASPACE
       DATASETS---------------5     FORMAT-1-DSCB:               ATTRIBUTES:
       EXTENTS----------------1     CCHHR------X'0000000103'     SUBALLOC
       SEC-ALLOC-------------40     TIMESTAMP                    EXPLICIT
       TYPE---------------TRACK          X'8A51B61D97B04000'     USERCAT
       EXTENT-DESCRIPTOR:
       TRACKS-TOTAL---------160     BEG-CCHH-----X'00000002'     SPACE-MAP-----------5947
       TRACKS-USED-----------89
       DATASET-DIRECTORY:
         DSN----MJKCAT                                           ATTRIBUTES--------(NULL)     EXTENTS----------------3
         DSN----MJK.CLUSTER.DATA                                 ATTRIBUTES--------(NULL)     EXTENTS----------------1
         DSN----MJK.CLUSTER1.INDEX                               ATTRIBUTES--------(NULL)     EXTENTS----------------1
         DSN----MJK.ALT.INDEX1.DATA                              ATTRIBUTES--------(NULL)     EXTENTS----------------1
         DSN----MJK.ALT.INDEX1.INDEX                             ATTRIBUTES--------(NULL)     EXTENTS----------------1

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------1
                   ALIAS -----------------1
                   CLUSTER ---------------2
                   DATA ------------------3
                   GDG -------------------1
                   INDEX -----------------3
                   NONVSAM ---------------2
                   PAGESPACE -------------0
                   PATH ------------------1
                   SPACE -----------------1
                   USERCATALOG -----------0
                   TOTAL ----------------15

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 14 (Part 5 of 5). Example of LISTCAT ALL Output

LISTCAT ALLOCATION Output Listing

When you specify the LISTCAT command and include the ALLOCATION parameter, each cataloged object with space allocated to it from a VSAM data space is listed (see Figure 15). All information about the object's space is listed, but none of the object's other cataloged information is listed. The entry types that can be specified when the ALLOCATION parameter is specified are limited to DATA and INDEX.

```
LISTCAT -
   ALLOCATION -
   CATALOG(MJKCAT)
                                                                      LISTING FROM CATALOG -- MJKCAT

AIX ---------- MJK.ALT.INDEX1
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000010'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
  DATA ---------- MJK.ALT.INDEX1.DATA
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000011'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------73728
       SPACE-PRI--------------6     HI-USED-RBA--------73728
       SPACE-SEC--------------6
     VOLUME
       VOLSER------------333001     PHYREC-SIZE---------4096     HI-ALLOC-RBA-------73728     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK------------3     HI-USED-RBA--------73728     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------6
       EXTENTS:
       LOW-CCHH-----X'00040008'     LOW-RBA----------------0     TRACKS-----------------6
       HIGH-CCHH----X'0004000D'     HIGH-RBA-----------73727
INDEX --------- MJK.ALT.INDEX1.INDEX
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000012'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     ALLOCATION
       SPACE-TYPE---------TRACK
       SPACE-PRI--------------1     HI-ALLOC-RBA-------10240
       SPACE-SEC--------------1     HI-USED-RBA--------00512
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------10240     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA----------512     EXTENT-TYPE--------X'40'
       VOLFLAG------------PRIME     TRACKS/CA--------------1
       EXTENTS:
       LOW-CCHH-----X'0004000E'     LOW-RBA----------------0     TRACKS-----------------1
       HIGH-CCHH----X'0004000E'     HIGH-RBA-----------10239
PATH ---------- MJK.AIX.PATH
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000014'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
CLUSTER ------- MJK.CLUSTER1
     HISTORY
       OWNER-IDENT-----OWNCLUST     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'00000E'
       RELEASE----------------2     EXPIRATION--------87.313     RCVY-DEVT----X'30502009'
   DATA -------- MJK.CLUSTER.DATA
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'00000D'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------24576
       SPACE-PRI--------------2     HI-USED-RBA--------24576
       SPACE-SEC--------------2
     VOLUME
       VOLSER------------333001     PHYREC-SIZE---------6144     HI-ALLOC-RBA-------24576     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK------------2     HI-USED-RBA--------24576     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------2
       EXTENTS:
       LOW-CCHH-----X'00040005'     LOW-RBA----------------0     TRACKS-----------------2
       HIGH-CCHH----X'00040006'     HIGH-RBA-----------24575
```

Figure 15 (Part 1 of 3). Example of LISTCAT ALLOCATION Output

```
                                                                      LISTING FROM CATALOG -- MJKCAT

   INDEX --------- MJK.CLUSTER1.INDEX
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'00000F'
       RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
     ALLOCATION
       SPACE-TYPE---------TRACK
       SPACE-PRI--------------1     HI-ALLOC-RBA-------10240
       SPACE-SEC--------------1     HI-USED-RBA----------512
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------10240     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA----------512     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------1
       EXTENTS:
       LOW-CCHH-----X'00040007'     LOW-RBA----------------0     TRACKS-----------------1
       HIGH-CCHH----X'00040007'     HIGH-RBA-----------10239
CLUSTER ------- MJKCAT
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------87.313
       RELEASE----------------2     EXPIRATION--------99.999
   DATA ---------- VSAM.CATALOG.BASE.DATA.RECORD
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------00.000
       RELEASE----------------2     EXPIRATION--------00.000
     ALLOCATION
       SPACE-TYPE---------TRACK
       SPACE-PRI-------------57     HI-ALLOC-RBA------389120
       SPACE-SEC-------------18     HI-USED-RBA-------389120
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA------368640     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA--------20480     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------3
       LOW-KEY---------------00
       HIGH-KEY--------------3F
       HI-KEY-RBA----------6144
     EXTENTS:
       LOW-CCHH-----X'00000002'     LOW-RBA----------------0     TRACKS----------------54
       HIGH-CCHH----X'00020011'     HIGH-RBA----------368639
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA------389120     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA-------389120     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------3
       LOW-KEY---------------40
       HIGH-KEY--------------FF
       HI-KEY-RBA--------368640
       EXTENTS:
       LOW-CCHH-----X'00030002'     LOW-RBA-----------368640     TRACKS-----------------3
       HIGH-CCHH----X'00030004'     HIGH-RBA----------389119
   INDEX --------- VSAM.CATALOG.BASE.INDEX.RECORD
     HISTORY
       OWNER-IDENT-------(NULL)     CREATION----------00.000
       RELEASE----------------2     EXPIRATION--------00.000
     ALLOCATION
       SPACE-TYPE---------TRACK     HI-ALLOC-RBA-------40448
       SPACE-PRI--------------3     HI-USED-RBA--------40448
       SPACE-SEC--------------3
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------30720     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA----------512     EXTENT-TYPE--------X'00'
       VOLFLAG------------PRIME     TRACKS/CA--------------1
       EXTENTS:
       LOW-CCHH-----X'00020012'     LOW-RBA----------------0     TRACKS-----------------3
       HIGH-CCHH----X'00030001'     HIGH-RBA-----------30719
     VOLUME
       VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------39936     EXTENT-NUMBER----------1
       DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA--------31232     EXTENT-TYPE--------X'80'
       VOLFLAG------------PRIME     TRACKS/CA--------------3
       LOW-KEY---------------00
       HIGH-KEY--------------3F
       EXTENTS:
       LOW-CCHH-----X'00000002'     LOW-RBA------------30720     TRACKS----------------54
       HIGH-CCHH----X'00020011'     HIGH-RBA-----------39935
```

Figure 15 (Part 2 of 3). Example of LISTCAT ALLOCATION Output

```
                                                                       LISTING FROM CATALOG -- MJKCAT

      VOLUME
        VOLSER------------333001     PHYREC-SIZE----------512     HI-ALLOC-RBA-------40448     EXTENT-NUMBER----------1
        DEVTYPE------X'30502009'     PHYRECS/TRK-----------20     HI-USED-RBA--------40448     EXTENT-TYPE--------X'80'
        VOLFLAG------------PRIME     TRACKS/CA--------------3
        LOW-KEY---------------40
        HIGH-KEY--------------FF
        EXTENTS:
        LOW-CCHH-----X'00030002'     LOW-RBA-----------39936     TRACKS-----------------3
        HIGH-CCHH----X'00030004'     HIGH-RBA----------40447

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------1
                   ALIAS -----------------0
                   CLUSTER ---------------2
                   DATA ------------------3
                   GDG -------------------0
                   INDEX -----------------3
                   NONVSAM ---------------0
                   PAGESPACE -------------0
                   PATH ------------------1
                   SPACE -----------------0
                   USERCATALOG -----------0
                   TOTAL ----------------10

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 15 (Part 3 of 3). Example of LISTCAT ALLOCATION Output

LISTCAT HISTORY Output Listing

When you specify the LISTCAT command and include the HISTORY parameter, only the name, ownerid, creation date, and expiration date are listed for each selected entry (see Figure 16). Only these types of entries have HISTORY information: ALTERNATEINDEX, CLUSTER, DATA, INDEX, NONVSAM, and PATH.

```
 LISTCAT -
   HISTORY -
   CATALOG(MJKCAT)
                                                                       LISTING FROM CATALOG -- MJKCAT

AIX ----------- MJK.ALT.INDEX1
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000010'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    DATA ---------- MJK.ALT.INDEX1.DATA
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000011'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502609'
    INDEX --------- MJK.ALT.INDEX1.INDEX
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000012'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    PATH ---------- MJK.AIX1.PATH
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000014'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
 CLUSTER ------- MJK.CLUSTER1
      HISTORY
        OWNER-IDENT-----OWNCLUST     CREATION----------87.213     RCVY-VOL----------333001     RCVY-C1---------X'00000E'
        RELEASE----------------2     EXPIRATION--------87.313     RCVY-DEVT----X'30502009'
```

Figure 16 (Part 1 of 2). Example of LISTCAT HISTORY Output

```
                                                                       LISTING FROM CATALOG -- MJKCAT

    DATA ---------- MJK.CLUSTER.DATA
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.213     RCVY-VOL----------333001     RCVY-C1---------X'00000D'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
    INDEX --------- MJK.CLUSTER1.INDEX
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.213     RCVY-VOL----------333001     RCVY-C1---------X'00000F'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
 GDG BASE ------ MJK.GDG1
      HISTORY
        OWNER-IDENT-------OWNGDG     CREATION----------87.213     RCVY-VOL----------333001     RCVY-C1---------X'000015'
        RELEASE----------------2     EXPIRATION--------99.365     RCVY-DEVT----X'30502009'
   NONVSAM ------- MJK.GDG1.G0001V00
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000016'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
 ALIAS --------- MJK.GDG1.ALIAS
      HISTORY
        RELEASE----------------2     RCVY-VOL----------333001     RCVY-DEVT----X'30502009'     RCVY-C1---------X'000017'
 NONVSAM ------- MJK.NONVSAM1
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313     RCVY-VOL----------333001     RCVY-C1---------X'000018'
        RELEASE----------------2     EXPIRATION--------00.000     RCVY-DEVT----X'30502009'
 CLUSTER ------- MJKCAT
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------87.313
        RELEASE----------------2     EXPIRATION--------99.999
    DATA ------- VSAM.CATALOG.BASE.DATA.RECORD
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------00.000
        RELEASE----------------2     EXPIRATION--------00.000
    INDEX ------ VSAM.CATALOG.BASE.INDEX.RECORD
      HISTORY
        OWNER-IDENT-------(NULL)     CREATION----------00.000
        RELEASE----------------2     EXPIRATION--------00.000
    VOLUME ----- 333001
      HISTORY
        RELEASE----------------2     RCVY-VOL----------333001     RCVY-DEVT----X'30502009'     RCVY-C1---------X'000009'

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------1
                   ALIAS -----------------1
                   CLUSTER ---------------2
                   DATA ------------------3
                   GDG -------------------1
                   INDEX -----------------3
                   NONVSAM ---------------2
                   PAGESPACE -------------0
                   PATH ------------------1
                   SPACE -----------------1
                   USERCATALOG -----------0
                   TOTAL ----------------15

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 16 (Part 2 of 2). Example of LISTCAT HISTORY Output

LISTCAT CREATION/EXPIRATION Output Listing

When you specify the LISTCAT command and include the CREATION or EXPIRATION parameter (or both), entries that have a creation or expiration date are selected according to the number of days you specify in the subparameter.

In Figure 17 on page 283, for example, because all entries in the listed catalog, USERCAT3, were created on the same day as the LISTCAT, no entries are listed as a result of the LISTCAT CREATION(5) job. When that job is run on an older catalog, each entry whose creation date is prior to the number of days specified with the CREATION parameter is listed (that is, the CREATION number of days specifies that all objects in the catalog at least 5 days old are to be listed). The creation date of the data and index objects of a cluster or alternate index is always the same as the creation date of its associated cluster or alternate index object. The creation date of the data and index object of a catalog is always set to 0.

When you list all entries of a catalog, and you specify the CREATION parameter, each user catalog connector entry and each alias entry are also listed regardless of their creation date.

When the LISTCAT EXPIRATION(20) job is run, each entry whose expiration date occurs within 20 days of today's date is listed. Because the expiration date of a cluster or alternate index is controlled by the cluster or alternate index object entry in the catalog, the expiration date for the data and index objects of a cluster or alternate index is always 0.

When you list all entries of a catalog and you specify the EXPIRATION parameter, each volume entry will be listed, because volume entries have no expiration date.

These types of entries can have a creation or expiration date: ALTERNATEINDEX, PATH, CLUSTER, DATA, INDEX, NONVSAM, GDG, and PAGESPACE.

```
                                                                      LISTING FROM CATALOG -- MJKCAT

 /* LIST EACH CATALOG ENTRY WITH CREATION DATE OF 5 DAYS AGO OR GREATER */

LISTCAT -
   CREATION(5) -
   CATALOG(MJKCAT)

ALIAS --------- MJK.GDG1.ALIAS

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------0
                   ALIAS -----------------1
                   CLUSTER ---------------0
                   DATA ------------------0
                   GDG -------------------0
                   INDEX -----------------0
                   NONVSAM ---------------0
                   PAGESPACE -------------0
                   PATH ------------------0
                   SPACE -----------------0
                   USERCATALOG -----------0
                   TOTAL -----------------1

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0
```

Figure 17 (Part 1 of 2). Example of LISTCAT CREATION/EXPIRATION Output

```
                                                                   LISTING FROM CATALOG -- MJKCAT

 /*  LIST EACH CATALOG ENTRY WITH AN EXPIRATION DATE WITHIN 20 DAYS  */

LISTCAT -
   EXPIRATION(20) -
   CATALOG(MJKCAT)

AIX ----------- MJK.ALT.INDEX1
   DATA ------- MJK.ALT.INDEX1.DATA
   INDEX ------ MJK.ALT.INDEX1.INDEX

   PATH ------- MJK.AIX1.PATH
ALIAS --------- MJK.GDG1.ALIAS
NONVSAM ------- MJK.NONVSAM1
VOLUME -------- 333001

         THE NUMBER OF ENTRIES PROCESSED WAS:
                   AIX -------------------1
                   ALIAS -----------------1
                   CLUSTER ---------------0
                   DATA ------------------1
                   GDG -------------------0
                   INDEX -----------------1
                   NONVSAM ---------------1
                   PAGESPACE -------------0
                   PATH ------------------1
                   SPACE -----------------1
                   USERCATALOG -----------0
                   TOTAL -----------------7

         THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 17 (Part 2 of 2). Example of LISTCAT CREATION/EXPIRATION Output

Examples of LISTCAT in a TSO Environment

The following examples illustrate the output produced at a TSO terminal for a LISTCAT NAMES (default) and LISTCAT VOLUME. A TSO logon ID of IBMUSER is assumed.

For LISTCAT NAMES, the catalog name is printed, followed by the names of all entries that have a high-level qualifier equal to the USER logon ID.

For LISTCAT VOLUME, all entrynames that have a high-level qualifier equal to the USER logon ID are printed, followed by the volume serial numbers for those entries that contain volume information.

Note: Because volume serial numbers for a cluster or an alternate index are contained in the data and index components, the data and index must have been named on the initial DEFINE in order to list the volume serial numbers.

```
LOGON IBMUSER
   .
   .
   .
READY
LISTCAT

IN CATALOG: AMAST1
IBMUSER.AIX
IBMUSER.AIXDATA
IBMUSER.AIXIDX
IBMUSER.GDG
IBMUSER.GDG.G0001V00
IBMUSER.GDG.G0002V00
IBMUSER.GDG.G0003V00
IBMUSER.KSDS
IBMUSER.KSDSDATA
IBMUSER.KSDSIDX
IBMUSER.NVSAM1
IBMUSER.NVSAM2
IBMUSER.NVSAM3
IBMUSER.NVSAM4
IBMUSER.NVSAM5
READY

LISTCAT VOLUME

IBMUSER.AIX
IBMUSER.AIXDATA
  --VOLUMES--
    333001
IBMUSER.AIXIDX
  --VOLUMES--
    333001
IBMUSER.GDG
IBMUSER.GDG.G0001V00
  --VOLUMES--
    333001
    333002
    333003
IBMUSER.GDG.G0002V00
  --VOLUMES--
    333004
    333005
    333006
    333007
    333008
IBMUSER.GDG.G0003V00
  --VOLUMES--
    333009
    333010
IBMUSER.KSDS
IBMUSER.KSDSDATA
  --VOLUMES--
    333001
IBMUSER.KSDSIDX
  --VOLUMES--
    333001
IBMUSER.NVSAM1
  --VOLUMES--
    333001
    333002
IBMUSER.NVSAM2
  --VOLUMES--
```

```
    333003
    333004
    333005

IBMUSER.NVSAM3
  --VOLUMES--
    333006
IBMUSER.NVSAM4
  --VOLUMES--
    333007
IBMUSER.NVSAM5
  --VOLUMES--
    333008
    333009
    333010
    333011
    333012
READY
```

Appendix B. Interpreting LISTCRA Output Listings

When you code the LISTCRA command, you can specify options that allow you to tailor the contents of the LISTCRA output. This appendix illustrates the various types of LISTCRA output, the order in which entries are listed, and the meanings of the listed fields.

There are five kinds of LISTCRA listings. Four are illustrated in this appendix. The fifth, SEQUENTIALDUMP, is the same as that for DUMP NOCOMPARE, except that the entries are not sorted into groups.

Each listed entry is identified by *type* (by cluster, non-VSAM, and so on) and by *name*. Entries are usually listed in alphabetic order within groups of entries, according to entryname (except for SEQUENTIALDUMP). However, if insufficient virtual storage is available for the sorting operation, the records are listed as they appear in the catalog recovery area.

On the listing, entries are sorted into three groups (except for a SEQUENTIALDUMP listing):

- VSAM entries (which are also sorted according to entryname). Cluster entries, alternate index entries, and their associated data, index, and path entries are within this group.
- Other entries that are sorted according to entryname. User catalog connector entries and non-VSAM entries are in this group.
- Unsorted entries: other entries that are not sorted according to entryname. Entries that are listed within this group depend on the type of LISTCRA listing requested.

The following list contains the abbreviation, type, and description for each kind of entry that can be listed as a result of the LISTCRA command:

Abbreviation	Type	Description
AIX	G	Alternate index entry
ALIA	X	Alias entry
CLUS	C	Cluster entry
DATA	D	Data component entry
FRSP	F	Freespace entry
GDGB	B	Generation data group entry
INDX	I	Index component entry
NONV	A	Non-VSAM data set entry
OEXT	E	Extension record for entry other than volume entry
PATH	P	Path entry
UCAT	U	User catalog connector entry (in master catalog only)
UPGD	Y	Upgrade set entry
VEXT	W	Extension record for a volume entry
VOL	V	Volume entry

Examples of LISTCRA Listings

The five kinds of LISTCRA listings are:

1. NAME NOCOMPARE—This is the default option. Each entryname, its volumes, and the name and volumes of each related entry are listed. Within the “unsorted entries” group, all catalog records not yet printed are printed. See Figure 18 on page 291.

2. DUMP NOCOMPARE—When DUMP is specified (NOCOMPARE is a default), each record is listed in the dump format. In addition, the name and volumes of each indirectly related entry are also listed. Within the “unsorted entries” group, the CRA's self-describing records (control intervals through 8) are printed, and any free space records and records not yet printed are printed. See Figure 19 on page 294.

3. NAME COMPARE—When COMPARE is specified (NAME is a default), only the name of each miscompared catalog entry is listed. A miscompared catalog entry is one whose information does not duplicate the information contained in the entry's copy in the catalog recovery area. A MISCOMPARE message is printed that identifies the most serious level of miscomparison. Within the “unsorted entries” group, miscompared records not yet printed out are printed. See Figure 20 on page 297.

4. DUMP COMPARE—When DUMP and COMPARE are specified, only the records (in dump format) of each miscompared catalog entry are listed. A miscompared catalog entry is one whose information is not identical to the information contained in the entry's copy in the catalog area. For each entry, the catalog recovery area copy is listed first, followed by the catalog entry, followed by a line that contains asterisks to identify each miscompared byte. Following each entry, a MISCOMPARE message is printed that identifies the most serious level of miscomparison. Within the “unsorted entries” group, miscompared records not yet printed out are printed in the dump format. See Figure 21 on page 298.

   Note: As explained above, all MISCOMPARE messages result from a comparison between the catalog and the CRA. If the comparison shows that the catalog and CRA records are not identical, no inference is given as to which is correct. You must make this determination yourself by looking at other mismatches in the same listing and by examining related records in the catalog or CRA.

5. SEQUENTIALDUMP—When SEQUENTIALDUMP is specified, each record in the catalog recovery area is printed. The format of the output is the same as that of the DUMP NOCOMPARE, except that the entries are not sorted into groups or alphabetic sequence.

Job Control Language (JCL) for LISTCRA Jobs

The job control language (JCL) statements that can be used to list catalog recovery areas are:

```
//LISTCAT   JOB    ...
//STEP1     EXEC   PGM=IDCAMS
//STEPCAT   DD     DSN=YOURCAT,DISP=SHR
//CATDD     DD     DSN=YOURCAT,DISP=OLD
//CRADD1    DD     VOL=SER=333001,UNIT=3380,DISP=OLD
//CRADD2    DD     VOL=SER=333002,UNIT=3380,DISP=OLD
//OUTDD     DD     DSN=LISTCRA.OUTPUT,UNIT=3480,
//          VOL=SER=TAPE10,LABEL=(1,NL),DISP=(NEW,KEEP),
//          DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSPRINT  DD     SYSOUT=A
//SYSIN     DD     *

    LISTCRA -
       COMPARE -
       DUMP -
       INFILE(CRADD1,CRADD2) -
       CATALOG(YOURCAT/PASSWORD CATDD) -
       MASTERPW(SECRET) -
       OUTFILE(OUTDD)
/*
```

The JOB statement contains user and accounting information required for your installation.

The EXEC statement identifies the program to be executed, IDCAMS (the access method services program).

- STEPCAT DD allocates your catalog. This is only required if the COMPARE option is specified. The catalog must be open as a catalog before it can be opened as a data set through the DD statement that so identifies it for the comparisons.
- CATDD specifies the catalog to be opened as a data set and compared to the catalog recovery areas. This is only required if the COMPARE option is specified.
- CRADD1 specifies a volume whose catalog recovery area (CRA) is to be listed.
- CRADD2 specifies another volume whose CRA is to be listed.
- OUTDD specifies an alternate output file, so that the LISTCRA output can be written onto an auxiliary storage device. The LISTCRA command's OUTFILE parameter points to the OUTDD DD statement. Only the LISTCRA output is written to the alternate output device. JCL statements, system messages, and job statistics are written to the SYSPRINT output device.
  - DSN=LISTCRA.OUTPUT specifies the name for the magnetic tape file.
  - UNIT=3480 and VOL=SER=TAPE10 specify that the file is to be contained on magnetic tape volume TAPE10.

- LABEL=(1,NL) specifies that this is the first file on a nonlabeled tape. You can also use a standard-labeled tape by specifying LABEL=(1,SL). If subsequent job steps produce additional files of LISTCRA output on the same tape volume, you should increase the file number in each job step's LABEL subparameter (LABEL=(2,NL) for the second job step, LABEL=(3,NL) for the third job step, and so on).
- DISP=(NEW,KEEP) specifies that this is a new tape file and is to be rewound when the job finishes. If a subsequent job step prints the tape, DISP=(NEW,PASS) should be specified. If your job step contains more than one LISTCRA command, DISP=(MOD,KEEP) or DISP=(MOD,PASS) can be used to concatenate all of the LISTCRA output in one sequential file.
- DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629) specifies that the LISTCRA output records are variable length, blocked 5-to-1, and are preceded by an ANSI print-control character.

- SYSPRINT DD is required for each access method services job step. It identifies the output queue, SYSOUT=A, on which all LISTCRA output and system output messages are printed (unless the OUTFILE parameter and its associated DD statement is specified; see OUTDD above).

Note: If you want *all* output to be written to an auxiliary storage device, replace `'OUTDD'` with `'SYSPRINT'` in the OUTDD DD statement and omit the SYSPRINT DD SYSOUT=A statement.

- SYSIN DD specifies, with an asterisk (*), that the statements that follow are the input data statements. A `'/*'` terminates the input data statements.

The LISTCRA command parameters shown above are common to the LISTCRA DUMP COMPARE example that follows. Other LISTCRA parameters may be coded and the output that results is illustrated.

COMPARE specifies that the CRA entries are to be compared with the catalog entries identified by the CATALOG parameter. Only those that miscompare will be listed.

DUMP specifies that each listed entry is to be printed in its entirety in both hexadecimal and character form.

INFILE specifies the two DD statements, CRADD1 and CRADD2, which identify the two volumes whose CRAs are to be compared with the catalog entries and the miscomparing entries listed.

CATALOG identifies the DD statement, CATDD that identifies the catalog, YOURCAT, whose entries are to be compared with those in the CRAs. If the catalog is password protected, its master password, PASSWORD, is required.

MASTERPW specifies the master password of the master catalog, SECRET, to enable the CRAs to be OPENed.

OUTFILE points to the OUTDD DD statement. The OUTDD DD statement allocates an alternate output file for the LISTCRA output.

If you want to print the LISTCRA output that is contained on an alternate output file, you can use the IEBGENER program. The following shows the JCL required to print the alternate output file, LISTCRA.OUTPUT, that was allocated previously:

```
//PRINTOUT   JOB    ...
//STEP1      EXEC   PGM=IEBGENER
//SYSUT1     DD     DSN=LISTCRA.OUTPUT,UNIT=3480,
            DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSUT2     DD     SYSOUT=A
//SYSPRINT   DD     SYSOUT=A
//SYSIN      DD     DUMMY
/*
//
```

LISTCRA Output Listing

When you specify LISTCRA with no parameters, each entryname, its volume(s), and the name and volume(s) of each related entry are listed. The same listing would result if the NAME and NOCOMPARE parameters were specified.

You can use this type of listing to list the name of each catalog entry whose copy is in the catalog recovery area, and to determine the number of entries in each catalog recovery area. The total number of entries is an approximate size, in records, of the catalog recovery area.

```
LISTING OF CATALOG RECOVERY AREA FOR VOLUME 333301 - VSAM ENTRIES

VOL  - 333301
    CRAVOLRCD  -  10/07/74   23:35:00
    F4DSCBVSAM -  10/07/74   23:35:00
    F4DSCBDUMP -  10/07/74   23:35:00

CLUS - AA.LISTCRA.ESDS

  DATA - TF41C9A0.VSAMDSET.DFD74280.T861DAD4.TF41C9A0
    DATA VOL -
      333301

  AIX  - AA2.LR.ESDS
    DATA VOL -
      333301
    INDX VOL -
      333301

  AIX  - AA1.LR.ESDS
    DATA VOL -
      333301
    INDX VOL -
      333301

  PATH - AAU.LR.ESDS

  UPGD -
```

Figure 18 (Part 1 of 2). Example of LISTCRA NAME NOCOMPARE Output

```
CLUS - AA.LISTCRA.KSDS

  DATA - T5C55DD0.VSAMDSET.DFD74280.T861DB0A.T5C55DD0
    DATA VOL -
      333301
  INDX - T5C56E70.VSAMDSET.DFD74280.T861DB0A.T5C56E70
    INDX VOL -
      333301

AIX  - AA1.LR.ESDS

  DATA - TCD41020.VSAMDSET.DFD74280.T861DB23.TCD41020
    DATA VOL -
      333301

  INDX - TCD41F00.VSAMDSET.DFD74280.T861DB23.TCD41F00
    INDX VOL -
      333301

  CLUS - AA.LISTCRA.ESDS

  PATH - AA1U.LR.ESDS

  PATH - AA1N.LR.ESDS

CLUS - LR.MCKEYRNG.KSDS

  DATA - TF081480.VSAMDSET.DFD74280.T861DB0E.TF081480
    DATA VOL - HIGH KEY
      333301 - C1C1C1C1C1C1C1C5F9
      333301 - C1C1C1C1C1C1C1E9E9

  INDX - TF082370.VSAMDSET.DFD74280.T861DB0E.TF082370
    INDX VOL -
      333301
      333301
LISTING OF CATALOG RECOVERY AREA FOR VOLUME 333301 - OTHER ENTRIES
UCAT - USERCAT2
  DATA VOL -
    333304

NUMBER OF ENTRIES PROCESSED
 CLUS -  3
 DATA -  4
 AIX  -  1
 INDX -  2
 PATH -  3
 VOL  -  1
 UPGD -  1
 SUM  - 15
```

Figure 18 (Part 2 of 2). Example of LISTCRA NAME NOCOMPARE Output

LISTCRA NAME NOCOMPARE Output Notes:

- The title line of the output contains the volume serial number and identifies the group that the following entries are within (in this case, VSAM Entries).
- The time stamps:

  CRAVOLRCD is the timestamp of the CRA volume record. It is updated only when the first catalog record and first CRA volume record are updated, after the CRA is opened when VSAM is running.

  Note: If the volume is moved to a DOS/VS system and used there, the CRAVOLRCD timestamp is updated each time the catalog and CRA volume records are updated for a space allocation change.)

  F4DSCBVSAM is a timestamp and is updated in the same manner as the CRAVOLRCD timestamp.

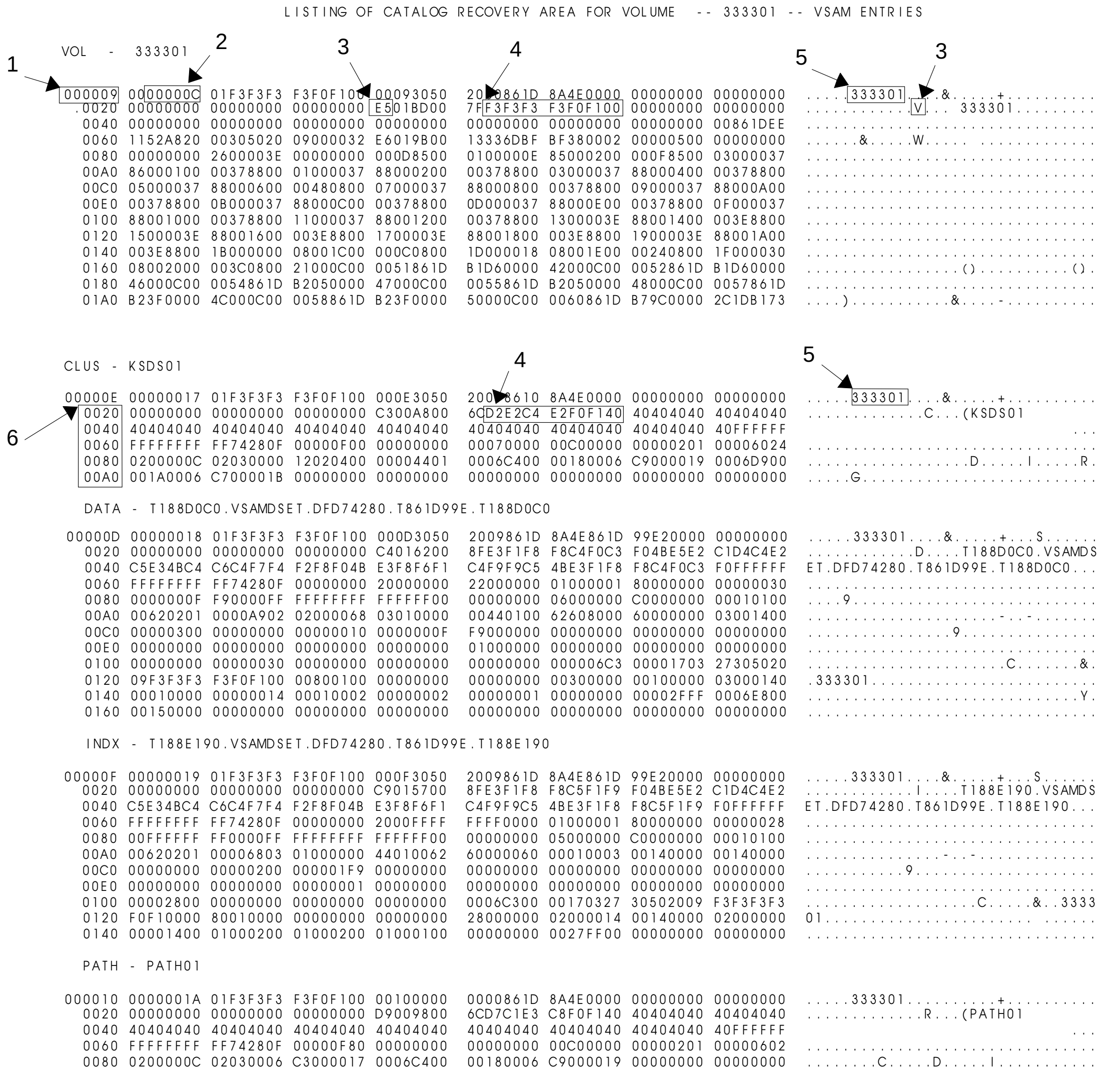
  F4DSCBDUMP is also a timestamp and is updated in the same manner as the CRAVOLRCD timestamp. It is also updated whenever the operating system utility program IEHDASDR dumps the volume.
- VSAM entries are listed along with the entryname and volume(s) of each related entry.
- Paths are shown as related only to the entry to which the path provides access. A path that serves as an alias for a VSAM data set is listed with the data-set's entry. A path that shows the relationship of an alternate index to a base cluster is listed with the alternate-index's entry only.
- UPGD indicates that there are alternate indexes in the base-cluster's upgrade set. If you want to identify the indexes in the upgrade set, use the DUMP NOCOMPARE option.
- The high-key value of each keyrange is shown.
- SUM is the total number of catalog recovery area entries printed.

LISTCRA DUMP Output Listing

When you specify LISTCRA with the DUMP parameter, each record in the catalog recovery area is listed in dump format. In addition, the name and volumes of each indirectly related entry are also listed. The same listing would result if the DUMP and NOCOMPARE parameters were specified.

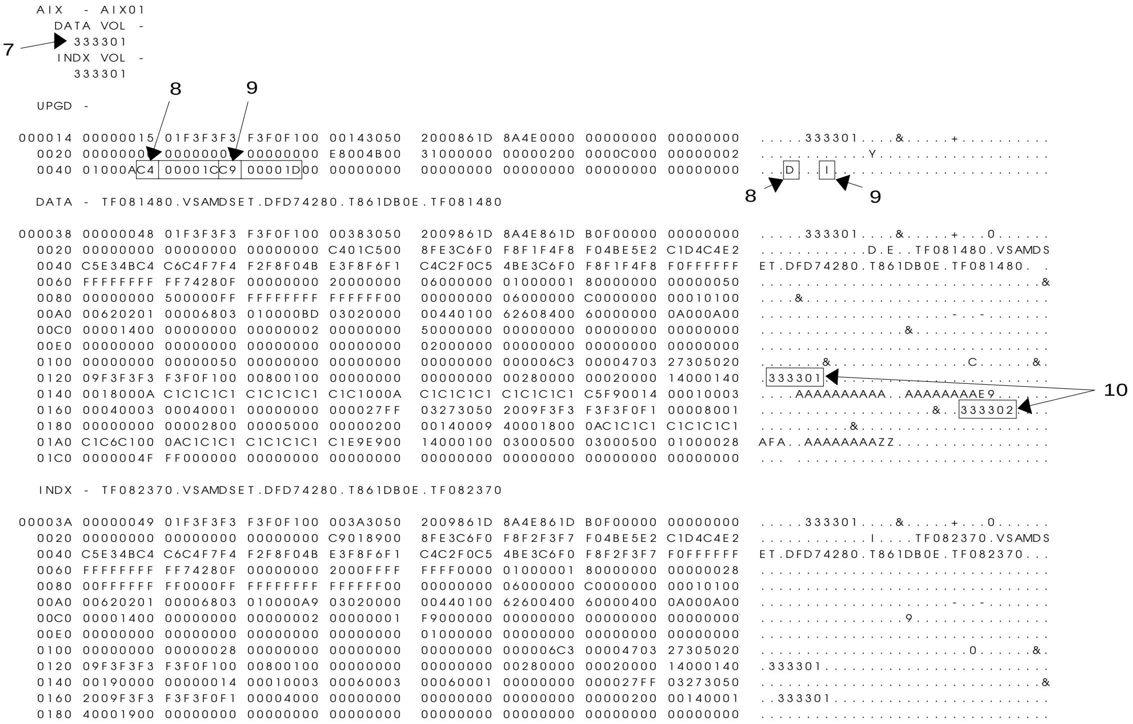
When you specify LISTCRA SEQUENTIALDUMP, the same listing results, except that the records are listed in their entry sequence within the catalog recovery area.

You can use this type of listing to list the complete contents of each catalog entry whose copy is in the catalog recovery area, and to determine the exact number of entries and records in each catalog recovery area.



```
                    LISTING OF CATALOG RECOVERY AREA FOR VOLUME  -- 333301 -- VSAM ENTRIES

  VOL  -  333301

000009 0000000C 01F3F3F3 F3F0F100 00093050  2009861D 8A4E0000 00000000 00000000  .....333301....&.....+..........
 .0020 00000000 00000000 00000000 E501BD00  7FF3F3F3 F3F0F100 00000000 00000000  ............V... 333301.........
  0040 00000000 00000000 00000000 00000000  00000000 00000000 00000000 00861DEE  ................................
  0060 1152A820 00305020 09000032 E6019B00  13336DBF BF380002 00000500 00000000  .....&.....W......  ............
  0080 00000000 2600003E 00000000 000D8500  0100000E 85000200 000F8500 03000037  ................................
  00A0 86000100 00378800 01000037 88000200  00378800 03000037 88000400 00378800  ................................
  00C0 05000037 88000600 00480800 07000037  88000800 00378800 09000037 88000A00  ................................
  00E0 00378800 0B000037 88000C00 00378800  0D000037 88000E00 00378800 0F000037  ................................
  0100 88001000 00378800 11000037 88001200  00378800 1300003E 88001400 003E8800  ................................
  0120 1500003E 88001600 003E8800 1700003E  88001800 003E8800 1900003E 88001A00  ................................
  0140 003E8800 1B000000 08001C00 000C0800  1D000018 08001E00 00240800 1F000030  ................................
  0160 08002000 003C0800 21000C00 0051861D  B1D60000 42000C00 0052861D B1D60000  ................()..........().
  0180 46000C00 0054861D B2050000 47000C00  0055861D B2050000 48000C00 0057861D  ................................
  01A0 B23F0000 4C000C00 0058861D B23F0000  50000C00 0060861D B79C0000 2C1DB173  ....)...........&....-..........


  CLUS  -  KSDS01

00000E 00000017 01F3F3F3 F3F0F100 000E3050  2009861D 8A4E0000 00000000 00000000  .....333301....&.....+..........
  0020 00000000 00000000 00000000 C300A800  6CD2E2C4 E2F0F140 40404040 40404040  ............C...(KSDS01
  0040 40404040 40404040 40404040 40404040  40404040 40404040 40404040 40FFFFFF                               ...
  0060 FFFFFFFF FF74280F 00000F00 00000000  00070000 00C00000 00000201 00006024  ................................
  0080 0200000C 02030000 12020400 00004401  0006C400 00180006 C9000019 0006D900  .................D.....I.....R.
  00A0 001A0006 C700001B 00000000 00000000  00000000 00000000 00000000 00000000  .....G..........................

   DATA  -  T188D0C0.VSAMDSET.DFD74280.T861D99E.T188D0C0

00000D 00000018 01F3F3F3 F3F0F100 000D3050  2009861D 8A4E861D 99E20000 00000000  .....333301....&.....+...S......
  0020 00000000 00000000 00000000 C4016200  8FE3F1F8 F8C4F0C3 F04BE5E2 C1D4C4E2  ............D....T188D0C0.VSAMDS
  0040 C5E34BC4 C6C4F7F4 F2F8F04B E3F8F6F1  C4F9F9C5 4BE3F1F8 F8C4F0C3 F0FFFFFF  ET.DFD74280.T861D99E.T188D0C0...
  0060 FFFFFFFF FF74280F 00000000 20000000  22000000 01000001 80000000 00000030  ................................
  0080 0000000F F90000FF FFFFFFFF FFFFFF00  00000000 06000000 C0000000 00010100  ....9...........................
  00A0 00620201 0000A902 02000068 03010000  00440100 62608000 60000000 03001400  ....................-..-........
  00C0 00000300 00000000 00000010 0000000F  F9000000 00000000 00000000 00000000  ................9...............
  00E0 00000000 00000000 00000000 00000000  01000000 00000000 00000000 00000000  ................................
  0100 00000000 00000030 00000000 00000000  00000000 000006C3 00001703 27305020  .....................C.......&.
  0120 09F3F3F3 F3F0F100 00800100 00000000  00000000 00300000 00100000 03000140  .333301.........................
  0140 00010000 00000014 00010002 00000002  00000001 00000000 00002FFF 0006E800  ..............................Y.
  0160 00150000 00000000 00000000 00000000  00000000 00000000 00000000 00000000  ................................

   INDX  -  T188E190.VSAMDSET.DFD74280.T861D99E.T188E190

00000F 00000019 01F3F3F3 F3F0F100 000F3050  2009861D 8A4E861D 99E20000 00000000  .....333301....&.....+...S......
  0020 00000000 00000000 00000000 C9015700  8FE3F1F8 F8C5F1F9 F04BE5E2 C1D4C4E2  ............I....T188E190.VSAMDS
  0040 C5E34BC4 C6C4F7F4 F2F8F04B E3F8F6F1  C4F9F9C5 4BE3F1F8 F8C5F1F9 F0FFFFFF  ET.DFD74280.T861D99E.T188E190...
  0060 FFFFFFFF FF74280F 00000000 2000FFFF  FFFF0000 01000001 80000000 00000028  ................................
  0080 00FFFFFF FF0000FF FFFFFFFF FFFFFF00  00000000 05000000 C0000000 00010100  ................................
  00A0 00620201 00006803 01000000 44010062  60000060 00010003 00140000 00140000  ..............-..-..............
  00C0 00000000 00000200 000001F9 00000000  00000000 00000000 00000000 00000000  ...........9....................
  00E0 00000000 00000000 00000001 00000000  00000000 00000000 00000000 00000000  ................................
  0100 00002800 00000000 00000000 00000000  0006C300 00170327 30502009 F3F3F3F3  ...................C.....&..3333
  0120 F0F10000 80010000 00000000 00000000  28000000 02000014 00140000 02000000  01.......................  ......
  0140 00001400 01000200 01000200 01000100  00000000 0027FF00 00000000 00000000  ................................

   PATH  -  PATH01

000010 0000001A 01F3F3F3 F3F0F100 00100000  0000861D 8A4E0000 00000000 00000000  .....333301..........+..........
  0020 00000000 00000000 00000000 D9009800  6CD7C1E3 C8F0F140 40404040 40404040  ............R...(PATH01
  0040 40404040 40404040 40404040 40404040  40404040 40404040 40404040 40FFFFFF                               ...
  0060 FFFFFFFF FF74280F 00000F80 00000000  00000000 00C00000 00000201 00000602  ................................
  0080 0200000C 02030006 C3000017 0006C400  00180006 C9000019 00000000 00000000  ........C.....D.....I...........
```

Figure 19 (Part 1 of 2). Example of LISTCRA DUMP NOCOMPARE Output



```
    AIX   - AIX01
      DATA VOL  -
         333301
      INDX VOL  -
         333301

    UPGD  -

000014 00000015 01F3F3F3 F3F0F100 00143050  2000861D 8A4E0000 00000000 00000000  .....333301....&.....+..........
  0020 00000000 00000000 00000000 E8004B00  31000000 00000200 0000C000 00000002  ............Y...................
  0040 01000AC4 00001CC9 00001D00 00000000  00000000 00000000 00000000 00000000  ...D...I........................

    DATA  - TF081480.VSAMDSET.DFD74280.T861DB0E.TF081480

000038 00000048 01F3F3F3 F3F0F100 00383050  2009861D 8A4E861D B0F00000 00000000  .....333301....&.....+...0......
  0020 00000000 00000000 00000000 C401C500  8FE3C6F0 F8F1F4F8 F04BE5E2 C1D4C4E2  ............D.E..TF081480.VSAMDS
  0040 C5E34BC4 C6C4F7F4 F2F8F04B E3F8F6F1  C4C2F0C5 4BE3C6F0 F8F1F4F8 F0FFFFFF  ET.DFD74280.T861DB0E.TF081480. .
  0060 FFFFFFFF FF74280F 00000000 20000000  06000000 01000001 80000000 00000050  ...............................&
  0080 00000000 500000FF FFFFFFFF FFFFFF00  00000000 06000000 C0000000 00010100  ....&...........................
  00A0 00620201 00006803 010000BD 03020000  00440100 62608400 60000000 0A000A00  .....................-..-.......
  00C0 00001400 00000000 00000002 00000000  50000000 00000000 00000000 00000000  ................&...............
  00E0 00000000 00000000 00000000 00000000  02000000 00000000 00000000 00000000  ................................
  0100 00000000 00000050 00000000 00000000  00000000 000006C3 00004703 27305020  .......&...............C......&.
  0120 09F3F3F3 F3F0F100 00800100 00000000  00000000 00280000 00020000 14000140  .333301.........................
  0140 0018000A C1C1C1C1 C1C1C1C1 C1C1000A  C1C1C1C1 C1C1C1C1 C5F90014 00010003  ....AAAAAAAAAA..AAAAAAAAE9......
  0160 00040003 00040001 00000000 000027FF  03273050 2009F3F3 F3F3F0F1 00008001  ...................&..333302....
  0180 00000000 00002800 00005000 00000200  00140009 40001800 0AC1C1C1 C1C1C1C1  ..........&.....................
  01A0 C1C6C100 0AC1C1C1 C1C1C1C1 C1E9E900  14000100 03000500 03000500 01000028  AFA..AAAAAAAAZZ.................
  01C0 0000004F FF000000 00000000 00000000  00000000 00000000 00000000 00000000  ... ............................

    INDX  - TF082370.VSAMDSET.DFD74280.T861DB0E.TF082370

00003A 00000049 01F3F3F3 F3F0F100 003A3050  2009861D 8A4E861D B0F00000 00000000  .....333301....&.....+...0......
  0020 00000000 00000000 00000000 C9018900  8FE3C6F0 F8F2F3F7 F04BE5E2 C1D4C4E2  ............I....TF082370.VSAMDS
  0040 C5E34BC4 C6C4F7F4 F2F8F04B E3F8F6F1  C4C2F0C5 4BE3C6F0 F8F2F3F7 F0FFFFFF  ET.DFD74280.T861DB0E.TF082370...
  0060 FFFFFFFF FF74280F 00000000 2000FFFF  FFFF0000 01000001 80000000 00000028  ................................
  0080 00FFFFFF FF0000FF FFFFFFFF FFFFFF00  00000000 06000000 C0000000 00010100  ................................
  00A0 00620201 00006803 010000A9 03020000  00440100 62600400 60000400 0A000A00  .....................-..-.......
  00C0 00001400 00000000 00000002 00000001  F9000000 00000000 00000000 00000000  ................9...............
  00E0 00000000 00000000 00000000 00000000  01000000 00000000 00000000 00000000  ................................
  0100 00000000 00000028 00000000 00000000  00000000 000006C3 00004703 27305020  .......................0......&.
  0120 09F3F3F3 F3F0F100 00800100 00000000  00000000 00280000 00020000 14000140  .333301.........................
  0140 00190000 00000014 00010003 00060003  00060001 00000000 000027FF 03273050  ...............................&
  0160 2009F3F3 F3F3F0F1 00004000 00000000  00000000 00000000 00000200 00140001  ..333301........................
  0180 40001900 00000000 00000000 00000000  00000000 00000000 00000000 00000000  ................................
```

Figure 19 (Part 2 of 2). Example of LISTCRA DUMP NOCOMPARE Output

LISTCRA DUMP NOCOMPARE Output Notes:

Note: When you specify SEQUENTIALDUMP, the same information is listed. The entries are not sorted according to type of entry, or according to alphanumeric-sequence of the entryname field. See also Note 7, below.

1. The 3-byte CRA control interval number, in hexadecimal form.
2. The 3-byte control interval number of the catalog record for which this is a copy, in hexadecimal form.
3. The entrytype at offset X'2C' (decimal 44), a character that identifies the type of catalog entry being listed.
4. A 44-byte field at offset X'31' (decimal 49) that contains the entry's entryname (padded with binary zeros), or an 8-byte field followed by 36 bytes of binary zeros that contain the volume entry's volume serial number.
5. The volume serial number of the recovery volume.
6. A 2-byte displacement value. Printing is suppressed after the last line containing data is listed, even though all catalog records are 512 bytes long.
7. As in the NAME NOCOMPARE output, the alternate index name and the fact that there is an upgrade set is given, along with the volume serial numbers of the alternate index's data and index components.

   Note: If SEQUENTIALDUMP is specified, the information described with this note is not listed.)
8. The first byte identifies the alternate index's data component and the next three bytes contain its catalog control interval number.

9. The first byte identifies the alternate index's index component and the next three bytes contain its catalog control interval number.
10. Because there are two key ranges for this cluster, there are two volume information sets of fields in the cluster's data and index component entries.

LISTCRA COMPARE Output Listing

When you specify LISTCRA with the COMPARE parameter, each record in the catalog recovery area is compared with its original in the catalog. The name of each catalog entry that miscompares is listed. A miscompared catalog entry is one whose information is not identical to the information contained in the entry's copy in the catalog recovery area. The same listing would result if the NAME and COMPARE parameters were specified.

You can use this type of listing to determine the number of damaged entries in your catalog, and you can get an idea of the type of damage that occurred to each entry. You can issue the EXPORTRA and IMPORTRA commands to recover the catalog and make its damaged entries usable.

```
LISTING OF CATALOG RECOVERY AREA FOR VOLUME -- 333301 -- VSAM ENTRIES

    CATVOLRCD  -  09/17/74   23:53:47
    CRAVOLRCD  -  10/07/74   23:35:00
    F4DSCBVSAM -  10/07/74   23:35:00
    F4DSCBDUMP -  10/07/74   23:35:00

CLUS - LR.DELETED.ESDS

* MISCOMPARES - CATALOG ENTRY HAS DIFFERENT NAME

CLUS - LR.MCHURBA.ESDS

  DATA - T73FEDA0.VSAMDSET.DFD74280.T861DAE1.T73FEDA0
    DATA VOL -
      333301

* MISCOMPARES - HIGH USED RBA

CLUS - LR.MCKEYRNG.KSDS

  DATA - TF081480.VSAMDSET.DFD74280.T861DB0E.TF081480
    DATA VOL - HIGH KEY
      333301 - C1C1C1C1C1C1C1C5F9
      333301 - C1C1C1C1C1C1C1E9E9
LISTING OF CATALOG RECOVERY AREA FOR VOLUME -- 333301 -- VSAM ENTRIES

* MISCOMPARES - HIGH USED RBA

  INDX - TF082370.VSAMDSET.DFD74280.T861DB0E.TF082370
    INDX VOL -
      333301
      333301

* MISCOMPARES - STATISTICS

NUMBER OF ENTRIES PROCESSED
 CLUS - 23
 DATA - 18
 AIX  -  8
 INDX - 11
 PATH -  5
 VOL  -  1
 UPGD -  3
 SUM  - 69

IDC0665I NUMBER OF ENTRIES THAT MISCOMPARED IN THIS CRA - 3
IDC0877I NUMBER OF RECORDS THAT MISCOMPARED IN THIS CRA - 4
```

Figure 20. Example of LISTCRA NAME COMPARE Output

LISTCRA NAME COMPARE Output Notes:

- In addition to the timestamps described for the NAME NOCOMPARE output (noted previously), the timestamp in the catalog volume record, CATVOLRCD, is listed. CATVOLRCD is updated in the same manner as the CRAVOLRCD timestamp.
- The MISCOMPARES message always refers to the record listed above it. See *DFSMS/MVS Managing Catalogs* for the cause and seriousness of this MISCOMPARES message.

- The number of records is sometimes larger than the number of entries, because an entry might consist of a catalog record and one or more extension records that failed to compare correctly.

LISTCRA DUMP COMPARE Output Listing

When you specify LISTCRA with the DUMP and COMPARE parameters, each record in the catalog recovery area is compared to its original in the catalog. Each catalog entry's copy in the catalog recovery area that miscompares is listed, followed by its original catalog entry (which is damaged), followed by asterisks to indicate each miscompared byte.

You can use this type of listing to determine the exact damage that occurred to each entry. You might be able to correct some or all of the damage by using the ALTER command. You can issue the EXPORTRA and IMPORTRA commands to recover the catalog and make its damaged entries usable.

```
                                  LISTING OF CATALOG RECOVERY AREA FOR VOLUME -- 333301 -- VSAM ENTRIES

    CLUS – LR.MCHURBA.ESDS

1──►000020  0000002C  01F3F3F3  F3F0F100  00203050   2009861D  8A4E0000  00000000  00000000  ....333301....&.....+.....
    CATRCD  0000002C  01F3F3F3  F3F0F100  00203050   2009861D  8A4E0000  00000000  00000000  ....333301....&.....+.....◄────2

      0020  00000000  00000000  00000000  C3008200   6CD3D94B  D4C3C8EA  D9C2C14B  C5E2C4E2  ............(LR.MCHURBA.ESDS
            00000000  00000000  00000000  C3008200   6CD3D94B  D4C3C8EA  D9C2C14B  C5E2C4E2  ............(LR.MCHURBA.ESDS

      0040  40404040  40404040  40404040  40404040   40404040  40404040  40404040  40FFFFFF                           ...
            40404040  40404040  40404040  40404040   40404040  40404040  40404040  40FFFFFF                           ...

      0060  FFFFFFFF  FF74280F  00000F00  00000000   00000000  00020100  00004401  0006C400  ..........................D.
            FFFFFFFF  FF74280F  00000F00  00000000   00000000  00020100  00004401  0006C400  ..........................D.

      0080  002D0000  00000000  00000000  00000000   00000000  00000000  00000000  00000000  ............................
            002D0000  00000000  00000000  00000000   00000000  00000000  00000000  00000000  ............................

      DATA  -  T73FEDAD.VSAMDSET.DFD74280.T861DAE1.T73FEDA0

    000021  0000002D  01F3F3F3  F3F0F100  00213050   2009861D  8A4E861D  AE2E0000  00000000  ....333301....&.....+.......
    CATRCD  0000002D  01F3F3F3  F3F0F100  00213050   2009861D  8A4E861D  AE2E0000  00000000  ....333301....&.....+.......

      0020  00000000  00000000  00000000  C4015700   8FE4F7F3  C6C5C4C1  F04BE5E2  C1D4C4E2  ........D....T73FEDA0.VSAMDS
            00000000  00000000  00000000  C4015700   8FE4F7F3  C6C5C4C1  F04BE5E2  C1D4C4E2  ........D....T73FEDA0.VSAMDS

      0040  C5E34BCA  C6C4F7F4  F2F8FD4B  E3F8F6F1   C4C1C5F1  4BE3F7F3  C6C5C4C1  F0FFFFFF  ET.DFD74280.T861DAE1.T73FEDAD...
            C5E34BCA  C6C4F7F4  F2F8FD4B  E3F8F6F1   C4C1C5F1  4BE3F7F3  C6C5C4C1  F0FFFFFF  ET.DFD74280.T861DAE1.T73FEDAD...

      0060  FFFFFFFF  FF74280F  00000000  20000000   04000000  01000001  80000000  00000028  ............................
            FFFFFFFF  FF74280F  00000000  20800000   04000000  01000001  80000006  00000028  ............................
3───► *                          **                      **
      0080  00000000  500000FF  FFFFFFFF  FFFFFF00   00000000  05000000  00000000  00010100  ....&.......................
            00000000  500000FF  FFFFFFFF  FFFFFF00   00000000  05000000  00000000  00010100  ....&.......................

      00A0  00620201  00006803  01000000  44010062   60000060  00000000  00000000  00140000  ................-..-.......
            00620201  00006803  01000000  44010062   60000060  00000000  00000000  00140000  ................-..-.......

      * MISCOMPARES - HIGH USED RBA ◄───4
```

Figure 21. Example of LISTCRA DUMP COMPARE Output

LISTCRA DUMP COMPARE Output Notes:

1. The 3-byte CRA control interval number in hexadecimal form.
2. Each pair of hexadecimal-data lines is the information in the catalog recovery area's copy of the catalog record, followed by the information in the catalog record, for the same displacement.

3. Asterisks are printed below the bytes in which a miscompare exists and, in the left margin, the miscompared lines are flagged with a single asterisk.
4. See *DFSMS/MVS Managing Catalogs* for the cause and seriousness of this MISCOMPARES message.

Appendix C. Invoking Access Method Services from Your Program

Access method services can be invoked by your program through the ATTACH, LINK, or LOAD and CALL macro instructions.

The dynamic invocation of access method services enables respecification of selected processor defaults as well as the ability to manage input/output operations for selected data sets.

From a User's Program

A processing program can invoke access method services with the ATTACH, LINK, LOAD, and CALL macros. Before the program issues the invoking macro, however, it must initialize the appropriate register and argument list contents.

The contents of registers follow standard linkage conventions; that is, register 1 contains the address of the argument list, register 13 contains the address of a save area, register 14 contains the address of the return point, and register 15 contains the address of the entry point IDCAMS in access method services. IDCAMS only supports 24-bit virtual addresses that are passed in argument lists, control blocks, buffers, and user exit routines. However, IDCAMS can be called in 31-bit mode, but will switch to 24-bit mode and then return to the calling program in the caller's mode.

The contents of the argument list are described in this appendix. For information on manipulating sensitive data in a secured environment, see *DFSMS/MVS Managing Catalogs*. For information on using APF, see *OS/390 MVS Programming: Authorized Assembler Services Guide*.

Invoking Macro Instructions

The following descriptions of the invoking macro instructions are related to Figure 22 on page 305, which describes the argument lists referenced by the invoking macros.

LINK or ATTACH Macro Instruction

Access method services may be invoked through either the LINK or the ATTACH macro instruction.

The syntax of the LINK or ATTACH macro instruction is:

```
[name]      LINK‘ATTACH      EP=IDCAMS,
                             PARAM=(optionaddr
                             [,ddnameaddr]
                             [,pgnoaddr]
                             [,iolistaddr]),
                             VL=1
```

EP=IDCAMS
specifies that the program to be invoked is IDCAMS.

PARAM=
specifies the addresses of the parameters to be passed to IDCAMS. These values can be coded:

optionaddr
specifies the address of an option list, which can be specified in the PARM parameter of the EXEC statement and is a valid set of parameters for the access method services PARM command. If you do not want to specify any options, this address must point to a halfword of binary zeros. Figure 22 on page 305 shows the format of the options list.

ddnameaddr
specifies the address of a list of alternate dd names for standard data sets used during IDCAMS processing. If standard ddnames are used and this is not the last parameter in the list, it should point to a halfword of binary zeros. If it is the last parameter, it may be omitted. Figure 22 shows the format of the alternate ddname list.

pgnoaddr
specifies the address of a 3- to 6-byte area that contains an EBCDIC starting page number for the system output file. If the page number is not specified, but this is not the last parameter in the list, the parameter must point to a halfword of binary zeros. If it is the last parameter, it may be omitted. If omitted, the default page number is 1. Figure 22 on page 305 shows the format of the page number area.

iolistaddr
specifies the address of a list of externally controlled data sets and the addresses of corresponding I/O routines. If no external I/O routines are supplied, this parameter may be omitted. Figure 22 shows the format of the I/O list.

VL=1
causes the high-order bit of the last address parameter of the PARAM list to be set to 1.

LOAD and CALL Macro Instructions

Access method services may also be invoked via a LOAD of the module IDCAMS, followed by a CALL to that module. The syntax of the LOAD macro instruction is:

```
[name]      LOAD      {EP=IDCAMS‘EPLOC=address of name}
```

where:

EP=IDCAMS
is the entry point name of the IDCAMS program to be loaded into virtual storage.

EPLOC=*address of name*
is the address of an 8-byte character string `'IDCAMS bb'`.

After loading IDCAMS, register 15 must be loaded with the address returned from the LOAD macro. Then CALL may be used to pass control to IDCAMS. The syntax of the CALL macro instruction is:

	15,0	**(15),**
LR	**[***name***]**	**(***optionaddr*
	CALL	**[,***ddnameaddr***]**
		[,*pgnoaddr***]**
		[,*iolistaddr***]),**
		VL

where:

15 is the register containing the address of the entry point to be given control.

optionaddr
specifies the address of an options list that can be specified in the PARM parameter of the EXEC statement and is a valid set of parameters for the access method services PARM command. If you do not want to specify any options, this address must point to a halfword of binary zeros. Figure 22 on page 305 shows the format of the options list.

ddnameaddr
specifies the address of a list of alternate dd names for standard data sets used during IDCAMS processing. If standard ddnames are used and this is not the last parameter in the list, it should point to a halfword of binary zeros. If it is the last parameter, it may be omitted. Figure 22 shows the format of the alternate ddname list.

pgnoaddr
specifies the address of a 6-byte area that contains an EBCDIC starting page number for the system output file. If the page number is not specified, but this is not the last parameter in the list, the parameter must point to a halfword of binary zeros. If it is the last parameter, it may be omitted. If omitted, the default page number is 1. Figure 22 on page 305 shows the format of the page number area.

iolistaddr
specifies the address of a list of externally controlled data sets and the addresses of corresponding I/O routines. If no external I/O routines are supplied, this parameter may be omitted. Figure 22 shows the format of the I/O list.

VL causes the high-order bit of the last address parameter in the macro expansion to be set to 1.

Invocation from a PL/I Program

Access method services may also be invoked from a PL/I program using the facilities of the IBM PL/I Optimizing Compiler Licensed Program. IDCAMS must be declared to the compiler as an external entry point with the ASSEMBLER and INTER options. The access method services processor is loaded by issuing a FETCH IDCAMS statement, is branched to via a CALL statement, and deleted via a RELEASE IDCAMS statement. The format of the CALL statement is:

```
CALL      IDCAMS      (options[,ddnames][,pageno][,iolist]);
```

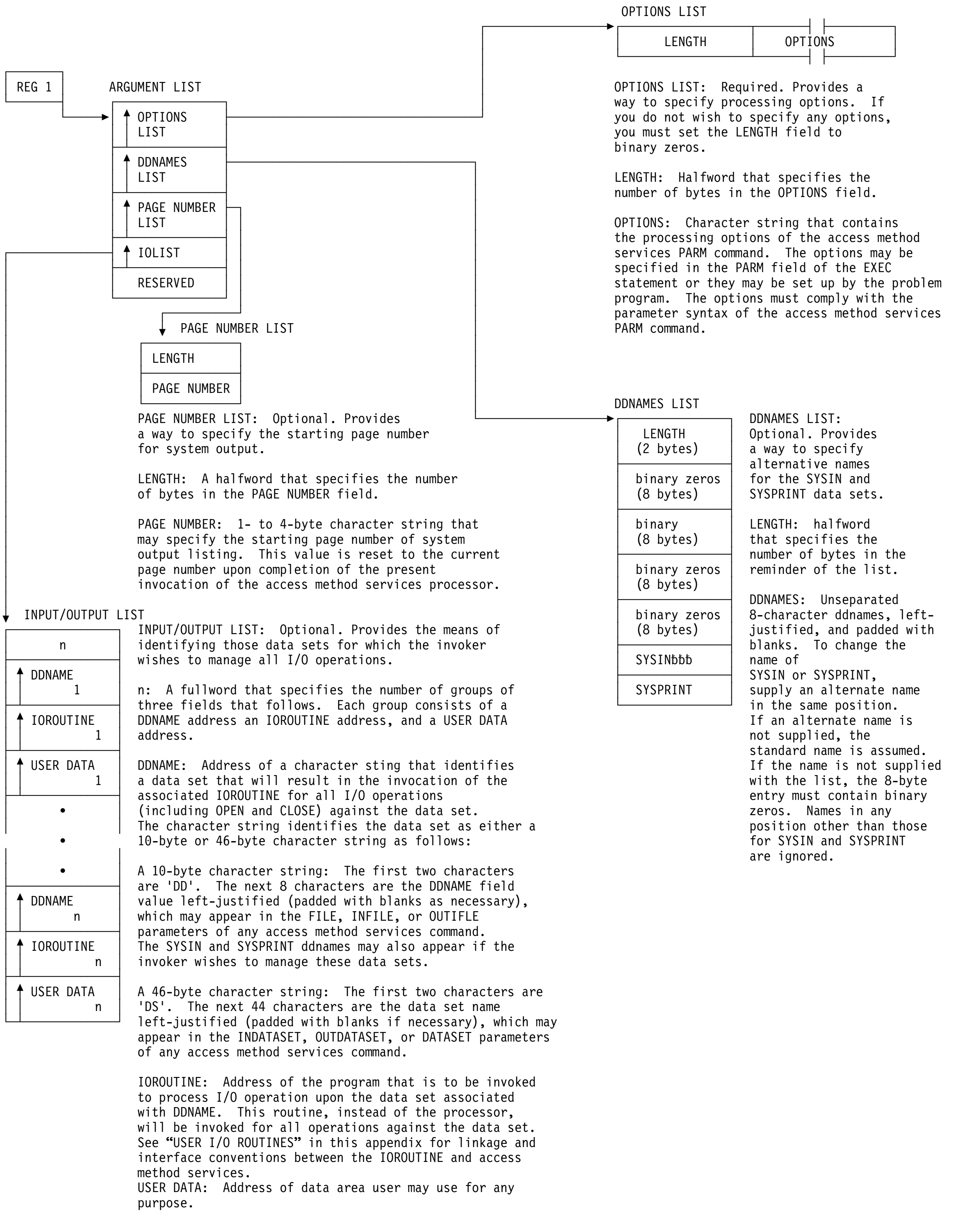
where:

options
: specifies a valid set of parameters for the access method services PARM command. If no parameters are to be specified, options should be a halfword of binary zeros. Figure 22 on page 305 shows the format of the options area.

ddnames
: specifies a list of alternate ddnames for standard data sets used during IDCAMS processing. If standard ddnames are used and this is not the last parameter in the list, ddnames should be a halfword of binary zeros. If it is the last parameter, it may be omitted. Figure 22 shows the format of the alternate ddnames list.

pageno
: specifies a 6-byte field that contains an EBCDIC starting page number for the system output file. If the page number is not specified, but this is not the last parameter in the list, the parameter must be a halfword of binary zeros. If it is the last parameter, it may be omitted. If not specified, the default page number is 1. Figure 22 shows the format of the page number area.

iolist
: specifies a list of externally controlled data sets and the addresses of corresponding I/O routines. If no external I/O routines are supplied, this parameter may be omitted. Figure 22 shows the format of the I/O list.



OPTIONS LIST: Required. Provides a way to specify processing options. If you do not wish to specify any options, you must set the LENGTH field to binary zeros.

LENGTH: Halfword that specifies the number of bytes in the OPTIONS field.

OPTIONS: Character string that contains the processing options of the access method services PARM command. The options may be specified in the PARM field of the EXEC statement or they may be set up by the problem program. The options must comply with the parameter syntax of the access method services PARM command.

PAGE NUMBER LIST: Optional. Provides a way to specify the starting page number for system output.

LENGTH: A halfword that specifies the number of bytes in the PAGE NUMBER field.

PAGE NUMBER: 1- to 4-byte character string that may specify the starting page number of system output listing. This value is reset to the current page number upon completion of the present invocation of the access method services processor.

DDNAMES LIST: Optional. Provides a way to specify alternative names for the SYSIN and SYSPRINT data sets.

LENGTH: halfword that specifies the number of bytes in the reminder of the list.

DDNAMES: Unseparated 8-character ddnames, left-justified, and padded with blanks. To change the name of SYSIN or SYSPRINT, supply an alternate name in the same position. If an alternate name is not supplied, the standard name is assumed. If the name is not supplied with the list, the 8-byte entry must contain binary zeros. Names in any position other than those for SYSIN and SYSPRINT are ignored.

INPUT/OUTPUT LIST: Optional. Provides the means of identifying those data sets for which the invoker wishes to manage all I/O operations.

n: A fullword that specifies the number of groups of three fields that follows. Each group consists of a DDNAME address an IOROUTINE address, and a USER DATA address.

DDNAME: Address of a character sting that identifies a data set that will result in the invocation of the associated IOROUTINE for all I/O operations (including OPEN and CLOSE) against the data set. The character string identifies the data set as either a 10-byte or 46-byte character string as follows:

A 10-byte character string: The first two characters are 'DD'. The next 8 characters are the DDNAME field value left-justified (padded with blanks as necessary), which may appear in the FILE, INFILE, or OUTFILE parameters of any access method services command. The SYSIN and SYSPRINT ddnames may also appear if the invoker wishes to manage these data sets.

A 46-byte character string: The first two characters are 'DS'. The next 44 characters are the data set name left-justified (padded with blanks if necessary), which may appear in the INDATASET, OUTDATASET, or DATASET parameters of any access method services command.

IOROUTINE: Address of the program that is to be invoked to process I/O operation upon the data set associated with DDNAME. This routine, instead of the processor, will be invoked for all operations against the data set. See “USER I/O ROUTINES” in this appendix for linkage and interface conventions between the IOROUTINE and access method services.
USER DATA: Address of data area user may use for any purpose.

Figure 22. Processor Invocation Argument List from Your Program

Processor Invocation

Figure 22 on page 305 shows the processor invocation argument list as it exists in the user's area.

Entry and exit to the access method services processor is through the entry point IDCAMS. Standard linkage is used; that is, register 1 points to the argument list, register 13 points to a save area, register 14 contains the return address, and register 15 contains the entry point address for IDCAMS. On exit from the access method services processor, register 15 contains the value of MAXCC (see “Processor Condition Codes”).

The argument list, as shown in Figure 22, can be a maximum of four fullword addresses pointing to strings of data. The last address in the list contains a “1” in the sign field. The first three possible strings of data begin with a 2-byte length field. A null element in the list can be indicated by either an address of zeros or a length of zero.

Processor Condition Codes

The processor's condition code is LASTCC, which can be interrogated in the command stream following each functional command. The possible values, their meanings, and examples of causes are:

Code	**Meaning**
0(0)	The function was executed successfully. Informational messages may have been issued.
4(4)	Some minor problems in executing the complete function were encountered, but it was possible to continue. The results may not be exactly what the user wants, but no permanent harm appears to have been done by continuing. A warning message was issued.
8(8)	A function could not perform all that was asked of it. The function was completed, but specific details were bypassed.
12(C)	The entire function could not be performed.
16(10)	Severe error or problem encountered. Remainder of command stream is flushed and processor returns condition code 16 to the operating system.

LASTCC is set by the processor at the completion of each functional command. MAXCC, which can also be interrogated in the command stream, is the highest value of LASTCC thus far encountered.

User I/O routines enable a user to perform all I/O operations for a data set that would normally be handled by the access methods services processor. This makes it possible, for instance, to control the command input stream by providing an I/O routine for SYSIN. As pointed out above, standard linkage is used.

A user I/O routine is invoked by access method services for all operations against the selected data sets. The identification of the data sets and their associated I/O routines is via the input/output list of the processor invocation parameter list (see Figure 22 on page 305).

When writing a user I/O routine, the user must be aware of three things: First, the processor handles the user data set as if it were a non-VSAM data set that contains variable-length unblocked records (maximum record length is 32760 bytes) with a physical sequential organization. The processor does not test for the existence of the data set. Second, the user must know the data format so that the routine can be coded to handle the correct type of input and format the correct type of output. Third, each user routine must handle errors encountered for data sets it is managing and provide a return code to the processor in register 15. The processor uses the return code to determine what it is to do next.

The permissible return codes are:

Code	**Meaning**
0(0)	Operation successful.
4(4)	End of data for a GET operation.
8(8)	Error encountered during a GET/PUT operation, but continue processing.
12(C)	Do not allow any further calls (except CLOSE) to this routine.

Figure 23 on page 308 shows the argument list used in communication between the user I/O routine and the access method services processor. The user I/O routine is invoked by the processor for OPEN, CLOSE, GET, and PUT routines.

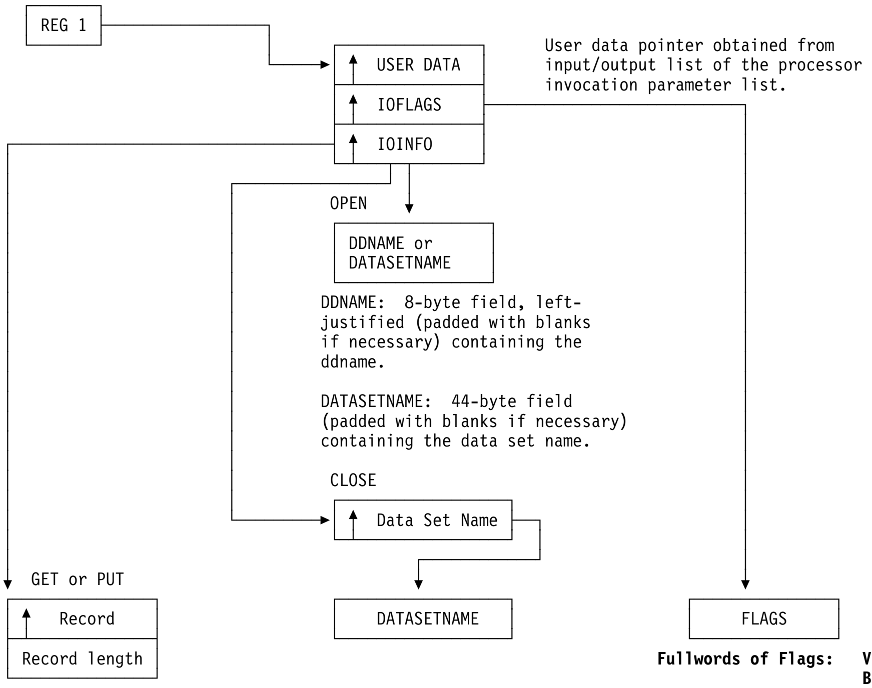
The type of operation to be performed is indicated via IOFLAGS. The IOINFO field indicates, for OPEN and CLOSE operations, the data set name or ddname of the data set; for GET and PUT operations, the IOINFO field is used to communicate the record length and address.

A user I/O routine for SYSPRINT receives control each time the processor issues a PUT against the SYSPRINT data set. If the PUT has been issued to print an IDC message, the unique message number is passed to the routine via IOFLAGS (see Figure 23 on page 308). Each IDC message is in the form IDCsnnnI or IDCsnnnnI, where:

s is a code indicating the severity of the problem.

nnn or nnnn is the message number that is unique across all IDC messages.

The 2-byte message number passed via IOFLAGS is the nnn or nnnn portion of the message converted to binary.



User data pointer obtained from input/output list of the processor invocation parameter list.

DDNAME: 8-byte field, left-justified (padded with blanks if necessary) containing the ddname.

DATASETNAME: 44-byte field (padded with blanks if necessary) containing the data set name.

for a GET,this information is returned to the processor by the user's I/O routine in the 8-byte area passes to the routine.

For a PUT, the processor gives this information to the user's I/O routine.

Record (GET): Address of retrieved record.

Record Length (GET): Full-word length of retrieved record.

Record (PUT): Address of record to be written.

Record length (PUT): Full-word length of record to be written.

DATASETNAME: 44-BYTE fields (padded with blanks if necessary) containing the data set name.

Fullwords of Flags:	**Value or Bit Pattern**	**Meaning**
Byte 1 (Operation)	X'00'	OPEN
	X'04'	CLOSE
	X'08'	GET
	X'0C'	PUT
Byte 2	1...	OPEN for input
	.1..	OPEN for output
	..1.	Indicates IOINFO contains the address of a ddname on OPEN.
	...1	Indicates IOINFO contains the address of a data set name on OPEN.
Bytes 3, 4 (Record type for PUT only)	0	Normal data record is to be written.
	n	Message serial number converted to binary if IDC message is to be written. (See “User I/O Routine” for a description of this value.)

Figure 23. Arguments Passed to and from a User I/O Routine

Appendix D. Command Reference Summary

This appendix shows the syntax of each access method services functional command and parameter abbreviations. You may remove this index and use it for a quick reference.

ALTER

Figure 24. ALTER Command Syntax

Parameters	Abbreviation
ALTER	—
entryname[/*password*]	—
[ADDVOLUMES(*volser*[*volser*...])]	AVOL
[ATTEMPTS(*number*)]	ATT
[AUTHORIZATION(*entrypoint*[*string*])]	AUTH
[BUFFERSPACE(*size*)]	BUFSP, BUFSPC
[CODE(*code*)]	—
[CONTROLPW(*password*)]	CTLPW
[EMPTY‘NOEMPTY]	EMP NEMP
[ERASE‘NOERASE]	ERAS NERAS
[EXCEPTIONEXIT(*entrypoint*)]	EEXT
[FILE(*ddname*)]	—
[FREESPACE(*CI-percent*[*CA-percent*])]	FSPC
[INHIBIT‘UNINHIBIT]	INH UNINH
[KEYS(*length* *offset*)]	—
[MASTERPW(*password*)]	MRPW
[NEWNAME(*newname*)]	NEWNM
[NULLIFY(	NULL
[AUTHORIZATION(MODULE‘STRING)]	AUTH MDLE STRG
[CODE]	—
[CONTROLPW]	CTLPW
[EXCEPTIONEXIT]	EEXT
[MASTERPW]	MRPW
[OWNER]	—
[READPW]	RDPW
[RETENTION]	RETN
[UPDATEPW])]	UPDPW
[OWNER(*ownerid*)]	—
[READPW(*password*)]	RDPW
[RECORDSIZE(*average* *maximum*)]	RECSZ
[REMOVEVOLUMES(*volser*[*volser*...])]	RVOL
[SCRATCH‘NOSCRATCH]	SCR NSCR
[SHAREOPTIONS(*crossregion*[*crosssystem*])]	SHR
[TO(*date*)‘FOR(*days*)]	— —
[UNIQUEKEY‘NONUNIQUEKEY]	UNQK NUNQK
[UPDATE‘NOUPDATE]	UPD NUPD
[UPDATEPW(*password*)]	UPDPW
[UPGRADE‘NOUPGRADE]	UPG NUPG
[WRITECHECK‘NOWRITECHECK]	WCK NWCK
[CATALOG(*catname*[/*password*])]	CAT

BLDINDEX

Figure 25. BLDINDEX Command Syntax

Parameters	Abbreviation
BLDINDEX	BIX
{INFILE(_ddname_**[/**_password_**])‘**	IFILE
INDATASET(_entryname_**[/**_password_**])}**	IDS
{OUTFILE(_ddname_**[/**_password_**]**	OFILE
[_ddname_**[/**_password_**]...])‘**	
OUTDATASET(_entryname_**[/**_password_**]**	ODS
[_entryname_**[/**_password_**]...])}**	
[{EXTERNALSORT‘INTERNALSORT }]	ESORT ISORT
[{SORTCALL‘NOSORTCALL}]	
[SORTDEVICETYPE_(device type)_**]**	SORTDVT SDVT
[SORTFILENUMBER_(number)_**]**	SORTFN SFN
[SORTMESSAGEDD_(ddname)_**]**	SORTMDD SMDD
[SORTMESSAGELEVEL{ALL‘CRITICAL‘NONE}]	SORTML SML
[WORKFILES(_ddname ddname_**)]**	WFILE
[CATALOG(_catname_**[/**_password_**])]**	CAT

CNVTCAT

Figure 26. CNVTCAT Command Syntax

Parameters	Abbreviation
CNVTCAT	CNVTC
{INFILE(_ddname_**)‘**	IFILE
INDATASET(_entryname_**)}**	IDS
{OUTFILE(_ddname_**[/**_password_**])‘**	OFILE
OUTDATASET(_entryname_**[/**_password_**])‘**	ODS
CATALOG(_catname_**[/**_password_**])}**	CAT
[CVOLEQUATES((_catname_**(**_volser_	CVEQU
[_volser_**...]))[(**_catname_**...)...])]**	
[LIST‘NOLIST]	— NLIST
[MASTERCATALOG(_catname_**[/**_password_**])]**	MCAT

DEFINE ALIAS

Figure 27. DEFINE ALIAS Command Syntax

Parameters	Abbreviation
DEFINE ALIAS	DEF —
(NAME(_aliasname_**)**	—
RELATE(_entryname_**))**	REL
[CATALOG(_catname_**[/**_password_**])]**	CAT

DEFINE ALTERNATEINDEX

Figure 28 (Page 1 of 2). DEFINE ALTERNATEINDEX Command Syntax

Parameters	Abbreviation
DEFINE ALTERNATEINDEX	DEF AIX
(NAME(*entryname***)**	—
RELATE(*entryname***[/***password***])**	REL
{CYLINDERS[1] **(***primary***[** *secondary***])‘**	CYL
RECORDS[1]**(***primary***[** *secondary***])‘**	REC
TRACKS[1]**(***primary***[** *secondary***])}**	TRK
VOLUMES[2]**(***volser***[** *volser***...])**	VOL
[ATTEMPTS(*number***‘2)]**	ATT
[AUTHORIZATION(*entrypoint***[** *string***])]**	AUTH
[BUFFERSPACE(*size***)]**	BUFSP, BUFSPC
[CODE(*code***)]**	—
[CONTROLINTERVALSIZE(*size***)]**	CISZ, CNVSZ
[CONTROLPW(*password***)]**	CTLPW
[ERASE‘NOERASE]	ERAS NERAS
[EXCEPTIONEXIT(*entrypoint***)]**	EEXT
[FILE(*ddname***)]**	—
[FREESPACE(*CI-percent***[** *CA-percent***]‘0 0)**	FSPC
[IMBED‘NOIMBED][3]	IMBD NIMBD
[KEYRANGES((*lowkey highkey***)**	KRNG
[(*lowkey highkey***)...])]**	
[KEYS(*length offset***‘64 0)]**	—
[MASTERPW(*password***)]**	MRPW
[MODEL(*entryname***[/***password***]**	—
[*catname***[/***password***]])]**	
[ORDERED‘UNORDERED]	ORD UNORD
[OWNER(*ownerid***)]**	—
[READPW(*password***)]**	RDPW
[RECORDSIZE(*average maximum***‘4086 32600)]**	RECSZ
[REPLICATE‘NOREPLICATE]	REPL NREPL
[REUSE‘NOREUSE]	RUS NRUS
[SHAREOPTIONS(*crossregion*	SHR
[*crosssystem***]‘1 3)]**	
[SPEED‘RECOVERY]	— RCVY
[TO(*date***)‘FOR(***days***)]**	— —
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UNIQUEKEY‘NONUNIQUEKEY]	UNQK NUNQK
[UPDATEPW(*password***)]**	UPDPW
[UPGRADE‘NOUPGRADE]	UPG NUPG
[WRITECHECK‘NOWRITECHECK])	WCK NWCK
DATA	—
([ATTEMPTS(*number***)]**	ATT
[AUTHORIZATION(*entrypoint***[** *string***])]**	AUTH
[BUFFERSPACE(*size***)]**	BUFSP, BUFSPC
[CODE(*code***)]**	—
[CONTROLINTERVALSIZE(*size***)]**	CISZ, CNVSZ
[CONTROLPW(*password***)]**	CTLPW
[CYLINDERS(*primary***[** *secondary***])‘**	CYL
RECORDS(*primary***[** *secondary***])‘**	REC
TRACKS(*primary***[** *secondary***])]**	TRK
[ERASE‘NOERASE]	ERAS NERAS
[EXCEPTIONEXIT(*entrypoint***)]**	EEXT
[FILE(*ddname * ****)]**	—
[FREESPACE(*CI-percent***[** *CA-percent***])]**	FSPC

Figure 28 (Page 2 of 2). DEFINE ALTERNATEINDEX Command Syntax

Parameters	Abbreviation
[KEYRANGES((*lowkey highkey*) [(*lowkey highkey*)...])]	KRNG
[KEYS(*length offset*)]	—
[MASTERPW(*password*)]	MRPW
[MODEL(*entryname*[/*password*] [*catname*[/*password*]])]	—
[NAME(*entryname*)]	—
[ORDERED‘UNORDERED]	ORD UNORD
[OWNER(*ownerid*)]	—
[READPW(*password*)]	RDPW
[RECORDSIZE(*average maximum*)]	RECSZ
[REUSE‘NOREUSE]	RUS NRUS
[SHAREOPTIONS(*crossregion*[*crosssystem*])]	SHR
[SPEED‘RECOVERY]	— RCVY
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UNIQUEKEY‘NONUNIQUEKEY]	UNQK NUNQK
[UPDATEPW(*password*)]	UPDPW
[VOLUMES(*volser*[*volser*...])]	VOL
[WRITECHECK‘NOWRITECHECK])]	WCK NWCK
[INDEX	IX
([ATTEMPTS(*number*)]	ATT
[AUTHORIZATION(*entrypoint*[*string*])]	AUTH
[CODE(*code*)]	—
[CONTROLINTERVALSIZE(*size*)]	CISZ, CNVSZ
[CONTROLPW(*password*)]	CTLPW
[CYLINDERS(*primary*[*secondary*])‘	CYL
RECORDS(*primary*[*secondary*])‘	REC
TRACKS(*primary*[*secondary*])}	TRK
[EXCEPTIONEXIT(*entrypoint*)]	EEXT
[FILE(*ddname*)]	—
[IMBED‘NOIMBED][3]	IMBD NIMBD
[MASTERPW(*password*)]	MRPW
[MODEL(*entryname*[/*password*] [*catname*[/*password*]])]	—
[NAME(*entryname*)]	—
[ORDERED‘UNORDERED]	ORD UNORD
[OWNER(*ownerid*)]	—
[READPW(*password*)]	RDPW
[REPLICATE‘NOREPLICATE]	REPL NREPL
[REUSE‘NOREUSE]	RUS NRUS
[SHAREOPTIONS(*crossregion*[*crosssystem*])]	SHR
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UPDATEPW(*password*)]	UPDPW
[VOLUMES(*volser*[*volser*...])]	VOL
[WRITECHECK‘NOWRITECHECK])]	WCK NWCK
[CATALOG(*catname*[/*password*])]	CAT

[1] CYLINDERS, RECORDS, or TRACKS must be specified as a parameter of ALTERNATEINDEX, as a parameter of DATA, or as a parameter of both DATA and INDEX if MODEL is not specified.

[2] VOLUMES must be specified as a parameter of ALTERNATEINDEX or as a parameter of both DATA and INDEX if MODEL is not specified.

[3] IMBED is no longer supported.

DEFINE CLUSTER

Figure 29 (Page 1 of 2). DEFINE CLUSTER Command Syntax

Parameters	Abbreviation
DEFINE CLUSTER	DEF CL
(NAME(_entryname_**)**	—
{CYLINDERS[1]**(**_primary_**[** _secondary_ **])‘**	CYL
RECORDS[1]**(**_primary_**[** _secondary_**])‘**	REC
TRACKS[1]**(**_primary_**[** _secondary_**])}**	TRK
VOLUMES[2]**(**_volser_**[** _volser_**...])**	VOL
[ATTEMPTS(_number_**‘2)]**	ATT
[AUTHORIZATION(_entrypoint_**[** _string_**])]**	AUTH
[BUFFERSPACE(_size_**)]**	BUFSP, BUFSPC
[CODE(_code_**)]**	—
[CONTROLINTERVALSIZE(_size_**)]**	CISZ, CNVSZ
[CONTROLPW(_password_**)]**	CTLPW
[ERASE‘NOERASE]	ERAS NERAS
[EXCEPTIONEXIT(_entrypoint_**)]**	EEXT
[FILE(_ddname_**)]**	—
[FREESPACE[3]**(**_CI-percent_	FSPC
[_CA-percent_**]‘0 0)]**	
[IMBED‘NOIMBED][4]	IMBD NIMBD
[INDEXED‘NONINDEXED‘NUMBERED]	IXD NIXD NUMD
[KEYRANGES[3] **((**_lowkey highkey_**)**	KRNG
[(_lowkey highkey_**)...])]**	
[KEYS[3] **(**_length offset_**‘ 64 0)]**	—
[MASTERPW(_password_**)]**	MRPW
[MODEL(_entryname_**[/**_password_**]**	—
[_catname_**[/**_password_**]])]**	
[ORDERED‘UNORDERED]	ORD UNORD
[OWNER(_ownerid_**)]**	—
[READPW(_password_**)]**	RDPW
[RECORDSIZE[5] **(**_average maximum_**)]**	RECSZ
[REPLICATE‘NOREPLICATE][3]	REPL NREPL
[REUSE‘NOREUSE]	RUS NRUS
[SHAREOPTIONS(_crossregion_	SHR
[_crosssystem_**]‘1 3)]**	
[SPANNED‘NONSPANNED]	SPND NSPND
[SPEED‘RECOVERY]	— RCVY
[TO(_date_**)‘FOR(**_days_**)]**	— —
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UPDATEPW(_password_**)]**	UPDPW
[WRITECHECK‘NOWRITECHECK])	WCK NWCK
[DATA	—
([ATTEMPTS(_number_**)]**	ATT
[AUTHORIZATION(_entrypoint_**[** _string_**])]**	AUTH
[BUFFERSPACE(_size_**)]**	BUFSP, BUFSPC
[CODE(_code_**)]**	—
[CONTROLINTERVALSIZE(_size_**)]**	CISZ, CNVSZ
[CONTROLPW(_password_**)]**	CTLPW
[CYLINDERS(_primary_**[** _secondary_**])‘**	CYL
RECORDS(_primary_**[** _secondary_**])‘**	REC
TRACKS(_primary_**[** _secondary_**])]**	TRK
[ERASE‘NOERASE]	ERAS NERAS
[EXCEPTIONEXIT(_entrypoint_**)]**	EEXT
[FILE(_ddname_**)]**	—
[FREESPACE[3] **(**_CA-percent_**])]**	FSPC

Figure 29 (Page 2 of 2). DEFINE CLUSTER Command Syntax

Parameters	Abbreviation
[KEYRANGES[3] **((***lowkey highkey***)**	KRNG
[(*lowkey highkey***)...])]**	
[KEYS[3] **(***length offset***)]**	—
[MASTERPW(*password***)]**	MRPW
[MODEL(*entryname***[/***password***]**	—
[*catname***[/***password***]])]**	
[NAME(*entryname***)]**	—
[ORDERED‘UNORDERED]	ORD UNORD
[OWNER(*ownerid***)]**	—
[READPW(*password***)]**	RDPW
[RECORDSIZE(*average maximum***)]**	RECSZ
[REUSE‘NOREUSE]	RUS NRUS
[SHAREOPTIONS(*crossregion***[** *crosssystem***])]**	SHR
[SPANNED‘NONSPANNED]	SPND NSPND
[SPEED‘RECOVERY]	— RCVY
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UPDATEPW(*password***)]**	UPDPW
[VOLUMES(*volser***[** *volser***...])]**	VOL
[WRITECHECK‘NOWRITECHECK])]	WCK NWCK
[INDEX[3]	IX
([ATTEMPTS(*number***)]**	ATT
[AUTHORIZATION(*entrypoint***[** *string***])]**	AUTH
[CODE(*code***)]**	—
[CONTROLINTERVALSIZE(*size***)]**	CISZ,CNVSZ
[CONTROLPW(*password***)]**	CTLPW
[CYLINDERS(*primary***[** *secondary***])‘**	CYL
RECORDS(*primary***[** *secondary***])‘**	REC
TRACKS(*primary***[** *secondary***])]**	TRK
[EXCEPTIONEXIT(*entrypoint***)]**	EEXT
[FILE(*ddname***)]**	—
[IMBED‘NOIMBED][4]	IMBD NIMBD
[MASTERPW(*password***)]**	MRPW
[MODEL(*entryname***[/***password***]**	—
[*catname***[/***password***]])]**	
[NAME(*entryname***)]**	—
[ORDERED‘UNORDERED]	ORD UNORD
[OWNER(*ownerid***)]**	—
[READPW(*password***)]**	RDPW
[REPLICATE‘NOREPLICATE][3]	REPL NREPL
[REUSE‘NOREUSE]	RUS NRUS
[SHAREOPTIONS(*crossregion***[** *crosssystem***])]**	SHR
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UPDATEPW(*password***)]**	UPDPW
[VOLUMES(*volser***[** *volser***...])]**	VOL
[WRITECHECK‘NOWRITECHECK])]	WCK NWCK
[CATALOG(*catname***[/***password***])]**	CAT

[1] CYLINDERS, RECORDS, or TRACKS must be specified as a parameter of CLUSTER, as a parameter of DATA, or as a parameter of both DATA and INDEX if MODEL is not specified.

[2] VOLUMES must be specified as a parameter of CLUSTER or as a parameter of both DATA and INDEX if MODEL is not specified.

[3] Can only be specified for a key-sequenced cluster.

[4] IMBED is no longer supported.

[5] When SPANNED is specified, the default is RECORDSIZE (**4086** **32600**). Otherwise, the default RECORDSIZE is (**4089** **4089**).

DEFINE GENERATIONDATAGROUP

Figure 30. DEFINE GENERATIONDATAGROUP Command Syntax

Parameters	Abbreviation
DEFINE GENERATIONDATAGROUP	DEF GDG
(NAME(_entryname_**)**	—
LIMIT(_limit_**)**	LIM
[EMPTY‘NOEMPTY]	EMP NEMP
[OWNER(_ownerid_**)]**	—
[SCRATCH‘NOSCRATCH]	SCR NSCR
[TO(_date_**)‘FOR(**_days_**)])**	—
[CATALOG(_catname_**[/**_password_**])]**	CAT

DEFINE NONVSAM

Figure 31. DEFINE NONVSAM Command Syntax

Parameters	Abbreviation
DEFINE NONVSAM	DEF NVSAM
(NAME(_entryname_**)**	—
DEVICETYPES(_devtype_**[** _devtype_**...])**	DEVT
VOLUMES(_volser_**[** _volser_**...])**	VOL
[FILESEQUENCENUMBERS(_number_**[** _number_**...])]**	FSEQN
[OWNER(_ownerid_**)]**	—
[TO(_date_**)‘FOR(**_days_**)])**	— —
[CATALOG(_catname_**[/**_password_**])]**	CAT

DEFINE PAGESPACE

Figure 32 (Page 1 of 2). DEFINE PAGESPACE Command Syntax

Parameters	Abbreviation
DEFINE PAGESPACE	DEF PGSPC
(NAME(_entryname_**)**	—
{CYLINDERS(_primary_**)‘**	CYL
RECORDS(_primary_**)‘**	REC
TRACKS(_primary_**)}**	TRK
VOLUME(_volser_**)**	VOL
[ATTEMPTS(_number_**‘2)]**	ATT
[AUTHORIZATION(_entrypoint_**[** _string_**])]**	AUTH
[CODE(_code_**)]**	—
[CONTROLPW(_password_**)]**	CTLPW
[FILE(_ddname_**)]**	—
[MASTERPW(_password_**)]**	MRPW
[MODEL(_entryname_**[/**_password_**]**	—
[_catname_**[/**_password_**]])]**	
[OWNER(_ownerid_**)]**	—
[READPW(_password_**)]**	RDPW
[SWAP‘NOSWAP]	— NSWAP

Figure 32 (Page 2 of 2). DEFINE PAGESPACE Command Syntax

Parameters	Abbreviation
[TO(*date*)‘FOR(*days*)]	— —
[UNIQUE‘SUBALLOCATION]	UNQ SUBAL
[UPDATEPW(*password*)])	UPDPW
[CATALOG(*catname*[/*password*])]	CAT

DEFINE PATH

Figure 33. DEFINE PATH Command Syntax

Parameters	Abbreviation
DEFINE PATH	DEF —
(NAME(*entryname*)	—
PATHENTRY(*entryname*[/*password*])	PENT
[ATTEMPTS(*number*‘2)]	ATT
[AUTHORIZATION(*entrypoint*[*string*])]	AUTH
[CODE(*code*)]	—
[CONTROLPW(*password*)]	CTLPW
[FILE(*ddname*)]	—
[MASTERPW(*password*)]	MRPW
[MODEL(*entryname*[/*password*]	—
[*catname*[/*password*]])]	
[OWNER(*ownerid*)]	—
[READPW(*password*)]	RDPW
[TO(*date*)‘FOR(*days*)]	— —
[UPDATE‘NOUPDATE]	UPD NUPD
[UPDATEPW(*password*)])	UPDPW
[CATALOG(*catname*[/*password*])]	CAT

DEFINE SPACE

Figure 34. DEFINE SPACE Command Syntax

Parameters	Abbreviation
DEFINE SPACE	DEF SPC
({CANDIDATE‘	CAN
CYLINDERS(*primary*[*secondary*])‘	CYL
RECORDS(*primary*[*secondary*])	REC
RECORDSIZE(*average* *maximum*)‘	RECSZ
TRACKS(*primary*[*secondary*])}	TRK
VOLUMES(*volser*[*volser*...])	VOL
[FILE(*ddname*)])	—
[CATALOG(*catname*[/*password*])]	CAT

DEFINE USERCATALOG‘MASTERCATALOG

Figure 35 (Page 1 of 2). DEFINE USERCATALOG‘MASTERCATALOG Command Syntax

Parameters	Abbreviation
DEFINE USERCATALOG‘MASTERCATALOG	DEF UCAT MCAT
(NAME(*entryname*)	—

Figure 35 (Page 2 of 2). DEFINE USERCATALOG‘MASTERCATALOG Command Syntax

Parameters	Abbreviation
{CYLINDERS(*primary*[*secondary*])‘	CYL
RECORDS(*primary*[*secondary*])‘	REC
TRACKS(*primary*[*secondary*])}	TRK
VOLUME(*volser*)	VOL
VSAMCATALOG	—
[ATTEMPTS(*number*‘2)]	ATT
[AUTHORIZATION(*entrypoint*[*string*])]	AUTH
[BUFFERSPACE(*size*‘3072)]	BUFSP, BUFSPC
[CODE(*code*)]	—
[CONTROLPW(*password*)]	CTLPW
[FILE(*ddname*)]	—
[MASTERPW(*password*)]	MRPW
[MODEL(*entryname*[/*password*]	—
[*catname*[/*password*]])]	
[OWNER(*ownerid*)]	—
[READPW(*password*)]	RDPW
[RECOVERABLE‘NOTRECOVERABLE]	RVBL NRVBL
[TO(*date*)‘FOR(*days*)]	— —
[UPDATEPW(*password*)]	UPDPW
[WRITECHECK‘NOWRITECHECK])	WCK NWCK
[DATA	—
([BUFFERSPACE(*size*)]	BUFSP, BUFSPC
[CYLINDERS(*primary*[*secondary*])‘	CYL
RECORDS(*primary*[*secondary*])‘	REC
TRACKS(*primary*[*secondary*])]	TRK
[RECOVERABLE‘NOTRECOVERABLE]	RVBL NRVBL
[WRITECHECK‘NOWRITECHECK])]	WCK NWCK
[INDEX	IX
([CYLINDERS(*primary*)‘	CYL
RECORDS(*primary*)‘	REC
TRACKS(*primary*)]	TRK
[WRITECHECK‘NOWRITECHECK])]	WCK NWCK
[CATALOG(*mastercatname*[/*password*])]	CAT

DELETE

Figure 36 (Page 1 of 2). DELETE Command Syntax

Parameters	Abbreviation
DELETE	DEL
(*entryname*[/*password*]	—
[*entryname*[/*password*]...])	
[ALIAS‘	—
ALTERNATEINDEX‘	AIX
CLUSTER‘	CL
GENERATIONDATAGROUP‘	GDG
NONVSAM‘	NVSAM
PAGESPACE‘	PGSPC
PATH‘	—
SPACE[1]‘	SPC
USERCATALOG[1]	UCAT
[ERASE‘NOERASE]	ERAS NERAS
[FILE(*ddname*)]	—

Figure 36 (Page 2 of 2). DELETE Command Syntax

Parameters	**Abbreviation**
[FORCE‘NOFORCE]	FRC NFRC
[PURGE‘NOPURGE]	PRG NPRG
[SCRATCH‘NOSCRATCH]	SCR NSCR
[CATALOG(*catname***[/***password***])]**	CAT

[1] When you delete a data space or catalog, you cannot delete any other type of entry. You must specify SPACE or USERCATALOG to identify the type of entry to be deleted.

EXAMINE

Figure 37. EXAMINE Command Syntax

Parameters	**Abbreviation**
EXAMINE	—
NAME(*clustername***[***/password***])**	— — —
[INDEXTEST‘NOINDEXTEST]	ITEST NOITEST
[DATATEST‘NODATATEST]	DTEST NODTEST
[ERRORLIMIT(value)]	ELIMIT

EXPORT

Figure 38. EXPORT Command Syntax

Parameters	**Abbreviation**
EXPORT	EXP
*entryname***[/***password***]**	—
{OUTFILE(*ddname***)‘OUTDATASET(***entryname***)}**	OFILE ODS
[ERASE‘NOERASE]	ERAS NERAS
[INFILE(*ddname***)]**	IFILE
[INHIBITSOURCE‘NOINHIBITSOURCE]	INHS NINHS
[INHIBITTARGET‘NOINHIBITTARGET]	INHT NINHT
[PURGE‘NOPURGE]	PRG NPRG
[TEMPORARY‘PERMANENT]	TEMP PERM

EXPORT DISCONNECT

Figure 39. EXPORT DISCONNECT Command Syntax

Parameters	**Abbreviation**
EXPORT	EXP
*usercatname***[/***password***]**	—
DISCONNECT	DCON

EXPORTRA

Figure 40. EXPORTRA Command Syntax

Parameters	Abbreviation
EXPORTRA	XPRA
OUTFILE(_ddname_**)**	OFILE
CRA((_ddname_**1**	—
{ALL[INFILE(_ddname_**2)]‘**	— IFILE
ENTRIES((_entryname_**[** _ddname3_**])**	ENT
[(_entryname_**[** _ddname3_**])...])‘**	
NONE})	—
[(_ddname1_**...)...])**	
[FORCE‘NOFORCE]	FRC NFRC
[MASTERPW(_password_**)]**	MRPW

IMPORT

Figure 41. IMPORT Command Syntax

Parameters	Abbreviation
IMPORT	IMP
{INFILE(_ddname_**)‘INDATASET(**_entryname_**)}**	IFILE IDS
{OUTFILE(_ddname_**[/**_password_**])‘**	OFILE
OUTDATASET(_entryname_**[/**_password_**])}**	ODS
[ERASE‘NOERASE]	ERAS NERAS
[INTOEMPTY]	IEMPTY
[OBJECTS((_entryname_	OBJ
[FILE(_ddname_**)]**	—
[KEYRANGES((_lowkey_ _highkey_**)**	KRNG
[(_lowkey_ _highkey_**)...])]**	
[NEWNAME(_newname_**)]**	NEWNM
[ORDERED‘UNORDERED]	ORD UNORD
[VOLUMES(_volser_**[** _volser_**...])])**	VOL
[(_entryname_**...)...])]**	
[PURGE‘NOPURGE]	PRG NPRG
[SAVRAC‘NOSAVRAC]	— —
[CATALOG(_catname_**[/**_password_**])]**	CAT

IMPORT CONNECT

Figure 42. IMPORT CONNECT Command Syntax

Parameters	Abbreviation
IMPORT CONNECT	IMP CON
OBJECTS((_usercatname_	OBJ
DEVICETYPE(_devtype_**)**	DEVT
VOLUMES(_volser_**)))**	VOL
[CATALOG(_mastercatname_**[/**_password_**])]**	CAT

IMPORTRA

Figure 43. IMPORTRA Command Syntax

Parameters	Abbreviation
IMPORTRA	MPRA
{INFILE(*ddname***)‘INDATASET(***entryname***)}**	IFILE IDS
[OUTFILE(*ddname***)]**	OFILE
[OBJECTS((*entryname*	OBJ
[DEVICETYPES(*devtype***[** *devtype***...])]**	DEVT
[FILE(*ddname***)]**	—
[VOLUMES(*volser***[** *volser***...])])**	VOL
[(*entryname***...)...])]**	
[SAVRAC‘NOSAVRAC]	— —
[CATALOG(*catname***[/***password***])]**	CAT

LISTCAT

Figure 44. LISTCAT Command Syntax

Parameters	Abbreviation
LISTCAT	LISTC
[ALIAS]	—
[ALTERNATEINDEX]	AIX
[CLUSTER]	CL
[DATA]	—
[GENERATIONDATAGROUP]	GDG
[INDEX]	IX
[NONVSAM]	NVSAM
[PAGESPACE]	PGSPC
[PATH]	—
[SPACE]	SPC
[USERCATALOG]	UCAT
[CREATION(*days***)]**	CREAT
[ENTRIES(*entryname***[/***password***]**	ENT
[*entryname***[/***password***]...])‘**	
LEVEL(level)]	LVL
[EXPIRATION(*days***)]**	EXPIR
[NAME‘	—
HISTORY‘	HIST
VOLUME‘	VOL
ALLOCATION‘	ALLOC
ALL]	—
[NOTUSABLE]	NUS
[OUTFILE(*ddname***)]**	OFILE
[CATALOG(*catname***[/***password***])]**	CAT

LISTCRA

Figure 45. LISTCRA Command Syntax

Parameters	Abbreviation
LISTCRA	LISTR
INFILE(*ddname***[** *ddname***...])**	IFILE
[CATALOG(*catname***[/***password***]** *ddname***)]**	CAT
[COMPARE‘NOCOMPARE]	CMPR NCMPR
[DUMP‘NAME‘SEQUENTIALDUMP]	— — SDUMP
[MASTERPW(*password***)]**	MRPW
[OUTFILE(*ddname***)]**	OFILE

PRINT

Figure 46. PRINT Command Syntax

Parameters	Abbreviation
PRINT	
{INFILE(*ddname***[/***password***])‘**	IFILE
INDATASET(*entryname***[/***password***])}**	IDS
[CHARACTER‘DUMP‘HEX]	CHAR — —
[FROMKEY(*key***)‘FROMADDRESS(***address***)‘**	FKEY FADDR
FROMNUMBER(*number***)‘SKIP(***count***)]**	FNUM —
[OUTFILE(*ddname***)]**	OFILE
[TOKEY(*key***)‘TOADDRESS(***address***)‘**	— TADDR
TONUMBER(*number***)‘COUNT(***number***)]**	TNUM —

REPRO

Figure 47 (Page 1 of 2). REPRO Command Syntax

Parameters	Abbreviation
REPRO	—
{INFILE(*ddname***[/***password***]**	IFILE
[ENVIRONMENT(DUMMY)])‘	ENV DUM
INDATASET(*entryname***[/***password***]**	IDS
[ENVIRONMENT(DUMMY)])}	ENV DUM
{OUTFILE(*ddname***[/***password***])‘**	OFILE
OUTDATASET(*entryname***[/***password***])}**	ODS
[FROMKEY(*key***)‘FROMADDRESS(***address***)‘**	FKEY FADDR
FROMNUMBER(*number***)‘SKIP(***count***)]**	FNUM —
[REPLACE‘NOREPLACE]	REP NREP
[REUSE‘NOREUSE]	RUS NRUS
[TOKEY(*key***)‘TOADDRESS(***address***)‘**	— TADDR
TONUMBER(*number***)‘COUNT(***count***)]**	TNUM —
[ENCIPHER[1]	ENCPHR
({EXTERNALKEYNAME(*keyname***)‘**	EKN
INTERNALKEYNAME(*keyname***)‘PRIVATEKEY}**	IKN PRIKEY
[CIPHERUNIT(*number***‘1)]**	CPHRUN
[DATAKEYFILE(*ddname***)‘DATAKEYVALUE(***value***)]**	DKFILE DKV
[SHIPKEYNAMES(*keyname***[** *keyname***...])]**	SHIPKN
[STOREDATAKEY‘NOSTOREDATAKEY]	STRDK NSTRDK
[STOREKEYNAME(*keyname***)]**	STRKN
[USERDATA(*value***)])]**	UDATA

Figure 47 (Page 2 of 2). REPRO Command Syntax

Parameters	Abbreviation
[DECIPHER[1]	DECPHR
({DATAKEYFILE(*ddname***)‘**	DKFILE
DATAKEYVALUE(*value***)‘SYSTEMKEY]**	DKV SYSKEY
[SYSTEMDATAKEY(*value***)]**	SYSDK
[SYSTEMKEYNAME(*keyname***)]})]**	SYSKN

[1] The ENCIPHER and DECIPHER parameters apply only with the Programmed Cryptographic Facility (5740-XY5) or the IBM Cryptographic Unit Support (5740-XY6). For more information, see *DFSMS/MVS Using Data Sets*.

RESETCAT

Figure 48. RESETCAT Command Syntax

Parameters	Abbreviation
RESETCAT	RCAT
CATALOG(*catname***[/***password***][** *ddname***])**	CAT
{CRAFILES((*ddname1***[ALL‘ NONE])**	— — —
[(*ddname1***[ALL‘ NONE])...])‘**	— —
CRAVOLUMES((*volser***[** *devtype***])**	CRAVOL
[(*volser***[** *devtype***])...])}**	
[IGNORE‘NOIGNORE]	IGN NIGN
[MASTERPW(*password***)]**	MRPW
[WORKCAT(*catname***[/***password***])]**	WCAT
[WORKFILE(*ddname***[/***password***])]**	WFILE

VERIFY

Figure 49. VERIFY Command Syntax

Parameters	Abbreviation
VERIFY	VFY
{FILE(*ddname***[/***password***])‘**	—
DATASET(*entryname***[/***password***])}**	DS

Modal Commands

IF-THEN-ELSE Command Sequence

```
IF
 {LASTCC‘MAXCC} operator number
 THEN[  command‘
   DO
      command  set
   END]
 [ELSE[  command‘
   DO
    command  set
   DO
   END]]
```

SET Command

```
SET
 {MAXCC‘LASTCC} = number
```

CANCEL Command

```
CANCEL
```

PARM Command

```
PARM
 [TEST(
  {[TRACE]
  [AREAS(areaid[   areaid...])]
  [FULL((dumpid[   count1[   count2]]])[(dumpid...)...])]‘OFF})]
 [GRAPHICS(CHAIN(chain)‘TABLE(mname))]
 [MARGINS(leftmargin    rightmargin)]
```

Abbreviations

The following abbreviations are defined as they are used in the DFSMS/MVS library. If you do not find the abbreviation you are looking for, see *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.

This list may include acronyms and abbreviations from:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018.
- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1).

ACB. Access method control block.

ACDS. Active control data set.

AIX. Alternate index.

CA. Control area.

CI. Control interval.

CRA. Catalog recovery area.

CVOL. Control volume.

DADSM. Direct access device space management

DFSMShsm. DFSMS Hierarchical Storage Manager.

DFSMS/MVS. Data Facility Storage Management Subsystem.

DFSORT. Data Facility Sort.

DSCB. Data set control block.

ESDS. Entry-sequenced data set.

GDG. Generation data group.

GDS. Generation data set.

GRS. global resource serialization.

HCD. Hardware Configuration Definition

IDRC. Improved data recording capability.

ISMF. Interactive Storage Management Facility.

KSDS. Key-sequenced data set.

LRECL. Logical record length.

OAM. Object Access Method.

PDSE. Partitioned data set extended.

RACF. Resource Access Control Facility.

RBA. Relative byte address.

RRDS. Relative record data set.

SMS. Storage Management Subsystem.

TCDB. Tape Configuration Data Base.

TSO. Time sharing option

USVR. User-security-verification routine.

VSAM. Virtual storage access method.

VTOC. Volume table of contents.

Glossary

The following terms are defined as they are used in the DFSMS/MVS Library. If you do not find the term you are looking for, see the IBM Software Glossary at:

http://www.networking.ibm.com/nsg/nsgmain.htm

This glossary is an ever-evolving document that defines technical terms used in the documentation for many software products.

A

access method control block (ACB). A control block that links an application program to VSAM or VTAM programs.

access method services. A multifunction service program that manages VSAM and non-VSAM data sets, as well as integrated catalog facility (ICF) and VSAM catalogs. Access method services provides the following functions:

- defines and allocates space for VSAM data sets, VSAM catalogs, and ICF catalogs
- converts indexed-sequential data sets to key-sequenced data sets
- modifies data set attributes in the catalog
- reorganizes data sets
- facilitates data portability among operating systems
- creates backup copies of data sets
- assists in making inaccessible data sets accessible
- lists the records of data sets and catalogs
- defines and builds alternate indexes
- converts CVOLS and VSAM catalogs to ICF catalogs

aggregate group. A collection of related data sets and control information that have been pooled to meet a defined backup or recovery strategy.

alias entry. An entry that relates an alias to the real entryname of a user catalog or non-VSAM data set.

allocation. Generically, the entire process of obtaining a volume and unit of external storage, and setting aside space on that storage for a data set.

alternate index (AIX). In systems with VSAM, a key-sequenced data set containing index entries organized by the alternate keys of its associated base data records. It provides an alternate means of locating records in the data component of a cluster on which the alternate index is based.

alternate index cluster. The data and index components of an alternate index.

alternate index entry. In VSAM, a catalog entry that contains information about an alternate index. An alternate index entry points to a data entry and an index entry to describe the alternate index's components, and to a cluster entry to identify the alternate index's base cluster. See also *cluster entry*.

alternate index record. In VSAM, a collection of items used to sequence and locate one or more data records in a base cluster. Each alternate index record contains an alternate-key value and one or more pointers. When the alternate index supports a key-sequenced data set, the pointer is the prime key value of each data record. When the alternate index supports an entry-sequenced data set (ESDS), the RBA value of the data records is the pointer. See also *alternate index entry*, *alternate key*, *base cluster*, and *key*.

alternate key. One or more characters within a data record used to identify the data record or control its use. Unlike the prime key, the alternate key can identify more than one data record. It is used to build an alternate index or to locate one or more base data records with an alternate index. See also *key* and *prime key*.

application. The use to which an access method is put or the end result that it serves; contrasted to the internal operation of the access method.

availability. For a storage subsystem, the degree to which a data set or object can be accessed when requested by a user.

B

backup. The process of creating a copy of a data set or object to be used in case of accidental loss.

backup data set. A copy that can be used to replace or reconstruct a damaged data set.

base cluster. A key-sequenced data set or entry-sequenced data set over which one or more alternate indexes are built. See also *alternate index entry* and *path*.

buffer. A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another.

C

catalog. A data set that contains extensive information required to locate other data sets, to allocate and deallocate storage space, to verify the access authority of a program or operator, and to accumulate data set usage statistics. See *master catalog* and *user catalog*.

catalog cleanup. A process that allows the deletion of entries if their volume is no longer available; catalog cleanup also allows deletion of a catalog even though it is not empty. Catalog cleanup is a function of the DELETE command.

catalog connector. A catalog entry, called either a user catalog entry or a catalog connector entry, in the master catalog that points to a user catalog's volume (that is, it contains the volume serial number of the direct access volume that contains the user catalog).

catalog recovery area (CRA). An entry-sequenced data set that exists on each volume owned by a recoverable catalog, including the volume on which the catalog resides. The CRA contains copies of the catalog's records and can be used to recover a damaged catalog.

cell. An occurrence of information such as passwords, volume information, or associations.

cluster. In VSAM, a named structure consisting of a group of related components. For example, when the data is key-sequenced, the cluster contains both the data and the index components; for data that is entry-sequenced, the cluster contains only a data component.

cluster entry. A catalog entry that contains information about a key-sequenced or entry-sequenced VSAM cluster: ownership, cluster attributes, and the cluster's passwords and protection attributes. A key-sequenced cluster entry points to both a data entry and an index entry. An entry-sequenced cluster entry points to a data entry only.

component. (1) A named, cataloged collection of stored records. A component, the lowest member of the hierarchy of data structures that can be cataloged, contains no named subsets. (2) In this book, the components of an object are usually referred to as the object's data component and index component. Also, the cluster, data, or index fields of a subrecord.

control area (CA). A group of control intervals used as a unit for formatting a data set before adding records to it. Also, in a key-sequenced data set, the set of control intervals pointed to by a sequence-set index record; used by VSAM for distributing free space and for placing a sequence-set index record adjacent to its data.

control interval (CI). A fixed-length area of auxiliary storage space in which VSAM stores records. It is the unit of information (an integer multiple of block size) transmitted to or from auxiliary storage by VSAM.

control volume (CVOL). A volume that contrains one or more indexes of the catalog.

D

data component. The part of a VSAM data set, alternate index, or catalog that contains the object's data records.

data entry. A catalog entry that describes the data component of a cluster, alternate index, page spaces, or catalog. A data entry contains the data component's attributes, allocation and extent information, and statistics. A data entry for a cluster's or catalog's data component can also contain the data component's passwords and protection attributes.

Data Facility Sort (DFSORT). An IBM licensed program that is a high-speed data processing utility. DFSORT provides an efficient and flexible way to handle sorting, merging, and copying operations, as well as providing versatile data manipulation at the record, field, and bit level.

data record. A collection of items of information from the standpoint of its use in an application, as a user supplies it to VSAM for storage. (Contrast with *index record*.)

data security. Prevention of access to or use of data or programs without authorization. As used in this publication, the safety of data from unauthorized use, theft, or purposeful destruction.

data set. In DFSMS/MVS, the major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access. In OS/390 non-UNIX environments, the terms *data set* and *file* are generally equivalent and sometimes are used interchangeably. See also *file*.

data set control block (DSCB). A control block in the VTOC that describes data set characteristics.

DFSMS environment. An environment that helps automate and centralize the management of storage. This is achieved through a combination of hardware, software, and policies. In the DFSMS environment for MVS, the function is provided by DFSORT, RACF, and the combination of DFSMS/MVS and MVS.

DFSMS/MVS. An IBM System/390 licensed program that provides storage, data, and device management functions. When combined with MVS/ESA SP Version

5 it composes the base MVS/ESA operating environment. DFSMS/MVS consists of DFSMSdfp, DFSMSdss, DFSMShsm, and DFSMSrmm.

DFSMSdfp. A DFSMS/MVS functional component or base element of OS/390, that provides functions for storage management, data management, program management, device management, and distributed data access.

DFSMShsm. A DFSMS/MVS functional component or base element of OS/390, used for backing up and recovering data, and managing space on volumes in the storage hierarchy.

direct access. The retrieval or storage of data by a reference to its location in a data set rather than relative to the previously retrieved or stored data.

dynamic allocation. The allocation of a data set or volume by the use of the data set name or volume serial number rather than by the use of information contained in a JCL statement.

E

entry. A collection of information about a cataloged object in a master or user catalog. Each entry resides in one or more 512-byte records.

entry name. A unique name for each component or object as it is identified in a catalog. The entryname is the same as the dsname in a DD statement that describes the object.

entry sequence. The order in which data records are physically arranged (according to ascending RBA) in auxiliary storage, without respect to their contents. Contrast to *key sequence*.

entry-sequenced data set (ESDS). In VSAM, a data set whose records are loaded without respect to their contents, and whose RBAs cannot change. Records are retrieved and stored by addressed access, and new records are added at the end of the data set.

esoteric unit name. A name used to define a group of devices having similar hardware characteristics, such as TAPE or SYSDA. Contrast with *generic unit name*.

expiration. The process by which data sets or objects are identified for deletion because their expiration date or retention period has passed. On DASD, data sets and objects are deleted. On tape, when all data sets have reached their expiration date, the tape volume is available for reuse.

export. To create a backup or portable copy of a VSAM cluster, alternate index, or integrated catalog facility user catalog.

extent. A continuous space allocated on a DASD volume occupied by a data set or portion of a data set. An extent of a data set contains a whole number of control areas.

F

field. In a record or a control block, a specified area used for a particular category of data or control information.

file. A collection of information treated as a unit. In OS/390 non-UNIX environments, the terms *data set* and *file* are generally equivalent and are sometimes used interchangeably. See also *data set*.

G

generation data group base entry. An entry that permits non-VSAM data sets to be associated with other non-VSAM data sets as generation data sets.

generic name. An name used to define a group of devices having similar hardware characteristics such as TAPE or SYSDA.

generic unit name. A name assigned to a class of devices with the same geometry (such as 3390). Contrast with *esoteric unit name*.

global resource serialization (GRS). A component of MVS used for serializing use of system resources and for converting hardware reserves on DASD volumes to data set enqueues.

H

hardware configuration definition (HCD). An interactive interface in MVS that enables an installation to define hardware configurations from a single point of control.

I

improved data recording capability (IDRC). A recording mode that can increase the effective cartridge data capacity and the effective data rate when enabled and used. IDRC is always enabled on the 3490E Magnetic Tape Subsystem.

index entry. A catalog entry that describes the index component of a key-sequenced cluster, alternate index, or catalog. An index entry contains the index component's attributes, passwords and protection attributes, allocation and extent information, and statistics.

index level. A set of index records that order and give the location of records in the next lower level or of control intervals in the data set that it controls.

index record. A collection of index entries that are retrieved and stored as a group. Contrast with *data record*.

index set. The set of index levels above the sequence set. The index is comprised of the index set and the sequence set.

integrated catalog facility. The name of the catalog in DFSMSdfp that is a functional replacement for OS CVOLs and VSAM catalogs.

Interactive Storage Management Facility (ISMF). The interactive interface of DFSMS/MVS that allows users and storage administrators access to the storage management functions.

import. To restore a VSAM cluster or alternate index from a portable data set created by the EXPORT command.

J

job step catalog. A catalog made available for a job by means of the STEPCAT DD statement.

K

key. One or more characters within an item of data that are used to identify it or control its use. As used in this publication, one or more consecutive characters taken from a data record, used to identify the record and establish its order with respect to other records. See also *prime key*.

key sequence. The collating sequence of data records, determined by the value of the key field in each of the data records. It can be the same as, or different from, the entry sequence of the records.

key-sequenced data set (KSDS). A VSAM data set whose records are loaded in key sequence and controlled by an index. Records are retrieved and stored by keyed access or by addressed access, and new records are inserted in the data set in key sequence because of free space allocated in the data set. Relative byte addresses of records can change because of control interval or control area splits.

L

library. A partitioned data set containing a related collection of named members.

M

master catalog. A catalog that contains extensive data set and volume information that VSAM requires to locate data sets, to allocate and deallocate storage space, to verify the authorization of a program or operator to gain access to a data set, and accumulate usage statistics for data sets.

MVS/ESA. An MVS operating system environment that supports ESA/390.

N

non-VSAM entry. A catalog entry that describes a non-VSAM data set. A non-VSAM entry contains the data set's volume serial number and device type. If the data set resides on a magnetic tape volume, the entry can also identify the data set's file number. When the data set resides on a direct access device, the operating system obtains further information by examining the data set's DSCB (data set control block) in the volume's VTOC (volume table of contents).

O

object. A named byte stream having no specific format or record orientation.

object access method (OAM). An access method that provides storage, retrieval, and storage hierarchy management for objects and provides storage and retrieval management for tape volumes contained in system-managed libraries.

P

page space. A system data set that contains pages of virtual storage. The pages are stored into and retrieved from the page space by the auxiliary storage manager.

partitioned data set (PDS). A data set on direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data.

partitioned data set extended (PDSE). A system-managed data set that contains an indexed directory and members that are similar to the directory and members of partitioned data sets. A PDSE can be used instead of a partitioned data set.

password. A unique string of characters stored in a catalog that a program, a computer operator, or a terminal user must supply to meet security requirements before the program gains access to a data set.

path. A named, logical entity composed of one or more clusters (an alternate index and its base cluster, for example).

path entry. A catalog entry that contains information about a path, and that points to the path's related objects.

performance. (1) A measurement of the amount of work a product can produce with a given amount of resources. (2) In a DFSMS environment, a measurement of effective data processing speed with respect to objectives set by the storage administrator. Performance is largely determined by throughput, response time, and system availability.

plaintext. A data set or key which is not enciphered (with the cryptographic option). A data set or key is plaintext before it is enciphered and after it is deciphered.

portability. The ability to use VSAM data sets with different operating systems. Volumes whose data sets are cataloged in a user catalog can be removed from storage devices of one system, moved to another system, and mounted on storage devices of that system. Individual data sets can be transported between operating systems using access method services.

portable data set. A data set that can be transported between systems using access method services.

primary space allocation. Amount of space requested by a user for a data set when it is created. Contrast with *secondary space allocation*.

prime index. The index component of a key-sequenced data set.

prime key. One or more characters within a data record used to identify the data record or control its use. A prime key must be unique.

private. The state of a tape volume which contains user-written data. A private volume is requested by specifying the volume serial number.

Q

qualified name. A data set name consisting of a string of names segmented by periods; for example TREE.FRUIT.APPLE is a qualified name.

R

RACF authorization. (1) The facility for checking a user's level of access to a resource against the user's desired access. (2) The result of that check.

record. A set of data treated as a unit. See *index record*, *data record*, *stored record*.

recoverable catalog. A catalog defined with the recoverable attribute. Duplicate catalog entries are put into catalog recovery areas (CRAs) that can be used to recover data in the event of catalog failure. See also *catalog recovery area*.

recovery. The process of rebuilding data after it has been damaged or destroyed, often by using a backup copy of the data or by reapplying transactions recorded in a log.

recovery volume. The first volume of a prime index if the VSAM data set is a key-sequenced cluster; the first volume of the data set if entry-sequenced.

relative byte address (RBA). The displacement of a data record or a control interval from the beginning of the data set to which it belongs; independent of the manner in which the data set is stored.

relative record data set (RRDS). A VSAM data set whose records are loaded into fixed-length, or variable-length slots.

Resource Access Control Facility (RACF). An IBM-licensed program or a base element of OS/390, that provides for access control by identifying and verifying the users to the system, authorizing access to protected resources, logging the detected unauthorized attempts to enter the system, and logging the detected accesses to protected resources.

S

secondary space allocation. Amount of additional space requested by the user for a data set when primary space is full. Contrast with *primary space allocation*.

security. See *data security*.

sequence set. The lowest level of the index of a key-sequenced data set; it gives the locations of the control intervals in the data set and orders them by the key sequence of the data records they contain. The sequence set and the index set together comprise the index.

spanned record. A logical record whose length exceeds control interval length, and as a result crosses (or spans) one or more control interval boundaries within a single control area.

sphere record. A collection of logically related subrecords in one VSAM logical record.

storage management. The activities of data set allocation, placement, monitoring, migration, backup, recall, recovery, and deletion. These can be done either manually or by using automated processes. The Storage Management Subsystem automates these processes for you, while optimizing storage resources. See also *Storage Management Subsystem*.

Storage Management Subsystem (SMS). A DFSMS/MVS facility used to automate and centralize the management of storage. Using SMS, a storage administrator describes data allocation characteristics, performance and availability goals, backup and retention requirements, and storage requirements to the system through data class, storage class, management class, storage group, and ACS routine definitions.

stored record. A data record, together with its control information, as stored in auxiliary storage.

subrecord. The user definition level of a sphere, such as an alternate index, cluster, or generation data set.

T

tape volume. Storage space on tape, identified by a volume label, which contains data sets or objects and available free space. A tape volume is the recording space on a single tape cartridge or reel. See also *volume*.

U

user catalog. An optional catalog used in the same way as the master catalog and pointed to by the master catalog. It lessens the contention for the master catalog and facilitates volume portability.

user catalog connector. See *catalog connector*.

V

volume. The storage space on DASD, tape, or optical devices, which is identified by a volume label.

volume table of contents (VTOC). A table on a direct access volume that describes each data set on the volume.

volume cleanup. The process of deleting all VSAM data spaces from a volume and removing a VSAM catalog's ownership of the volume, even though the volume contains VSAM data records.

volume entry. A catalog entry that describes a volume owned by the catalog.

VSAM catalog. A special key-sequenced data set with an index containing extensive data set and volume information that VSAM requires to locate data sets or files, allocate and deallocate storage space, verify the authorization of a program or operator to gain access to a file, and accumulate usage statistics for data sets or files. VSAM catalogs have been functionally replaced by integrated catalog facility catalogs. VSAM catalogs are not supported by the Storage Management Subsystem.

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Access Method Services
for VSAM Catalogs

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