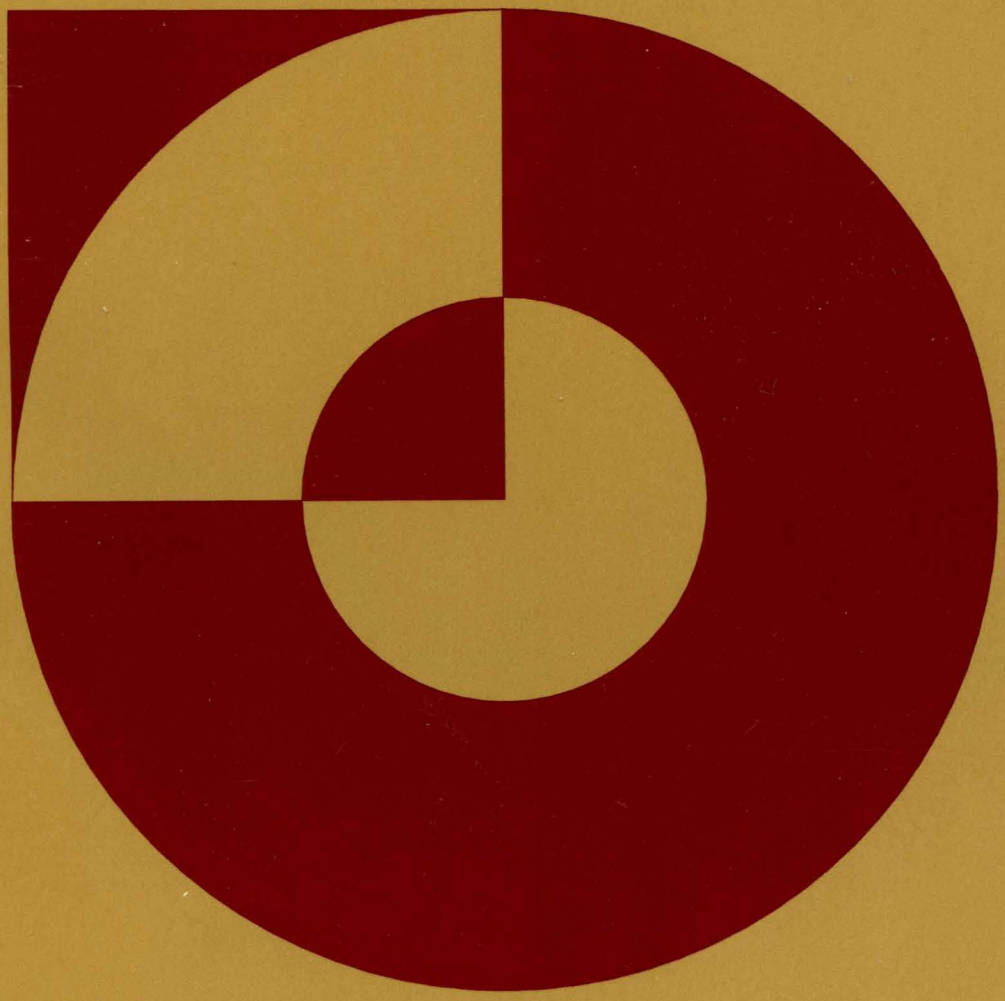
IBM

Cache Device Administration

GC35-0101-2



Storage Subsystem Library

GC35-0101-2

Cache Device Administration

Note

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

Third Edition (January 1991)

This book applies to the IBM 3880 Storage Control only. For information regarding the IBM 3990 Storage Control see the *IBM 3990 Storage Control Planning, Installation, and Storage Administration* guide.

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This manual is intended to help the user use the LISTDATA routine of the Cache RMF Reporter to obtain subsystem status or counts information.

This manual also documents Product-Sensitive Programming Interface and Associated Guidance Information.

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Product-Sensitive Programming Interface and Associated Guidance Information is identified where it occurs, either by an introductory statement to a chapter or section or by the following marking:

Product-Sensitive Programming Interface

Product-Sensitive Programming Interface and Associated Guidance Information...

End of Product-Sensitive Programming Interface

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ECKD	IBM	NetView	MVS
MVS/DFP	MVS/ESA	MVS/SP	MVS/XA
VM	VM/XA	3090	

Summary of Changes

This book is for the user of the IBM 3880 Storage Control Most references to the 3990 Storage Control have been removed in this edition. Any user who wants to find information on the 3990 Storage Control such as IDCAMS commands for 3990 basic functions or extended functions should see the *IBM 3990 Storage Control Planning, Installation, and Storage Administration* manual. Information on the Interactive Storage Management Facility (ISMF) panel support for monitoring and controlling 3990 Storage Controls is in the *ISMF User's Guide*.

Contents

Figures

Chapter 1. Preface

This book is part of the Storage Subsystem Library (SSL) — a set of books that provides information about the hardware components of IBM disk storage subsystems. The SSL includes both direct access storage (DAS) and storage control publications.

This book specifies the access method services tools for administering a 3880 storage control with cache under MVS.

About This Book

This book is a guide for the storage administrator, system programmer, or hardware performance specialist who is responsible for providing and maintaining required levels of storage subsystem availability and performance.

Terminology

A comprehensive glossary is provided at the back of this book. This glossary contains terms used not only in this book but also terms, abbreviations, and acronyms from other books in the Storage Subsystem Library.

The Storage Subsystem Library

The Storage Subsystem Library describes characteristics, capabilities, and features of the hardware and provides instructions for installing, using, and maintaining storage subsystem components effectively in various IBM operating environments. The library is designed to provide hardware and software related information for DAS and storage controls.

Figure 1 on page 4 shows the relationships among the 3990, 3390, and 3380 SSL books in terms of high-level tasks described in each book.

Storage Control Publications

The 3990 subset of the SSL includes:

- *IBM 3990 Storage Control Introduction*, GA32-0098

  Provides a complete description of the various models of the 3990 Storage Control, including its data availability, performance, and reliability improvements over previous storage controls. In addition, the book provides descriptions of the configuration attachment options, optional features, performance characteristics, and software support of the 3990 Storage Control.

- *IBM 3990 Storage Control Planning, Installation, and Storage Administration Guide*, GA32-0100

  Provides a functional description of the 3990 Storage Control. The book describes the planning, program installation, and storage management tasks used in typical environments. Configuration examples as well as sample programs for controlling the various functions of the 3990 Storage Control are provided.

- *IBM 3990 Storage Control Reference*, GA32-0099

  Provides descriptions and reference information for the 3990 Storage Control. The book contains channel commands, error recovery, and sense information.

- *Cache Device Administration*, GC35-0101

  Specifies the access method services tools for administering a 3880 Storage Control with cache under MVS. The book supports only the 3880 Storage Control models with cache.

- *IBM 3990 Operations Study Guide*, GA32-0131

  A study guide for operators of 3990 storage subsystems. Provides general information on system control program commands and messages, and guidelines for basic problem determination.

3390 Publications

The 3390 subset of the SSL includes:

- *IBM 3390 Direct Access Storage Introduction*, GC26-4573

  Provides a complete description of each 3390 model, including characteristics, features, and capabilities. In addition, the configuration and attachment options are described along with other information that will help you design a subsystem to meet your needs.

- *Using IBM 3390 Direct Access Storage in an MVS Environment*, SC26-4574

  Provides specific guidance for using 3390s in an MVS/ESA, MVS/XA or MVS/370 operating environment. The book provides detailed instruction for planning the addition of new 3390 devices, installing devices, moving data to new devices, and performing ongoing storage subsystem management.

- *Using IBM 3390 Direct Access Storage in a VM Environment*, SC26-4575

  Provides specific guidance for using 3390s in a VM/SP HPO, or VM/XA SP operating environment. The book provides detailed instruction for planning the addition of new 3390s, installing devices, moving data to new devices, and performing ongoing storage subsystem management. In addition, storage considerations related to guest systems are addressed.

- *IBM 3390 Direct Access Storage Reference Summary*, GC26-4577

  Provides a summary of 3390 capacity, performance, and operating characteristics.

3380 Publications

The 3380 subset of the SSL includes:

- *IBM 3380 Direct Access Storage Introduction*, GC26-4491

  Provides a complete description of the various models of the 3380, including characteristics, features, and capabilities. In addition, the configuration and attachment options are described along with other information that helps in designing a storage subsystem to meet your needs. This book does *not* cover 3380 Model CJ2.

- *IBM 3380 Direct Access Storage Direct Channel Attach Model CJ2 Introduction and Reference*, GC26-4497

  Provides a complete description of the 3380 direct channel attach Model CJ2 characteristics, features, capabilities, and string configuration options.

- *Using the IBM 3380 Direct Access Storage in an MVS Environment*, GC26-4492

  Provides specific guidance for using the 3380 in an MVS/XA or MVS/370 operating environment. The book provides detailed instruction for planning the addition of new 3380 devices from a logical and physical point of view, installing devices, moving data to new devices, and performing some ongoing activities to maintain a reliable storage subsystem.

- *Using the IBM 3380 Direct Access Storage in a VM Environment*, GC26-4493

  Provides specific guidance for using the 3380 in a VM/SP, VM/SP HPO, or VM/XA SP operating environment. The book provides detailed instruction for planning the addition of new 3380 devices, installing devices, moving data to new devices, and performing ongoing storage management activities to maintain reliable performance and availability. In addition, hardware considerations related to guest systems are addressed.

- *Using the IBM 3380 Direct Access Storage in a VSE Environment*, GC26-4494

  Provides specific guidance for using the 3380 in a VSE operating environment. The book provides instruction for planning the addition of new 3380 devices, installing devices, moving data to new devices, and performing ongoing storage subsystem management.

- *IBM 3380 Direct Access Storage Reference Summary*, GX26-1678

  Provides a summary of 3380 capacity, performance, and operating characteristics.

Shared SSL Publications

The following publications contain information relevant to the entire Storage Subsystem Library.

- *Maintaining IBM Storage Subsystem Media*, GC26-4495

  Describes how the storage subsystem and the various operating systems handle disk storage errors and provides instruction on using the Environmental Record Editing and Printing (EREP) program and the Device Support Facilities (ICKDSF) program to diagnose and correct disk media errors. Recovery procedures are provided for the various device types. In addition, background material on DAS storage concepts is included.

- *Storage Subsystem Library Master Index*, GC26-4496

  Provides a central source for information related to storage subsystem topics. Books for IBM 3390 DAS, IBM 3380 DAS, and 3990 Storage Controls are indexed in this publication. An overview of the material in the Storage Subsystem Library is provided with this index.

Storage Subsystem Library

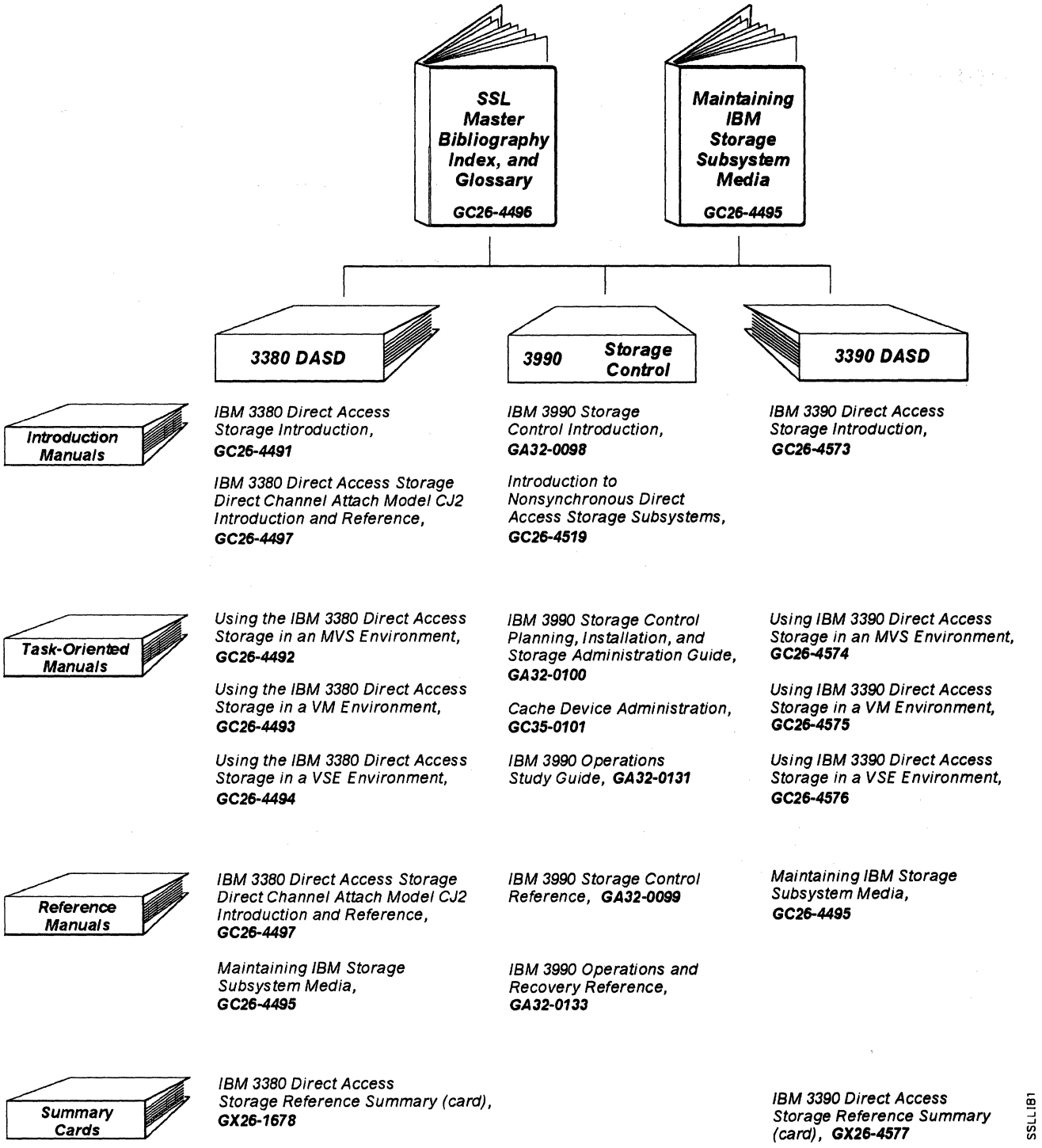

Figure 1. The Storage Subsystem Library

Storage Subsystem Library Ordering Information

The entire SSL or parts of it tailored to your hardware and software environment can be ordered with bill of form numbers.

3390 and 3990 Publications

You can obtain a copy of **every manual** in the 3390 and 3990 subsets of the SSL with one order number, **SBOF-3124**. Select one of the following bill of form numbers to obtain information tailored to your hardware and software environment. To obtain an individual manual, use its order number.

Table 1. 3390 and 3990 Subsets

Title	MVS SBOF-3121	VM SBOF-3122	3990 GBOF-0366	SBOF-3124
IBM 3390 Direct Access Storage Introduction, GC26-4573	X	X		X
Using IBM 3390 Direct Access Storage in an MVS Environment, SC26-4574	X			X
Using IBM 3390 Direct Access Storage in a VM Environment, SC26-4575		X		X
Maintaining IBM Storage Subsystem Media, GC26-4495	X	X		X
IBM 3390 Direct Access Storage Reference Summary, GX26-4577	X	X		X
IBM 3990 Storage Control Introduction, GA32-0098			X	X
IBM 3990 Storage Control Planning, Installation, and Storage Administration Guide, GA32-0100			X	X
IBM 3990 Storage Control Reference, GA32-0099			X	X
Cache Device Administration, GC35-0101			X	X
IBM 3990 Operations Study Guide, GA32-0131			X	X
Storage Subsystem Library Master Bibliography, Index, and Glossary, GC26-4496	X	X	X	X
Binder and 3390 inserts, SX26-3777	X	X		X
Binder and 3990 inserts, GX26-3768			X	X

3380 and 3990 Publications

You can obtain a copy of **every manual** in the 3380 and 3990 subsets of the SSL using one General Bill of Forms (GBOF) number, **GBOF-1762**. Select one of the following bill of form numbers to obtain information tailored to your hardware and software environment. To obtain an individual manual, use its order number.

Table 2. 3380 and 3990 Subsets

Title	MVS GBOF-1756	VM GBOF-1757	VSE GBOF-1758	CJ2/MVS GBOF-1759	CJ2/VM GBOF-1760	CJ2/VSE GBOF-1761	3990 GBOF-0366
IBM 3380 Direct Access Storage Introduction, GC26-4491	X	X	X				
IBM 3380 Direct Access Storage Direct Channel Attach Model CJ2 Introduction and Reference, GC26-4497				X	X	X	
Using IBM 3380 Direct Access Storage in an MVS Environment, GC26-4492	X			X			
Using IBM 3380 Direct Access Storage in a VM Environment, GC26-4493		X			X		
Using IBM 3380 Direct Access Storage in a VSE Environment, GC26-4494			X			X	
Maintaining IBM Storage Subsystem Media, GC26-4495	X	X	X	X	X	X	
IBM 3380 Direct Access Storage Reference Summary, GX26-1678	X	X	X	X	X	X	
IBM 3990 Storage Control Introduction, GA32-0098							X
IBM 3990 Storage Control Planning, Installation, and Storage Administration Guide, GA32-0100							X
IBM 3990 Storage Control Reference, GA32-0099							X
Cache Device Administration, GC35-0101							X
IBM 3990 Operations Study Guide, GA32-0131							X
Storage Subsystem Library Master Bibliography, Index, and Glossary, GC26-4496	X	X	X	X	X	X	X
Binder and 3380 inserts, GX26-3767	X	X	X	X	X	X	
Binder and 3990 inserts, GX26-3768							X

Storage Subsystem Library Binders

Binder kits are available to help organize your library. Kits consist of a binder with identifying cover and spine inserts for 3390, 3380, or 3990 manuals, and are included when you order the following numbers:

- SBOF-3121 and SBOF-3122 include a binder with 3390 inserts.
- GBOF-1756 through GBOF-1761 include a binder with 3380 inserts.
- GBOF-0366 includes a binder with 3990 inserts.
- SBOF-3124 includes binders and inserts for both 3990 **and** 3390.
- GBOF-1762 includes binders and inserts for both 3990 **and** 3380.

Binder kits may also be ordered separately.

- Order number SX26-3777 contains a binder and 3390 inserts.
- Order number GX26-3767 contains a binder and 3380 inserts.
- Order number GX26-3768 contains a binder and 3990 inserts.

Related Publications

"Bibliography" on page 81 contains a list of publications that are referred to in this book or that may provide additional, related information. The bibliography includes a short description of each publication.

Chapter 2. Introduction

This book describes the access method services commands for managing the IBM 3880 storage controls that have cache storage. These commands are presented in the following chapters with one chapter for each storage control. Table 3 lists each storage control and shows which commands it supports. If the command is supported, the page number explaining the command is given.

Table 3. Command to Model Cross-Reference Table

Storage	LISTDATA		SETCACHE	
Control	**Supported**	**Page**	**Supported**	**Page**
3880-23	Yes	13	Yes	22
3880-21	Yes	27	Yes	35
3880-13	Yes	42	Yes	52
3880-11	Yes	55	No	

Note:

3880 Model 13 also supports the BINDDATA command.
See "BINDDATA" on page 39 for information on this command.

For basic understanding of the IBM 3880 Models 11, 13, 21, and 23, see the respective introduction book.

For an explanation of the coding and syntax rules for access method services commands, see *Access Method Services Reference*.

DFP Support

Table 4 shows the minimum levels of Data Facility Product (DFP) that support the various cache storage controls.

Table 4. Levels of DFP Supporting Cache Storage Controls				
Storage Control	**MVS/DFP Ver. 3**	**DFP/XA Ver. 2**	**DFP/XA Ver. 1**	**MVS/370 DFP Ver. 1**
3880-23 (with Feature 3010)	1.0	2.3	1.3	1.2
3880-23 (without Feature 3010)	1.0	1.0	1.2	1.1
3880-21	1.0	1.0	1.2	1.1
3880-13	1.0	1.0	1.1	1.0
3880-11	1.0	1.0	1.1	1.0

Syntax Conventions

In this book, the following conventions are used to show command syntax:

[ ] brackets indicate an optional parameter.

{ } braces indicate a choice of entry; unless a default is shown, you must choose one of the entries within the braces.

| vertical bar indicates alternative items. You cannot select more than one item.

BOLDFACE type indicates the exact character must be entered.

italic type indicates fields that you must supply.

BOLDFACE UNDERSCORE type indicates a default. If the parameter is omitted, the underscored value is assumed.

System Authorization Facility

The following table show the SAF/RACF resources that are used to protect the shown commands and parameters.

To use a command and any of its parameters, you must be authorized to use both the command and its parameter. See your RACF administrator or system programmer for RACF authorization.

Table 5. SAF/RACF Resources. SAF/RACF resource access required for IDCAMS commands.

Command or parameter	Resource class	Resource Name	Access
BINDDATA	FACILITY	STGADMIN.IDC.BINDDATA	READ
LISTDATA	FACILITY	STGADMIN.IDC.LISTDATA	READ
SETCACHE	FACILITY	STGADMIN.IDC.SETCACHE	READ
SUBSYSTEM	FACILITY	STGADMIN.IDC.SETCACHE.SUBSYSTEM	READ

Note: Each authorization check is performed independently. To issue a command using a protected parameter, the user must have READ access authority to the resource for the command, as well as to the resource for the parameter. For example, to issue a SETCACHE SUBSYSTEM command, a user must have READ access to both of the following:

- STGADMIN.IDC.SETCACHE
- STGADMIN.IDC.SETCACHE.SUBSYSTEM

Chapter 3. 3880 Model 23 Commands

LISTDATA

The LISTDATA command obtains information about activity within the IBM 3880 Storage Control Model 23 including the Model 23 with the 3380 AJ4/AK4 Attachment (Feature 3010). You can obtain two different types of reports:

- Subsystem Counters Report—a record of the counters within the subsystem at the time the report is requested.
- Subsystem Status Report—a record of the status within the subsystem at the time the report is requested.

With either type of report, you can request a legend that describes the headings used.

A user interface has been provided specifically for non-access method services callers (for example, the Cache RMF Reporter). This interface allows you to obtain subsystem status or count information. The description of the interface is in Appendix B, "User Access to Subsystem Status and Counts Information" on page 67.

Note: The LISTDATA command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the LISTDATA command is:

Table 6. LISTDATA command format, 3880 Model 23

LISTDATA	{**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)] [**WTO**]

LISTDATA can be abbreviated: LDATA

Required Parameters

COUNTS|STATUS
specifies the type of report.

COUNTS
specifies that a subsystem counters report be printed.

Abbreviation: CNT

STATUS
specifies that a subsystem status report be printed.

Abbreviation: STAT

FILE(*ddname*)|VOLUME(*volser*) UNIT(*unittype*)
specifies a device that resides in the subsystem for which the report is requested.

FILE(*ddname*)
specifies the name of a DD statement that identifies the unit and volume of a device within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type and volume serial number.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type of the subsystem. This parameter is required only when the VOLUME parameter is specified.

Optional Parameters

DEVICE|SUBSYSTEM|ALL
specifies the subsystem counters to be reported in the subsystem counters report. These parameters can be specified only when the COUNTS parameter is specified.

DEVICE
specifies that the subsystem counters for the addressed device are included in the subsystem counters report.

Abbreviation: DEV

SUBSYSTEM
specifies that the subsystem counters for all devices within the subsystem are included in the subsystem counters report.

Abbreviation: SSYS or SUBSYS

ALL
specifies that subsystem counters for all devices on all like models of storage controls are to be included in the subsystem counters report. ALL is the default parameter when the COUNTS parameter is specified.

LEGEND|NOLEGEND
specifies whether a legend explaining the headings used is to be printed following the requested report.

LEGEND
specifies that the legend is printed.

Abbreviation: LGND

NOLEGEND
specifies that the legend is not printed. This is the default parameter.

Abbreviation: NOLGND

OUTFILE(*ddname*)|OUTDATASET(*dsname*)
specifies an alternate target data set if the SYSPRINT data set is not to be used for the report.

OUTFILE(*ddname*)
specifies the name of a DD statement identifying the data set to be used to contain the report. For *ddname*, substitute the name of the DD statement identifying the data set.

Abbreviation: OFILE

OUTDATASET(*dsname*)
specifies the name of the alternate target data set. For *dsname*, substitute the name of the data set to be used. The data set name must be cataloged.

Note: Be sure to erase the previous alternate target data set before specifying the OUTDATASET parameter. If you do not erase the old data set, your reports may not be accurate. If a report seems to be in error, compare the time field with the time the job was submitted.

Abbreviation: ODS or OUTDS

WTO
specifies that information on the overall condition of the subsystem be sent to the system console and a full report printed.

Abbreviation: None

Note: The WTO parameter can be used only if the STATUS parameter is specified.

Examples

Listing Subsystem Counters for a Particular Device: Example 1

In this example, a Subsystem Counters Report for a particular device is being requested.

```
//LISTDAT1  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL1  DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   FILE(LISTVOL1)-
   DEVICE
/*
```

Job control language statement:

- LISTVOL1 DD, which specifies a 3380 unit and volume VOL123 for which the report is requested.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- FILE, which specifies LISTVOL1 as the DD statement that allocates a 3380 unit and volume VOL123.
- DEVICE, which specifies that the Subsystem Counters Report should include only subsystem counters for the addressed device.

See "Reports" on page 18, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices within a Subsystem: Example 2

In this example, a Subsystem Counters Report is being requested for all devices within a subsystem.

```
//LISTDAT2  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDD     DD    DSN=OUTDS,DISP=(NEW,KEEP),VOL=SER=OUTVOL,
//          UNIT=3480,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3380)-
   SUBSYSTEM-
   OUTFILE(OUTDD)
/*
```

Job control language statement:

- OUTDD DD, which allocates the output data set (DSN=OUTDS) on tape (UNIT=3480) for use by the LISTDATA command. If you do not allocate an output data set, the subsystem counters are printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set if it is new.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report is printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3380 unit.
- SUBSYSTEM, which specifies that the Subsystem Counters Report should include counters for all devices within this subsystem.
- OUTFILE, which specifies OUTDD as the name of the DD statement identifying the data set used to contain the report.

See "Reports" on page 18, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices on All Like Subsystems: Example 3

In this example, a Subsystem Counters Report is being requested for all devices on all like subsystems.

```
//LISTDAT3  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDS     DD    DSN=OUTDATA,DISP=(,CATLG),UNIT=3380,
//                VOL=SER=VOL001,SPACE=(CYL,(2,1)),
//                DCB=(RECFM=VBA,
//                LRECL=250,BLKSIZE=504)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3380)-
   ALL-
   OUTDATASET(OUTDATA)
/*
```

Job control language statement:

- OUTDS DD, which allocates the output data set (DSN=OUTDATA) on a 3380 (UNIT=3380) for use by the LISTDATA command. If an output data set is not allocated, the report is printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set. The output data set is cataloged in the master catalog (DISP=(,CATLG)). This DD statement allocates 2 cylinders for the output data set and, if more space is required for the report, the space is extended in increments of 1 cylinder.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3380 unit.
- ALL, which specifies that the Subsystem Counters Report should include subsystem counters for all devices on all like subsystems.
- OUTDATASET, which identifies OUTDATA as the output data set to be used for the report, rather than the SYSPRINT data set.

See "Reports" on page 18, for an example of a printed Subsystem Counters Report.

Listing Subsystem Status: Example 4

In this example, subsystem status report is being requested.

```
//LISTDAT4  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL2  DD    UNIT=3380,VOL=SER=VOL269,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   STATUS-
   FILE(LISTVOL2)-
   WTO
/*
```

Job control language statement:

- LISTVOL2 DD, which specifies a 3380 unit for which subsystem status is being reported.

The LISTDATA command parameters are:

- STATUS, which specifies that a Subsystem Status Report be printed.
- FILE, which specifies LISTVOL2 as the DD statement that allocates a 3380 unit and volume VOL269.
- WTO which specifies that an informational message indicating the status of subsystem caching activity will be displayed on the system console. For example, WTO may produce a message similar to the one below:

```
IDC01551I 3380 CACHING STATUS: ACTIVE FOR SD X'05' DEV ID X'01'
```

Reports

Use the LISTDATA command to list information about activity within the IBM 3880 Storage Control Model 23. You can obtain two different types of reports: subsystem counters report and subsystem status report. Optionally, you can also obtain a legend for each report. This legend describes the headings used in the report. When you request a legend, it is printed at the end of the report.

Subsystem Counters Report

The Subsystem Counters Report provides a record of the counters within the subsystem at the time the report is requested. The counters are not reset when the report is taken.

Figure 2 on page 19 is a sample Subsystem Counters Report for Model 23.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 12:29:08
                    3380   SUBSYSTEM COUNTERS REPORT

VOLUME 338DH0    DEVICE ID X'C0'
                            CHANNEL COMMAND CHAINS IN BYTES

                         .........SEARCH/READ.........
REQUESTS      SD ID          TOTAL        CACHE READ          WRITE TOTAL

NORMAL        X'FB'            29                28                   24
              X'FA'            30                28                   15

SEQUENTIAL    X'FB'             6                 5                    1
              X'FA'             6                 5                    2

TOTAL/1000                      0                 0                    0

REQUESTS                    SD ID    COMMAND CHAINS

INHIBIT CACHE LOADING       X'FB'                 0
                            X'FA'                 0

BYPASS CACHE                X'FB'                38
                            X'FA'                39

DASD TO CACHE XFERS         SD ID             NORMAL          SEQUENTIAL

                            X'FB'                 2                    1
                            X'FA'                 3                    1

                   CONTROL UNIT DATA TRANSFER IN BYTES
SD ID  CACHE/CHAN          DASD/CHAN         DASD/CH&CA         DASD/CACHE

X'FB'        8392              41776               1264               3552
X'FA'        8434              44544               1408              11152
```

Figure 2. Sample Subsystem Counters Report for the IBM 3880 Storage Control Model 23

The report in Figure 3 on page 20 is the corresponding legend of Figure 2.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 12:29:08
                            LEGEND

                            SUBSYSTEM COUNTERS LEGEND

VOLUME           - VOLUME SERIAL NUMBER FOR WHICH THE DATA IS GATHERED
DEVICE ID        - DEVICE IDENTIFICATION
SD ID            - STORAGE DIRECTOR FOR WHICH DATA IS GATHERED

CHANNEL COMMAND CHAINS    - A CCW CHAIN WHICH CONTAINS AT LEAST ONE
                    SEARCH, READ OR WRITE, COUNTS ARE IN BYTES
  SEARCH/READ    - CCW CHAINS WHICH CONTAIN AT LEAST ONE SEARCH OR
                    READ BUT NO WRITE CCW
  TOTAL          - ALL SEARCH/READ CCW CHAINS
  CACHE READS    - CCW CHAINS WHICH REQUIRED NO DATA TO BE MOVED
                    TO/FROM THE DASD
  WRITE TOTAL    - ALL WRITE CCW CHAINS

NORMAL           - CCW CHAINS WHICH DO NOT INCLUDE A DEFINE EXTENT CCW
                    OR SPECIFY NORMAL CACHE REPLACEMENT IN THE DEFINE
                    EXTENT CCW

SEQUENTIAL       - CCW CHAINS WHICH SPECIFY SEQUENTIAL ACCESS IN THE
                    DEFINE EXTENT CCW

TOTAL/1000       - TOTAL DIVIDED BY 1000 FOR EACH VERTICAL LINE ITEM
INHIBIT CACHE LOADING - CCW CHAINS WHICH SPECIFY INHIBIT CACHE LOADING
                    IN THE DEFINE EXTENT CCW
BYPASS CACHE     - CCW CHAINS WHICH SPECIFY THE BYPASS CACHE ATTRIBUTE
                    IN THE DEFINE EXTENT CCW

DASD TO CACHE TRANSFERS - THE NUMBER OF DATA PROMOTION OPERATIONS WHICH
                    MOVE DATA FROM THE DASD TO THE CACHE
NORMAL           - DATA MOVEMENT OPERATIONS EXCLUDING SEQUENTIAL
SEQUENTIAL       - 'NEXT TRACK' DATA MOVEMENT OPERATIONS IN SEQUENTIAL
                    ACCESS MODE

  CONTROL UNIT DATA TRANSFER IN BYTES

CACHE/CHAN       - BYTES TRANSFERRED FROM CACHE TO THE CHANNEL
DASD/CHAN        - BYTES TRANSFERRED FROM THE DASD TO THE CHANNEL
DASD/CH&CA       - BYTES TRANSFERRED FROM DASD TO THE CACHE AND
                    CHANNELS
DASD/CACHE       - BYTES TRANSFERRED FROM THE DASD TO THE CACHE
```

Figure 3. Subsystem Counters Report Legend for the IBM 3880 Storage Control Model 23

Subsystem Status Report

The Subsystem Status Report provides a record of the status within the subsystem at the time the report is requested. This report includes:

- Address of the subsystem caching storage director.
- Address of the device on which I/O was done.

- Amount of subsystem storage that is CONFIGURED, AVAILABLE, OFFLINE, and BOUND.[1]
- 40 bytes of hexadecimal data representing subsystem status as it is returned from the subsystem before it is interpreted.

Figure 4 is a sample Subsystem Status Report for Model 23.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 12:28:44
                          3380   SUBSYSTEM STATUS REPORT

             SD ID X'FB'     DEVICE ID X'C0'

               SUBSYSTEM STORAGE IN BYTES

             CONFIGURED            16777216

             AVAILABLE             16731840

             BOUND                        0

             OFFLINE                      0

 RETURNED STATUS 0-19 FBC00000 0C00FFFF FFFF0100 000000FF 4EC00000

               20-39 00000000 00000000 00000000 00000000 00000000
OVERALL CACHING STATUS            ACTIVE

FOR DEVICES                       00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
                                  10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F

             SD ID X'FA'     DEVICE ID X'C0'

               SUBSYSTEM STORAGE IN BYTES

             CONFIGURED            16777216

             AVAILABLE             16731840

             BOUND                        0

             OFFLINE                      0

 RETURNED STATUS 0-19 FAC00000 0C00FFFF FFFF0100 000000FF 4EC00000

               20-39 00000000 00000000 00000000 00000000 00000000
OVERALL CACHING STATUS            ACTIVE

FOR DEVICES                       00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
                                  10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
```

Figure 4. Sample Subsystem Status Report for the IBM 3880 Storage Control Model 23

The report in Figure 5 on page 22 is the corresponding legend of Figure 4.

[1] The sum of AVAILABLE, BOUND, and OFFLINE is always less than CONFIGURED. The difference is the amount of storage occupied by control data and the space remaining after the storage director has allocated as many track slot segments as possible from the subsystem storage space which is not occupied by subsystem control data.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 12:28:44
                          LEGEND

                          SUBSYSTEM STATUS LEGEND

SD ID           - ADDRESS OF THE SUBSYSTEM'S CACHING STORAGE DIRECTOR
DEVICE ID       - ADDRESS OF THE DEVICE ON WHICH THE I/O WAS DONE

SUBSYSTEM STORAGE IN BYTES
CONFIGURED      - THE AMOUNT OF STORAGE THAT EXISTS IN THE CACHE FOR
                  THIS SUBSYSTEM
AVAILABLE       - THE AMOUNT OF STORAGE THAT IS AVAILABLE FOR CACHING
BOUND           - THE AMOUNT OF STORAGE THAT IS RESTRICTED TO SPECIFIC
                  DATA IN THE CACHE
OFFLINE         - THE AMOUNT OF STORAGE THAT IS OFFLINE BECAUSE OF A
                  HOST OR SUBSYSTEM  ERROR

RETURNED STATUS - INDICATES THE UNINTERPRETED DATA RETURNED

                  FROM THE SUBSYSTEM FOR A STATUS REQUEST

OVERALL CACHING STATUS - STATES WHETHER THE CACHE IS ACTIVE, WHETHER
                  THERE WAS A SUBSYSTEM ERROR OR A HOST
                  TERMINATION

FOR DEVICES     - SPECIFIES FOR WHICH DEVICES CACHING HAS NOT
                  BEEN DEACTIVATED, WHETHER OR NOT ACTUALLY
                  ATTACHED
```

Figure 5. Subsystem Status Report Legend for the IBM 3880 Storage Control Model 23

SETCACHE

Use the SETCACHE command with the IBM 3880 Storage Control Model 23 to:

- Make an addressed device (actuator) eligible or not eligible for caching operations.
- Make subsystem storage available or not available to the subsystem for caching operations.

Note: The SETCACHE command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the SETCACHE command is:

Table 7. SETCACHE command format, 3880 Model 23

SETCACHE	{**FILE(***ddname***)**|**VOLUME(***volser***) UNIT(***unittype***)**} [**DEVICE**|**SUBSYSTEM**] [**ON**|**OFF**]

SETCACHE can be abbreviated: SETC

Required Parameters

FILE(*ddname***)|VOLUME(***volser***) UNIT(***unittype***)**
specifies the volume of a unit within the subsystem.

FILE(*ddname***)**
specifies the name of a DD statement that identifies the device type and volume of a unit within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type.

VOLUME(*volser***)**
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype***)**
specifies the unit type of the subsystem.

Optional Parameters

DEVICE|SUBSYSTEM
specifies whether access to a particular device or to the entire subsystem cache be allowed or prohibited.

DEVICE
specifies that access to the cache of a particular device is allowed or prohibited.

Abbreviation: DEV

SUBSYSTEM
specifies that access to the entire subsystem cache is allowed or prohibited.

Abbreviation: SSYS or SUBSYS

Note: RACF READ access authority to the FACILITY class resource STGADMIN.IDC.SETCACHE.SUBSYSTEM is required to use the SUBSYSTEM parameter.

ON|OFF
specifies whether access to the cache be allowed or prohibited.

ON
specifies that access to the cache be allowed.

OFF
specifies that access to the cache be prohibited.

Note: Setting subsystem cache on or off and setting cache for a device on or off are independent operations. That is, cache for individual devices may be set on or off whether the subsystem cache is on or off. However, if the subsystem cache is set off, setting cache for an individual device on has no effect until the subsystem cache is set on.

Examples

You can enter the SETCACHE command by using JCL statements or by using ISMF panels.

Allowing Access to the Cache for a Particular Device: Example 1

In this example, access to the cache is allowed for a particular device.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SET01     DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   FILE(SET01)-
   DEVICE-
   ON
/*
```

Job control language statement:

- SET01 DD, which specifies a 3380 unit for which access to the cache is to be allowed, and specifies volume VOL123.

The SETCACHE command parameters are:

- FILE, which specifies SET01 as the DD statement that allocates a 3380 unit and volume VOL123.
- DEVICE, which specifies that access to a single device is affected.
- ON, which specifies that access to the cache be allowed.

Allowing Access to the Cache for an Entire Subsystem: Example 2

In this example, access to the cache is allowed for an entire subsystem.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   VOLUME(VOL002)-
   UNIT(3380)-
   SUBSYSTEM-
   ON
/*
```

The SETCACHE command parameters are:

- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3380 unit.
- SUBSYSTEM, which specifies that cache access is affected for all devices in the subsystem containing volume VOL002.
- ON, which specifies that access to the cache is allowed.

Prohibiting Access to the Cache for a Particular Device: Example 3

In this example, access to the cache is prohibited for a particular device.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SET01     DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   FILE(SET01)-
   DEVICE-
   OFF
/*
```

Job control language statement:

- SET01 DD, which specifies a 3380 unit for which the cache is to be disabled, and specifies volume VOL123.

The SETCACHE command parameters are:

- FILE, which specifies SET01 as the DD statement that allocates a 3380 unit and volume VOL123.
- DEVICE, which specifies that cache access for a single device is affected.
- OFF, which specifies that access to the cache be prohibited.

Chapter 4. 3880 Model 21 Commands

LISTDATA

The LISTDATA command obtains information about activity within the IBM 3880 Storage Control Model 21. You can obtain two different types of reports:

- Subsystem Counters Report—a record of the counters within the subsystem at the time the report is requested.
- Subsystem Status Report—a record of the status within the subsystem at the time the report is requested.

With either type of report, you can request a legend that describes the headings used.

A user interface has been provided specifically for non-access method services callers (for example, the Cache RMF Reporter). This interface allows you to obtain subsystem status or count information. The description of the interface is in Appendix B, "User Access to Subsystem Status and Counts Information" on page 67.

Note: The LISTDATA command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the LISTDATA command is:

Table 8. LISTDATA command format, 3880 Model 21

LISTDATA	{**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)]

LISTDATA can be abbreviated: LDATA

Required Parameters

COUNTS|STATUS
specifies the type of report.

COUNTS
specifies that a subsystem counters report be printed.

Abbreviation: CNT

STATUS
specifies that a subsystem status report be printed.

Abbreviation: STAT

FILE(*ddname*)|VOLUME(*volser*) UNIT(*unittype*)
specifies a device that resides in the subsystem for which the report is requested.

FILE(*ddname*)
specifies the name of a DD statement that identifies the unit and volume of a device within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type and volume serial number.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type of the subsystem. This parameter is required only when the VOLUME parameter is specified.

Optional Parameters

DEVICE|SUBSYSTEM|ALL
specifies the subsystem counters to be reported in the subsystem counters report. These parameters can be specified only when the COUNTS parameter is specified.

DEVICE
specifies that the subsystem counters for the addressed device are included in the subsystem counters report.

Abbreviation: DEV

SUBSYSTEM
specifies that the subsystem counters for all devices within the subsystem are included in the subsystem counters report.

Abbreviation: SSYS or SUBSYS

ALL
specifies that the subsystem counters for all devices on all like models of storage controls be included in the subsystem counters report. ALL is the default parameter when the COUNTS parameter is specified.

LEGEND|NOLEGEND
specifies whether a legend explaining the headings used is printed following the report.

LEGEND
specifies that the legend is printed. This is the default parameter.

Abbreviation: LGND

NOLEGEND
specifies that the legend is not printed.

Abbreviation: NOLGND

OUTFILE(*ddname*)|OUTDATASET(*dsname*)
specifies an alternate target data set if the SYSPRINT data set is not used for the report.

OUTFILE(*ddname*)
specifies the name of a DD statement identifying the data set to be used to contain the report. For *ddname*, substitute the name of the DD statement identifying the data set.

Abbreviation: OFILE

OUTDATASET(*dsname*)
specifies the name of the alternate target data set. OUTDATASET can be specified only in MVS systems. For *dsname*, substitute the name of the data set to be used. The data set name must be cataloged.

Note: Be sure to erase the previous alternate target data set before specifying the OUTDATASET parameter. If you do not erase the old data set, your reports may not be accurate. If a report seems to be in error, compare the time field with the time the job was submitted.

Abbreviation: ODS or OUTDS

Examples

Listing Subsystem Counters for a Particular Device: Example 1

In this example, a Subsystem Counters Report for a particular device is being requested.

```
//LISTDAT1  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL1  DD    UNIT=3350,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   FILE(LISTVOL1)-
   DEVICE
/*
```

Job control language statement:

- LISTVOL1 DD, which specifies a 3350 unit and volume VOL123 for which the report is requested.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- FILE, which specifies LISTVOL1 as the DD statement that allocates a 3350 unit and volume VOL123.
- DEVICE, which specifies that the Subsystem Counters Report should include only subsystem counters for the addressed device.

See "Reports" on page 31, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices within a Subsystem: Example 2

In this example, a Subsystem Counters Report is being requested for all devices within a subsystem.

```
//LISTDAT2  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDD     DD    DSN=OUTDS,DISP=(NEW,KEEP),VOL=SER=OUTVOL,
//          UNIT=3480,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3350)-
   SUBSYSTEM-
   OUTFILE(OUTDD)
/*
```

Job control language statement:

- OUTDD DD, which allocates the output data set (DSN=OUTDS) on tape (UNIT=3480) for use by the LISTDATA command. If you do not allocate an output data set, the subsystem counters are printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set if it is new.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report is printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3350 unit.
- SUBSYSTEM, which specifies that the Subsystem Counters Report should include counters for all devices within this subsystem.
- OUTFILE, which specifies OUTDD as the name of the DD statement identifying the data set used to contain the report.

See "Reports" on page 31, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices on All Like Subsystems: Example 3

In this example, a Subsystem Counters Report is being requested for all devices on all like subsystems.

```
//LISTDAT3  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDS     DD    DSN=OUTDATA,DISP=(,CATLG),UNIT=3350,
//                VOL=SER=VOL001,SPACE=(CYL,(2,1)),
//                DCB=(RECFM=VBA,
//                LRECL=250,BLKSIZE=504)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3350)-
   ALL-
   OUTDATASET(OUTDATA)
/*
```

Job control language statement:

- OUTDS DD, which allocates the output data set (DSN=OUTDATA) on a 3350 (UNIT=3350) for use by the LISTDATA command. If an output data set is not allocated, the report is printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set. The output data set is cataloged in the master catalog (DISP=(,CATLG)). This DD statement allocates 2 cylinders for the output data set and, if more space is required for the report, the space is extended in increments of 1 cylinder.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3350 unit.
- ALL, which specifies that the Subsystem Counters Report should include subsystem counters for all devices on all like subsystems.
- OUTDATASET, which identifies OUTDATA as the output data set to be used for the report, rather than the SYSPRINT data set.

See "Reports," for an example of a printed Subsystem Counters Report.

Listing Subsystem Status: Example 4

In this example, subsystem status report is being requested.

```
//LISTDAT4  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL2  DD    UNIT=3350,VOL=SER=VOL269,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   STATUS-
   FILE(LISTVOL2)
/*
```

Job control language statement:

- LISTVOL2 DD, which specifies a 3350 unit for which subsystem status is being reported.

The LISTDATA command parameters are:

- STATUS, which specifies that a Subsystem Status Report be printed.
- FILE, which specifies LISTVOL2 as the DD statement that allocates a 3350 unit and volume VOL269.

Reports

Use the LISTDATA command to list information about activity within the caching models of IBM storage controls. You can obtain two different types of reports: subsystem counters report and subsystem status report. Optionally, you can also obtain a legend for each report. This legend describes the headings used in the report. When you request a legend, it is printed at the end of the report.

Subsystem Counters Report

The Subsystem Counters Report provides a record of the counters within the subsystem at the time the report is requested. The counters are not reset when the report is taken. Figure 6 is a sample Subsystem Counters Report for Model 21.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 11:09:14
                    3350   SUBSYSTEM COUNTERS REPORT

VOLUME 335S20    DEVICE ID X'20'   SD ID X'74'

                DATA TRANSFERS    ...READS..       NO DASD ACCESS

TOTAL PAGING                0              N/A                 0

NON-SEQUENTIAL              0                0                 0
SEQUENTIAL                  0                0                 0
SWAP-INS                    0                0                 0

TOTAL/1000                  0                0                 0

          BLOCK WRITES              0
          DASD UPDATES              0
          BLOCK DISCARDS            0
          BLOCK UPDATES             0

VOLUME 335S20    DEVICE ID X'20'   SD ID X'75'

                DATA TRANSFERS    ...READS..       NO DASD ACCESS

TOTAL PAGING                0              N/A                 0

NON-SEQUENTIAL              0                0                 0
SEQUENTIAL                  0                0                 0
SWAP-INS                    0                0                 0

TOTAL/1000                  0                0                 0

          BLOCK WRITES              0
          DASD UPDATES              0
          BLOCK DISCARDS            0
          BLOCK UPDATES             0
```

Figure 6. Sample Subsystem Counters Report for the IBM 3880 Storage Control Model 21

The report in Figure 7 on page 33 is the corresponding legend of Figure 6.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 11:09:23
                          LEGEND

                          SUBSYSTEM COUNTERS LEGEND

VOLUME             - VOLUME SERIAL NUMBER FOR WHICH THE DATA IS GATHERED

DEVICE ID          - DEVICE IDENTIFICATION
SD ID              - STORAGE DIRECTOR FOR WHICH THE DATA IS GATHERED

DATA TRANSFERS     - NUMBER OF CCW CHAINS TO THIS DEVICE WITH A READ OR
                     WRITE IN IT
   READS           - NUMBER OF READ CCWS
   NO DASD ACCESS  - NUMBER OF CCW CHAINS FOR WHICH NO READS REQUIRED
                     DASD ACCESS

TOTAL PAGING
   NON-SEQUENTIAL - SET PAGING PARAMETER COMMANDS THAT WERE NOT SET
                    SEQUENTIAL
   SEQUENTIAL     - SET PAGING PARAMETER COMMANDS THAT WERE SET
                    SEQUENTIAL

   SWAP-INS       - SET PAGING PARAMETER COMMANDS SET FOR SWAP-IN

   TOTAL/1000     - TOTAL DIVIDED BY 1000 FOR EACH VERTICAL LINE ITEM
BLOCK WRITES      - 4K BLOCKS WRITTEN FROM THE HOST
DASD UPDATES      - INTERNAL COMMAND CHAINS PERFORMING CACHE TO DASD
                    TRANSFERS
BLOCK DISCARDS    - BLOCKS AVAILABLE FOR REASSIGNMENT THROUGH DISCARD
                    BLOCK CCWS
BLOCK UPDATES     - 4K BLOCKS WRITTEN FROM CACHE TO DASD
```

Figure 7. Subsystem Counters Report Legend for the IBM 3880 Storage Control Model 21

Subsystem Status Report

The Subsystem Status Report provides a record of the status within the subsystem at the time the report is requested. This report includes:

- Address of the subsystem paging storage director.
- Address of the device on which I/O was done.
- Amount of subsystem storage that is CONFIGURED, AVAILABLE, OFFLINE, and PINNED.[1]
- 40 bytes of hexadecimal data representing subsystem status as it is returned from the subsystem before it is interpreted.

[1] The sum of AVAILABLE, PINNED, and OFFLINE is always less than CONFIGURED. The difference is the amount of storage occupied by control data and the space remaining after the storage director has allocated as many track slot segments as possible from the subsystem storage space which is not occupied by subsystem control data.

Figure 8 is a sample Subsystem Status Report for Model 21.

```
IDCAMS  SYSTEM SERVICES                                    TIME: 11:09:47

                          3350   SUBSYSTEM STATUS REPORT

             SD ID X'74'     DEVICE ID X'20'

               SUBSYSTEM STORAGE IN BYTES

             CONFIGURED            33554432

             AVAILABLE             33099776

             OFFLINE                     0

             PINNED                      0

 RETURNED STATUS 0-19 7420008F 02000000 01F91000 00000000 00000000

               20-39 99000000 00000000 00000000 00000000 00000000

             SD ID X'75'     DEVICE ID X'20'

               SUBSYSTEM STORAGE IN BYTES

             CONFIGURED            33554432

             AVAILABLE             33099776

             OFFLINE                     0

             PINNED                      0

 RETURNED STATUS 0-19 7520008F 02000000 01F91000 00000000 00000000

               20-39 99000000 00000000 00000000 00000000 00000000
```

Figure 8. Sample Subsystem Status Report for the IBM 3880 Storage Control Model 21

The report in Figure 9 is the corresponding legend of Figure 8 on page 34.

```
IDCAMS  SYSTEM SERVICES                                        TIME: 11:09:10
                          LEGEND

                          SUBSYSTEM STATUS LEGEND

SD ID                   - ADDRESS OF THE SUBSYSTEM'S PAGING STORAGE
                          DIRECTOR
DEVICE ID               - ADDRESS OF THE DEVICE ON WHICH THE I/O
                          WAS DONE

SUBSYSTEM STORAGE IN BYTES

CONFIGURED              - STORAGE THAT EXISTS IN THE CACHE FOR THIS
                          SUBSYSTEM
AVAILABLE               - STORAGE THAT IS AVAILABLE FOR PAGING
OFFLINE                 - STORAGE THAT IS OFFLINE AND NOT AVAILABLE
                          FOR PAGING
PINNED                  - STORAGE UNAVAILABLE BECAUSE OF CACHE TO DASD
                          EXCEPTIONS

RETURNED STATUS         - INDICATES THE UNINTERPRETED DATA RETURNED
                          FROM THE SUBSYSTEM FOR A STATUS REQUEST
```

Figure 9. Subsystem Status Report Legend for the IBM 3880 Storage Control Model 21

SETCACHE

Use the SETCACHE command with the IBM 3880 Storage Control Model 21 to:

- Make an addressed device (actuator) eligible or not eligible for caching operations.
- Make subsystem storage available or not available to the subsystem for caching operations.
- Enable or disable a storage director.

Note: The SETCACHE command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the SETCACHE command is:

Table 9. SETCACHE command format, 3880 Model 21

SETCACHE	{**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} {**SUBSYSTEM**|**DIRECTOR** {**1**|**2**}} [**ON**|**OFF**]

SETCACHE can be abbreviated: SETC

Required Parameters

FILE(*ddname*)|VOLUME(*volser*) UNIT(*unittype*)
specifies the volume of a unit within the subystem.

FILE(*ddname*)
specifies the name of a DD statement that identifies the device type and volume of a unit within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type of the subsystem. This parameter is required only when the VOLUME parameter is specified.

SUBSYSTEM|DIRECTOR (1)|(2)

SUBSYSTEM
specifies that access to the entire subsystem cache be allowed or prohibited.

Abbreviation: SSYS or SUBSYS

Note: RACF READ access authority to the FACILITY class resource STGADMIN.IDC.SETCACHE.SUBSYSTEM is required to use the SUBSYSTEM parameter.

DIRECTOR
specifies whether the odd or even addressed storage director on a paging subsystem will be allowed to access the cache. Director 1 is the even address and Director 2 is the odd address. This relationship is determined by the labeling on the service panel.

(1)
specifies that storage director 1 (the even address) will be used.

(2)
specifies that storage director 2 (the odd address) will be used.

Abbreviation: SD

Warning: You use SETCACHE DIRECTOR (1)|(2) OFF to permit maintenance on one storage director (the one set off) while continuing paging operations on the other storage director. However, by setting one director off and then setting the other director off, you set the entire subsystem off. Turning the entire subsystem off (regardless of how the subsystem is turned off) might cause data to be lost and will probably require a re-IPL of the system. After a director has been set off, use SETCACHE SUBSYSTEM ON to set the director on again. If a storage director is offline, vary the path online to the storage director and issue a SETCACHE SUBSYSTEM ON. The message below indicates that the storage is offline:

```
IDC31612I NO PATHS ARE AVAILABLE TO THE REQUESTED SD; TO SET ON,
ISSUE A SETCACHE SUBSYSTEM ON.
```

Optional Parameters

ON|OFF
specifies whether access to the cache be allowed or prohibited.

ON
specifies that access to the cache be allowed.

OFF
specifies that access to the cache be prohibited.

Examples

Allowing Access to the Cache for an Entire Subsystem: Example 1

In this example, access to the cache is allowed for an entire subsystem.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   VOLUME(VOL002)-
   UNIT(3350)-
   SUBSYSTEM-
   ON
/*
```

The SETCACHE command parameters are:

- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3350 unit.
- SUBSYSTEM, which specifies that cache access is affected for all devices in the subsystem containing VOL002.
- ON, which specifies that access to the cache is allowed.

Prohibiting Access to the Cache for a Director: Example 2

This example is valid for Model 21 only. This is an example that assumes that both storage directors are actively supporting paging activities when it becomes necessary or desirable to make Storage Director 1 available for concurrent maintenance activities while Storage Director 2 is still supporting paging mode activities.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SET01     DD    UNIT=3350,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   FILE(SET01)-
   DIRECTOR(1)-
   OFF
/*
```

Job control language statement:

- SET01 DD, which allocates a 3350 unit and volume VOL123.

The SETCACHE command parameters are:

- FILE, which specifies SET01 as the DD statement that allocates a 3350 unit and volume VOL123.
- DIRECTOR(1) identifies the storage director for which the command is intended.
- OFF, which specifies that access to the cache be prohibited.

Note: Subsystem storage is made not available to a storage director that is put offline for concurrent maintenance. When maintenance is completed, vary the path online to the storage director, and then issue a SETCACHE SUBSYSTEM ON command. This makes the subsystem available again to that storage director.

Chapter 5. 3880 Model 13 Commands

BINDDATA

You can use the BINDDATA command with the Model 13 to:

- Transfer data records from DASD to cache, reserving a portion of the cache for those data records, and
- Release tracks of subsystem storage, making that subsystem storage available to store other frequently accessed application data.

When you use the BINDDATA command to transfer data from DASD to cache, the data records are retained in the cache until one of the following occurs:

- The BINDDATA command with the TERMINATE parameter is issued.
- An initial microcode load (IML) of the cache storage director is performed.
- A SET SUBSYSTEM MODE command is encountered which deactivates the cache to the device or makes the cache not available to the subsystem storage.

When you issue the BINDDATA command, you must specify the track address—upper and lower limit—in *cchh* format (cylinder and head number) of the data records to be copied. Except for defective and alternate tracks, all tracks within the specified range for the device are transferred to the cache. The track address must be valid; otherwise, command processing ends.

Before you use the BINDDATA command, you must make sure there is enough subsystem storage available to accommodate the storage request. To determine the amount of storage available, issue the LISTDATA command with the STATUS parameter to obtain a subsystem status report. If there is not enough storage available, the BINDDATA command processing ends.

Before data can be bound to a volume, caching must be allowed for the volume. If caching is not active for the volume, a SETCACHE command can be used to allow caching for it.

When you specify a range of tracks to be read into the cache and a data check occurs in DASD data, the track on which the error occurs is not transferred into cache. The BINDDATA operation continues with the next track until the operation is complete. No error indication is given for any tracks that are not transferred to the cache.

When you use the BINDDATA command to release tracks of subsystem storage, all tracks within the specified track range for the addressed device are released and placed on the available queue as the next available space in the cache. The range of tracks being released does not have to coincide with a previously established range. A portion of an area may be released, or the specified range may overlap other established areas. If all established areas for an addressed device or for the subsystem are released, all tracks are also released.

Note: The BINDDATA command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the BINDDATA command is:

Table 10. BINDDATA command format, 3880 Model 13	
BINDDATA	{**ESTABLISH**|**TERMINATE**} {**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} [**DEVICE**|**SUBSYSTEM**] [**HIGHCCHH**(*cchh*)] [**LOWCCHH**(*cchh*)]

BINDDATA can be abbreviated: BDATA

Required Parameters

ESTABLISH|TERMINATE
specifies that data will be transferred from DASD to cache, or that tracks of subsystem storage are to be made available for other application data.

ESTABLISH
specifies that data be transferred into the subsystem storage.

Abbreviation: ESTAB, EST

TERMINATE
specifies that tracks of subsystem storage are to be made available for other application data.

Abbreviation: TERM

FILE(*ddname*)|VOLUME(*volser*) UNIT(*unittype*)
specifies a DASD volume that contains data to be read into the cache.

FILE(*ddname*)
specifies the name of a DD statement that identifies the unit and volume within the subsystem that contains data to be transferred to the cache. For *ddname*, substitute the name of the DD statement identifying the device.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem that contains data to be transferred to the cache. For *volser*, substitute the serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type for a device within the subsystem that contains data to be transferred to the cache. This parameter is required only when the VOLUME parameter is specified.

Optional Parameters

DEVICE|SUBSYSTEM
specifies whether data on a particular direct access storage device be transferred to or from the cache, or all bound data is released and subsystem storage be made available for other application data. When the TERMINATE parameter is specified, the SUBSYSTEM parameter is the default.

DEVICE
specifies that data on a particular direct access storage device be transferred to cache, or be made available for other application data.

Abbreviation: DEV

SUBSYSTEM
specifies that the entire subsystem storage be released and made available for other application data.

Abbreviation: SSYS or SUBSYS

LOWCCHH(*cchh*)
specifies the track address of the lower limit of a series of tracks containing data that is to be transferred to the cache or that is to be made available for other application data.

cchh
specifies the address in the format cylinder head as an 8-digit hexadecimal number. The first 4 digits are the cylinder portion of the address, and the second 4 digits are the head or track portion of the address.

Abbreviation: LCCHH

HIGHCCHH(*cchh*)
specifies the track address of the upper limit of a series of tracks that contain data that is to be transferred to the cache or that is to be made available for other application data.

cchh
specifies the address in the format cylinder head as an 8-digit hexadecimal number. The first 4 digits are the cylinder portion of the address, and the second 4 digits are the head or track portion of the address. The maximum values that can be specified for a 3380 device are returned from an invocation of DEVTYPE.

Abbreviation: HCCHH

Example

In this example, the first extent of a data set on a 3380 direct access storage device attached to a 3880 Model 13 is read into cache.

Binding a Range of Data: Example 1

In this example, the first extent of a data set is bound:

```
//BINDAT1   JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//BIND01    DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  BINDDATA-
   ESTABLISH-
   FILE(BIND01)-
   LOWCCHH(00010001)-
   HIGHCCHH(00010002)
/*
```

Job control language statements:

- BIND01 DD, which specifies a 3380 unit and volume VOL123.

The BINDDATA command parameters are:

- ESTABLISH, which specifies that data be transferred to the cache.
- FILE, which specifies BIND01 as the DD statement that identifies volume VOL123 on a 3380 direct access storage device from which the data is to be transferred.
- LOWCCHH, which specifies the track address of the lower limit CCHH to be transferred to the cache.
- HIGHCCHH, which specifies the track address of the higher limit CCHH to be transferred to the cache.

LISTDATA

The LISTDATA command obtains information about activity within the IBM 3880 Storage Control Model 13. You can obtain two different types of reports:

- Subsystem Counters Report—a record of the counters within the subsystem at the time the report is requested.
- Subsystem Status Report—a record of the status within the subsystem at the time the report is requested.

With either type of report, you can request a legend that describes the headings used.

A user interface has been provided specifically for non-access method services callers (for example, the Cache RMF Reporter). This interface allows you to obtain subsystem status or count information. The description of the interface is in Appendix B, "User Access to Subsystem Status and Counts Information" on page 67.

Note: The LISTDATA command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the LISTDATA command is:

Table 11. LISTDATA command format, 3880 Model 13

LISTDATA	{**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)] [**WTO**]

LISTDATA can be abbreviated: LDATA

Required Parameters

COUNTS|STATUS
specifies the type of report.

COUNTS
specifies that a subsystem counters report be printed.

Abbreviation: CNT

STATUS
specifies that a subsystem status report be printed.

Abbreviation: STAT

FILE(*ddname*)|VOLUME(*volser*) UNIT(*unittype*)
specifies a device that resides in the subsystem for which the report is requested.

FILE(*ddname*)
specifies the name of a DD statement that identifies the unit and volume of a device within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type and volume serial number.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type of the subsystem. This parameter is required only when the VOLUME parameter is specified.

Optional Parameters

DEVICE|SUBSYSTEM|ALL
specifies the subsystem counters to be reported in the subsystem counters report. These parameters can be specified only when the COUNTS parameter is specified.

DEVICE
specifies that the subsystem counters for the addressed device are included in the subsystem counters report.

Abbreviation: DEV

SUBSYSTEM
specifies that the subsystem counters for all devices within the subsystem are included in the subsystem counters report.

Abbreviation: SSYS or SUBSYS

ALL
specifies that subsystem counters for all devices on all like models of storage controls be included in the subsystem counters report. ALL is the default parameter when the COUNTS parameter is specified.

LEGEND|NOLEGEND
specifies whether a legend explaining the headings used is printed following the requested report.

LEGEND
specifies that the legend is printed.

Abbreviation: LGND

NOLEGEND
specifies that the legend is not printed. This is the default parameter.

Abbreviation: NOLGND

OUTFILE(*ddname*)|OUTDATASET(*dsname*)
specifies an alternate target data set if the SYSPRINT data set is not used for the report.

OUTFILE(*ddname*)
specifies the name of a DD statement identifying the data set to be used to contain the report. For *ddname*, substitute the name of the DD statement identifying the data set.

Abbreviation: OFILE

OUTDATASET(*dsname*)
specifies the name of the alternate target data set. For *dsname*, substitute the name of the data set to be used. The data set name must be cataloged.

Note: Be sure to erase the previous alternate target data set before specifying the OUTDATASET parameter. If you do not erase the old data set, your reports may not be accurate. If a report seems to be in error, compare the time field with the time the job was submitted.

Abbreviation: ODS or OUTDS

WTO
specifies that information on the overall condition of the subsystem be sent to the system console and a full report printed.

Abbreviation: None

Note: This parameter can be used only if the STATUS parameter is specified.

Examples

Listing Subsystem Counters for a Particular Device: Example 1

In this example, a Subsystem Counters Report for a particular device is being requested.

```
//LISTDAT1  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL1  DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   FILE(LISTVOL1)-
   DEVICE
/*
```

Job control language statement:

- LISTVOL1 DD, which specifies a 3380 unit and volume VOL123 for which the report is requested.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- FILE, which specifies LISTVOL1 as the DD statement that allocates a 3380 unit and volume VOL123.
- DEVICE, which specifies that the Subsystem Counters Report should include only subsystem counters for the addressed device.

See "Reports" on page 47, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices within a Subsystem: Example 2

In this example, a Subsystem Counters Report is being requested for all devices within a subsystem.

```
//LISTDAT2  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDD     DD    DSN=OUTDS,DISP=(NEW,KEEP),VOL=SER=OUTVOL,
//          UNIT=3480,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3380)-
   SUBSYSTEM-
   OUTFILE(OUTDD)
/*
```

Job control language statement:

- OUTDD DD, which allocates the output data set (DSN=OUTDS) on tape (UNIT=3480) for use by the LISTDATA command. If you do not allocate an output data set, the subsystem counters are printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set if it is new.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report is printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3380 unit.
- SUBSYSTEM, which specifies that the Subsystem Counters Report should include counters for all devices within this subsystem.
- OUTFILE, which specifies OUTDD as the name of the DD statement identifying the data set used to contain the report.

See "Reports" on page 47, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices on All Like Subsystems: Example 3

In this example, a Subsystem Counters Report is being requested for all devices on all like subsystems.

```
//LISTDAT3  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDS     DD    DSN=OUTDATA,DISP=(,CATLG),UNIT=3380,
//                VOL=SER=VOL001,SPACE=(CYL,(2,1)),
//                DCB=(RECFM=VBA,
//                LRECL=250,BLKSIZE=504)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3380)-
   ALL-
   OUTDATASET(OUTDATA)
/*
```

Job control language statement:

- OUTDS DD, which allocates the output data set (DSN=OUTDATA) on a 3380 (UNIT=3380) for use by the LISTDATA command. If an output data set is not allocated, the report is printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set. The output data set is cataloged in the master catalog (DISP=(,CATLG)). This DD statement allocates 2 cylinders for the output data set and, if more space is required for the report, the space is extended in increments of 1 cylinder.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3380 unit.
- ALL, which specifies that the Subsystem Counters Report should include subsystem counters for all devices on all like subsystems.
- OUTDATASET, which identifies OUTDATA as the output data set to be used for the report, rather than the SYSPRINT data set.

See "Reports" on page 47, for an example of a printed Subsystem Counters Report.

Listing Subsystem Status: Example 4

In this example, subsystem status report is being requested.

```
//LISTDAT4  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL2  DD    UNIT=3380,VOL=SER=VOL269,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   STATUS-
   FILE(LISTVOL2)-
   WTO
/*
```

Job control language statement:

- LISTVOL2 DD, which specifies a 3380 unit for which subsystem status is being reported.

The LISTDATA command parameters are:

- STATUS, which specifies that a Subsystem Status Report be printed.
- FILE, which specifies LISTVOL2 as the DD statement that allocates a 3380 unit and volume VOL269.
- WTO which specifies that an informational message indicating the status of subsystem caching activity will be displayed on the system console. For example, WTO may produce a message similar to the one below:

```
IDC01551I 3380 CACHING STATUS:  SYSTEM AVAILABLE FOR SD X'05' DEV ID X'01'
```

Reports

Use the LISTDATA command to list information about activity within the 3880 Model 13. You can obtain two different types of reports:

- Subsystem counters report and
- Subsystem status report.

Optionally, you can also obtain a legend for each report. This legend describes the headings used in the report. When you request a legend, it is printed at the end of the report.

Subsystem Counters Report

The Subsystem Counters Report provides a record of the counters within the subsystem at the time the report is requested. The counters are not reset when the report is taken. Figure 10 on page 48 is a sample Subsystem Counters Report for Model 13.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 11:56:22
                    3380   SUBSYSTEM COUNTERS REPORT

VOLUME 338RF0    DEVICE ID X'13'

                              CHANNEL COMMAND CHAINS
                        ....SEARCH/READ.......     .......WRITE...........
REQUESTS     SD ID    SUBTOTAL    CACHE READ      SUBTOTAL   CACHE WRITE

NORMAL       X'13'          27            22            14            12
             X'12'          24            23            15            13

SEQUENTIAL   X'13'           2             1             1           N/A
             X'12'           1             1             0           N/A

TOTAL/1000                   0             0             0             0

BOUND TRACK SD ID   READ TOTAL   WRITE TOTAL

             X'13'           0             0
             X'12'           0             0

INHIBIT CACHE LOADING REQUESTS. SD ID X'13'          0
                                      X'12'          0

DASD TO CACHE XFERS, INTERNAL COMMAND CHAINS. SD ID X'13'         68
                                                    X'12'         86

CONTROL UNIT DATA TRANSFER IN BYTES

  CACHE TO CHANNEL    SD ID X'13'       10092
                            X'12'        7602

  DASD TO CHANNEL     SD ID X'13'       60144
                            X'12'       60480

  CACHE TO DASD       SD ID X'13'        2112
                            X'12'        1856

  DASD TO CACHE       SD ID X'13'     1447856
                            X'12'     2290472
```

Figure 10. Sample Subsystem Counters Report for the IBM 3880 Storage Control Model 13

The report in Figure 11 on page 49 is the corresponding legend of Figure 10.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 11:56:22
                          LEGEND

                           SUBSYSTEM COUNTERS LEGEND

 VOLUME           - VOLUME SERIAL NUMBER FOR WHICH THE DATA IS GATHERED
 DEVICE ID        - DEVICE IDENTIFICATION
 SD ID            - STORAGE DIRECTOR FOR WHICH DATA IS GATHERED

 CHANNEL COMMAND CHAINS - A CCW CHAIN WHICH CONTAINS AT LEAST ONE
                    SEARCH, READ OR WRITE
   SEARCH/READ    - CCW CHAINS WHICH CONTAIN AT LEAST ONE SEARCH OR
                    READ BUT NO WRITE CCW
   WRITE          - CCW CHAINS CONTAINING AT LEAST ONE WRITE
   SUBTOTAL       - ALL SEARCH/READ CCW CHAINS
   CACHE READS    - CCW CHAINS WHICH REQUIRED NO DATA TO BE MOVED
                    TO/FROM THE DASD
   SUBTOTAL       - ALL WRITE CCW CHAINS
   CACHE WRITES   - CHAINS NOT REQUIRING DATA MOVEMENT TO THE CACHE
                    FROM THE DASD. THIS DATA IS NOT KEPT FOR SEQUENTIAL

 NORMAL           - CCW CHAINS WHICH DO NOT INCLUDE A DEFINE EXTENT CCW
                    OR SPECIFY NORMAL CACHE REPLACEMENT IN THE DEFINE
                    EXTENT CCW
 SEQUENTIAL       - CCW CHAINS WHICH SPECIFY SEQUENTIAL ACCESS IN THE
                    DEFINE EXTENT CCW

 TOTAL/1000       - TOTAL DIVIDED BY 1000 FOR EACH VERTICAL LINE ITEM
 BOUND TRACK      - CCW CHAINS WHICH SPECIFY A TRACK PREVIOUSLY BOUND BY
 INHIBIT CACHE LOADING - CCW CHAINS WHICH SPECIFY INHIBIT CACHE LOADING
                    IN THE DEFINE EXTENT CCW
 DASD TO CACHE TRANSFERS - THE NUMBER OF INTERNAL COMMAND CHAINS WHICH
                    MOVE DATA FROM THE DASD TO THE CACHE


   CONTROL UNIT DATA TRANSFER IN BYTES

 CACHE/CHAN       - BYTES TRANSFERRED FROM CACHE TO THE CHANNEL
 DASD/CHAN        - BYTES TRANSFERRED FROM THE DASD TO THE CHANNEL
 CACHE/DASD       - BYTES TRANSFERRED FROM CACHE TO DASD. THIS ALSO
                    REPRESENTS CHANNEL TO CACHE
 DASD/CACHE       - BYTES TRANSFERRED FROM THE DASD TO THE CACHE
```

Figure 11. Subsystem Counters Report Legend for the IBM 3880 Storage Control Model 13

Subsystem Status Report

The Subsystem Status Report provides a record of the status within the subsystem at the time the report is requested. This report includes:

- Address of the subsystem caching storage director.
- Address of the device on which I/O was done.

- Amount of subsystem storage that is CONFIGURED, AVAILABLE, OFFLINE, and BOUND.[1]
- 40 bytes of hexadecimal data representing subsystem status as it is returned from the subsystem before it is interpreted.

Figure 12 is a sample Subsystem Status Report for Model 13.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 11:55:54

                            3380   SUBSYSTEM STATUS REPORT

             SD ID X'12'     DEVICE ID X'13'

               SUBSYSTEM STORAGE IN BYTES

             CONFIGURED             4194304

             AVAILABLE              2690240

             BOUND                  1489240

             OFFLINE                      0

 RETURNED STATUS 0-19 12130000 00000000 FFFF0040 00000029 0CC00016

               20-39 B9580000 00000000 00000000 00000000 00000000
OVERALL CACHING STATUS           ACTIVE

FOR DEVICES                      00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
                                 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
```

Figure 12. Sample Subsystem Status Report for the IBM 3880 Storage Control Model 13

[1] The sum of AVAILABLE, BOUND, and OFFLINE is always less than CONFIGURED. The difference is the amount of storage occupied by control data and the space remaining after the storage director has allocated as many track slot segments as possible from the subsystem storage space which is not occupied by subsystem control data.

The report in Figure 13 is the corresponding legend of Figure 12 on page 50.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 11:56:17
                            LEGEND

                       SUBSYSTEM STATUS LEGEND

SD ID           - ADDRESS OF THE SUBSYSTEM'S CACHING STORAGE DIRECTOR
DEVICE ID       - ADDRESS OF THE DEVICE ON WHICH THE I/O WAS DONE

SUBSYSTEM STORAGE IN BYTES
CONFIGURED      - THE AMOUNT OF STORAGE THAT EXISTS IN THE CACHE FOR
                  THIS SUBSYSTEM
AVAILABLE       - THE AMOUNT OF STORAGE THAT IS AVAILABLE FOR CACHING
BOUND           - THE AMOUNT OF STORAGE THAT IS RESTRICTED TO SPECIFIC
                  DATA IN THE CACHE
OFFLINE         - THE AMOUNT OF STORAGE THAT IS OFFLINE BECAUSE OF A
                  HOST OR SUBSYSTEM ERROR

RETURNED STATUS - INDICATES THE UNINTERPRETED DATA RETURNED FROM THE
                   SUBSYSTEM FOR A STATUS REQUEST

OVERALL CACHING STATUS - STATES WHETHER THE CACHE IS ACTIVE, WHETHER
                  THERE WAS A SUBSYSTEM ERROR OR A HOST
                  TERMINATION

FOR DEVICES     - SPECIFIES FOR WHICH DEVICES CACHING HAS NOT
                  BEEN DEACTIVATED, WHETHER OR NOT ACTUALLY
                  ATTACHED
```

Figure 13. Subsystem Status Report Legend for the IBM 3880 Storage Control Model 13

SETCACHE

Use the SETCACHE command with IBM 3880 Storage Control Model 13 to:

- Make an addressed device (actuator) eligible or not eligible for caching operations.
- Make subsystem storage available or not available to the subsystem for caching operations.

Note: The SETCACHE command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the SETCACHE command is:

Table 12. SETCACHE command format, 3880 Model 13	
SETCACHE	{**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} [**DEVICE**|**SUBSYSTEM**] [**ON**|**OFF**]

SETCACHE can be abbreviated: SETC

Required Parameters

FILE(*ddname*)\|**VOLUME**(*volser*) **UNIT**(*unittype*)
specifies the volume of a unit within the subsystem.

FILE(*ddname*)
specifies the name of a DD statement that identifies the device type and volume of a unit within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type of the subsystem.

Optional Parameters

DEVICE\|**SUBSYSTEM**
specifies whether access to a particular device or to the entire subsystem cache be allowed or prohibited.

DEVICE
specifies that access to the cache of a particular device is allowed or prohibited.

Abbreviation: DEV

SUBSYSTEM
specifies that access to the entire subsystem cache is allowed or prohibited.

Abbreviation: SSYS or SUBSYS

Note: RACF READ access authority to the FACILITY class resource STGADMIN.IDC.SETCACHE.SUBSYSTEM is required to use the SUBSYSTEM parameter.

ON|OFF
specifies whether access to the cache be allowed or prohibited.

ON
specifies that access to the cache be allowed.

OFF
specifies that access to the cache be prohibited.

Note: Setting subsystem cache on or off and setting cache for a device on or off are independent operations. That is, cache for individual devices may be set on or off whether the subsystem cache is on or off. However, if the subsystem cache is set off, setting cache for an individual device on has no effect until the subsystem cache is set on.

Examples

You can enter the SETCACHE command by using JCL statements or by using ISMF panels.

Allowing Access to the Cache for a Particular Device: Example 1

In this example, access to the cache is allowed for a particular device.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SET01     DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   FILE(SET01)-
   DEVICE-
   ON
/*
```

Job control language statement:

- SET01 DD, which specifies a 3380 unit for which access to the cache is to be allowed, and specifies volume VOL123.

The SETCACHE command parameters are:

- FILE, which specifies SET01 as the DD statement that allocates a 3380 unit and volume VOL123.
- DEVICE, which specifies that access to a single device is affected.
- ON, which specifies that access to the cache be allowed.

Allowing Access to the Cache for an Entire Subsystem: Example 2

In this example, access to the cache is allowed for an entire subsystem.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   VOLUME(VOL002)-
   UNIT(3380)-
   SUBSYSTEM-
   ON
/*
```

The SETCACHE command parameters are:

- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3380 unit.
- SUBSYSTEM, which specifies that cache access is affected for all devices in the subsystem containing volume VOL002.
- ON, which specifies that access to the cache is allowed.

Prohibiting Access to the Cache for a Particular Device: Example 3

In this example, access to the cache is prohibited for a particular device.

```
//SETCACHE  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//SET01     DD    UNIT=3380,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  SETCACHE-
   FILE(SET01)-
   DEVICE-
   OFF
/*
```

Job control language statement:

- SET01 DD, which specifies a 3380 unit for which the cache is to be disabled, and specifies volume VOL123.

The SETCACHE command parameters are:

- FILE, which specifies SET01 as the DD statement that allocates a 3380 unit and volume VOL123.
- DEVICE, which specifies that cache access for a single device is affected.
- OFF, which specifies that access to the cache be prohibited.

Chapter 6. 3880 Model 11 Commands

LISTDATA

The LISTDATA command obtains information about activity within the IBM 3880 Storage Control Model 11. You can obtain two different types of reports:

- Subsystem Counters Report—a record of the counters within the subsystem at the time the report is requested.
- Subsystem Status Report—a record of the status within the subsystem at the time the report is requested.

With either type of report, you can request a legend that describes the headings used.

A user interface has been provided specifically for non-access method services callers (for example, the Cache RMF Reporter). This interface allows you to obtain subsystem status or count information. The description of the interface is in Appendix B, "User Access to Subsystem Status and Counts Information" on page 67.

Note: The LISTDATA command is protected by SAF/RACF resources, see "System Authorization Facility" on page 11 for further information.

The format of the LISTDATA command is:

Table 13. LISTDATA command format, 3880 Model 11

LISTDATA	{**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*) **UNIT**(*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)]

LISTDATA can be abbreviated: LDATA

Required Parameters

COUNTS|STATUS
specifies the type of report.

COUNTS
specifies that a subsystem counters report be printed.

Abbreviation: CNT

STATUS
specifies that a subsystem status report be printed.

Abbreviation: STAT

FILE(*ddname*)**|VOLUME**(*volser*) **UNIT**(*unittype*)
specifies a device that resides in the subsystem for which the report is requested.

FILE(*ddname*)
specifies the name of a DD statement that identifies the unit and volume of a device within the subsystem. For *ddname*, substitute the name of the DD statement identifying the device type and volume serial number.

VOLUME(*volser*)
specifies the volume serial number of a volume within the subsystem. For *volser*, substitute the volume serial number of the volume.

Abbreviation: VOL

UNIT(*unittype*)
specifies the unit type of the subsystem. This parameter is required only when the VOLUME parameter is specified.

Optional Parameters

DEVICE|SUBSYSTEM|ALL
specifies the subsystem counters to be reported in the subsystem counters report. These parameters can be specified only when the COUNTS parameter is specified.

DEVICE
specifies that the subsystem counters for the addressed device are included in the subsystem counters report.

Abbreviation: DEV

SUBSYSTEM
specifies that the subsystem counters for all devices within the subsystem are included in the subsystem counters report.

Abbreviation: SSYS or SUBSYS

ALL
specifies that subsystem counters for all devices on all like models of storage controls be included in the subsystem counters report. ALL is the default parameter when the COUNTS parameter is specified.

LEGEND|NOLEGEND
specifies whether a legend explaining the headings used is printed following the requested report.

LEGEND
specifies that the legend is printed.

Abbreviation: LGND

NOLEGEND
specifies that the legend is not printed. This is the default parameter.

Abbreviation: NOLGND

OUTFILE(*ddname*)|OUTDATASET(*dsname*)
specifies an alternate target data set if the SYSPRINT data set is not to be used for the report.

OUTFILE(*ddname*)
specifies the name of a DD statement identifying the data set to be used to contain the report. For *ddname*, substitute the name of the DD statement identifying the data set.

Abbreviation: OFILE

OUTDATASET(*dsname*)
specifies the name of the alternate target data set. For *dsname*, substitute the name of the data set to be used. The data set name must be cataloged.

Note: Be sure to erase the previous alternate target data set before specifying the OUTDATASET parameter. If you do not erase the old data set, your reports may not be accurate. If a report seems to be in error, compare the time field with the time the job was submitted.

Abbreviation: ODS or OUTDS

Examples

Listing Subsystem Counters for a Particular Device: Example 1

In this example, a Subsystem Counters Report for a particular device is being requested.

```
//LISTDAT1  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL1  DD    UNIT=3350,VOL=SER=VOL123,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   FILE(LISTVOL1)-
   DEVICE
/*
```

Job control language statement:

- LISTVOL1 DD, which specifies a 3350 unit and volume VOL123 for which the report is requested.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- FILE, which specifies LISTVOL1 as the DD statement that allocates a 3350 unit and volume VOL123.
- DEVICE, which specifies that the Subsystem Counters Report should include only subsystem counters for the addressed device.

See "Reports" on page 61, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices within a Subsystem: Example 2

In this example, a Subsystem Counters Report is being requested for all devices within a subsystem.

```
//LISTDAT2  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDD     DD    DSN=OUTDS,DISP=(NEW,KEEP),VOL=SER=OUTVOL,
//          UNIT=3480,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=629)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3350)-
   SUBSYSTEM-
   OUTFILE(OUTDD)
/*
```

Job control language statement:

- OUTDD DD, which allocates the output data set (DSN=OUTDS) on tape (UNIT=3480) for use by the LISTDATA command. If you do not allocate an output data set, the subsystem counters are printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set if it is new.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report is printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3350 unit.
- SUBSYSTEM, which specifies that the Subsystem Counters Report should include counters for all devices within this subsystem.
- OUTFILE, which specifies OUTDD as the name of the DD statement identifying the data set used to contain the report.

See "Reports" on page 61, for an example of a printed Subsystem Counters Report.

Listing Subsystem Counters for All Devices on All Like Subsystems: Example 3

In this example, a Subsystem Counters Report is being requested for all devices on all like subsystems.

```
//LISTDAT3  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//OUTDS     DD    DSN=OUTDATA,DISP=(,CATLG),UNIT=3350,
//                VOL=SER=VOL001,SPACE=(CYL,(2,1)),
//                DCB=(RECFM=VBA,
//                LRECL=250,BLKSIZE=504)
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   COUNTS-
   VOLUME(VOL002)-
   UNIT(3350)-
   ALL-
   OUTDATASET(OUTDATA)
/*
```

Job control language statement:

- OUTDS DD, which allocates the output data set (DSN=OUTDATA) on a 3350 (UNIT=3350) for use by the LISTDATA command. If an output data set is not allocated, the report is printed on the SYSPRINT data set. The DCB parameter is required for the alternate output data set. The output data set is cataloged in the master catalog (DISP=(,CATLG)). This DD statement allocates 2 cylinders for the output data set and, if more space is required for the report, the space is extended in increments of 1 cylinder.

The LISTDATA command parameters are:

- COUNTS, which specifies that a Subsystem Counters Report be printed.
- VOLUME, which specifies volume VOL002.
- UNIT, which specifies a 3350 unit.
- ALL, which specifies that the Subsystem Counters Report should include subsystem counters for all devices on all like subsystems.
- OUTDATASET, which identifies OUTDATA as the output data set to be used for the report, rather than the SYSPRINT data set.

See "Reports" on page 61, for an example of a printed Subsystem Counters Report.

Listing Subsystem Status: Example 4

In this example, subsystem status report is being requested.

```
//LISTDAT4  JOB   ...
//STEP1     EXEC  PGM=IDCAMS
//LISTVOL2  DD    UNIT=3350,VOL=SER=VOL269,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSIN     DD    *
  LISTDATA-
   STATUS-
   FILE(LISTVOL2)
/*
```

Job control language statement:

- LISTVOL2 DD, which specifies a 3350 unit for which subsystem status is being reported.

The LISTDATA command parameters are:

- STATUS, which specifies that a Subsystem Status Report be printed.
- FILE, which specifies LISTVOL2 as the DD statement that allocates a 3350 unit and volume VOL269.

Reports

Use the LISTDATA command to list information about activity within the caching models of IBM storage controls. You can obtain two different types of reports: subsystem counters report and subsystem status report. Optionally, you can also obtain a legend for each report. This legend describes the headings used in the report. When you request a legend, it is printed at the end of the report.

Subsystem Counters Reports

The Subsystem Counters Report provides a record of the counters within the subsystem at the time the report is requested. The counters are not reset when the report is taken.

Figure 14 is a sample Subsystem Counters Report for Model 11.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 12:33:37
                          3350   SUBSYSTEM COUNTERS REPORT

VOLUME PAGSA1    DEVICE ID X'00'   SD ID X'00'

                DATA TRANSFERS    ...READS..      NO DASD ACCESS

TOTAL PAGING         300300              N/A            300300

NON-SEQUENTIAL       300300           300300            300300
SEQUENTIAL           300300           300300            300300
SWAP-INS             300300           300300            300300

TOTAL/1000              900              900               900

          BLOCK WRITES        300300
          DASD UPDATES        300300
          BLOCK DISCARDS      300300
          BLOCK UPDATES       300300
```

Figure 14. Sample Subsystem Counters Report for the IBM 3880 Storage Control Model 11

The report in Figure 15 is the corresponding legend of Figure 14 on page 61.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 12:33:37
                          LEGEND

                          SUBSYSTEM COUNTERS LEGEND

VOLUME             - VOLUME SERIAL NUMBER FOR WHICH THE DATA IS GATHERED

DEVICE ID          - DEVICE IDENTIFICATION
SD ID              - STORAGE DIRECTOR FOR WHICH THE DATA IS GATHERED

DATA TRANSFERS     - NUMBER OF CCW CHAINS TO THIS DEVICE WITH A READ OR
                     WRITE IN IT

   READS           - NUMBER OF READ CCWS
   NO DASD ACCESS  - NUMBER OF CCW CHAINS FOR WHICH NO READS REQUIRED
                     DASD ACCESS

TOTAL PAGING
   NON-SEQUENTIAL - SET PAGING PARAMETER COMMANDS THAT WERE NOT SET
                    SEQUENTIAL
   SEQUENTIAL     - SET PAGING PARAMETER COMMANDS THAT WERE SET
                    SEQUENTIAL
   SWAP-INS       - SET PAGING PARAMETER COMMANDS SET FOR SWAP-IN

   TOTAL/1000     - TOTAL DIVIDED BY 1000 FOR EACH VERTICAL LINE ITEM

BLOCK WRITES       - 4K BLOCKS WRITTEN FROM THE HOST
DASD UPDATES       - INTERNAL COMMAND CHAINS PERFORMING CACHE TO DASD
                     TRANSFERS
BLOCK DISCARDS     - BLOCKS AVAILABLE FOR REASSIGNMENT THROUGH DISCARD
                     BLOCK CCWS
BLOCK UPDATES      - 4K BLOCKS WRITTEN FROM CACHE TO DASD
```

Figure 15. Subsystem Counters Report Legend for the IBM 3880 Storage Control Model 11

Subsystem Status Report

The Subsystem Status Report provides a record of the status within the subsystem at the time the report is requested. This report includes:

- Address of the subsystem paging storage director.
- Address of the device on which I/O was done.
- Amount of subsystem storage that is CONFIGURED, AVAILABLE, OFFLINE, and PINNED.[1]
- 40 bytes of hexadecimal data representing subsystem status as it is returned from the subsystem before it is interpreted.

[1] The sum of AVAILABLE, PINNED, and OFFLINE is always less than CONFIGURED. The difference is the amount of storage occupied by control data and the space remaining after the storage director has allocated as many track slot segments as possible from the subsystem storage space which is not occupied by subsystem control data.

Figure 16 is a sample Subsystem Status Report for Model 11.

```
IDCAMS  SYSTEM SERVICES                                          TIME: 10:17:25

                          3350   SUBSYSTEM STATUS REPORT

            SD ID X'00'     DEVICE ID X'00'

              SUBSYSTEM STORAGE IN BYTES

            CONFIGURED              6000000

            AVAILABLE               5000000

            OFFLINE                 1000000

            PINNED                        0

 RETURNED STATUS 0-19  00000000 0000EA60 00002710 00000000 00000000

               20-39  F5000000 00000000 00000000 00000000 00000000
```

Figure 16. Sample Subsystem Status Report for the IBM 3880 Storage Control Model 11

The report in Figure 17 is the corresponding legend of Figure 16.

```
IDCAMS  SYSTEM SERVICES                                      TIME: 10:17:25
                            LEGEND

                            SUBSYSTEM STATUS LEGEND

SD ID                  - ADDRESS OF THE SUBSYSTEM'S PAGING STORAGE
                         DIRECTOR
DEVICE ID              - ADDRESS OF THE DEVICE ON WHICH THE I/O
                         WAS DONE

SUBSYSTEM STORAGE IN BYTES

CONFIGURED             - STORAGE THAT EXISTS IN THE CACHE FOR THIS
                         SUBSYSTEM
AVAILABLE              - STORAGE THAT IS AVAILABLE FOR PAGING
OFFLINE                - STORAGE THAT IS OFFLINE AND NOT AVAILABLE
                         FOR PAGING
PINNED                 - STORAGE UNAVAILABLE BECAUSE OF CACHE TO DASD
                         EXCEPTIONS

RETURNED STATUS    - INDICATES THE UNINTERPRETED DATA RETURNED
                     FROM THE SUBSYSTEM FOR A STATUS REQUEST
```

Figure 17. Subsystem Status Report Legend for the IBM 3880 Storage Control Model 11

Appendix A. Command Reference Summary

This appendix shows the format of the access method services commands that you can use with each of the caching models of the IBM 3880 Storage Controls. See "DFP Support" on page 10 to determine the support for each cache controller.

3880 Model 23

Parameters	Abbreviation
LISTDATA {**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)] [**WTO**]	LDATA CNT STAT VOL DEV SSYS SUBSYS LGND NOLGND OFILE ODS OUTDS

Parameters	Abbreviation
SETCACHE {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**] [**ON**|**OFF**]	SETC VOL DEV SSYS SUBSYS

3880 Model 21

Parameters	Abbreviation
LISTDATA {**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)]	LDATA CNT STAT VOL DEV SSYS SUBSYS LGND NOLGND OFILE ODS OUTDS

Parameters	Abbreviation
SETCACHE {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} {**SUBSYSTEM**|**DIRECTOR** {**1**|**2**}} [**ON**|**OFF**]	SETC VOL SSYS SUBSYS SD

3880 Model 13

Parameters	Abbreviation
BINDDATA {**ESTABLISH**|**TERMINATE**} {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**] [**HIGHCCHH**(*cchh*)] [**LOWCCHH**(*cchh*)]	BDATA ESTAB EST TERM VOL DEV SSYS SUBSYS HCCHH LCCHH

Parameters	Abbreviation
LISTDATA {**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)] [**WTO**]	LDATA CNT STAT VOL DEV SSYS SUBSYS LGND NOLGND OFILE ODS OUTDS

Parameters	Abbreviation
SETCACHE {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**] [**ON**|**OFF**]	SETC VOL DEV SSYS SUBSYS

3880 Model 11

Parameters	Abbreviation
LISTDATA {**COUNTS**|**STATUS**} {**FILE**(*ddname*)|**VOLUME**(*volser*)**UNIT** (*unittype*)} [**DEVICE**|**SUBSYSTEM**|**ALL**] [**LEGEND**|**NOLEGEND**] [**OUTFILE**(*ddname*)|**OUTDATASET**(*dsname*)]	LDATA CNT STAT VOL DEV SSYS SUBSYS LGND NOLGND OFILE ODS OUTDS

Appendix B. User Access to Subsystem Status and Counts Information

This appendix documents product-sensitive programming interfaces and associated guidance information provided by IDCAMS.

A user access is provided specifically for non-access method services callers (for example, the Cache RMF Reporter). Its purpose is to invoke the access method services LISTDATA routine (IDCSS01) to obtain subsystem status or count information. To obtain this information, the caller must be in an authorized library before linking to IDCSS01, which is contained in SYS1.LINKLIB. The caller passes to IDCSS01 a 3-word parameter list pointed to by register 1. If the caller is not authorized and attempts to link to IDCSS01, the system abends with error code 047.

The Cache RMF Reporter (5798-DQD), an IBM Program Offering, implements the user access to subsystem status and counts through LISTDATA. It consists of RMF user exits and a batch post processor report program. The RMF exit obtains all subsystem counts and status, calculates the difference in the device counts (from the previous read), and writes these values and the subsystem status to the system management facilities (SMF) data set as user records. Statistics such as hit ratios and read-to-write ratios are calculated by the post processor report program. A detailed explanation of this program offering can be found in the *Cache RMF Reporter Description/Operation Manual*.

Register 1 Parameter List

Word 1
must be zero.

Word 2
contains an address of a pointer to the argument list SSGARGL (detailed below), which IDCSS01 requires. Within this argument list is a field named SSGOADR, which points to the buffer area in which IDCSS01 returns subsystem status or counts information. The buffer area may be obtained by the caller or may be left for IDCSS01 to obtain.

Word 3
points to a 2-byte binary return code.

Possible return codes are:

0 — Successful completion
4 — GETMAIN failure
8 — I/O error
12 — Requested volume not found
16 — ESTAE not established
20 — Real address in SSGOADR not valid
24 — Passed buffer not large enough
28 — ddname not found in TIOT
32 — Requested volume not found on ALL request
36 — Path to storage director(s) not available
40 — No paths available
44 — Subsystem/device does not support request
56 — AOMSERV macro error occurred.

Note: If you pass the buffer, or if the return code is not 4, 12, or 28, the calling routine is responsible for freeing the buffer.

Passed Argument List — SSGARGL

The following describes SSGARGL. SSGARGL is the area pointed to by the word that Word 2 points to. Word 2 is part of the parameter list passed to IDCSS01. The caller must establish some fields; IDCSS01 establishes other fields.

The caller must set an option flag to indicate whether information requested is status (SSGRSS) or counts (SSGRPD) information. If counts information is requested, the caller must indicate whether it applies to all subsystems (SSGALL), a specific subsystem (SSG1SS), or a specific device (SSGDEV).

In addition, the caller must either pass the ddname (through SSGADDN) of a DD statement that allocates a caching subsystem volume, or the caller must identify the volume and unit (through SSGAVOL and SSGUNIT) of a caching subsystem volume for which information is being requested. If the caller passes SSGADDN, IDCSS01 establishes SSGAVOL and SSGUNIT. The following list contains other fields that IDCSS01 establishes.

Offset	Bytes	Field Name	Description: Contents
0(0)	8	SSGHEAD	Will be set to SSGARGL by IDCSS01.
8(8)	4	SSGADDN	Address of ddname; zero if none. Volume serial number and device type are retrieved from UCB if nonzero. Return code 28 if the ddname pointed to by SSGADDN is not found in the task input/output table.
12(C)	4	SSGAVOL	Address of volume serial; zero if none. Return code 12, if the volume serial number pointed to by SSGAVOL is not found in the UCBs. Counts information is obtained for all like subsystems when the volume serial number is unknown, by pointing to the model number in the form 'FFFFFFFFFFxx', where 'xx' is: X'08' for an IBM 3880 Model 11 X'09' for an IBM 3880 Model 13 X'0A' for an IBM 3880 Model 21 X'0B' for an IBM 3880 Model 23 X'0C' for an IBM 3990 Model 3 X'0D' for an IBM 3880 Model 23 with 3380 AJ4/AK4 Attachment Feature.
Note: X'0B' and X'0D' produce the same results. If either X'0B' or X'0D' is specified, information is returned for all Model 23s whether or not 3380 AJ4/AK4 Attachment (Feature 3010) is installed.			
16(10)	4	SSGUNIT	Four-byte unit type (required when the address of the volume serial number is used). The format is that of UCBTYP (for example, X'3010200E').
20(14)	4	SSGOLN	Length of buffer storage area.

Offset	Bytes	Field Name	Description: Contents
24(18)	4	SSGOADR	Address of buffer area. The calling routine is responsible for freeing the buffer area. A return code of 20 indicates that the Load Real Address (LRA) instruction failed.
28(1C)	1	SSGOPT	Reserved.
	1...	SSGRPD	Request to sense subsystem counts.
	.1..	SSGRSS	Request to sense subsystem status.
	..1.	SSGCACHE	Set off for 3880 Models 11 and 21; on for 3880 Models 13, 23, 3880 Model 23 with 3380 AJ4/AK4 Attachment (Feature 3010) and 3990 Model 3.
	...1	SSGSDS	Set on for 3880 Model 11, and 3990 Model 3; off for 3880 Models 13, 21, 23, and 3880 Model 23 with 3380 AJ4/AK4 Attachment (Feature 3010).
	.... 1...	SSGALL	Request counts for all like subsystems.
	.... .1..	SSG1SS	Request counts for a specified subsystem.
	.... ..1.	SSGDEV	Request counts for a specified device.
	1	SSGAMD	Pointer to 3880 model passed instead of a pointer to the volume.
29(1D)	1	SSGOPT	Reserved.
	1...	SSG2SD	Reserved.
	.111 1111	—	Reserved.
30(1E)	1	SSGMDLID	Subsystem identifiers.
31(1F)	1	SSGRCIOS	IOS return code.

Note: SSGAMD must be set on to indicate that the model was passed instead of the volume pointer. SSGALL must be set on to indicate that the request is for all subsystem counts. A return code of 12 indicates an invalid model.

Buffer Area Returned from IDCSS01

For each volume in the subsystem, the request for counts returns the following information for each volume. If subsystem status was requested, only one entry per subsystem is returned with the volume and unit address specifying the unit used for the I/O operation.

Offset	Bytes	Field Name	Description: Contents
0(0)	6	SSGDAVOL	SSGDAVOL contains the volume serial number. For multiple entries in the buffer (other than subsystem status) the last entry is followed by 6 bytes of binary zeros.
6(6)	2	—	Reserved.
8(8)	3	SSGDAUA1	Three-character unit address.

Offset	Bytes	Field Name	Description: Contents
11(B)	3	SSGDAUA2	Three-character unit address second read; valid for all models except 3880 Model 11 and 3990 Model 3.
14(E)	2	SSGDALN	Data length.
16(10)	var	SSGDADA	Data returned from the subsystem through status and counts request(s).

The following fields constitute SSGDADA:

40	SSGDASS	Subsystem status entry length for 3880 Models 11, and 13 and 3990 Model 3.
80	SSGDA2SD	Subsystem status entry length for 3880 Models 21, 23, and Model 23 with 3380 AJ4/AK4 Attachment (Feature 3010).
80	SSGDAIPF	Subsystem counts entry length for 3880 Model 11.
96	SSGDAXPF	Subsystem counts entry length for 3990 Model 3.
160	SSGDASPF	Subsystem counts entry length for 3880 Models 13, 21, or 23.

The format of the data provided is returned from the subsystem in response to SENSE SUBSYSTEM STATUS, SENSE SUBSYSTEM COUNTS, and READ SUBSYSTEM DATA commands. For further information, see IBM 3880 Storage Control Description manuals for all caching models or *IBM 3990 Storage Control Reference*.

Acronyms and Abbreviations

This list contains definitions for acronyms and abbreviations used in the various books in the Storage Subsystem Library. The terms in this list are not necessarily used in *this specific* book. Some terms are more specifically defined in the glossary.

ACB Access method control block

ACS Automatic class selection

ACDS Active control data set

AIX Alternate index

ASCII American National Standard Code for Information Interchange

BCS Basic catalog structure

BDAM Basic direct access method

BPAM Basic partitioned access method

BSAM Basic sequential access method

BSDS Bootstrap data set

CCHH Cylinder, cylinder, head, head

CCHHR Cylinder, cylinder, head, head, record

CCW Channel command word

CHL-I Channel interface

CHPID Channel path identifier

CI Control interval

CKD Count-key-data

CMS Conversational Monitor System

CP Control program

CTC channel-to-channel

CTL-I Control interface

CVOL Control volume

DASD Direct access storage device

DCB Data control block

DD Data definition

DFDSS Data Facility Data Set Services.

DFHSM Data Facility Hierarchical Storage Manager

DFP Data Facility Product

DFSORT Data Facility Sort

DL Data length

DLS Device level selection

DLSE Device level selection enhanced

DPS Dynamic path selection

EBCDIC Extended binary coded decimal interchange code

ECKD Extended count-key data

EOF End-of-file

ERDS Error recording data set

EREP Environmental Record Editing and Printing program

ESDS Entry-sequenced data set

EXCP Execute channel program

ESQA Extended system queue area

FBA Fixed-block architecture

FCCHH Flag, cylinder, cylinder, head, head

FRU Field replaceable unit

GB Gigabyte

GDG Generation data group

GRS global resource serialization

GTF Generalized trace facility

HA Home address

HDA Head-disk assembly

ID Identifier

IML Initial microcode load

IOCP I/O configuration program

IOGEN Input/output device generation

IMS Information Management System

I/O Input/output

IPL Initial program load

ISAM Indexed sequential access method

ISCII International Reference Version of the International Standard for Information Interchange

ISMF Interactive Storage Management Facility

ISPF/PDF Interactive System Productivity Facility / Program Development Facility

JCL job control language

JCT JES control table

JES Job entry subsystem

KL key length

KSDS Key-sequenced data set

KVA kilovolt ampere

LDS Linear data set

LRU	Least recently used algorithm
MAP	Maintenance analysis procedure
MB	megabyte
MPSD	Mulitpath storage director
MVSCP	MVS configuration program
NVS	Nonvolatile storage
OLTEP	Online Test Executive Program
OS	Operating system
PAM	Partitioned access method
PFK	Program function keyboard
PLPA	Pageable link pack area
PTF	Program temporary fix
R0	Record zero
RACF	Resource Access Control Facility
RMF	Resource Measurement Facility
RPS	Rotational position sensing
RRDS	Relative record data set
RTM/SF	Realtime Monitor / Systems Facility
SAM	Sequential access method
SCA	Shared control array
SCDS	Source control data set
SF	Support facility
SIM	Service information message
SLR	Service Level Reporter
SMF	System Management Facilities
SML	MVS Storage Management Library
SMS	Storage Management Subsystem
SQL/DS	Structured Query Language / Data System
SSID	Subsystem identifier
TCO	Triple Capacity Option
TPF	Transaction Processing Facility
TSO	Time sharing option
TTR	Track record
UCB	Unit control block
UCW	unit control word
VIO	Virtual input/output
VMMAP	VM Monitor Analysis Program
VMPPF	VM Performance Planning Facility
VMPRF	VM Performance Reporting Facility
VSAM	Virtual storage access method
VTAM	Virtual telecommunications access method
VTOC	Volume table of contents
VVDS	VSAM volume data set
WTO	Write to operator
XA	Extended architecture

Glossary

This glossary contains disk storage subsystem terms used in the various books of the Storage Subsystem Library (SSL).

Each of the terms included here is not necessarily used in *this specific* book. If you do not find the term you are looking for, refer to the index or to *Dictionary of Computing*, SC20-1699.

A

A-unit. The direct access storage unit that contains the controller functions to attach to the storage control. An A-unit controls the B-units that are attached to it and is often referred to as a head of string.

access authorization. Bits in the Define Extent file mask that define one of the three authorization groups for a channel program (normal authorization, device support authorization, or diagnostic authorization).

access mechanism. See actuator.

active duplex state. A state of operation that occurs when both devices in a dual copy logical volume are automatically updated. See also duplex state and suspended duplex state.

actuator. A set of access arms and their attached read/write heads, which move as an independent component within a head and disk assembly (HDA). See also device and volume.

alternate track. On a direct access storage device, a track designated to contain data in place of a defective primary track.

B

B-unit. A direct access storage unit that attaches to the subsystem through an A-unit.

C

C-unit. A direct channel attach 3380 direct access storage unit that contains both the storage control functions and the DASD controller functions. A 3380 C-unit (3380 Model CJ2) functions as a head of string and controls the B-units that are attached to it.

cache. A random access electronic storage in selected storage controls used to retain frequently used data for faster access by the channel. For example, 3990 Model 3 contains cache.

cache fast write. A form of fast write where the data is written directly to cache without using nonvolatile storage and is available for later destaging. This 3990 Model 3 Storage Control function should be used for data of a temporary nature, or data which is readily recreated, such as the sort work files created by the appropriate release of DFSORT.

cache fast write data. Data that the channel command modifies in cache and not on DASD. It has read-hit performance benefits for write hits. See cache fast write and cache fast write identifier.

cache fast write identifier. An identification to ensure that a program does not access data in cache that is down-level data.

channel connection address. The I/O address that uniquely identifies an I/O device to the channel during an I/O operation.

channel interface (CHL-I). The circuitry of a storage control that attaches storage paths to a host channel.

check-1 error. In the storage control and DASD, an error that does not allow the use of normal machine functions to report details of the error condition.

check-2 error. In the storage control and DASD, an error that can be reported using the normal machine functions.

cluster. See storage cluster.

concurrent maintenance. The capability that permits a service representative to perform a service action on a storage control or DASD while normal operations continue on hardware not affected by the service action.

concurrent media maintenance. The capability that enables a customer to perform maintenance on a track while allowing user access to that data.

connection check alert. The electronic signal used by the DASD to indicate a check-1 error condition to the storage control. See check-1 error.

contingent allegiance. A state the storage path establishes for an I/O device that allows only the channel path that is communicating with the I/O device to continue to do so. This state occurs when the channel accepts a status byte that contains unit check.

control interface (CTL-I). The hardware connection between the storage control function and the DASD controller function.

control unit. A hardware unit that controls the reading, writing, or displaying of data at one or more input/output devices. See also storage control.

controller. The hardware component of a DASD head of string unit that provides the path control and data transfer functions. For example, 3390 A-units have four controllers, and there are two controllers in a 3380 Model AE4, AK4, or CJ2. See also device adapter.

controller address. The 1-bit address used by the storage control to direct commands to the correct DASD string on the CTL-I. Controller address applies to the 3380 Models AA4, AD4, and AE4. See also string address.

controller ID. An 8-bit identifier that uniquely identifies the physical string regardless of the selection address. It identifies to the service representative, by means of EREP, a failing subsystem component (controller or device) without having to translate a selection address (which may have little relation to a physical address) to a physical component. The controller ID is the number shown on the operator panel. Controller ID applies to the 3380 Models AA4, AD4, and AE4. See also string ID.

count-key-data (CKD). A DASD data recording format employing self-defining record formats in which each record is represented by a count area that identifies the record and specifies its format, an optional key area that may be used to identify the data area contents, and a data area that contains the user data for the record. CKD is also used to refer to a set of channel commands that are accepted by a device that employs the CKD recording format. See extended count-key-data architecture.

D

DASD. Direct access storage device.

DASD fast write. A form of fast write to cache where the data is written concurrently to cache and nonvolatile storage and automatically scheduled for destaging to the DASD. Both copies are retained in the storage control until the data is completely written to the DASD, providing data integrity equivalent to writing directly to the DASD. DASD fast write is available with a 3990 Model 3 Storage Control.

DASD subsystem. One or more DASD strings and the storage control(s) to which the DASD are attached.

demotion. The process of removing the image of one or more records from cache. A set of one or more DASD records is demoted either by being selected for replacement (overlay) by another set of DASD records or by being marked invalid. Compare to promotion.

destage. The asynchronous write of new or updated data from cache or nonvolatile storage to DASD. This is used only for the fast write and dual copy functions of 3990 Model 3. See also fast write and write hit.

device. A uniquely addressable part of a DASD unit that consists of a set of access arms, the associated disk surfaces, and the electronic circuitry required to locate, read, and write data. See also volume.

device adapter (DA). The hardware component of a 3390 head of string unit that provides the path control and data transfer functions. See also controller.

device address. Three or four hexadecimal digits that uniquely define a physical I/O device on a channel path in System/370 mode. The one or two leftmost digits are the address of the channel to which the device is attached. The two rightmost digits represent the unit address.

device ID. An 8-bit identifier that uniquely identifies a physical I/O device.

device level selection (DLS). A DASD function available with 3380 Models AD4, BD4, AE4, BE4, AJ4, BJ4, AK4, BK4, and CJ2. With DLS, each of the two controllers in the DASD string has a path to all devices in the string, and any two devices in the 2-path DASD string can read or write data simultaneously. See DLS mode.

device level selection enhanced (DLSE). A DASD function providing four data transfer paths to each device in a 4-path DASD string. With DLSE, any four devices in a 4-path DASD string can read or write data simultaneously. See DLSE mode.

device number. Four hexadecimal digits that logically identify an I/O device in a System/370 Extended Architecture or Enterprise Systems Architecture/370 Systems.

device release. A command that terminates the reservation of the device from the channel issuing the command or from all channels on the interface path group.

device reserve. A command that reserves the device for the channel issuing the command, or for all channels in the same interface path group.

device support authorization. Channel programs executing with this authorization can access all tracks in all track groups, and can execute all Locate Record operations.

Device Support Facilities program (ICKDSF). A program used to initialize DASD at installation and provide media maintenance.

device support tracks. Reserved tracks of a DASD volume that may be used to store the subsystem status information used by cached subsystems (for example at IML time), and defect skipping information on some device types.

diagnostic authorization. Channel programs using diagnostic authorization can access only the diagnostic and device support tracks.

diagnostic tracks. Tracks used by the diagnostic programs for testing the read/write function.

director. See storage director.

director-to-device connection (DDC). The control interface that connects a storage path in the storage control to a controller in the DASD A-unit.

diskette drive. A direct access storage device that uses diskettes as the storage medium. A 3880 uses a read-only diskette drive for microcode storage; 3990s and 3380 Model CJ2s use read/write diskette drives for microcode storage and error logs.

DLS mode. A mode of operation in a 3990 Storage Control that supports 3380 2-path strings. DLS mode must be specified by the IBM service representative at installation for the 3990. See single-path storage director.

DLSE mode. A mode of operation in a 3990 Model 2 or 3 Storage Control that supports 3380 AJ4 and AK4 4-path strings and 3390 strings. DLSE mode must be specified by the IBM service representative at installation time for the 3990. See multipath storage director.

domain. A scope of operations control that spans all the parameters specified by the Locate Record command. For example, the Locate Record command allows only certain commands, and the commands must be in a correct sequence.

See also locate record domain.

DPS array. An electronic storage area that contains device status information. When any 3380 A-unit, except Model A04, is attached to a 3880 Storage Control, the DPS array resides in the A-units. When the same models are attached to a 3990, the DPS array function is part of the 3990 shared control array. The 3380 Model CJ2 contains DPS array in the storage control function.

dual copy. A high availability function made possible by nonvolatile storage in a 3990 Model 3. Dual copy maintains two functionally identical copies of designated DASD volumes in the logical 3990 Model 3 subsystem, and automatically updates both copies every time a write operation is issued to the dual copy logical volume.

dual copy logical volume. A logical volume comprised of two physical devices with all data recorded twice, once on each device. A 3990 Model 3 Storage Control automatically ensures that both devices are updated with each write operation to the dual copy volume. Also called a duplex pair.

dual-frame configuration. Consists of two like storage controls physically interconnected. Pairs of 3880 Model 13 or Model 23 and 3990 Model 2 or Model 3 Storage Controls can be dual-framed. In a dual-frame configuration, each storage director in a logical DASD subsystem is in a different storage control. When a 3990 Storage Control is in DLS mode, each DASD string has one path to a single-path storage director in each of the 3990 Storage Controls. When a 3990 Storage Control is in DLSE mode, each DASD string has two paths to a multipath storage director in each of the 3990 Storage Controls.

duplex pair. See dual copy logical volume.

duplex state. Two devices in a 3990 Model 3 subsystem are in duplex state when they have been made into a dual copy logical volume.

dynamic path reconnect. A function that allows disconnected DASD operations to reconnect over any available channel path rather than being limited to the one on which the I/O operation was started. It is available only on System/370 Extended Architecture and Enterprise Systems Architecture/370 Systems. For example, when a host has four channels connected to 3990 Storage Control (in DLSE mode) with a 4-path DASD string, any device can reconnect on any one of four channel paths, providing improved performance and availability.

dynamic path selection (DPS). DASD subsystem functions available with all 3380 heads of string except Model A04. These functions include:

- Two controllers providing data paths from the 3380 strings to the storage directors
- Simultaneous transfer of data over two paths to two devices, providing the two devices are on separate internal paths within the string
- Sharing DASD volumes by using System-Related Reserve and Release
- Providing dynamic path reconnect to the first available path.

E

environmental data. Data the 3990 must report to the host; the data can be service information message (SIM) sense data, logging mode sense data, an error condition that prevents completion of an asynchronous operation, or a statistical counter overflow. The 3990 reports the appropriate condition as unit check status

to the host during a channel initiated selection. Sense byte 2, bit 3 (environmental data present) is set to 1.

Environmental Record Editing and Printing (EREP) program. The program that formats and prepares reports from the data contained in the Error Recording Data Set (ERDS).

erase. To remove data from a data medium, leaving the medium available for recording new data.

error burst. A sequence of bit errors counted as one unit, or burst.

error correcting code (ECC). A code designed to detect and correct error bursts by the use of check bytes.

extended count-key-data. A set of channel commands that use the CKD track format. Extended count-key-data uses the Define Extent and Locate Record commands to describe the nature and scope of a data transfer operation to the storage control to optimize the data transfer operation. The 3990 Storage Control supports the extended count-key-data commands.

extent. A set of consecutively addressed tracks that a channel program can access. The limits of an extent are defined by specifying the addresses of the first and last tracks in the extent.

F

fast dual copy. A dual copy capability where DASD fast write and dual copy are active concurrently to provide a significant dual copy performance enhancement.

fast write. In a 3990 Model 3 Storage Control, a write operation at cache speed that does not require immediate transfer of data to a DASD. The data is written directly to cache and/or nonvolatile storage and is available for later destaging. Fast write reduces the time an application must wait for the I/O operation to complete. See also DASD fast write, cache fast write, and destage.

fence. To separate one or more paths or elements from the remainder of the logical DASD subsystem. The separation is by logical boundaries rather than power boundaries. This separation allows isolation of failing components so that they do not affect normal operations.

G

gigabyte (GB). 10^9 bytes.

H

head and disk assembly (HDA). A field replaceable unit in a direct access storage device containing the disks and actuators.

head of string. The unit in a DASD string that contains controller functions. Also called the A-unit. See also device adapter.

home address (HA). The first field on a CKD track that identifies the track and defines its operational status. The home address is written after the index point on each track.

I

ICKDSF. See Device Support Facilities program.

IDCAMS. A component of Data Facility Product that is also referred to as access method services.

identifier (ID). A sequence of bits or characters that identifies a program, device, controller or system.

IML device. The diskette drive that reads the microcode for the storage control. See diskette drive.

index point. The reference point on a disk surface that determines the start of a track.

initial microcode load (IML). The act of loading microcode.

invalidation. The process of removing records from cache because of a change in status of a subsystem facility or function, or because of an error while processing the cache image of the set of records. When such a cache image is invalidated, the corresponding records cannot be accessed in cache and the assigned cache space is available for allocation.

I/O device. An addressable input/output unit, such as a direct access storage device, magnetic tape device, or printer.

K

kilobyte (KB). 1024 bytes.

L

least recently used algorithm (LRU). The algorithm used to identify and make available the cache space that contains the least recently used data.

locate record domain. The part of a channel command chain immediately following a Locate Record command

that must follow the restrictions imposed by operations the Locate Record parameters specify. The domain is in effect for the number of records or tracks that the count parameter specifies.

See also domain.

logical DASD subsystem. Two storage directors attached to the same DASD strings together with those DASD strings.

M

maintenance analysis procedure (MAP). A step-by-step procedure for tracing a symptom to the cause of a failure.

media. The disk surface on which data is stored.

media SIM. A message generated when 3390 detects a device media fault that requires media maintenance. See also service information message (SIM).

megabyte (MB). 10^6 bytes.

multipath storage director. A storage director in a 3990 Storage Control operating in DLSE mode. Each multipath storage director in a storage control is associated with two storage paths. All storage paths in a multipath storage director respond to the same range of control unit addresses on a channel.

multitrack operations. A mode of operation in which the storage director advances to the next track when the operation continues past the end of a track.

N

nondisruptive installation. Allows customer operations to continue concurrently with the physical installation of an additional 4-path DASD string (or 4-path DASD B-units), to an existing 4-path DASD subsystem. This provides access to data on the existing units while installation activity is in progress. Nondisruptive installation is available when only 4-path DASD are attached to a properly configured 3990 Model 2 or Model 3 Storage Control.

nondisruptive removal. Allows customer operations to continue concurrently with the physical removal of a 4-path DASD string (or 4-path DASD B-units), from an existing 4-path DASD subsystem. This provides access to data on the unaffected units while removal activity is in progress. Nondisruptive removal is available when only 4-path DASD are attached to a properly configured 3990 Model 2 or Model 3 Storage Control.

nonvolatile storage (NVS). Additional random access electronic storage with a backup battery power source, available with a 3990 Model 3 Storage Control, used to retain data during a power failure. Nonvolatile storage, accessible from all storage directors, stores data during DASD fast write and dual copy operations.

normal authorization. A channel program executing with normal authorization cannot access the diagnostic or device support tracks.

O

orient. An operational code of the Locate Record command that prepares the storage director to position the DASD to the seek address and sector number parameters.

orientation. A control state within a storage path that indicates the type of area (home address, count, key, or data field) that has just passed under the read/write head of the device.

P

physical ID. A unique designation to identify specific components in a data processing complex.

pinned data. Data that is held in a 3990 Model 3 Storage Control, because of a permanent error condition, until it can be destaged to DASD or until it is explicitly discarded by a host command. Pinned data exists only when using fast write or dual copy functions.

predictable write. A fast write operation that formats, in cache only, the entire user area of the track and creates a track image. This full-track image is available for later destaging to a DASD.

primary device. One device of a dual copy volume. All channel commands to the dual copy logical volume are directed to the primary device. The data on the primary device is duplicated on the secondary device. See also secondary device.

primary track. On a direct access storage device, the original track on which data is stored. See also alternate track.

promotion. The process of moving a track image from a DASD to cache.

Q

quiesce. A function on a 3990 Model 2 or 3 Storage Control in DLSE mode, configured with only 4-path strings. This function makes one component of a storage subsystem temporarily unavailable to the processor while assuring that the remaining components are available for data transfer. For example, components of a storage subsystem are storage path, controller, and DASD string. This

function is initiated by a service representative. Contrast with resume.

R

read hit. When data requested by the read operation are in the cache.

read miss. When data requested by the read operation are not in the cache.

release. A facility that allows other host systems to communicate with the reserved device. Contrast with reserve.

reserve. A facility for devices attached to multiple channel paths. It allows only one host system to communicate with the specified device. Contrast with release.

resume. A function on a 3990 Model 2 or 3 Storage Control in DLSE mode, configured with only 4-path strings. This function enables a component that has been quiesced. This function is initiated by a service representative. Contrast with quiesce.

rotational position sensing (RPS). A function that permits a DASD to reconnect to a block multiplexer channel when a specified sector has been reached. This allows the channel to service other devices on the channel during positional delay.

S

secondary device. One of the devices in a dual copy logical volume that contains a duplicate of the data on the primary device. Unlike the primary device, a limited subset of channel commands may be directed to the secondary device. See also primary device.

service information message (SIM). A message that appears on the operator console and in EREP reports, generated by a 3990, a 3380 Model CJ2, or a 3390, that contains notification of a need for repair or customer action. The SIM identifies the affected area of the storage control or device and the effect of the service action. See also media SIM.

shared control array (SCA). An electronic storage area in a 3990 Storage Control containing status information about its own cluster and the other storage cluster in the logical DASD subsystem. The information contained in the shared control array is replicated in each storage cluster in that subsystem.

SIM Alert. An operator console message that alerts the operator that an action requiring attention has occurred. The service information message (SIM) can be obtained from the EREP exception report.

simplex state. A volume is in the simplex state if it is not part of a dual copy logical volume. Terminating a dual copy logical volume returns the two devices to the simplex state. In this case, there is no longer any capability for either automatic updates of the secondary device or for logging changes, as would be the case in suspended duplex state.

single-frame configuration. In a single-frame configuration, the storage directors of a logical DASD subsystem are located inside one storage control. Contrast with dual-frame configuration.

single-path storage director. A storage director in a 3990 or 3380 Model CJ2 operating in DLS mode. Each single-path storage director in the storage cluster is associated with one storage path. A storage path on a single-path storage director responds to a unique control unit address on the channel. A single-path storage director in a 3990 is like a storage director in a 3880.

stage. The process of writing data from a DASD to the cache.

state-change interruption. A combination of bits in the status byte that occurs for a change in the subsystem or the device. For example, a state-change interruption can occur when a volume changes from simplex to duplex. The bit combination is attention, device end, and unit exception. This interruption is sent to all hosts to inform them of the state change.

This was formerly called pack-change interruption.

storage cluster. In the 3990 Storage Control and 3380 Model CJ2, a power and service region containing two independent transfer paths. See also storage director, single-path storage director, and multipath storage director.

storage control. The component in a DASD subsystem that connects the DASD to the host channels. It performs channel commands and controls the DASD devices. For example, the 3990 Model 2 and Model 3 are storage controls.

storage director. In a 3990 storage control, a logical entity consisting of one or more physical storage paths in the same storage cluster. In a 3880, a storage director is equivalent to a storage path. See also storage path, single-path storage director, and multipath storage director.

storage director ID. For 3880 Storage Control configurations, an 8-bit designation that uniquely identifies the storage director regardless of its selection address. It identifies to the service representative, by means of EREP, a failing subsystem component (storage director) without having to translate a selection address (which may have little relation to a physical address) to a physical

component. The storage director ID is the number shown on the operator panels of 3880s and the attached DASD units. For 3990's, see subsystem identifier (SSID).

storage management subsystem (SMS). An operating environment that helps automate and centralize the management of storage. To manage storage, SMS provides the storage administrator with control over data class, storage class, management class, storage group and automatic class selection routine definitions.

storage path. The hardware within the 3990 Storage Control that transfers data between the DASD and a channel. See also storage director.

storage subsystem. One or more storage controls and their attached storage devices.

string. A series of connected DASD units sharing the same A-unit (or head of string).

string address. The 1-bit address used by the storage control to direct commands to the correct 3380 AJ4/AK4 or 3390 DASD string on the CTL-I. See also controller address.

string ID. An 8-bit identifier that uniquely identifies the physical string regardless of the selection address. It identifies to the service representative, by means of EREP, a failing subsystem component (controller or device) without having to translate a selection address (which may have little relation to a physical address) to a physical component. The string ID is the number shown on the operator panel of the DASD A-unit. See also controller ID.

substring. In a 4-path AJ4/AK4 DASD configuration, one of the two A-units and the physically adjacent B-units (as many as three B-units).

subsystem identifier (SSID). In a 3990 Storage Control configuration, a number that identifies the physical components of a logical DASD subsystem. This number is set by the service representative at time of installation, and is included in the vital product data in the support facility. This number is identified on the DASD A-units and 3990 operator panels.

subsystem storage. A term used for cache in a 3880 Model 13 or 23. See cache.

support facility (SF). A component of each 3990 and 3380 Model CJ2 storage cluster that provides initial microcode load, error logging, maintenance panel, MAPs, and microdiagnostic functions for that cluster.

suspended duplex state. When only one of the devices in a dual copy logical volume is being updated because of either a permanent error condition or an authorized user command. All writes to the remaining functional device are logged. This allows for automatic resynchronization of both volumes when the dual copy logical volume is reset to the active duplex state.

system-managed storage. An approach to storage management in which the system determines data placement and an automatic data manager handles data backup, movement, space and security.

T

track compatibility mode. See 3380 track compatibility mode

U

unit address. The last two hexadecimal digits of a DAS device address. This identifies the storage control and DAS string, controller, and device to the channel subsystem. Often used interchangeably with control unit address and device address in System/370 mode.

V

vital product data (VPD). Nonvolatile data that includes configuration data, machine serial number, EC level, and machine features. It is maintained by the 3990 support facility. It is stored in the 3990 support facility and 3390.

volume. The DASD space accessible by a single actuator.

W

write hit. When data requested by the write operation are in the cache.

write miss. When data requested by the write operation are not in the cache.

Numerics

2-path string. A series of physically connected DASD units in which the head of string unit provides two data transfer paths that can operate simultaneously.

3380 track compatibility mode. A mode of operation in which a 3390 device manages its tracks as if they were 3380 tracks. Contrast with 3390 mode.

3390 mode. The mode of the actuator when the entire capacity of the 3390 device is initialized. Contrast with 3380 track compatibility mode.

4-path string. A series of physically connected DASD units in which the head of string provides four data transfer paths that can operate simultaneously. A 3390

4-path string requires one A-unit, while two 3380 Model AJ4/AK4 units are required for a 3380 4-path string.

Bibliography

The bibliography is divided into two parts. The books listed in "Part One" and "Part Two" contain more detailed information on subjects discussed in the Storage Subsystem Library. For each book, the tables show the short and expanded title with the book's order number, and a short description of its contents.

"Part One— Hardware Publications" contains **hardware** information. Storage Subsystem Library publications, along with publications containing information on physical planning and reference, 3880 storage control, and storage hardware maintenance, are listed here.
"Part Two— Software Publications" on page 83 contains **software** information related to various operating environments. Both parts are organized alphabetically by major heading, and alphabetically within each heading.

For information on how to order these manuals, contact your local IBM branch office.

Part One— Hardware Publications

The books listed below contain more detailed information on **hardware-related** subjects discussed in the Storage Subsystem Library (SSL). Following the SSL publications, titles are arranged alphabetically by major heading, and alphabetically within each heading.

Short Title	Full Title	Order Number	Contents
Storage Subsystem Library	**Shared Manuals**		
Maintaining IBM Storage Subsystem Media	*Maintaining IBM Storage Subsystem Media*	GC26-4495	Description of DASD media maintenance and error handling
Master Index	*Storage Subsystem Library Master Bibliography, Index, and Glossary*	GC26-4496	Comprehensive bibliography, index, and glossary to information in Storage Subsystem Library publications
Storage Subsystem Library	**3380 DASD Manuals**		
IBM 3380 Direct Access Storage Introduction	*IBM 3380 Direct Access Storage Introduction*	GC26-4491	Overview of all 3380 models
IBM 3380 Direct Access Storage Direct Channel Attach Model CJ2 Introduction and Reference	*IBM 3380 Direct Access Storage Direct Channel Attach Model CJ2 Introduction and Reference*	GC26-4497	Overview of functions and reference information for 3380 Model CJ2
3380 Direct Access Storage Reference Summary	*IBM 3380 Direct Access Storage: Reference Summary*	GX26-1678	Summary card containing 3380 device characteristics
Using the IBM 3380 Direct Access Storage in an MVS Environment	*Using the IBM 3380 Direct Access Storage in an MVS Environment*	GC26-4492	Discussion of 3380 use under MVS/ESA, MVS/XA, and MVS/370
Using the IBM 3380 Direct Access Storage in a VM Environment	*Using the IBM 3380 Direct Access Storage in a VM Environment*	GC26-4493	Discussion of 3380 use under VM
Using the IBM 3380 Direct Access Storage in a VSE Environment	*Using the IBM 3380 Direct Access Storage in a VSE Environment*	GC26-4494	Discussion of 3380 use under VSE
Storage Subsystem Library	**3390 DASD Manuals**		
IBM 3390 Direct Access Storage Introduction	*IBM 3390 Direct Access Storage Introduction*	GC26-4573	Overview of all 3390 models
3390 Direct Access Storage Reference Summary	*IBM 3390 Direct Access Storage Reference Summary*	GX26-4577	Summary card containing 3390 device characteristics
Using IBM 3390 Direct Access Storage in an MVS Environment	*Using IBM 3390 Direct Access Storage in an MVS Environment*	SC26-4574	Discussion of 3390 use under MVS.
Using IBM 3390 Direct Access Storage in a VM Environment	*Using IBM 3390 Direct Access Storage in a VM Environment*	SC26-4575	Discussion of 3390 use under VM.
Storage Subsystem Library	**3990 Storage Control Manuals**		
Cache Device Administration	*Cache Device Administration*	GC35-0101	Describes the IDCAMS cache utility commands necessary to manage cache and to obtain information about cache status and performance
IBM 3990 Storage Control Introduction	*IBM 3990 Storage Control Introduction*	GA32-0098	Overview of 3990 storage control unit functions

Short Title	Full Title	Order Number	Contents
IBM 3990 Storage Control Planning, Installation, and Storage Administration Guide	*IBM 3990 Storage Control Planning, Installation, and Storage Administration Guide*	GA32-0100	Detailed information on installation and use of the 3990 storage control
IBM 3990 Storage Control Reference	*IBM 3990 Storage Control Reference*	GA32-0099	Information on the 3990 channel interface (channel commands and sense bytes)
Other IBM Disk Storage Models			
IBM 3370 Direct Access Storage Description	*IBM 3370 Direct Access Storage Description*	GA26-1657	Description of 3370 Direct Access Storage functions
IBM 3375 Direct Access Storage Description and User's Guide	*IBM 3375 Direct Access Storage Description and User's Guide*	GA26-1666	Description of 3375 Direct Access Storage functions
IBM 9332 Disk Unit Models 200/400 Customer and Service Information	*IBM 9332 Disk Unit Models 200/400 Customer and Service Information*	SX21-9854	Set of publications covering planning, installing, problem analysis, and service considerations for the IBM 9332
IBM 9335 Direct-Access Storage Subsystem Customer Information	*IBM 9335 Direct-Access Storage Subsystem Customer Information*	SX33-6058	Set of publications describing disk functional characteristics and how to set up and use the IBM 9335
Reference Manual for IBM 3330 Series Disk Storage	*Reference Manual for IBM 3330 Series Disk Storage*	GA26-1615	Reference material for 3330 Series Disk Storage
Reference Manual for IBM 3340/3344 Disk Storage	*Reference Manual for IBM 3340/3344 Disk Storage*	GA26-1619	Reference material for 3340/3344 Disk Storage
Reference Manual for IBM 3350 Direct Access Storage	*Reference Manual for IBM 3350 Direct Access Storage*	GA26-1638	Reference material for 3350 Direct Access Storage
Physical Planning and Reference Information			
IBM I/O Equipment: Installation – Physical Planning for System/360, System/370, and 4300 Processors	*IBM Input/Output Equipment: Installation – Physical Planning for System/360, System/370, and 4300 Processors*	GC22-7069	Description of physical planning for I/O hardware
IBM System/360 System/370 4300 Processors I/O Equipment Installation Manual—Physical Planning	*IBM System/360 System/370 4300 Processors Input/Output Equipment Installation Manual—Physical Planning*	GC22-7064	Description of physical planning for I/O hardware
IBM 3031, 3032, 3033 Processor Complex Channel Configuration Guidelines	*IBM 3031, 3032, 3033 Processor Complex Channel Configuration Guidelines*	GG22-9020	Provides guidance on configuring 303X processor channels
IBM 3390 Direct Access Storage Migration Guide	*IBM 3390 Direct Access Storage Migration Guide*	GG24-3373	Provides guidelines and detailed procedures for moving MVS and VM data to 3390 from other DASD
IBM 360/370 OEMI manual	*IBM 360/370 Power Control Interface Original Equipment Manufacturers Information*	GA22-6906	Shows the interface specifications for remote power cables for the 3990.
Introduction to IBM Direct Access Storage Devices	*Introduction to IBM Direct Access Storage Devices*	SR20-4738	Textbook describing large IBM early DASD and data storage theory and methods
IOCP User's Guide and Reference	*Input/Output Configuration Program User's Guide and Reference*	GC28-1027	Shows how to define the I/O configuration data required by the processor complex to control I/O requests, describing the MVS version, the VM version, and the standalone version of IOCP
9370 Information System Installation Manual – Physical Planning	*9370 Information System Installation Manual – Physical Planning*	GA24-4031	Contains physical planning information for the 9370 family of processors
Storage Hardware Maintenance			
EREP User's Guide and Reference	*Environmental Record Editing and Printing (EREP) Program User's Guide and Reference*	GC28-1378	Description of EREP functions and commands for DASD media reporting
General Information and Planning for NetView Release 2	*General Information and Planning for NetView Release 2*	GC30-3463	Overview of NetView functions
ICKDSF Primer	*Device Support Facilities: Primer for the User of IBM 3380 and 3390 Direct Access Storage*	GC26-4498	Describes how to use ICKDSF with the 3380 and 3390

Short Title	Full Title	Order Number	Contents
ICKDSF User's Guide and Reference	*Device Support Facilities User's Guide and Reference*	GC35-0033	Description of ICKDSF functions and commands for DASD initialization and maintenance
3880 Storage Control Information			
IBM 3880 Storage Control Models 1, 2, 3, and 4 Description	*IBM 3880 Storage Control Models 1, 2, 3, and 4 Description Manual*	GA26-1661	Overview of 3880 Models 1, 2, 3, and 4 functions
IBM 3880 Storage Control Model 11 Description	*IBM 3880 Storage Control Model 11 Description*	GA32-0061	Reference manual for 3880 Model 11 functions
IBM 3880 Storage Control Model 13 Description	*IBM 3880 Storage Control Model 13 Description*	GA32-0067	Reference manual for 3880 Model 13 functions
IBM 3880 Storage Control Model 21 Description	*IBM 3880 Storage Control Model 21 Description*	GA32-0081	Reference manual for 3880 Model 21 functions
IBM 3880 Storage Control Model 21 Installation and Administration Guide	*IBM 3880 Storage Control Model 21 Installation and Administration Guide*	GA32-0084	Reference manual for 3880 Model 21 functions
IBM 3880 Storage Control Model 23 Description	*IBM 3880 Storage Control Model 23 Description*	GA32-0083	Reference manual for 3880 Model 23 functions
IBM 3880 Storage Control Model 23 Installation and Administration Guide	*IBM 3880 Storage Control Model 23 Installation and Administration Guide*	GA32-0085	Describes how to install and use the 3880 Model 23 effectively
IBM 3880 Storage Control Model 23 Introduction	*IBM 3880 Storage Control Model 23 Introduction*	GA32-0082	Overview of 3880 Model 23 functions
IBM 3880 Storage Control Model 23 with RPQ #8B0035 Description	*IBM 3880 Storage Control Model 23 with RPQ #8B0035 Description*	GA32-0087	Reference manual for 3880 Model 23 functions
Introduction to IBM 3880 Storage Control Model 21	*Introduction to IBM 3880 Storage Control Model 21*	GA32-0080	Overview of 3880 Model 21 functions
Introduction to IBM 3880 Storage Control Model 23 with RPQ #8B0035	*Introduction to IBM 3880 Storage Control Model 23 with RPQ #8B0035*	GA32-0086	Overview of 3880 Model 23 functions

Part Two— Software Publications

The books listed below contain more detailed information on **software-related** subjects discussed in the Storage Subsystem Library. They are arranged alphabetically by major heading, and alphabetically within each heading.

Short Title	Full Title	Order Number	Contents
DATABASE 2 (DB2) Information			
DBMAUI User's Guide	*Data Base Migration Aid Utility User's Guide*	SH20-9232	Describes how to migrate from one DB2 subsystem to another DB2 subsystem
DB2 Release 2 Data Portability	*DB2 Release 2 Data Portability*	GH20-9255	Describes moving DB2 data sets and volumes between DASD or systems
IBM DB2 General Information	*IBM DATABASE 2 General Information*	GC26-4073	Overview of DB2 operation and functions
IBM DB2 Installation	*IBM DATABASE 2 Installation*	SC26-4084	Describes installation requirements of DB2
IBM DB2 System Planning and Administration Guide	*IBM DATABASE 2 System Planning and Administration Guide*	SC26-4085	Describes planning activities for installing or migrating to DB2 Release 2 and managing system resources once installed
Data Facility Data Set Services (DFDSS) Information			
DFDSS: General Information (Version 2)	*Data Facility Data Set Services: General Information* (Version 2)	GC26-4123	Overview of capabilities and requirements
DFDSS: User's Guide and Reference (Version 2, Release 3)	*Data Facility Data Set Services: User's Guide and Reference* (Version 2, Release 3)	SC26-4125	Describes syntax and usage of DFDSS commands
DFDSS: User's Guide Version 2 Release 4	*Data Facility Data Set Services: User's Guide Version 2, Release 4*	SC26-4388	Describes usage of DFDSS commands
DFDSS: Reference Version 2 Release 4	*Data Facility Data Set Services: Reference Version 2 Release 4*	SC26-4389	Describes syntax of DFDSS commands
Data Facility SORT (DFSORT) Information			

Short Title	Full Title	Order Number	Contents
DFSORT General Information	*DFSORT General Information*	GC33-4033	Contains introductory material for planners, system support people, managers, or programmers
DFSORT Application Programming Guide	*DFSORT Application Programming Guide*	SC33-4035	Provides detailed programming information to enable programmers to prepare sort, merge or copy applications
Data Facility Hierarchical Storage Manager (DFHSM) Information			
DFHSM: Installation and Customization Guide	*Data Facility Hierarchical Storage Manager: Installation and Customization Guide*	SH35-0084	Describes how to install and tailor DFHSM to your needs
DFHSM: System Programmer's Guide	*Data Facility Hierarchical Storage Manager: System Programmer's Guide*	GH35-0085	Describes the concepts of DFHSM
DFHSM: System Programmer's Reference	*Data Facility Hierarchical Storage Manager: System Programmer's Reference*	GH35-0083	Describes and explains how to use the DFHSM system programmer, space manager, and operator commands
Data Facility Product (DFP) Information			
MVS/DFP: General Information	*MVS/ESA Data Facility Product Version 3: General Information*	GC26-4507	Overview of capabilities and requirements of MVS/DFP
	MVS Extended Architecture Data Facility Product Version 2: General Information	GC26-4142	Overview of capabilities and requirements of MVS/XA DFP
	MVS/370 Data Facility Product: General Information	GC26-4050	Overview of capabilities and requirements of MVS/370 DFP
MVS/DFP Planning Guides	*MVS/ESA Data Facility Product Version 3: Planning Guide*	SC26-4513	Describes installation of DFP
	MVS Extended Architecture Data Facility Product Version 2: Planning Guide	GC26-4147	Describes installation of DFP, conversion to integrated catalogs, and conversion to indexed VTOCs in MVS/XA
	MVS/370 Data Facility Product: Planning Guide	GC26-4052	Describes installation of DFP, conversion to integrated catalogs, and conversion to indexed VTOCs in MVS/370
MVS/DFP: Diagnosis	*MVS/ESA Data Facility Product Version 3: Diagnosis Guide*	LY27-0550	Used to develop the keyword string for reporting program failures
	MVS/ESA Data Facility Product Version 3: Diagnosis Reference	LY27-9530	Used as references for diagnosing program failures
	MVS Extended Architecture Data Facility Product Version 2: Diagnosis Guide	LY27-9521	Used to develop the keyword string for reporting program failures.
MVS/DFP Reference Information	*MVS/ESA Data Facility Product Version 3: Directory of Programming Interfaces for Customers*	GC26-4414	References programming interfaces documentation
	MVS Extended Architecture Data Facility Product Version 2: Diagnosis Reference	LY27-9530	Used as reference for diagnosing program failures.
Storage Administration Reference	*MVS/ESA Storage Administration Reference*	SC26-4514	Explains how to initialize, maintain, and perform storage management tasks using the MVS/DFP Storage Management Subsystem (SMS)
DFSMS/VM Information			
DFSMS/VM General Information	*DFSMS/VM General Information*	GC26-4604	Provides introductory information on using DFSMS/VM to perform data and storage management tasks under VM
Hierarchical Storage Manager (HSM) Information			
HSM Release 3 Installation Guide	*Hierarchical Storage Manager Release 3 Installation Guide*	GG22-9254	Describes requirements for and activities of HSM installation
OS/VS MVS HSM: General Information	*OS/VS MVS Hierarchical Storage Manager: General Information*	GH35-0007	Overview of capabilities and requirements

Short Title	Full Title	Order Number	Contents
OS/VS2 MVS HSM: User's Guide	*OS/VS2 MVS Hierarchical Storage Manager: User's Guide*	SH35-0024	Describes syntax and usage of HSM commands
IMS/VS Information			
Data Base Administration Guide	*IMS/VS Version 1, Data Base Administration Guide*	SH20-9025	Describes design, implementation and maintenance of IMS data base
General Information Manual	*IMS/VS Version 1, General Information Manual*	GH20-1260	Overview of capabilities and requirements
Utilities Reference Manual	*IMS/VS Version 1, Utilities Reference Manual*	SH26-4173	Provides detailed information on utilities and how to run them
Interactive Storage Management Facility (ISMF) Information			
ISMF User's Guide	*MVS/ESA Interactive Storage Management Facility User's Guide*	SC26-4508	Describes how to use ISMF to perform data and storage management tasks in an MVS/ESA environment
	MVS/XA Interactive Storage Management Facility User's Guide	GC26-4266	Describes how to use ISMF to perform data and storage management tasks in an MVS/XA environment
MVS/ESA Planning and Reference Information			
Access Method Services Reference	*MVS/ESA Integrated Catalog Administration: Access Method Services Reference*	SC26-4500	Describes access method services commands used to manipulate integrated catalog facility catalogs and VSAM data sets
	MVS/ESA VSAM Catalog Administration: Access Method Services Reference	SC26-4501	Describes access method services commands used to manipulate VSAM data sets
Basics of Problem Determination	*MVS/ESA Basics of Problem Determination*	GC28-1839	Describes the methods for problem determination an MVS/ESA environment
Catalog Administration Guide	*MVS/ESA Catalog Administration Guide*	SC26-4052	Describes how to use the integrated catalog facility
Data Administration Guide	*MVS/ESA Data Administration Guide*	SC26-4505	Describes how to use access methods (except VSAM) to process data sets
Data Administration: Macro Instruction Reference	*MVS/ESA Data Administration: Macro Instruction Reference*	SC26-4506	Describes how to code macro instructions for access methods
Initialization and Tuning	*MVS/ESA System Programming Library: Initialization and Tuning*	GG28-1828	Describes the effects of tuning an MVS/ESA system and how to define these values.
JCL Reference	*MVS/ESA Job Control Language Reference*	GC28-1829	Describes the syntax of JCL
JCL User's Guide	*MVS/ESA Job Control Language User's Guide*	GC28-1830	Describes the use of JCL
MVS Configuration Program Guide and Reference	*MVS/ESA MVS Configuration Program Guide and Reference*	GC28-1817	Describes use of MVSCP to define the I/O configuration to MVS/ESA
Routing and Descriptor Codes	*MVS/ESA Message Library: Routing and Descriptor Codes*	GC28-1816	Lists MVS/ESA system message routing and descriptor codes
Service Aids	*MVS/ESA System Programming Library: Service Aids*	GC28-1844	Describes how to use GTF, LIST, PRDMP, SADMP, and SPZAP
Supervisor Services and Macro Instructions	*MVS/ESA Supervisor Services and Macro Instructions*	GC28-1154	Provides supervisor services and macro instruction information for MVS/ESA
System Commands	*MVS/ESA Operations: System Commands*	GC28-1826	Describes syntax and use of MVS/ESA system commands
System: Data Administration	*MVS/ESA System: Data Administration*	SC26-4515	Overview of IBM access methods available in an MVS/ESA system
System Generation	*MVS/ESA System Generation*	GC28-1825	Describes how to do a complete sysgen MVS/ESA
System Messages Volume 1	*MVS/ESA Message Library: System Messages Volume 1*	GC28-1812	Lists MVS/ESA system messages and responses
System Messages Volume 2	*MVS/ESA System Messages Volume 2*	GC28-1813	Lists MVS/ESA system messages and responses

Short Title	Full Title	Order Number	Contents
VSAM Administration Guide	*MVS/ESA VSAM Administration Guide*	SC26-4518	Describes how to create VSAM data sets
MVS/XA Planning and Reference Information			
An MVS Tuning Perspective	*An MVS Tuning Perspective*	GG22-9023	Describes the effects of tuning an MVS system
Catalog Administration Guide	*MVS Extended Architecture Catalog Administration Guide*	GC26-4046	Describes how to use the integrated catalog facility
Data Administration Guide	*MVS Extended Architecture Data Administration Guide*	GC26-4140	Describes how to use access methods (except VSAM) to process data sets
Data Administration: Macro Instruction Reference	*MVS Extended Architecture Data Administration: Macro Instruction Reference*	GC26-4014	Describes how to code macro instructions for access methods
Data Administration: Utilities	*MVS Extended Architecture Data Administration: Utilities*	GC26-4150	Describes how to use DFP utility programs for data, device, and program management
Installation: System Generation	*MVS/Extended Architecture Installation: System Generation*	GC26-4009	Describes how to do a complete sysgen, iogen, or edtgen in MVS/XA
Integrated Catalog Administration: Access Method Services Reference	*MVS Extended Architecture Integrated Catalog Administration: Access Method Services Reference*	GC26-4135	Describes access method services commands used to manipulate integrated catalog facility catalogs and VSAM data sets
MVS/XA I/O Performance Considerations	*MVS/XA I/O Performance Considerations*	GG22-9346	Describes the effect of the MVS/XA I/O subsystem on device
MVS/XA JCL	*MVS/Extended Architecture Job Control Language (JCL)*	GC28-1148	Describes syntax and use of JCL in MVS/XA
System Messages Volume 1	*MVS/Extended Architecture Message Library: System Messages Volume 1*	GC28-1376	Lists MVS/XA system messages and responses
System Messages Volume 2	*MVS/Extended Architecture Message Library: System Messages Volume 2*	GC28-1377	Lists MVS/XA system messages and responses
MVS Configuration Program Guide and Reference	*MVS/Extended Architecture MVS Configuration Program Guide and Reference*	GC28-1335	Describes use of MVSCP to define the I/O configuration to MVS/XA
Operations: System Commands	*MVS/Extended Architecture Operations: System Commands*	GC28-1206	Describes syntax and use of MVS/XA system commands
System: Data Administration	*MVS Extended Architecture System: Data Administration*	GC26-4149	Overview of IBM access methods
System Programming Library: Service Aids	*MVS/Extended Architecture System Programming Library: Service Aids*	GC28-1159	Describes how to use GTF, LIST, PRDMP, SADMP, and SPZAP
VSAM Administration Guide	*MVS Extended Architecture VSAM Administration Guide*	GC26-4015	Describes how to create VSAM data sets
VSAM Catalog Administration: Access Method Services Reference	*MVS Extended Architecture VSAM Catalog Administration: Access Method Services Reference*	GC26-4136	Describes access method services commands used to manipulate VSAM data sets
MVS/370 Planning and Reference Information			
Access Method Services Reference	*MVS/370 Integrated Catalog Administration: Access Method Services Reference*	GC26-4051	Describes the access method services commands used with VSAM and integrated catalog facility catalogs
	MVS/370 VSAM Catalog Administration: Access Method Services Reference	GC26-4059	Describes the access method services commands used with VSAM
Data Administration Guide	*MVS/370 Data Administration Guide*	GC26-4058	Contains information on using access methods to do input and output
Data Administration: Macro Instruction Reference	*MVS/370 Data Administration: Macro Instruction Reference*	GC26-4057	Describes how to use macros to do input and output
Data Administration: Utilities	*MVS/370 Data Administration: Utilities*	GC26-4065	Describes how to use IEHLIST to maintain VTOC, IEHMOVE to maintain OS CVOLS, and IEHPROM to protect data sets

Short Title	Full Title	Order Number	Contents
Initialization and Tuning Guide	*OS/VS2 MVS System Programming Library: Initialization and Tuning Guide*	GC28-1029	Describes how to initialize the system and improve system performance, includes information on GTF
JCL User's Guide	*MVS/370 JCL User's Guide*	GC28-1349	Describes syntax of JCL statements, JES2 and JES3 control statements
MVS Planning: Global Resource Serialization Guide	*OS/VS2 MVS Planning: Global Resource Serialization*	GC28-1062	Contains information on how to serialize access to data sets on shared DASD volumes
MVS/SP Version 1 General Information Manual	*MVS/System Product Version 1 General Information Manual*	GC28-1025	Contains overview and planning information for JES3 and JES2 for MVS/370
MVS/SP Version 1 Release 3 Installation Considerations	*MVS/System Product Version 1 Release 3 Installation Considerations*	GG22-9250	Installation planning considerations for MVS/370
Operator's Library: OS/VS2 MVS System Commands	*Operator's Library: OS/VS2 MVS System Commands*	GC28-1031	Describes syntax and use of MVS/370 commands
System: Data Administration	*MVS/370 System: Data Administration*	GC26-4056	Describes MVS/370 DFP, and how to modify and extend the data management capabilities of the operating system
System Generation Reference	*MVS/370 System Generation Reference*	GC26-4063	Describes how to do a sysgen, iogen, or edtgen
VSAM Administration: Macro Instruction Reference	*MVS/370 VSAM Administration: Macro Instruction Reference*	GC26-4074	Describes using VSAM macro instructions for VSAM data sets
MVS Storage Management Library			
MVS SML: Configuring Storage Subsystems	*MVS Storage Management Library: Configuring Storage Subsystems*	SC26-4409	Describes evaluating hardware configurations, developing capacity plans, and performance, availability and space utilization considerations
MVS SML: Managing Data Sets	*MVS Storage Management Library: Managing Data Sets*	SC26-4408	Describes managing data sets, catalogs and control data sets. establishing and enforcing data set policy, and data set security
MVS SML: Managing Storage Pools	*MVS Storage Management Library: Managing Storage Pools*	SC26-4407	Describes storage requirements for groups of data sets, designing storage pools, making transition to pooled storage, and maintaining and monitoring storage pools
Performance, Availability, and Tuning Information			
Component Failure Impact Analysis—An Availability Management Technique	*Component Failure Impact Analysis—An Availability Management Technique*	GC20-1865	Planning for hardware availability through configuration
MVS/XA: JES3 User Modifications and Macros	*MVS/Extended Architecture: JES3 User Modifications and Macros*	SC23-0060	Describes tailoring JES3 exits and macros
Cache RMF Program Description and Operation	*Cache RMF Reporter Program Description/Operation*	SH20-6295	Provides detailed information on Cache RMF Reporter
RMF Version 4 General Information	*MVS/ESA Resource Measurement Facility Version 4 General Information*	GC28-1028	Describes capabilities, functions, and usage of RMF (Version 4 runs on an MVS/ESA system)
RMF Reference and User's Guide	*MVS/ESA Resource Measurement Facility Version 4 Monitor I and II Reference and User's Guide*	LY28-1007	Provides detailed information to operate RMF under MVS/ESA.
RMF Reference and User's Guide	*MVS/ESA Resource Measurement Facility Version 4 Monitor III Reference and User's Guide*	LY28-1008	Provides detailed information to operate RMF under MVS/ESA.
MVS/XA RMF Reference and User's Guide	*MVS/XA Resource Measurement Facility Reference and User's Guide*	LC28-1138	Provides detailed information to operate RMF under MVS/XA
MVS/XA SMF	*MVS Extended Architecture System Management Facilities*	GC28-1153	Describes how to plan for, install and use SMF to manage the MVS/XA system
OS/VS2 MVS Performance Notebook	*OS/VS2 MVS Performance Notebook*	GC28-0886	Describes tuning your system to meet performance expectations and optimizing use of your system

Short Title	Full Title	Order Number	Contents
OS/VS2 MVS Planning: Global Resource Serialization	*OS/VS2 MVS Planning: Global Resource Serialization*	GC28-1062	Contains information on how to serialize access to data sets on shared DASD volumes
RACF General Information Manual	*Resource Access Control Facility (RACF) General Information Manual*	GC28-0722	Provides overview and planning information for the RACF program
OS/VS2 MVS RMF Reference and User's Guide, Version 2	*OS/VS2 MVS RMF Reference and User's Guide, Version 2*	SC28-0922	Provides detailed information to operate RMF under MVS/370
OS/VS2 System Programming Library System Management Facilities	*OS/VS2 System Programming Library System Management Facilities*	GC28-1030	Describes how to plan for, install and use SMF to manage the MVS/370 system
OS/VS2 MVS RMF, Version 2, General Information	*OS/VS2 MVS Resource Measurement Facility, Version 2, General Information*	GC28-0921	Describes capabilities, functions, and usage of RMF (Version 2 runs on an MVS/370 system)
RMF, Version 3, General Information	*Resource Measurement Facility, Version 3, General Information*	GC28-1115	Describes capabilities, functions, and usage of RMF (Version 3 runs on an MVS/XA system)
SLR User's Guide	*Service Level Reporter User's Guide*	SH19-6215	Describes how generate reports using SLR
SLR, Version 2, General Information	*Service Level Reporter, Version 2, General Information*	GH19-6213	Overview of SLR functions
SPL: JES2 Installation, Initialization, and Tuning	*System Programming Library: JES2 Installation, Initialization, and Tuning*	SC23-0046	Describes requirements for and activities of JES2 installation, initialization, and tuning
SPL: JES3 Installation, Initialization, and Tuning	*System Programming Library: JES3 Installation, Initialization, and Tuning*	SC23-0041	Describes requirements for and activities of JES3 installation, initialization, and tuning
Transaction Processing Facility Information			
TPF2 General Information Manual	*Transaction Processing Facility Version 2 General Information Manual*	GH20-6200	Provides an overview of TPF with a description of supported hardware
VM System Installation, Operations, and Planning Information			
Installation	*VM/SP Installation Guide*	SC24-5237	Discussion of VM/SP installation tools, including the DISKMAP exec
	VM/SP HPO Installation Guide	SC38-0107	Discussion of VM/SP HPO installation tools, including the DISKMAP exec
	VM/XA SF Installation, Administration, and Service	GC19-6217	Discussion of VM/XA SF installation tools, including the DISKMAP exec
	VM/XA SP Installation and Service	SC23-0364	Discussion of system installation, definition, and maintenance in the VM/XA SP environment
Operations	*VM/SP Operator's Guide*	SC19-6202	Discussion of VM/SP operator commands and facilities, including DDR, MONITOR, VARY, and DMKFMT
	VM/SP HPO Operator's Guide (Release 4.2)	ST00-1898	Discussion of VM/SP HPO operator commands and facilities, including DDR, MONITOR, VARY, and DMKFMT
	VM/SP HPO Release 5 CP Support for the IBM 3990 Storage Control Model 3	GC23-0430	Describes the support of VM/SP HPO Release 5 for the 3990 Model 3.
	VM/XA SF Real System Operation	GC23-0139	Discussion of VM/XA SF operator commands and facilities, including DDR, MONITOR, VARY, and DMKFMT
	VM/XA SP Real System Operation	SC23-0371	Discussion of VM/XA SP operator commands and facilities, including DDR, MONITOR, VARY, and DMKFMT
	VM/XA SF Virtual Machine Operation	GC23-0138	Discussion of VM/XA SF operator commands and facilities

Short Title	Full Title	Order Number	Contents
Planning	*VM/SP Planning Guide and Reference*	SC19-6201	Discussion of VM/SP hardware and software planning, system design, and system definition
	VM/SP HPO Planning Guide and Reference	SC19-6223	Discussion of VM/SP HPO hardware and software planning, system design, and system definition
	VM/XA SF Virtual Machine Planning	SC23-0167	Discussion of VM/XA SF hardware and software planning, system design, and system definition
	VM/XA SP Planning and Administration	GC23-0378	Discussion of VM/XA SP hardware and software planning, system design, and system definition
	VM/XA Systems Facility Planning Guide	GG24-1709	Provides advanced installation and planning information for VM/XA SF, and includes planning information on MVS/370, MVS/XA, VSE and VM guests under VM/XA SF
VM/Integrated System Information			
VM/IS Planning For Your System	*VM/Integrated System Planning For Your System*	SC24-5337	Provides pre-installation planning instructions for VM/IS and should be read before *VM/IS Installing Your System*
VM/IS Installing Your System	*VM/Integrated System Installing Your System*	SC24-5341	Provides step-by-step instructions for installing VM/IS; use this book in conjunction with *VM/IS Planning For Your System*
VM/IS Managing Your System	*VM/Integrated System Managing Your System*	SC24-5338	Provides operation and administration instructions for VM/Integrated System
VM/IS Reporting System Problems	*VM/Integrated System Reporting System Problems*	SC24-5339	Provides problem reporting instructions for VM/IS and is based on VM/Interactive Productivity Facility's Problem Control Facility
VM/IS Learning to Use Your System: Error and Information Messages	*VM/Integrated System Learning to Use Your System: Error and Information Messages*	SC24-5351	Describes error and information messages produced by VM/IS; includes cross-reference table to help locate messages produced by other products and functions included in VM/IS
VM Performance and Monitor Information			
VM/RTM Program Description/Operations Manual	*VM/370 Real Time Monitor Program Description/Operations Manual*	SH20-2337	Description of RTM functions, commands, and reports for performance monitoring
RTM/SF Program Description/Operations Manual	*VM/XA Realtime Monitor/Systems Facility Program Description/Operations Manual*	SH26-7000	Description of RTM/SF functions, commands, and reports for performance monitoring
VMBACKUP Management System General Information	*VMBACKUP Management System General Information*	GH20-6248	Overview of VMBACKUP and VMArchive functions for data backup and archival
VM/Directory Maintenance General Information	*VM/Directory Maintenance General Information*	GC20-1836	Overview of DIRMAINT functions for directory maintenance
VM/Directory Maintenance Installation and System Administrator's Guide	*VM/Directory Maintenance Installation and System Administrator's Guide*	SC20-1840	Description of DIRMAINT administrator commands
VM/ISF General Information	VM/Intersystems Facility General Information	GC23-0397	Provides an overview of using VM/ISF for sharing minidisks
VM/ISF Planning and Installation	VM/Intersystems Facility Planning and Installation	SC23-0399	Provides guidance and reference information for those planning system resources' usage for VM/ISF and for installers of VM/ISF
VM/ISF Operation and Use	VM/Intersystems Facility Operation and Use	SC23-0400	Describes operation of VM/ISF functions, and contains CP and CMS command syntax and messages and codes for CP, CMS, and VM/Pass-Through Facility

Short Title	Full Title	Order Number	Contents
VMMAP General Information	*VM Monitor Analysis Program General Information*	GC34-2164	Overview of VMMAP functions for performance monitoring
VMMAP User's Guide and Reference	*Virtual Machine Monitor Analysis Program User's Guide and Reference*	SC34-2166	Description of VMMAP commands and reports
VM/PPF General Information	*VM Performance Planning Facility General Information*	GC34-2126	Overview of VM/PPF functions for performance analysis and modeling
VMPRF User Guide and Reference	*VM Performance Reporting Facility (VMPRF) User Guide and Reference*	SC23-0460	Guide to VMPRF functions for performance analysis and modeling
VM Reference Information			
Alternate Pathing under VM	*Alternate Pathing under VM*	GG22-9381	Description of how VM/SP uses alternate paths in the storage subsystem
CMS Reference	*VM/SP CMS Command and Macro Reference* (Release 4) *VM/SP CMS Command Reference* (Release 5)	SC19-6209	Discussion of CMS commands, including FORMAT and COPYFILE for the VM/SP and VM/SP HPO environments
	VM/XA SF CMS Command and Macro Reference	GC19-6231	Discussion of CMS commands, including FORMAT and COPYFILE
	VM/XA SP CMS Command Reference	SC23-0354	Discussion of CMS commands, including FORMAT and COPYFILE
Comparison of IBM 3380s and IBM 3350s Used for VM/CMS Minidisks	*Comparison of IBM 3380s and IBM 3350s Used for VM/CMS Minidisks.*	GG22-9347	Evaluates 3380 disk capacity and performance in VM/SP HPO
CP for System Programming	*VM/SP CP for System Programming* (Release 5)	SC24-5285	Discussion of system programming tasks and commands, including CP INDICATE, SYSOWN, MONITOR
	VM/SP HPO CP for System Programming (Release 5)	SC19-6224	Discussion of system programming tasks and commands, including CP INDICATE, SYSOWN, MONITOR
CP Reference	*VM/SP CP Command Reference*	SC19-6211	Discussion of CP commands for both general and non-general users
	VM/SP HPO CP Command Reference	SC19-6227	Discussion of CP commands for both general and non-general users
	VM/XA SF CP Command and Diagnosis Reference	GC19-6215	Discussion of CP commands for both general and non-general users
	VM/XA SP CP Command Reference	SC23-0358	Discussion of CP commands for both general and non-general users
DASD Sharing under VM	*DASD Sharing under VM*	GG22-9380	Description of how DASD can be shared among guest systems
System Facilities for Programming	*Virtual Machine System Facilities for Programming* (Release 5)	ST24-5288	Discussion of system programming tasks and commands, including DDR for both the VM/SP and VM/SP HPO environments
System Logic and Problem Determination Guide Volume 2—CMS	*VM/SP System Logic and Problem Determination Guide Volume 2—CMS*	LY20-0893	Discussion of CMS file storage logic in the VM/SP and VM/SP HPO environments
System Programmer's Guide	*VM/SP System Programmer's Guide* (Release 4)	SC19-6203	Discussion of system programming tasks and commands, including CP INDICATE, SYSOWN, MONITOR
	VM/SP HPO System Programmer's Guide (Release 4.2)	ST00-1897	Discussion of system programming tasks and commands, including CP INDICATE, SYSOWN, MONITOR
VM Running Guest Operating Systems	*VM Running Guest Operating Systems*	GC19-6212	Discussion of guest operating systems under VM
VM/SP AJ4,BJ4,AK4,BK4 User's Guide	*VM/SP IBM 3380 AJ4/BJ4/AK4/BK4 User's Guide*	GC24-5371	Contains general description of VM/SP software support (within CP and CMS) for the Enhanced Subsystem 3380s.
3380 VM Performance Analysis	*IBM 3380 Extended Capability DASD VM Benchmark Performance Analysis*	GG66-0262	Helps plan migration from 3380 standard models to 3380 extended capability models, providing migration execs
VSE System Information—Version 2			

Short Title	Full Title	Order Number	Contents
VSE/AF System Control Statement	*VSE/Advanced Functions System Control Statements*	SC33-6198	Description and syntax for VSE operator statements and commands
VSE/AF System Management Guide	*VSE/Advanced Functions System Management Guide*	SC33-6191	Description of system management tasks under VSE/AF
VSE/AF Operation	*VSE/Advanced Functions Operation*	SC33-6194	Various operational considerations including the PRINTLOG function
VSE/POWER Installation and Operation Guide	*VSE/POWER Installation and Operation Guide*	SH12-5329	Description of VSE/POWER input and output scheduling functions
VSE/SP Installation	*VSE/System Package Installation*	SC33-6178	Assistance with regenerating VSE system files and libraries
VSE/SP Migration (Volumes 1 and 2)	*VSE/System Package Migration (Volumes 1 and 2)*	SC33-6179	Techniques for migration of system and user data and data bases
VSE/SP System Use	*VSE/System Package Use*	SC33-6174	Use of Interactive Interface dialogs for tasks including storage management
VSE/VSAM Programmer's Reference	*VSE/VSAM Programmer's Reference*	SC24-5145	Detailed information on VSE/VSAM and converting non-VSAM files.
VSE System Information—Version 3			
VSE/AF System Control Statement	*VSE/Advanced Functions System Control Statements*	SC33-6198	Description and syntax for VSE operator statements and commands
VSE/AF System Management Guide	*VSE/Advanced Functions System Management Guide*	SC33-6191	Description of system management tasks under VSE/AF
VSE/AF Operation	*VSE/Advanced Functions Operation*	SC33-6194	Various operational considerations including the PRINTLOG function
VSE/POWER Application Programming	*VSE/POWER Application Programming*	SC33-6276	Information on using the system's accounting function
VSE/POWER Installation and Operation Guide	*VSE/POWER Installation and Operation Guide*	SH12-5329	Description of VSE/POWER input and output scheduling functions
VSE/SP Administration	*VSE/System Package Administration*	SC33-6306	Use of Interactive Interface dialogs for tasks including storage management
VSE/SP Installation	*VSE/System Package Installation*	SC33-6305	
VSE/SP Migration (Volumes 1 and 2)	*VSE/System Package Migration (Volumes 1 and 2)*	SC33-6179	Techniques for migration of system and user data and data bases
VSE/SP Operation	*VSE/System Package Operation*	SC33-6307	Use of Interactive Interface dialogs for tasks including storage management
VSE/VSAM Programmer's Reference	*VSE/VSAM Programmer's Reference*	SC24-5145	Detailed information on VSE/VSAM and converting non-VSAM files.
VSE Reference Information			
DITTO Program Reference and Operations Manual	*Data Interfile Transfer, Testing and Operations Utility for VSE and VM Program Reference and Operations Manual*	SH19-6104	Detailed information on using VSE/DITTO
DL1/DOS/VS Data Base Administration	*DL1/DOS/VS Data Base Administration*	SH24-5011	Assistance with moving DL/1 data bases
DL1/DOS/VS Resource Definition and Utilities	*DL1/DOS/VS Resource Definition and Utilities*	SH24-5021	Assistance with moving DL/1 data bases
VSE Fast Copy Data Set Installation Reference	*DOS/VSE Fast Copy Data Set Installation Reference*	SC33-6082	Specific information on using the VSE/Fast Copy utility
VSE/PT Program Description/Operations Manual	*VSE/Performance Tool Program Description/Operations Manual*	SH20-2171	Instructions for installation and use of optional VSE performance monitoring product
VM Running Guest Operating Systems	*VM Running Guest Operating Systems*	GC19-6212	Discussion of guest operating systems under VM
VMMAP User's Guide and Reference Manual	*Virtual Machine Monitor Analysis Program User's Guide and Reference*	SC34-2166	Discussion of guest operating systems under VM

Index

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