



Hitachi Dataset Replication for IBM[®] z/OS[®] User's Guide

Hitachi Universal Storage Platform V
Hitachi Universal Storage Platform VM
Hitachi TagmaStore[®] Universal Storage Platform
Hitachi TagmaStore[®] Network Storage Controller
Hitachi Lightning 9900[™] V Series
Hitachi Lightning 9900[™]

FASTFIND LINKS

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Preface

This document describes and provides instructions for installing and using Hitachi Dataset Replication for IBM® z/OS® software (DSR) on Hitachi RAID storage systems.

Please read this document carefully to understand how to use this product, and maintain a copy for reference purposes.

This preface includes the following information:

- [Intended Audience](#)
- [Product Version](#)
- [Document Revision Level](#)
- [Changes in this Revision](#)
- [Document Organization](#)
- [Referenced Documents](#)
- [Document Conventions](#)
- [Convention for Storage Capacity Values](#)
- [Getting Help](#)
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Note: The Hitachi Dataset Replication for IBM z/OS software was previously called Hitachi Logical Volume Divider. The Hitachi Dataset Replication software has the same functionality as Logical Volume Divider. This document replaces the previous document, *Hitachi Logical Volume Divider User's Guide*.

Notice: The use of Hitachi Dataset Replication for IBM z/OS and all other Hitachi Data Systems products is governed by the terms of your agreement(s) with Hitachi Data Systems.

Intended Audience

This document is intended for system administrators, Hitachi Data Systems representatives, and Authorized Service Providers who are involved in installing, configuring, and operating the Hitachi RAID storage system(s).

This document assumes the following:

- The user has a background in data processing and understands RAID storage systems and their basic functions.
- The user is familiar with the Hitachi RAID storage system(s) and has read the User and Reference Guide for the storage system(s) (e.g., *Hitachi Universal Storage Platform V/VM User and Reference Guide*).
- The user has a basic knowledge and understanding of the mainframe operating system (e.g., z/OS, OS/390®).
- The user has read and understands the mainframe ShadowImage User's Guide for the RAID storage system(s) (e.g., *Hitachi Universal Storage Platform V/VM Hitachi ShadowImage for IBM z/OS User's Guide*).

Product Version

This document revision applies to Hitachi Dataset Replication for IBM z/OS version 02-01-02 and higher.

Document Revision Level

Revision	Date	Description
MK-96RD648-P	February 2007	Preliminary Release
MK-96RD648-00	May 2007	Initial Release, supersedes and replaces MK-96RD648-P
MK-96RD648-01	December 2007	Revision 1, supersedes and replaces MK-96RD648-00

Source Document(s) for this Revision

DSR-Man05 (Hitachi RSD document)

Changes in this Revision

- Added support for the Hitachi Universal Storage Platform V and Universal Storage Platform VM storage systems.
- Added information on 2107 controller emulation.
- Corrected the device emulation information in Table 3-1.

Document Organization

The following table provides an overview of the contents and organization of this document. Click the [chapter title](#) in the left column to go to that chapter. The first page of each chapter provides links to the topics in that chapter.

Chapter	Description
Overview of Hitachi Dataset Replication	Provides a general overview of Hitachi Dataset Replication for z/OS software.
Overview of Hitachi DSR Operations	Describes Hitachi Dataset Replication for z/OS operations including routines, processes, and control statements.
Installation Requirements and Procedures	Specifies the requirements for installing Hitachi Dataset Replication for z/OS and provides detailed installation procedures and instructions.
Performing DSR Operations	Provides instructions and examples for completing Hitachi Dataset Replication for z/OS operations.
Samples	Provides examples of Hitachi Dataset Replication for z/OS operations.
Troubleshooting	Provides troubleshooting information for Hitachi Dataset Replication for z/OS and instructions for calling technical support.
Acronyms and Abbreviations	Defines the acronyms and abbreviations used in this document.

Referenced Documents

- Hitachi Universal Storage Platform V/VM documents:
 - *Hitachi USP V/VM User and Reference Guide*, MK-96RD635
 - *Hitachi TrueCopy for IBM z/OS User and Reference Guide*, MK-96RD623
 - *Hitachi ShadowImage for IBM z/OS User's Guide*, MK-96RD619
- Hitachi TagmaStore Universal Storage Platform and Network Storage Controller (NSC) documents:
 - *Hitachi USP User and Reference Guide*, MK-94RD231
 - *Hitachi NSC User and Reference Guide*, MK-95RD279
 - *Hitachi TrueCopy for IBM z/OS User and Reference Guide*, MK-94RD214
 - *Hitachi ShadowImage for IBM z/OS User's Guide*, MK-94RD212
- Hitachi Lightning 9900 V Series documents:
 - *Hitachi Lightning 9900V User and Reference Guide*, MK-92RD100
 - *Hitachi TrueCopy-S/390 User and Reference Guide*, MK-92RD107
 - *Hitachi ShadowImage-S/390 User's Guide*, MK-92RD109
- Hitachi Lightning 9900 documents:
 - *Hitachi Lightning 9900 User and Reference Guide*, MK-90RD008
 - *Hitachi TrueCopy-S/390 User and Reference Guide*, MK-91RD050
 - *Hitachi ShadowImage-S/390 User's Guide*, MK-90RD012

- IBM documents:
 - *OS/390 DFSMS Macro instructions for datasets*, SC26-4747
 - *OS/390 MVS System Messages, Vol. 1-5*, GC28-1786
 - ICKDSF APAR PQ92344





Document Conventions

The terms used in this document for the Hitachi RAID storage systems refer to all models of the storage system, unless otherwise noted. For example, the term “Universal Storage Platform” refers to all models of the Universal Storage Platform storage system, unless otherwise noted.

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <i>source-file target-file</i> Note: Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user. Example: # pairdisplay -g oradb
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: # pairdisplay -g <group> Note: Italic font is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.
underline	Indicates the default value. Example: [<u>a</u> b]

This document uses the following icons to draw attention to information:

Icon	Meaning	Description
	Note	Calls attention to important and/or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (e.g., disruptive operations).
	WARNING	Warns the user of severe conditions and/or consequences (e.g., destructive operations).

Convention for Storage Capacity Values

Physical storage capacity values (e.g., disk drive capacity) are calculated based on the following values:

- 1 KB = 1,000 bytes
- 1 MB = 1,000² bytes
- 1 GB = 1,000³ bytes
- 1 TB = 1,000⁴ bytes
- 1 PB = 1,000⁵ bytes

Logical storage capacity values (e.g., logical device capacity) are calculated based on the following values:

- 1 KB = 1,024 bytes
- 1 MB = 1,024² bytes
- 1 GB = 1,024³ bytes
- 1 TB = 1,024⁴ bytes
- 1 PB = 1,024⁵ bytes
- 1 block = 512 bytes

Getting Help

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The exact content of any error messages displayed on the host system(s).
- The exact content of any error messages displayed by Storage Navigator.
- The service information messages (SIMs), including reference codes and severity levels, displayed by Storage Navigator and/or logged at the host.

If you are reporting an error or have a question about Dataset Replication, see [Calling the Hitachi Data Systems Support Center](#) for specific instructions.

The Hitachi Data Systems customer support staff is available 24 hours/day, seven days a week. If you need technical support, please call:

- United States: (800) 446-0744
- Outside the United States: (858) 547-4526

Comments

Please send us your comments on this document. Make sure to include the document title, number, and revision. Please refer to specific section(s) and paragraph(s) whenever possible.

- **E-mail:** doc.comments@hds.com
- **Fax:** 858-695-1186
- **Mail:**
Technical Writing, M/S 35-10
Hitachi Data Systems
10277 Scripps Ranch Blvd.
San Diego, CA 92131

Thank you! (All comments become the property of Hitachi Data Systems.)

Overview of Hitachi Dataset Replication

This chapter provides an overview of the Hitachi Dataset Replication for IBM z/OS software product.

- [Hitachi Dataset Replication for IBM z/OS](#)

Hitachi Dataset Replication for IBM z/OS

Hitachi Dataset Replication for IBM z/OS (DSR) operates together with the ShadowImage feature of the Hitachi RAID storage systems. DSR rewrites the OS management information (VTOC, VVDS, and VTOCIX) and dataset name and creates a user catalog for a ShadowImage target volume (T-VOL) after a ShadowImage split operation. DSR provides prepare, volume divide, volume unify, and volume backup functions to enable use of a ShadowImage T-VOL on the same system as the ShadowImage source volume (S-VOL). DSR allows the user to access the data on the T-VOL (point-in-time copy of S-VOL) while the S-VOL remains online.

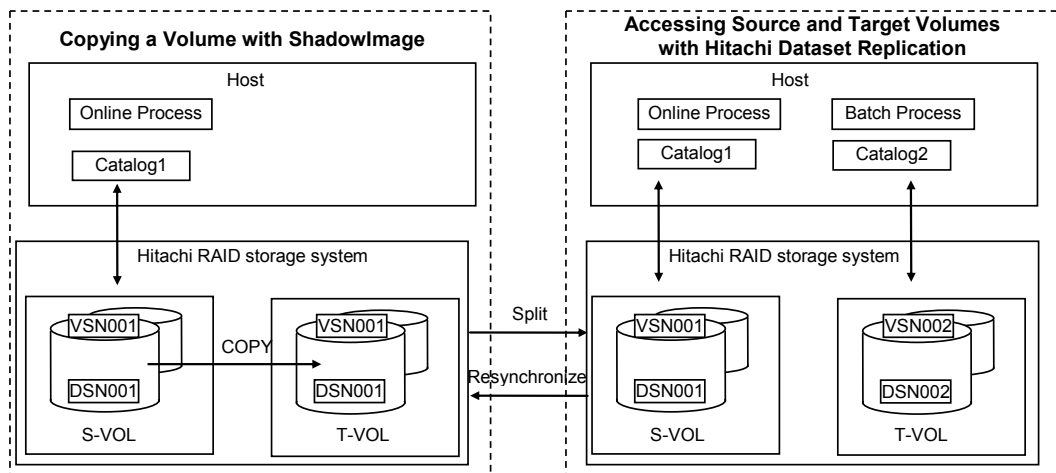


Figure 1-1 How DSR Works with ShadowImage

- Prepare function:
 - Creates parameters for the volume divide function.
 - Must be executed prior to the volume divide function.
- Volume divide function:
 - Issues the ShadowImage split command.
 - Rewrites the OS management information on the T-VOL.
 - Creates a user catalog for the T-VOL.
- Volume unify function:
 - Deletes the user catalog created by the volume divide function.
 - Issues the ShadowImage resynchronize command.
- Volume backup function:
 - Issues the ShadowImage split command.
 - Rewrites the volume serial number on the T-VOL.

Overview of Hitachi DSR Operations

This chapter describes Hitachi Dataset Replication for IBM z/OS operations, including routines, processes, and control statements.

- [Hitachi Dataset Replication Operations](#)
- [PREPARE Function](#)
- [Volume Divide Function](#)
- [Volume Backup Function](#)
- [Volume Unify Function](#)
- [Compare Process](#)
- [Job Control Statements](#)

Hitachi Dataset Replication Operations

Figure 2-1 shows the structure and functions of DSR. DSR consists of two programs (HRULVDP and HRULVDX) and four functions (prepare, volume divide, volume unify, and volume backup). The HRULVDP program is used to execute the prepare function. The HRULVDX program is used to execute the volume divide, volume unify function, and volume backup functions.

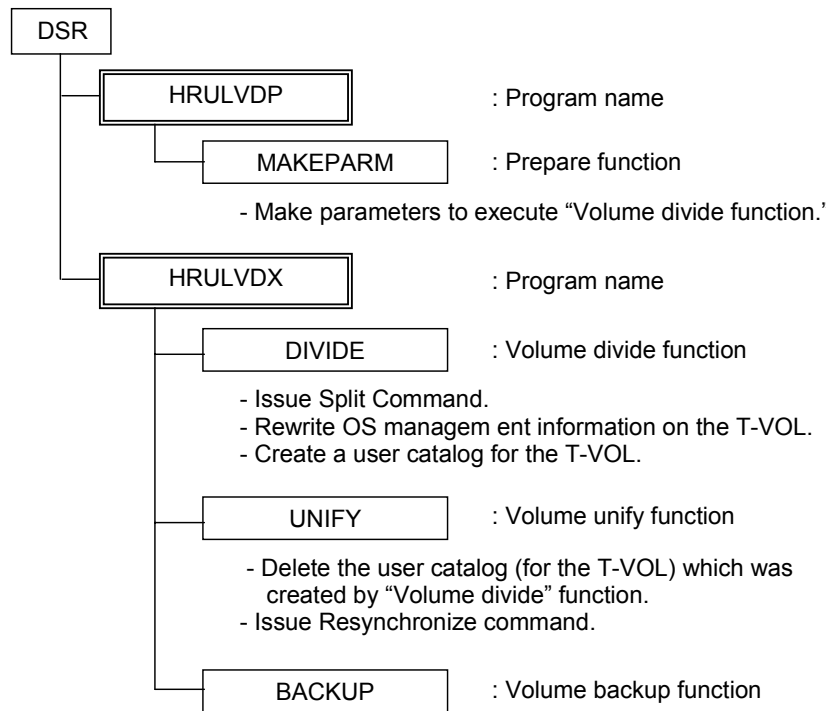


Figure 2-1 DSR Structure and Functions

To use a T-VOL for other jobs or file backup:

1. Execute the prepare function. DSR creates parameters for the volume divide function and the volume unify function.
2. Execute the volume divide function using the parameters created by the prepare function.
3. Use the T-VOL for other jobs or file backup.
4. When finished using the T-VOL, execute the volume unify function using the parameters created by the prepare function.

To use a T-VOL for physical volume backup:

1. Execute the volume backup function. The volume backup function does not require parameters to be created by the prepare function.
2. You do not need to use the prepare function or the volume divide function.

PREPARE Function

When you back up each dataset of the T-VOL, always execute the prepare function prior to the divide function. The prepare function is not needed for a physical backup process.

The prepare function creates parameters for the volume divide and volume unify functions, and also creates some DUMP lists to be checked by a user:

- The control statements (SYSIN data) for AMASPZAP and IDCAMS utilities are stored in a dataset that is specified by a user in ZAPPARM DD statement (see [Sample and Contents of ZAPPARM Members](#)).
- The DUMP list is stored in a dataset that is specified by the user in DUMPLIST DD statement (see [Sample of DUMPLIST](#)). The list shows a current dataset name in the S-VOL and also a dataset name, which is rewritten by DSR for the T-VOL. The DUMP list format is shown in [Sample of DUMPLIST](#).

If necessary, confirm whether the replaced parts are correct in the DUMP list.

DSR creates control statements for IDCAMS and AMASPZAP utilities invoked during the execution of the volume divide function or the volume unify function:

- Changing the VOLSER in the VTOC of a T-VOL for the volume divide function.
- Changing the dataset in the VVDS/VTOC of a T-VOL for the volume divide function.
- Creating a user catalog for the T-VOL for the volume divide function.
- Registering a dataset to a new user catalog for the T-VOL for the divide function.
- Deleting the new catalog for the T-VOL for the volume unify function.

Volume Divide Function

Figure 2-2 shows an overview of the volume divide function. The volume divide function splits an S-VOL and a T-VOL and rewrites the VTOC/VVDS/VTOCIX/dataset name in the T-VOL using the control statements created by the prepare function. Figure 2-3 shows an overview of the volume divide process.

The DSR volume divide function executes the following tasks (shown in Figure 2-2):

- If ZAPOLD DD statement is specified in JCL, DSR compares each SYSIN parameter.
- DSR splits a volume pair.
- DSR calls a user exit routine.
- DSR rewrites the volume serial number on a T-VOL.
- DSR changes the T-VOL to online status.
- DSR rewrites the volume serial number information in VVDS + VTOC on the T-VOL.
- DSR rewrites the dataset information in VVDS + VTOC on the T-VOL.
- DSR reassembles VTOCIX. (DSR uses BUILDINDEX command of ICKDSF program.)
- DSR calls a user exit routine.
- DSR creates a new user catalog for the T-VOL. (DSR uses DEFINE UCAT command of IDCAMS program.)
- DSR registers the dataset in the new user catalog for the T-VOL:
 - For VSAM dataset: DSR uses DEFINE CLUSTER and DEFINE AIX commands of IDCAMS program.
 - For Non-VSAM dataset: DSR uses DEFINE NONVSAM command of IDCAMS program.
 - For ALIAS, PATH and GDG datasets: DSR uses DEFINE ALIAS, PATH and GDG commands of IDCAMS program.
 - For extending the dataset name: DSR uses ALTER command of IDCAMS program.
- DSR calls a user exit routine if a user application is installed.

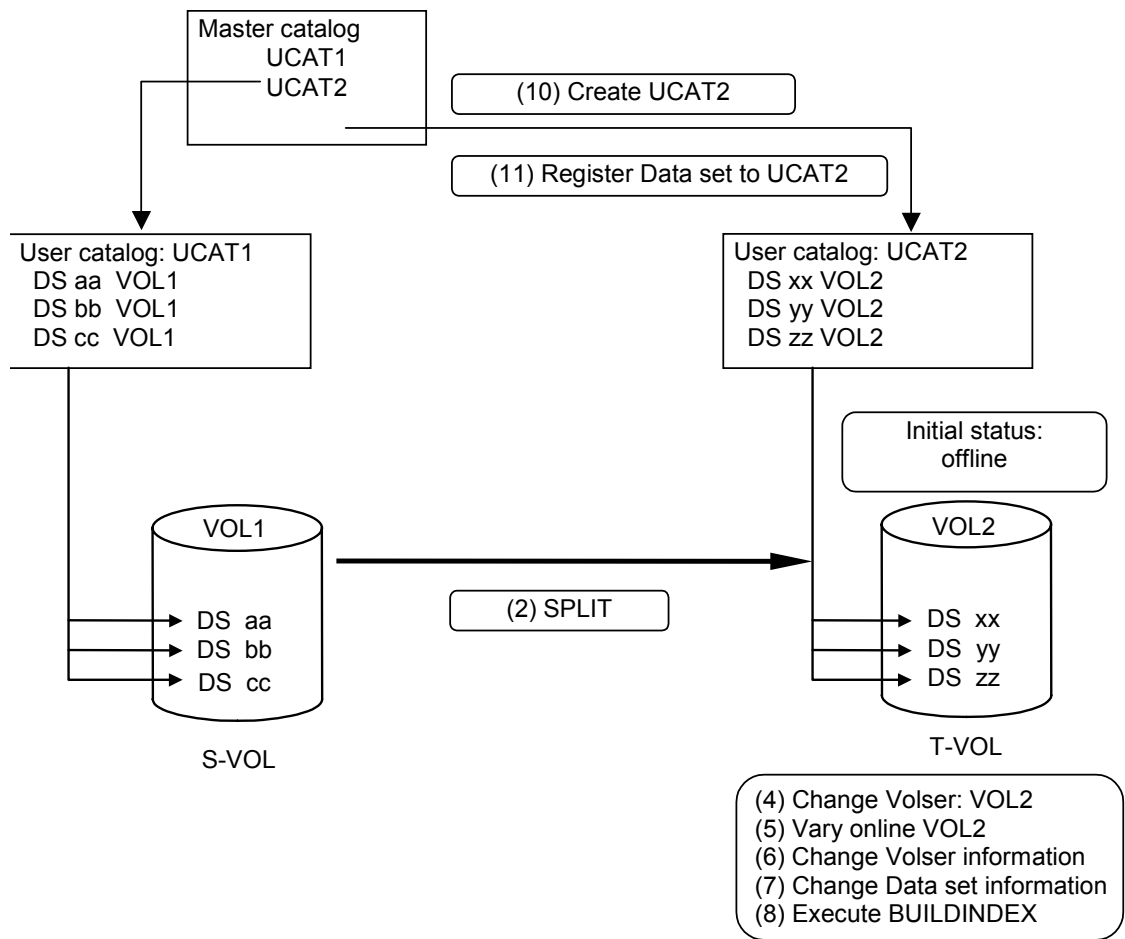
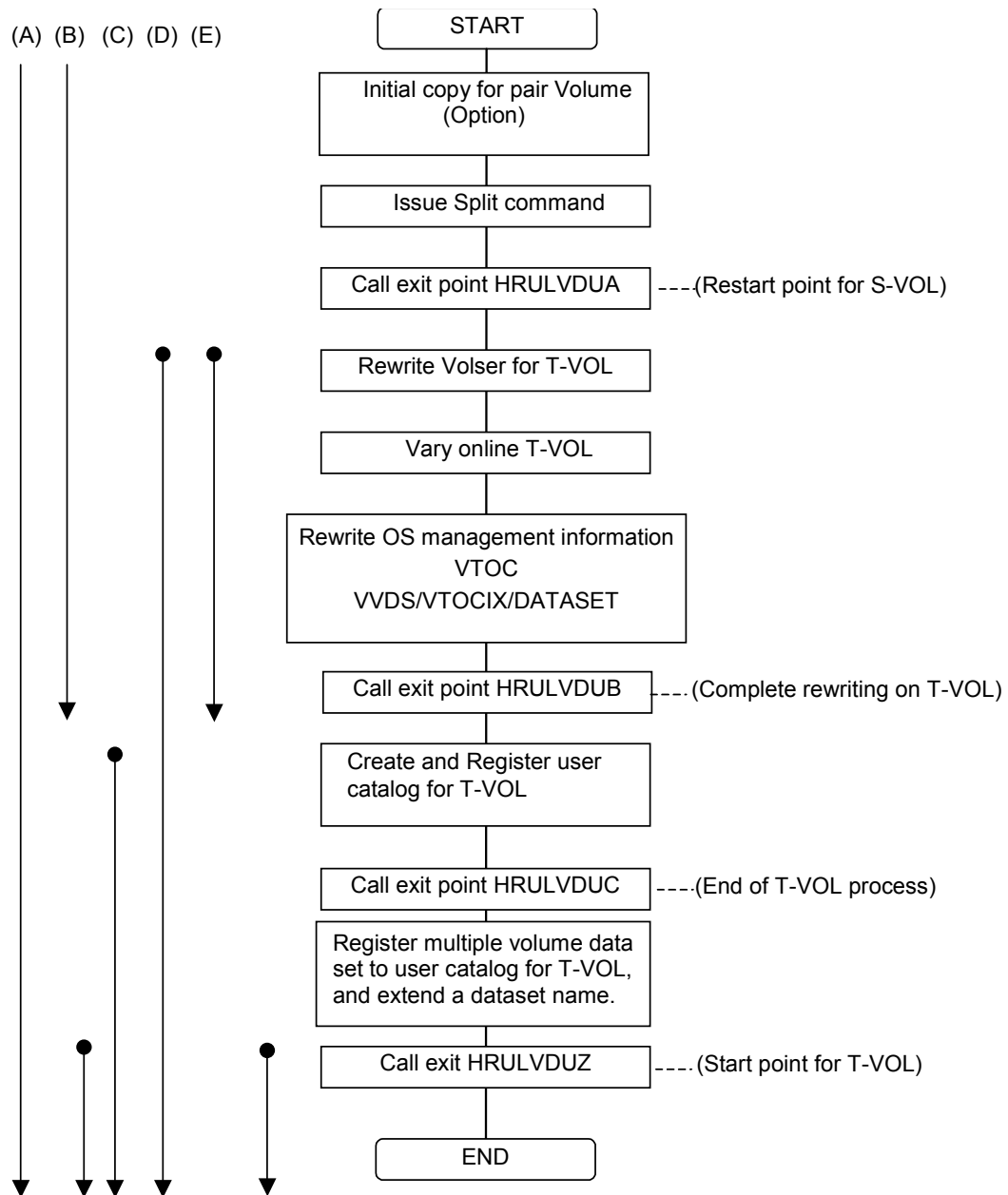


Figure 2-2 Volume Divide Function Overview



- (A) Default process.
 (B) Process specified by "PARM=FUNC(DIVIDE,CHGDSN)". *
 (C) Process specified by "PARM=FUNC(DIVIDE,RECAT)". *
 (D) Process specified by "PARM=FUNC(DIVIDE,NODELPAIR)". *
 (E) Process specified by "PARM=FUNC(DIVIDE,CHGDSN,NODELPAIR)". *

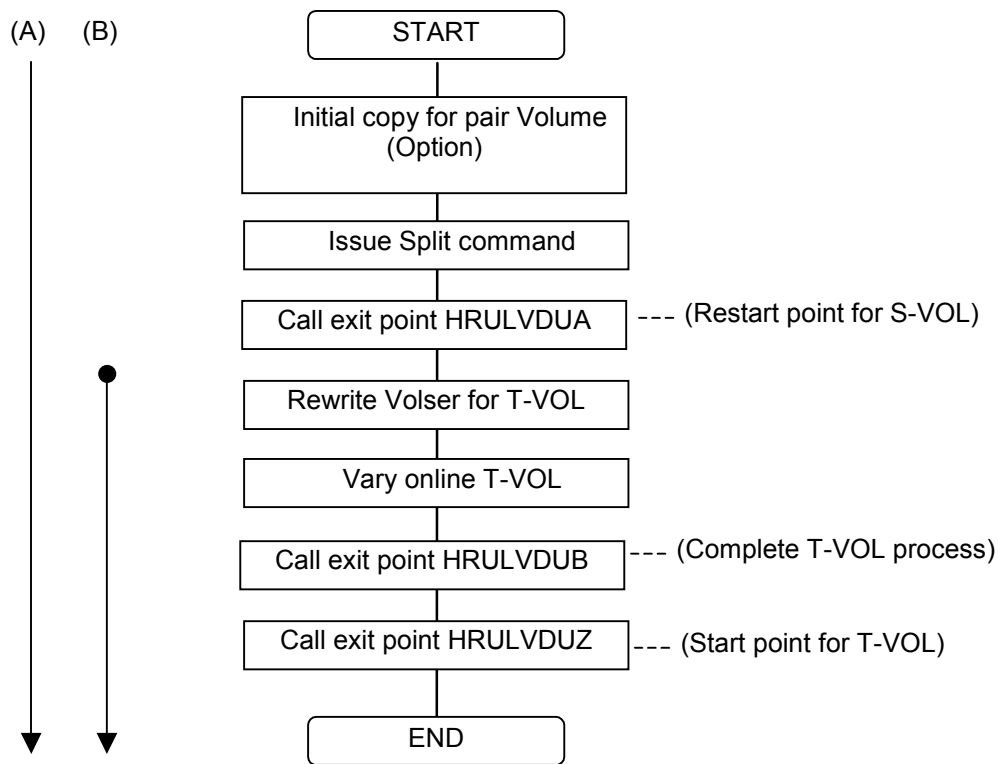
* See [Details of HRULVDX PARM.](#)

Figure 2-3 Volume Divide Process Overview

Volume Backup Function

Figure 2-4 shows an overview of the volume backup function. The volume backup function splits an S-VOL and a T-VOL, and rewrites only VTOC information on the T-VOL. Therefore the dataset in the T-VOL cannot access each dataset. As for the T-VOL, which is processed by the volume backup function, it is possible to execute the physical backup process.

When you execute the volume backup function, you do not need to execute the prepare function. The volume backup function does not use the parameters which are made by the prepare function. You can resynchronize the volumes by using the volume unify function without CATALOG parameter after you finish using the T-VOL.



(A) Default process

(B) Process which is specified by "PARM=FUNC(BACKUP,NODELPAIR)". *

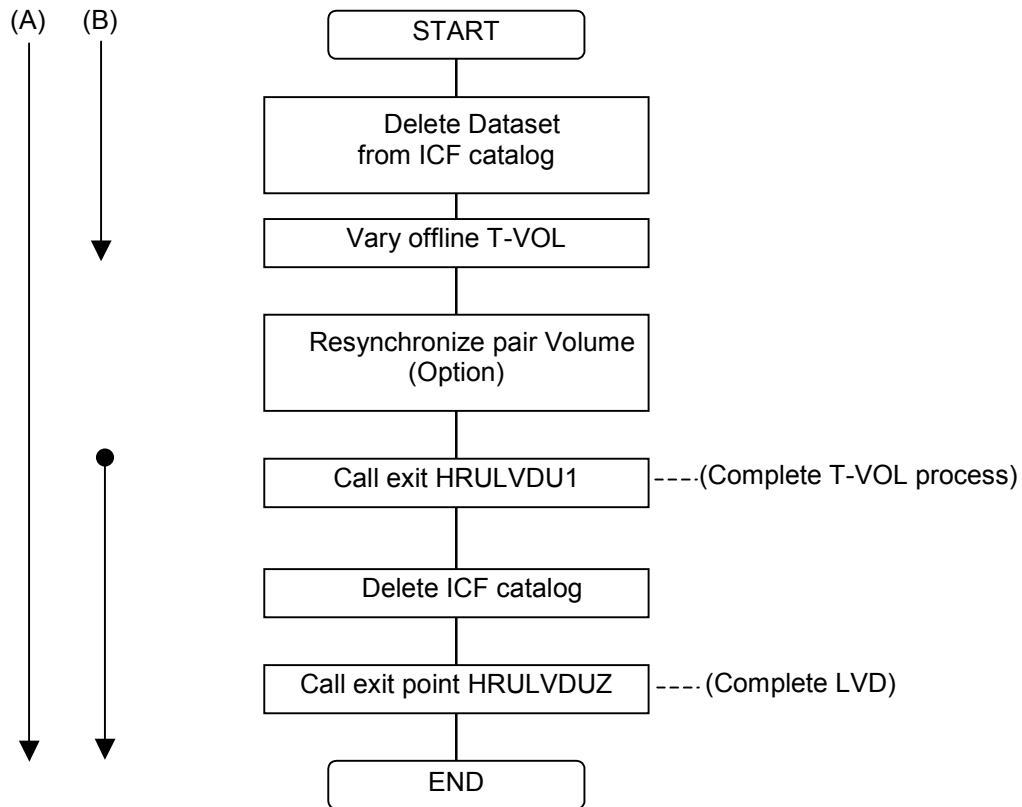
* See [Details of HRULVDX PARM.](#)

Figure 2-4 Volume Backup Process Overview

Volume Unify Function

Figure 2-5 shows an overview of the volume unify function. The volume unify function deletes the user catalog for the T-VOL and resynchronizes the S-VOL and the T-VOL. The ShadowImage function of the Hitachi storage system copies the data in the S-VOL to the T-VOL.

When you have finished using the T-VOL, always execute the volume unify function.



(A) Default process

(B) Process specified by "PARM=FUNC(UNIFY,NOPAIR)". *

* See [Details of HRULVDX PARM](#).

Figure 2-5 Volume Unify Process Overview

Compare Process

The DSR compare function checks to see if the parameters created by the prepare function are correct. Figure 2-6 shows the volume divide function without the compare process. Figure 2-7 shows the volume divide function with the compare process.

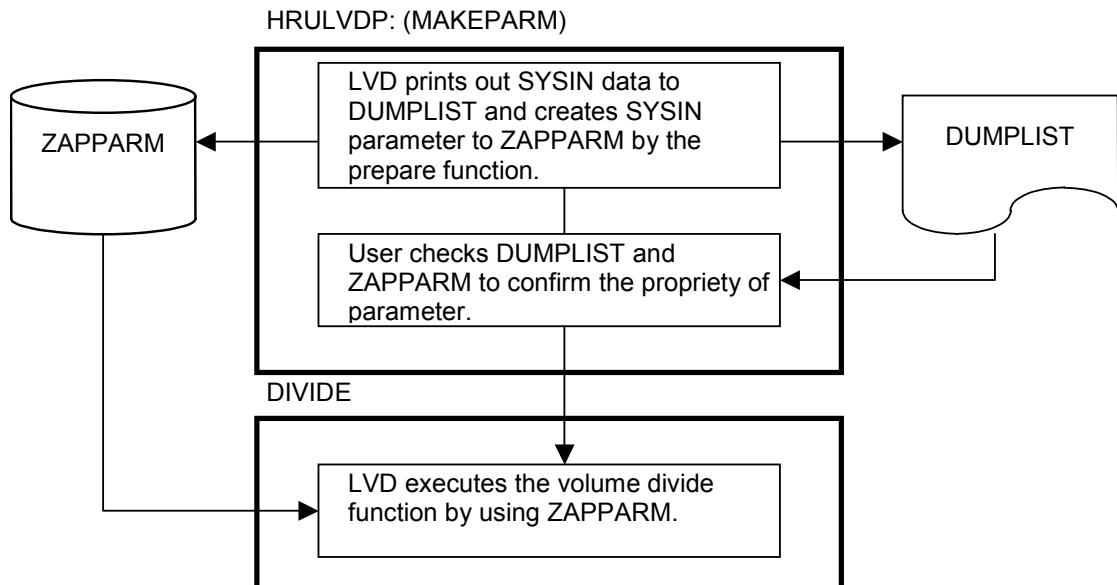


Figure 2-6 Divide Function without Compare Process

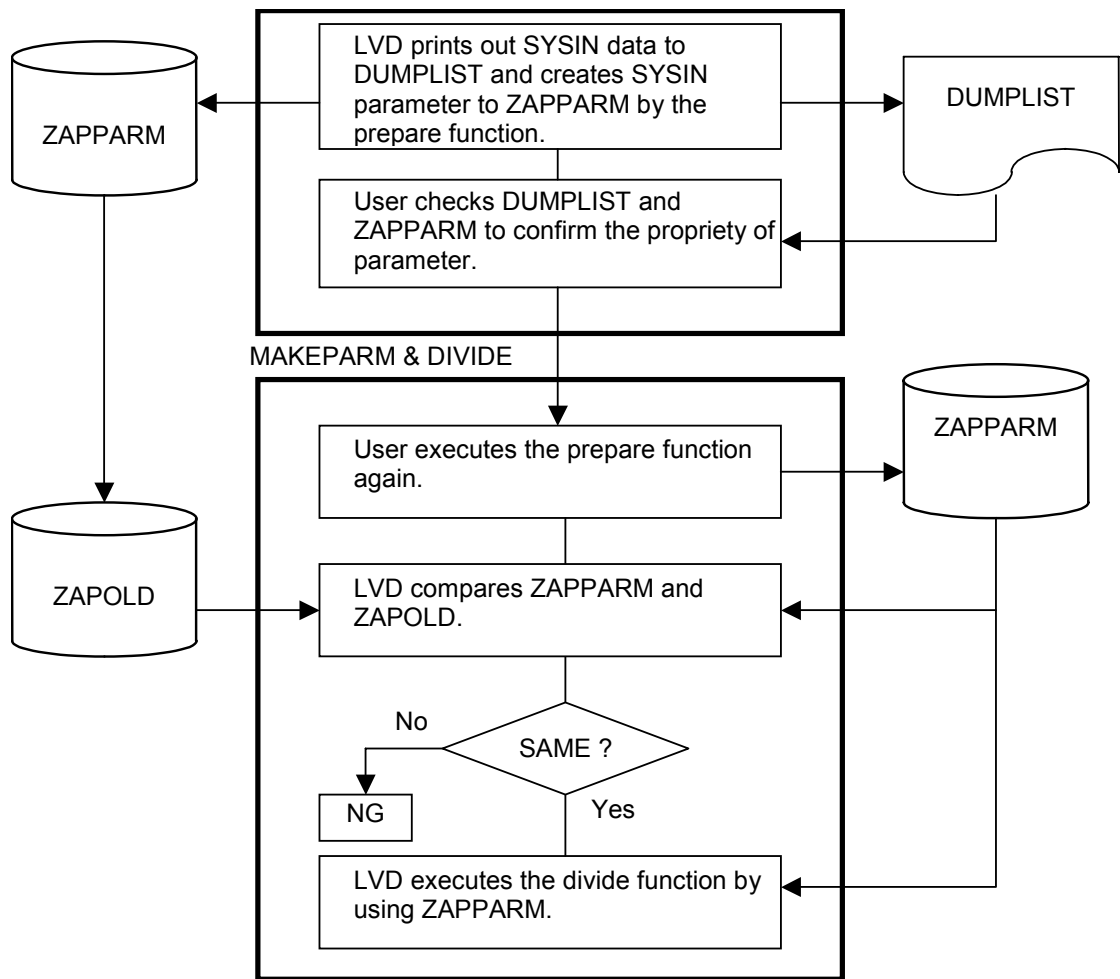


Figure 2-7 Divide Function with Compare Process

Job Control Statements

(1) Notation

Table 2-1 lists and describes the control statement notation.

Table 2-1 Notation for Control Statements

Notation	Description
{ } (BRACES)	Braces surround required parameters; select one parameter.
[] (BRACKETS)	Brackets surround optional parameters; select none or any.
() (PAREN)	Parameters in parentheses must be used as shown.
< >	Indicates the value that you can specify.
<< >>	When you omit the item, indicates the value that the program selects.
^ (ABBREV)	When shown indicates an abbreviation is acceptable.
(CONDITION)	When shown indicates an exclusive OR condition.

(2) Syntax

Table 2-2 lists and describes the syntax symbols for control statements.

Table 2-2 Syntax Symbols for Control Statements

Symbol	Acceptable Contents
< Alphanumeric >	A through Z (uppercase) 0 through 9 , @, \$, #
<Hexadecimal >	0 through 9 A through F (uppercase)
<Numeric >	- 0 through 9
<Special Characters >	Comma (,) Period (.) Slash (/) Apostrophe (`) Left parenthesis (() Right parenthesis ()) Asterisk (*) Ampersand (&) Plus sign (+) Hyphen (-) Equal sign (=)

(3) Parameter Values

Table 2-3 lists and describes the parameter values for control statements.

Table 2-3 Parameter Values for Control Statements

Parameter	Specified Values	Range of Values
Unit Address	Hexadecimal	3 or 4 characters
Device Type	Alphanumeric and Hyphen	1-8 characters
Dataset name (DSN)	Alphanumeric and Hyphen	1- 44 characters (including periods)
Volume Serial Number (VSN)	Alphanumeric and Hyphen	1- 6 characters
Disk Subsystem ID (SSID)	Hexadecimal	4 characters
Serial Number (SER#)	Alphanumeric	12 characters (specify the last 5 digits)
Channel Connection Address (CCA)	Hexadecimal	2 characters
Logical Control Unit number (LCU)	Hexadecimal	2 characters, 00- 1F

(4) Format

Table 2-4 shows an example of the control statement format. The required format for control statements is:

- Specify the control statements between the first (1) and seventy-first (71) column.
- Specify comments after you specify a pound sign (#) in the first column.
- When the statement is longer than one line (71st column), you can continue the statement on the next line as follows:
 - Specify a comma after the last parameter.
 - Specify a comma and a plus sign after the last parameter. A space is required between a comma and a plus sign.
 - Specify a comma and a hyphen after the last parameter. A space is required between a comma and a hyphen.
- You cannot describe comments in the same line that contains a control statement.
- You cannot specify a space (empty) line between each control statement.

Table 2-4 Sample of Control Statement Format

1	Column Position	71	Description
	<pre>//SYSIN DD * # SAMPLE JCL CATALOG(existing catalog , new catalog , ... device type) CHGVOL(source volser, source ccuu, source ssid , ... target volser, target ccuu, target ssid, ... , device type) CHGDSN(old dsn , + new dsn) //</pre>	<p>Sample of comment line</p> <p>Sample of continuation</p> <p>Sample of continuation</p> <p>Sample of continuation</p>	

HRULVDP Routine

- (1) Function:** Executes the prepare function.
- (2) How to execute:** You can use the following starting methods:
- EXEC statement in JCL
 - START command
- (3) Input/Output Configuration:** Figure 2-8 shows input/output configuration.

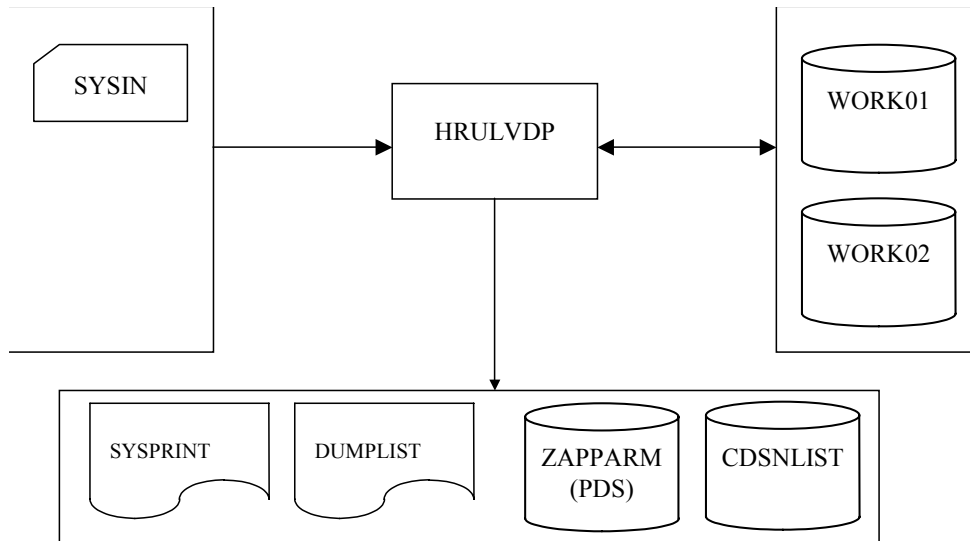


Figure 2-8 Input/Output Configuration for HRULVDP Routine

- (4) Job Control Statement:** Table 2-5 shows the job control statements required to execute with batch job.
- (5) Attribution of Dataset:** Table 2-6 shows the attribution of each dataset.
- (6) DUMPLIST DD statement:** The result of the execution is stored in the dataset specified by DUMPLIST DD statement. Check the validity of the VER/REP statement created by HRULVDP based on the result. Refer to [Sample of DUMPLIST](#).
- (7) CDSNLIST DD statement <option>:** A before-change dataset name and an after-change dataset name are output to the dataset specified to be a CDSNLIST DD statement. Refer to [Sample of CDSNLIST](#).

Table 2-5 Job Control Statements Required to Execute HRULVDP

Job Control Statement	Contents
EXEC statement	PGM = HRULVDP [REGION = region size] Region size must be larger than 2,048 KB. Execution region size must be larger than 2M bytes. [PARM = 'xxx'] See Details of HRULVDP PARM for details of PARM operand.
SYSIN DD statement	Dataset containing HRULVDP parameters. See Control Statement Details (HRULVDP and HRULVDX Routines) for details of the control statements. See Table 2-6 for the attribution of SYSIN dataset.
SYSPRINT DD statement	Dataset to store messages from HRULVDP. See Table 2-6 for the attribution of SYSIN dataset.
ZAPPARM DD statement	Dataset to store the SYSIN data for AMASZAP and IDCAMS utilities.
DUMPLIST DD statement	Dataset to store output of VVDS and VTOC dump format.
CDSNLIST DD statement	Dataset to store output before and after dataset names. <option>
WORK1 DD statement	Alternate SYSIN DD statement for AMASPZAP or ADRDSSU utility. If user specifies TYPE (3) in PARM statement, user can omit this DD statement.
WORK2 DD statement	Alternate SYSIN DD statement for AMASPZAP or ADRDSSU utility. If user specifies TYPE (3) in PARM statement, user can omit this DD statement.

Table 2-6 Attribution of HRULVDP Dataset

Attribution	DD Name						
	SYSIN	SYSPRINT	ZAPPARM	DUMPLIST	WORK01	WORK02	CDSNLIST
Type of dataset	SAM	SAM	PAM	SAM	SAM	SAM	SAM
Primary-qty Secondary-qty	Any	Any	Any	Any	Any	Any	Any
Type of record	F[B]	FBA	F[B]	FBA	F[B]	FBA	FB
Length of record	80	121	80	121	80	121	120
Length of block	Any	Any	3120	Any	3120	Any	Any

Details of HRULVDP PARM

```
PARM = 'FUNC ( MAKEPARM ) [,LINECNT (number of output lines)]  
[,TYPE({ 1 | 2 | 3 } ]  
[,ZAPOPT({1 | 2 | 3})]  
[,CANDIDATE({YES | NO})]'
```

(a) MAKEPARM

Output SYSIN data in ZAPPARM dataset.

(2) LINECNT (number of output lines)-((0, 10-99)) <<60>>

Specify the number of output lines per page. Default value is '60'.

(3) TYPE ({1 | 2 | 3 })-<<3>>

Specify a utility to get DUMPLIST of VVDS/VTOC:

(a) TYPE(1)

DSR uses an ADRDSSU utility. If an ADRDSSU utility is not available for the current system, it uses an AMASPZAP utility automatically.

(b) TYPE(2)

DSR uses an AMASPZAP utility.

(c) TYPE(3)

DSR uses a EXCP macro. Default is TYPE (3).

(4) ZAPOPT ({1 | 2 })-<<2>>

Specify the ZAP processing method in VTOC and VVDS:

(a) ZAPOPT(1)

Data set name searching in VTOC and VVDS is performed as a part of full data set name.

(b) ZAPOPT(2)

Data set name searching in VTOC and VVDS is performed as a prefix of full data set name and by using full data set name. Default is ZAPOPT(2).

(5) CANDIDATE ({YES | NO })-<<NO>>

On SMS environment, DSR creates an IDCAMS parameter (ALTER command) and put that parameter to ZAPPARM DD statement to add a CANDIDATE attribute to secondary volume on executing DIVIDE process.

(a) CANDIDATE(YES)

DSR creates an IDCAMS parameter (ALTER command) from CANDIDATE attribute on catalog information and put that parameter to ZAPPARM DD statement.

(b) CANDIDATE(NO)

DSR ignores a CANDIDATE attribute. Default is CANDIDATE(NO).

HRULVDX Routine

(1) Function: Executes the volume divide function, volume unify function, and volume backup function.

(2) How to execute: You can use the following starting methods:

- EXEC statement in JCL
- START command

(3) Input/Output Configuration: Figure 2-9 shows input/output configuration.

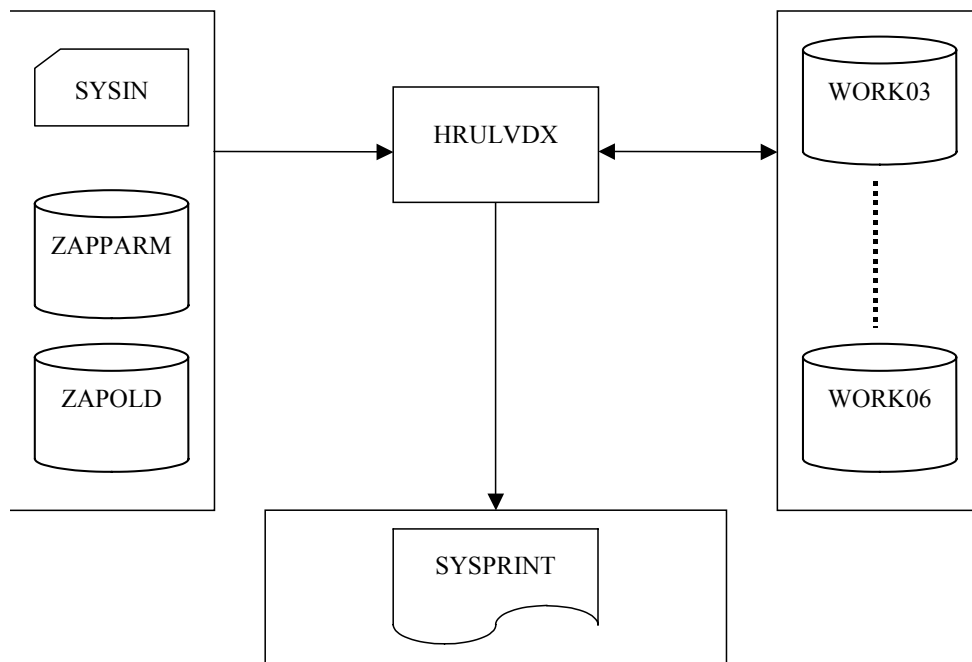


Figure 2-9 Input/Output Configuration for HRULVDX Routine

(4) Job Control Statement: Table 2-7 shows the job control statements for HRULVDX.

Table 2-7 Job Control Statements for HRULVDX

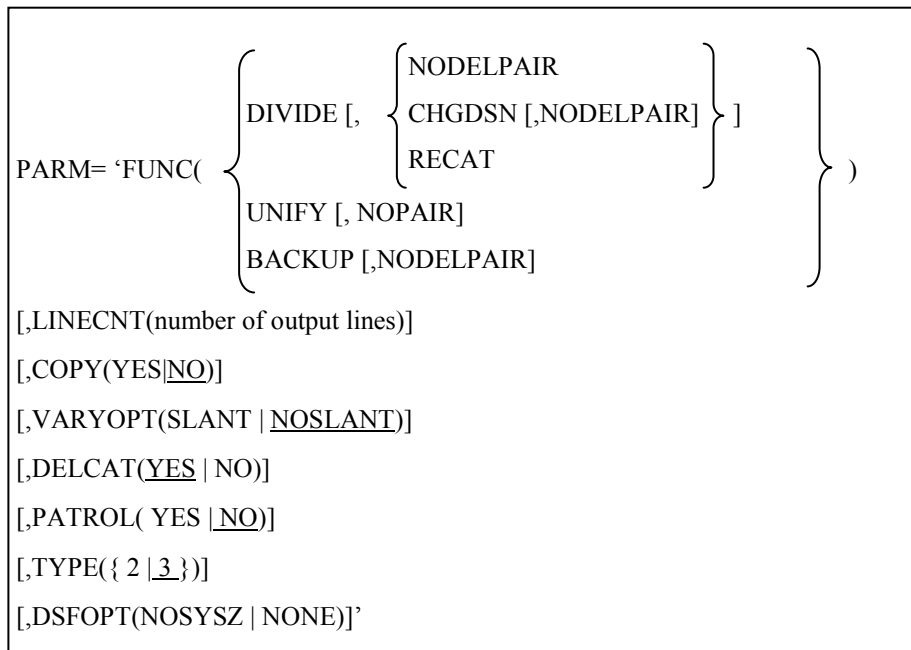
Job Control Statement	Contents
EXEC statement	PGM = HRULVDX [REGION = region size] Region size must be larger than 2,048 KB. Extension region size must be larger than 2M bytes. [PARM = 'xxx'] See Details of HRULVDX PARM for details of PARM operand.
SYSIN DD statement	Dataset of the HRULVDX parameters. See Control Statement Details (HRULVDP and HRULVDX Routines) for details of the control statements. See Table 2-6 for the attribution of SYSIN dataset.
SYSPRINT DD statement	Dataset to store messages from HRULVDX. See Table 2-6 for the attribution of SYSIN dataset.
ZAPPARM DD statement	Dataset to store the SYSIN data for AMASZAP and IDCAMS utilities.
ZAPPOLD DD statement	Dataset to store the SYSIN data for AMASPZAP and IDCAMS utilities. This dataset was stored at the prepare process (HRULVDP), and HRULVDX compares ZAPPARM and ZAPOLD. (Option)
WORK03 DD statement	Alternate SYSIN DD statement for ICKDSF utility.
WORK04 DD statement	Alternate SYSPRINT DD statement for ICKDSF utility.
WORK05 DD statement	Alternate SYSPRINT DD statement for AMASPZAP utility. If user specifies TYPE (3) in PARM statement, user can omit this DD statement.
WORK06 DD statement	Alternate SYSPRINT DD statement for IDCAMS utility.
WORK07 DD statement	Alternate SYSPRINT DD statement for IEHPROG utility.
PPRCPARAM DD statement	Dataset to store the parameter of ESTPAIR (PPRC) for ICKDSF utility. If VOLUME parameter is specified, this statement must be specified.
SYSTSPRT DD statement	This data set to store the execution result of IKJEFT01 utility. If CLASSNAME parameter is specified, this statement must be specified.
SYSTSIN DD statement	This data set to store the parameter for IKJEFT01 utility. If CLASSNAME parameter is specified, this statement must be specified.

(5) Attribution of Dataset: Table 2-8 shows the attribution of each dataset.

Table 2-8 Attributions of HRULVDX Datasets

	DD Statement					
Attribution	SYSIN	SYSPRINT	ZAPPARM	ZAPPOLD	WORK03	
Type of dataset	SAM	SAM	PAM	PAM	SAM	
Primary-qty Second-qty	Any	Any	Any	Any	Any	
Type of record	F[B]	FBA	F[B]	F[B]	F[B]	
Length of record	80	121	80	80	80	
Length of Block	Any	Any	3120	3120	3120	
	DD Statement					
Attribution	WORK04	WORK05	WORK06	WORK07	PPRCPAR M	
Type of dataset	SAM	SAM	SAM	SAM	PAM	
Primary-qty Second-qty	Any	Any	Any	Any	Any	
Type of record	FBA	FBA	VBA	VBA	F[B]	
Length of record	121	121	125	125	80	
Length of Block	Any	Any	Any	Any	3120	
	DD Statement					
Attribution	SYSTSIN	SYSTSPRT				
Type of dataset	SAM	SAM				
Primary-qty Second-qty	Any	Any				
Type of record	F[B]	FBA				
Length of record	80	132				
Length of Block	Any	Any				

Details of HRULVDX PARM



(1) FUNC

(a) $\text{DIVIDE } [, \left\{ \begin{array}{l} \text{NODELPAIR} \\ \text{CHGDSN } [, \text{NODELPAIR}] \\ \text{RECAT} \end{array} \right\}]$

Executes the volume divide function.

(i) NODELPAIR

DSR does not issue the split command.

(ii) CHGDSN [,NODELPAIR]

Executes the volume divide function and rewrites the volume serial number and the dataset name in the target volume.

Does not issue the split command.

(iii) RECAT

Creates a user catalog for a target volume and registers a dataset in the target volume in the created user catalog.

(b) UNIFY [, NOPAIR]

Executes Volume unify function.

(i) NOPAIR

Does not issue the resynchronize command.

(c) BACKUP [, NODELPAIR]

Executes this function for physical volume backup from a target volume. DSR rewrites only the volume serial number on the target volume. However, it neither rewrites the dataset name on the target volume, nor registers the user catalog for the target volume.

If you specify this operand, ZAPPARM, WORK05 and WORK06 DD statements are unnecessary. CATALOG and CHGDSN control statements are unnecessary.

(i) NODELPAIR

Does not issue the split command.

Note: The physical volume data that is backed up from a target volume using BACKUP operand must be restored to the source volume (a volume that has the same volume serial number as the source volume). If you restore the backup data to other volume, it may not be restorable.

(2) LINECNT (LINECNT(number of output lines)-((0,10-99)) <<60>>

Specifies the number of the output lines per page.

Default value is 60.

(3) COPY (YES|NO)-<<NO>>

Specifies whether initial copy is executed or not:

(a) YES

If YES is specified, DSR issues ESTPAIR or PPRC command for initial copy volume.

(b) NO

If NO is specified, DSR does not issue ESTPAIR or PPRC command.

No is the default value.

(4) VARYOPT (SLANT | NOSLANT)-<<NOSLANT>>

Specifies whether SLANT(/) is added before an unit address or not, when a VARY command is executed:

(a) SLANT

If SLANT is specified, DSR adds SLANT(/) before unit address.

(b) NOSLANT

If NO is specified, DSR does not add SLANT(/) before unit address.

NOSLANT is the default value.

(5) DELCAT (YES | NO) -<<YES>>

DELCAT option is specified whether all volumes or a part of volumes are process in UNIFY operation:

(a) YES

ALL volumes are process by UNIFY operation. YES is the default value.

(b) NO

A part of volumes are process by UNIFY operation.

(6) PATROL(YES | NO) -<<NO>>

PATROL option on UNIFY operation is specified to check whether the pair status of the object volume becomes to be DUPLEX. Default value is "NO":

(a) YES

A pair status check is not executed by UNIFY operation.

(b) NO

A pair status check is executed by UNIFY operation.

(7) TYPE(2 | 3) -<< 3 >>

User specifies a utility or macro to update VTOC/VVDS on secondary volumes. Default is TYPE(3):

(a) 2

DSR uses a AMASPZAP utility.

(b) 3

DSR uses a EXCP macro.

(8) DSFOPT(NOSYSZ | NONE) -<<NONE>>

Specify DSFOPT parameter if ICKDSF program bypasses serialization process when INDEX VTOC is built:

(a) NOSYSZ

ICKDSF program bypasses serialization process.

(b) NONE

ICKDSF program does not bypasses serialization process.



Note: When user specifies DSFOPT(NOSYSZ), one or more of the following APARs provided by IBM® must be installed: UQ91567, UQ91568, UQ91569, UQ91570, UQ91571. For details on the content of APARs, refer to the document (PQ92344) provided by IBM.

Outline of Control Statements

Table 2-9 shows the control statements provided by DSR.

Table 2-9 Summary of Control Statements

No.	Control Statement	Content	HRULVDP MAKEPARM	HRULVDX		
				DIVIDE	UNIFY	BACKUP
1	CATALOG	Specify catalog information	Required	Required	Ignored*	Ignored
2	CHGVOL	Specify volume information for source and target volumes	Required	Required	Required	Required
3	VOLUME	Specify volume information for source and target volumes	Required	Required	Required	Required
4	CHGDSN	Specify dataset name for source and target volumes	Optional	Ignored	Ignored	Ignored
5	SELECT	Specify catalog and dataset name for source volume	Optional	Ignored	Ignored	Ignored
6	EXCLUDE	Specify catalog and dataset name for source volume	Optional	Ignored	Ignored	Ignored
7	CHGSELECT	Specify catalog and dataset name for source volume	Optional	Ignored	Ignored	Ignored
8	CHGEXCLUDE	Specify catalog and dataset name for source volume	Optional	Ignored	Ignored	Ignored
9	CHGSMS	Specify SMS classes, which are storage and management	Optional	Ignored	Ignored	Ignored
10	ROUTE	Specify target system name	Ignored	Optional	Optional	Optional
11	ALIAS	Specify alias name and catalog dataset name for target vol.	Optional	Ignored	Ignored	Ignored
12	RECAT	Specify existing/new catalog name and data set information	Optional	Ignored	Ignored	Ignored
13	EXITUA	Specify user information to send to exit routine of HRULVDUA	Ignored	Optional	Ignored	Optional
14	EXITUB	Specify user information to send to exit routine of HRULVDUB	Ignored	Optional	Ignored	Optional
15	EXITUC	Specify user information to send to exit routine of HRULVDUC	Ignored	Optional	Ignored	Ignored
16	EXITU1	Specify user information to send to exit routine of HRULVDU1	Ignored	Ignored	Optional	Ignored
17	EXITUZ	Specify user information to send to exit routine of HRULVDUZ	Ignored	Optional	Optional	Optional
18	RETRYPPRC	Specify retry counts and interval when PPRC command is failed	Ignored	Optional	Ignored	Optional
19	CLASSNAME	Specify data set class for RACF® group.	Ignored	Optional	Optional	Ignored

* If you are executing the volume unify function after the volume backup function, it is not necessary to specify CATALOG parameter. If you are executing the volume unify function after the volume divide function, it is necessary to specify CATALOG parameter.

Control Statement Details (HRULVDP and HRULVDX Routines)

```
[ CATALOG (existing catalog , new catalog , catalog volser , primary-qty , second-qty  
[ , Device type] [ , NEW | OLD ] [ , temporary catalog ] ) ]  
[ CHGVOL (source volser , source ccuu , source ssid , source serialnum , source cca ,  
target volser , target ccuu , target ssid , target serialnum , target cca ,  
pair type [ , device type] [ , NOP] [ , WAIT] [ , source lcu , target lcu] ) ]  
[ VOLUME ( source ccuu , target ccuu , target volser , pair type [ , controller type] [ , dku type] ) ]  
[ CHGDSN (old-dsn [ , new-dsn1 ] [ , new-dsn2 ] ) ]  
[ SELECT (existing catalog , old-dsn) ]  
[ EXCLUDE (existing catalog , old-dsn) ]  
[ CHGSELECT (existing catalog , old-dsn) ]  
[ CHGEXCLUDE (existing catalog , old-dsn) ]  
[ CHGSMS (old-management-class , old-storage-class , new-management-class , new-storage-class) ]  
[ ROUTE (*ALL | *OTHER | system name or system group name) ]  
[ RECAT (existing catalog name , new catalog name , new-dsn1/new-dsn2) ]  
[ ALIAS (alias name , new catalog name) ]  
[ EXITUA (user specified information) ]  
[ EXITUB (user specified information) ]  
[ EXITUC (user specified information) ]  
[ EXITUD (user specified information) ]  
[ EXITUE (user specified information) ]  
[ EXITUF (user specified information) ]  
[ EXITUG (user specified information) ]  
[ EXITUH (user specified information) ]  
[ EXITUI (user specified information) ]  
[ EXITUJ (user specified information) ]  
[ EXITUK (user specified information) ]  
[ EXITUL (user specified information) ]  
[ EXITUM (user specified information) ]  
[ EXITUN (user specified information) ]  
[ EXITUO (user specified information) ]  
[ EXITUP (user specified information) ]  
[ EXITUQ (user specified information) ]  
[ EXITUR (user specified information) ]  
[ EXITUS (user specified information) ]  
[ EXITUT (user specified information) ]  
[ EXITUV (user specified information) ]  
[ EXITUW (user specified information) ]  
[ EXITUX (user specified information) ]  
[ EXITUY (user specified information) ]  
[ EXITUZ (user specified information) ]  
[ RETRYPPR (retry count , retry interval time) ]  
[ CLASSNAME (class name) ]
```

(1) CATALOG

Specifies the existing user catalog for the source volume, and a new user catalog for the target volume.

You can specify several CATALOG statements in a JCL.

The CATALOG statement is mandatory when you use MAKEPARM and DIVIDE functions:

- (a) existing catalog < Alphanumeric, 1-44 characters >: Specify the existing user catalog name for the source volume.
- (b) new catalog < Alphanumeric, 1-44 characters >: Specify the new user catalog name for the target volume.

The number of the characters for the new user catalog name must be equal to that of the existing catalog name.

(c) catalog volser < Alphanumeric and hyphen, less than 6 characters >: Specify the volume serial number to store the new user catalog.

(d) primary-qty < Numeric >: Specify the number of initial cylinders of the dataset to allocate the user catalog dataset for the target volume.

(e) second--qty < Numeric >: Specify the number of additional cylinders of the dataset to allocate the user catalog dataset for the target volume.

(f) device type <Alphanumeric and hyphen, less than 8 characters>
<<3390>>: Specify the device type to allocate the user catalog dataset for the target volume.

The default device type is 3390.

(g) [NEW | OLD] <<NEW>>: Specify whether new catalog dataset creation is created

- NEW: New catalog data set is created. (Default)
- OLD: New catalog data set is not created.

(h) temporary catalog name < Alphanumeric, 1-44 characters >: In case of being different length from existing catalog name and new catalog name, specify this temporary catalog name. The length of temporary catalog name must be same as the length of existing catalog name.

(2) CHGVOL

Specify the volser, ccuu, ssid, serial number, cca and device type of the source and target volume.

Specify the lcu if using the controller emulation type 2105.

You are able to specify several volumes in a JCL:

(a) source volser <Alphanumeric and hyphen, 1-6 characters>: Specify the volume serial number of the source volume.

(b) source ccuu < Hexadecimal, 3 or 4 characters>: Specify a unit address to which the source volume is mounted.

(c) source ssid < Hexadecimal, 4 characters>: Specify the disk storage system ID.

(d) source serialnum < Alphanumeric, 5 characters >: Specify the last five columns of a serial number (12 columns) of the source volume:

<Option 1: MRR00>

If 'MRR00' is specified in UNIFY function, the reverse re-synchronization function (data is copied from a target volume to a source volume), which is provided by ShadowImage, is performed. When you specify 'MRR00', you should be careful about the information related to the source catalog matching to the restored data.

<Option 2: AGxx0>>

If the pair type of TrueCopy Asynchronous (HRCA) is specified, a user must specify a special order in this part. The special rules are:

- * The specified characters are AGxx0, and 'xx' is consistency group ID.
- * Consistency group ID is described with hexadecimal numbers, and the range is between 00 to 3F.
- * Consistency group ID must be set in RAID storage system before DSR is executed.
- * Refer to the *TrueCopy User and Reference Guide* for instructions on setting a consistency group ID.

- (e) source cca < Hexadecimal, 2 characters>: Specify the channel connection address of the source volume
- (f) target volser < Alphanumeric and hyphen, 1-6 characters >: Specify the volume serial number of the target volume.
Number of the target volser characters must be equal to that of the source volser.
- (g) target ccuu < Hexadecimal, 3 or 4 characters>: Specify a unit address to which the target volume is mounted.
- (h) target ssid < Hexadecimal, 4 characters>: Specify the disk storage system ID of the target volume.
- (i) target serialnum < Hexadecimal, 5 characters>: Specify the last five columns of a serial number (12 columns) of the target volume.
- (j) target cca < Hexadecimal, 2 character>: Specify the channel connection address of the source volume
- (k) pair type: Specify the pair type of the copy function in the following:
- (i) HMRCF: Specify this parameter when the volume pair to be processed is a ShadowImage pair.
 - (ii) HRC: Specify this parameter when the volume pair to be processed is a TrueCopy (HRC) Synchronous pair.
 - (iii) HRCA: Specify this parameter when the volume pair to be processed is a TrueCopy (HRC) Asynchronous pair.
- (l) device type < Alphanumeric and hyphen, 1-8 characters > <<3390>>: Specify the device type of the target volume. The default device type is 3390.
- (m) NOP: If this option is specified, DSR does not execute the divide and backup operations for the volume specified by CHGVOL parameter.
- (n) WAIT: If this option is specified with COPY (YES) in PARM statement, DSR waits for completion of initial copy process by ShadowImage function only.
If this option is omitted, but COPY (YES) in PARM statement is specified, DSR issues the quick split command of ShadowImage function. Then a volume with simplex status is changed to the split status immediately.
This option is available only for a ShadowImage pair.
- (o) source lcu <Hexadecimal, 2 characters>: Specify LCU (logical control unit) number of source volume. (Only for controller emulation type 2105/2107.)
- (p) target lcu <Hexadecimal, 2 characters>: Specify LCU (logical control unit) number of target volume. (Only for the controller emulation type 2105/2107.)

(3) **VOLUME**

Specify the volser, ccuu and controller type.

You are able to specify several volumes in a JCL.

If this parameter is specified:

- PPRCPARM DD statement must be specified.
- CHGVOL parameter cannot be specified.
- COPY option cannot be specified.

(a) source ccuu < Hexadecimal, 3 or 4 characters>: Specify a unit address to which the source volume is mounted.

(b) target ccuu < Hexadecimal, 3 or 4 characters>: Specify a unit address to which the target volume is mounted.

(c) target volser < Alphanumeric and hyphen, 1-6 characters >: Specify the volume serial number of the target volume. Number of the target volser characters must be equal to that of the source volser.

(d) pair type: Specify the pair type of the copy function in the following:

(i) HMRCF: Specify this parameter when processing pair volume is produced by the ShadowImage function.

(ii) HRC: Specify this parameter when processing pair volume is produced by the TrueCopy Synchronous function.

(iii) HRCA: Specify this parameter when processing pair volume is produced by the TrueCopy Asynchronous function.

(e) controller type < Alphanumeric and hyphen, 1-8 characters >: Specify a controller type. Currently "2105" is the only supported controller type.

f) dku type < Alphanumeric and hyphen, 1-8 characters >: Specify a device type. Default value is 3390.

(4) CHGDSN

Specify a dataset name for a target volume before and after DSR rewrites.

Specify an old dsn, a new dsn1 and/or a new dsn2.

The length of an old dsn and a new dsn1 must be the same.

CDSNLIST shows old dsn and new dsn so that user should confirm the dataset name.

When a part of dataset name is specified, it processes as a general term name.

When a ZAPOPT(1) is specified, Asterisk (*) is specified at only one part which is surrounded by a period (.).

'SYS1' of data set information can not be specified.

When data set existing on secondary volume is registered to existing catalog, second operand (new dsn1) must be specified if user wishes to change a data set name.

(a) old dsn < Alphanumeric, asterisk and percent, 1-44 characters > :
Specify the dataset name before DSR rewrites.

You can specify an asterisk as a qualifier into a dataset name and you can specify a percent as a character into a dataset name. Asterisk and percent must be placed in same position between old dsn and new dsn1/new dsn2.

You cannot specify only single asterisk and double asterisk.

(b) new dsn1 < Alphanumeric, asterisk and percent, 1-44 characters > :
Specify the dataset name after DSR rewrites.

You can specify an asterisk as a qualifier into a dataset name and you can specify a percent as a character into a dataset name. Asterisk and percent must be placed in same position between old dsn and new dsn1/new dsn2.

You cannot specify only single asterisk and double asterisk.

Number of the new dsn1 characters must be equal to that of the old dsn characters.

(c) new dsn2 < Alphanumeric, asterisk and percent, 1-44 characters > :
Specify the dataset name after DSR rewrites, if a new dataset name is extended.

You can specify an asterisk as a qualifier into a dataset name and you can specify a percent as a character into a dataset name. Asterisk and percent must be placed in same position between old dsn and new dsn1/new dsn2.

You cannot specify only single asterisk and double asterisk.

In case of specifying an old dsn and a new dsn1 as the following, the dataset name of 'ABC.TEST' is changed to 'XYZ.SAMP'.

```
CHGDSN (ABC.TEST,XYZ.SAMP)
```

In case of specifying an old dsn and a new dsn2 as the following, the dataset name of 'ABC.TEST' is changed to 'XYZ.TEMP.SAMP'.

```
CHGDSN (ABC.TEST,,XYZ.TEMP.SAMP)
```

In case of specifying an old dsn, a new dsn1 and a new dsn2 as the following, the dataset name of 'ABC.TEST' is changed to 'XYZ.SAMP' at first. Then the dataset name of 'XYZ.SAMP' is changed to 'XYZ.TEMP.SAMP'.

CHGDSN (ABC.TEST,XYZ.SAMP,XYZ.TEMP.SAMP)

In case of not replacing dataset name as expected.

* Old dataset name

DSR0.TEST.DSR0 DSR0.TEST.DSR1 DSR0.TEST.DSR2
--

* Content of specifying SYSIN

CATALOG (CATALOG1, CATALOG2, CVOLO1, 5, 1, 3390) CHGVOL (VOL001, 1800, 0001, 30003, 00, VOL101, 1840, 0002, 30003, 40, HMRCE) CHGDSN (DSR0, DSR1)
--

* New dataset name

Expected value	Executed value
DSR1.TEST.DSR0	
DSR1.TEST.DSR1	
DSR1.TEST.DSR2	DSR1.TEST.DSR1
DSR1.TEST.DSR1	
DSR1.TEST.DSR2	

In the above case, duplicated dataset names of "DSR1.TEST.DSR1" are created on secondary volume.

In this case, To specify ZAPOPT(2) or full dataset name by CHGDSN parameter, this phenomenon is resolved as expected value.

(5) **SELECT**

Specify a dataset name and a catalog name corresponding to the source volume.

If you know which dataset to use on a target volume, specify this control statement.

In case of specifying this control statement, catalog parameter (IDCAMS) is created for a specified dataset within a specified user catalog. If this control statement is omitted, catalog parameter (IDCAMS) is created for all datasets corresponding to the user catalogs specified by CATALOG parameters.

When a part of dataset name is specified, it processes as a general term name.

This parameter cannot be specified with CHGSELECT/CHGEXCLUDE parameter.

CDSNLIST shows old dsn and new dsn so that user should confirm the dataset name.

(a) existing catalog < Alphanumeric, 1-44 characters >: Specify the existing user catalog name for the source volume.

(b) old dsn < Alphanumeric and asterisk, percent, 1-44 characters>: Specify the dataset name before DSR rewrites.

(6) **EXCLUDE**

Specify a dataset name and a catalog name corresponding to the source volume.

If you know which dataset not to use on the target volume, you should specify this control statement.

In case of specifying this control statement, catalog parameter (IDCAMS) is not created for a specified dataset within a specified user catalog. If this control statement is omitted, catalog parameter (IDCAMS) is created for all datasets corresponding to the user catalogs specified by CATALOG parameters.

When a part of dataset is specified, it processes as a general term name.

This parameter cannot be specified with CHGSELECT/CHGEXCLUDE parameter.

CDSNLIST shows old dsn and new dsn so that user should confirm the dataset name.

(a) existing catalog < Alphanumeric, 1-44 characters >: Specify the existing user catalog name for the source volume.

(b) old dsn < Alphanumeric and asterisk, percent, 1-44 characters>: Specify the dataset name before DSR rewrites.

(7) **CHGSELECT**

Specify a dataset name and a catalog name corresponding to the source volume.

The change rule of the dataset name specified with the CHGDSN parameter is applied only to the dataset chosen by this parameter, and it registers with a user catalog. Moreover, about the dataset that is not chosen by this parameter, it registers with a user catalog without changing a dataset name.

When a part of dataset is specified, it processes as a general term name.

This parameter cannot be specified with SELECT/EXCLUDE parameter.

This parameter cannot be specified with ZAPOPT(1) option.

(a) existing catalog < Alphanumeric, 1-44 characters >: Specify the existing user catalog name for the source volume.

(b) old dsn < Alphanumeric and asterisk, percent, 1-44 characters>: Specify the dataset name before DSR rewrites.

(8) **CHGEXCLUDE**

Specify a dataset name and a catalog name corresponding to the source volume.

To the dataset excepted by this parameter, the change rule of the dataset name specified with the CHGDSN parameter is not applied. It registers with a user catalog by the same name as the dataset name in source volume.

When a part of dataset is specified, it processes as a general term name.

This parameter cannot be specified with SELECT/EXCLUDE parameter.

This parameter cannot be specified with ZAPOPT(1) option.

(a) existing catalog < Alphanumeric, 1-44 characters >: Specify the existing user catalog name for the source volume.

(b) old dsn < Alphanumeric and asterisk, percent, 1-44 characters>: Specify the dataset name before DSR rewrites.

(9) **CHGSMS**

It specifies changing an SMS management attribute (a management class and storage class).

(a) old-management-class < Alphanumeric , 1-8 characters >: Specify the management class before change.

(b) old-storage-class < Alphanumeric , 1-8 characters >: Specify the storage class before change.

(c) new-management-class < Alphanumeric , 1-8 characters >: Specify the management class after change.

(d) new-storage-class < Alphanumeric , 1-8 characters >: Specify the storage class after change.

(10) ROUTE

It specifies issuing the ROUTE command after VARY ONLINE or VARY OFFLINE command execution.

(a) *ALL

The VARY command is issued to all the systems constructed in the SYSPLEX environment.

(b) *OTHER

The VARY command is issued to all systems except the DSR execution system constructed in the SYSPLEX environment.

(c) system name or system group name < Alphanumeric, 1-8 characters >

The system name or system group name which issues the ROUTE command is specified.

Note: When user specifies ROUTE parameter, DSR does not check offline status of secondary on other LPAR. So when user uses UNIFY function, PPRC command (Resync) is failed. If user specifies the ROUTE parameter, user should specify "FUNC=(UNIFY,NOPAIR)" in EXEC parameter. When user re-establishes a target pair, user should check offline status of secondary volume on other LPAR and then user should use to re-establish the target pair by using PPRC command (Resync) of ICKDSF utility.

(11) ALIAS

Specify an alias name, which is defined to a catalog for a target volume, and a catalog name corresponding to the target volume.

(a) alias name < Alphanumeric, 1-44 characters >: Specify an alias name to define for a new catalog for the target volume.

(b) new catalog name < Alphanumeric, less than 44 characters >: Specify a new catalog name specified in CATALOG parameter.

(12) RECAT

Specify to register a data set to different catalog from new catalog specified by CATALOG parameter.

*When user wishes to separate existing catalog, user should specify plural CATALOG parameters. In this case, RECAT parameter is not applied for existing and new catalog name in CATALOG parameter specified at top line.

(a) existing catalog name < Alphanumeric, less than 44 characters >: Specify an existing catalog name corresponding to CATALOG parameter that user wish to separate.

(b) new catalog name < Alphanumeric, less than 44 characters >: Specify a new catalog name that user wish to register a data set existing on existing catalog.

(c) data set name information < Alphanumeric, less than 44 characters and asterisk >: Specify a full data set name or a part of data set name to register to new catalog.

The full data set name or the part of data set name is a changed data set name by CHGDSN parameter.

The data set name information can be included asterisk ("*") in the information.

In case of specifying the part of data set name, this information is interpreted as prefix of data set.

(13) EXITUA

(a) user specified information< Alphanumeric, Maximum 8 characters > <<Job name>>: Specify alphanumeric characters that are sent to a user exit routine: HRULVDUA.

(14) EXITUB

(a) user specified information< Alphanumeric, Maximum 8 characters > <<Job name>>: Specify alphanumeric characters that are sent to a user exit routine: HRULVDUB.

(15) EXITUC

(a) user specified information< Alphanumeric, Maximum 8 characters > <<Job name>>: Specify alphanumeric characters that are sent to a user exit routine: HRULVDUC.

(16) EXITU1

(a) user specified information< Alphanumeric, Maximum 8 characters > <<Job name>>: Specify alphanumeric characters that are sent to a user exit routine: HRULVDU1.

(17) EXITUZ

(a) user specified information< Alphanumeric, Maximum 8 characters > <<Job name>>: Specify alphanumeric characters that are sent to a user exit routine: HRULVDUZ.

(18) RETRYPPRC

Specify the count and interval time to reissue DELPAIR or SUSPEND command in case of a command failure.

(a) retry count <0-100> <<3>>: Specify the count value to reissue DELPAIR or SUSPEND command. The default value is 3 times.

(b) retry interval time <0-60 minute > <<5>>: Specify the interval time value to reissue DELPAIR or SUSPEND command. The default value is 5 minutes.

(19) CLASSNAME

Specify class name, which relates to a RACF[®] security of dataset existing on primary volume. When this parameter is specified, DSR adds the RACF security information to secondary volume in divide operation.

(a) class name < Alphanumeric, less than 8 characters>: Specify class name used for dataset security of primary volume. Normally "DATASET" is used.

Installation Requirements and Procedures

This chapter specifies the requirements for installing Hitachi Dataset Replication for IBM z/OS and provides installation procedures and instructions.

- [System Requirements](#)
- [Restrictions](#)
- [Installing the DSR Load Module](#)
- [Confirming the Utility \(DSR\) Version](#)

System Requirements

Hitachi DSR operations involve the volumes on the Hitachi RAID storage system(s), the licensed DSR utility, and the licensed mainframe ShadowImage feature. Table 3-1 lists the system requirements for the Hitachi DSR utility. Table 3-2 lists the Hitachi storage system requirements for Hitachi Dataset Replication.

Table 3-1 System Requirements for Hitachi Dataset Replication

Item	Requirement(s)
Storage System	Hitachi RAID storage systems with mainframe ShadowImage installed. Supported storage systems: USP V/VM, USP/NSC, 9900V, and 9900.
OS	z/OS: V1 R1 through V1 R4 OS/390: V1 R1.0 and later, RACF V2.6 and later
DFSMS/MVS® Software	V1 R2.0 and later
MVS/ESA™ Software	V4 R3.0 and later
ICKDSF Software	R16 + PTF (PPRC support)
DFP	V3 R3.0 and later
Processing Type	Batch Job (Online)
Dataset Type	non-VSAM (SAM, DAM, PAM, ISAM) VSAM (ESDS, KSDS, RRDS, LDS, and AIX) GDG, PATH, ALIAS
Supported Catalog	ICF Catalog only
Controller Emulation	3990-3, -6, -6E; 2105; 2107
Device Emulation	3390-1, -2, -3, -3R, -9 3380-E, -J, -K, -3 (supported for Fujitsu MSP environment only)

Table 3-2 Microcode Requirements for Hitachi Dataset Replication

Hitachi RAID Storage System	Required Microcode Level
Hitachi Universal Storage Platform V/VM	ESCON channel: 60-01-xx and higher FICON channel: 60-01-xx and higher
Hitachi TagmaStore Universal Storage Platform and Network Storage Controller	ESCON channel: 50-01-xx and higher FICON channel: 50-01-xx and higher
Hitachi Lightning 9900 V Series	ESCON channel: 21-01-24-00/00 and higher FICON channel: 21-02-23-00/00 and higher
Hitachi Lightning 9900	ESCON channel: 01-13-18-00/07 and higher FICON channel: 01-17-94-00/00 and higher

Restrictions

User Application and Data Protection

DSR rewrites only OS management information (VTOC, VVDS, and VTOCIX). Hence DSR has no API for the application to use a target volume. Use an exit routine and rewrite the information if necessary.

DSR executes no special process regarding data protection. Use an exit routine and rewrite the information, if necessary.

Pause Access to a Source Volume

Pause access to a source volume while DSR is dividing the volume pairs and rewriting the OS management information in the target volume. You can restart access by using an exit routine: HRULVDUA or HRULVDUB.

Catalog

- You must not define catalog information in the volumes to be processed by DSR.
- DSR supports ICF catalog type only. You must not include datasets whose catalog type is VSAM in the volumes to be processed.
- Register all the datasets in the user catalog that are datasets you use in a target volume.
- The dataset types you register in a user catalog are KSDS, ESDS, RRDS, AIX, non-VSAM ALIAS, PATH, and GDG/GDS.
- Before DSR starts, the volume to contain the user catalog for a target volume must be online.

Volumes to be Processed: S-VOL and T-VOL by DSR

- DSR cannot process system volumes.
- You need to specify all volumes, if DSR processes multiple volumes or other related datasets (AIX: alternate index, etc.).
- An "IODEVICE" for a target volume must be defined. Before DSR starts, the device status must be changed to offline.
- If you do not change the dataset name in a target volume after the volume divide operation, you should use the target volume as read-only. In this case, you should specify 'DISP=SHR' in a DD statement for each dataset.
- To use the unify function, you should specify "PRIVATE" attribute for all the volumes which correspond to the volume unify operation.
- If the volumes to be processed include generation datasets (GDS) (managed by GDG, generation data group), you should specify the GDG name with the CHGDSN parameter. Do not specify the full name of a GDS.
- If the volumes to be processed include datasets related to PATH, ALIAS, and AIX (Alternate Index), you should specify the names of PATH, ALIAS, and AIX with CHGDSN parameter.

Dataset Security

- The dataset security information (RACF information) on primary volume is taken over for data set existing on secondary volume by specifying CLASSNAME parameter on divide operation. When the CLASSNAME parameter is specified, user should be sure to take the following notes into consideration:
 - Preparation of primary prefix group for data set existing on secondary volume
When user makes dataset profile by using RACF function, user needs to register primary prefix as RACF group if primary prefix does not register as RACF group to RACF database. When a prefix of data set renamed by DSR need to be register as RACF group before DSR is executed.
 - User attribute
When DSR is executed, user id must have a security management attribute. If user id does not have a security management attribute, user describes user id having a security management attribute in JCL (normally in JOB DD statement) of DSR.

Other Restrictions

- You must run the prepare function before the divide function, and when you run the divide function again, you must run the unify function first. If you omit the unify function and run the divide function, the divide function detects an error (does not execute).
- If you specify "NODELPAIR" or "NOPAIR" parameter in EXEC PARM of JCL, issue a split command or resynchronization command by yourself.
- If you divide volume pairs by using PPRC command of ICKDSF utility, you must use SUSPEND command only. If you use DELPAIR command, the contents of the source volume and the target volume are not equal.
- You can define multiple target volumes corresponding to a source volume. But DSR performs only one target volume in the divide function.
- In the prepare function, DSR uses the DFSMSDss or AMASPZAP programs to generate a DUMP list of VTOC and VVDS. If DFSMSDss is not installed in the user system, DSR uses AMASPZAP to generate a DUMP list. In this case, AMASPZAP takes much time to get it, and you should specify DCB parameter in WORK02 DD statement. Refer to [JCL Example for Prepare Function](#).
- If you use the initial copy function of TrueCopy Asynchronous by using a divide operation with COPY (YES) option, you must separate job steps for each initial copy operation and divide operation. If you specify a job step including both the initial copy operation and the divide operation, the job step fails. Refer to Example 3 in [Other JCL Examples](#).
- If you are integrating more than one existing catalog with one existing or new catalog, you should first execute a JOB step which has a NEW operand specified in CATALOG parameter when you execute multiple DIVIDE JOB steps. And at the end, you should execute a JOB step which has a NEW operand specified in CATALOG parameter when you execute multiple UNIFY JOB steps.
- Between the Prepare (MAKEPARM) and DIVIDE operations, you must not modify a dataset on a primary volume. If you delete, add, or update a dataset on a primary volume, you should re-execute the Prepare (MAKEPARM) operation. Because dataset information on the primary volume is changed by the above operation, the DIVIDE operation will return an error.
- In the Prepare (MAKEPARM) operation, when a dataset existing on secondary volume is registered (RECAT) to an existing catalog, you should pay an attention to a dataset name, which is changed by DSR. Because the DIVIDE operation returns an error when a changed dataset name existing on secondary volume is the same as a dataset name, which is still managed by existing catalog. The prepare (MAKEPARM) function provides a list of original and changed datasets by CDSNLIST DD statement. You should confirm whether all datasets existing on secondary volume are changed to another name.

- In Prepare (MAKEPARM) operation, when user carries out for many volumes and data sets, user should specify ZAPOPT (1). When user does not specify ZAPOPT (1), processing time increases.
- When user specifies ZAPOPT (1) option, data set name is changed that all matched part of data set name is based on data set information specified by CHGDSN parameter. The portion, which a user does not wish, may also be changed. After Prepare (MAKEPARM) operation is executed, user should confirm whether data set name is changed as expected by the data set list outputted to CDSNLIST.
- In UNIFY operation, when PATROL (YES) option is specified, DSR checks to become DUPLEX status of pair volume. When PATROL (YES) option is specified, UNIFY operation takes more time than PATROL (NO) option.
- In Prepare (MAKEPARM) operation, in case of including volume name into data set name, user should specify ZAPOPT(2). If user does not specify ZAPOPT(2), there is a possibility not to be renamed to a exact data set name.

Suppressing Messages

Create an MPFLSTxx member in 'SYS1.PARMLIB' and enter the message ID (e.g. AMA121I) in the member to suppress from a console display. Then issue a system command, "SET MPF=xx", from the console display.

Installing the DSR Load Module

Figure 3-1 shows: contents of provided media, outline of DSR installation.

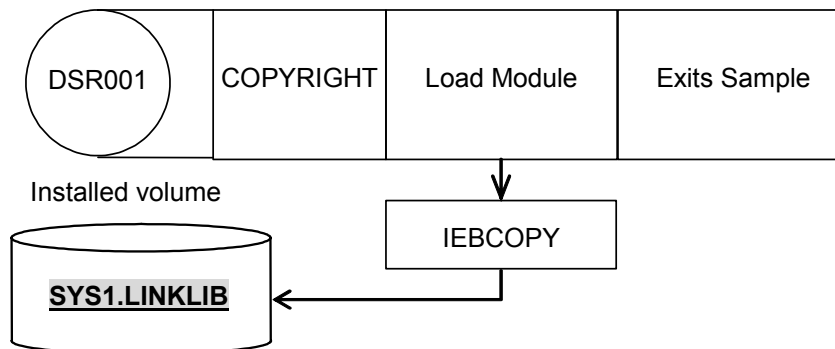


Figure 3-1 Outline of DSR Installation

Installation from the 1/2 Cartridge

1. Unload the tape files (refer to Figure 3-1).
 Installation Medium: 3490 Cartridge
 External Volume Serial Number: LVD001
 Label Format: Standard Label (SL)
 Number of Datasets/Files: 3
 File Configuration:

No.	Dataset Name	Order of Label	Contents
1	J81Y2.JCL01	(1,SL)	COPYRIGHT
2	J81Y2.LINKLIB	(2,SL)	DSR load module to install to SYS1.LINKLIB
3	J81Y2.SAMPLIB	(3,SL)	Sample source code of user exit routine

2. Perform JCL installation (see Figure 3-2).



Note: If you install this product in a library other than 'SYS1.LINKLIB', you need to register it as an authorized program library.

```

//COPYJOB JOB
//LABEL2 EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DISP=(OLD,KEEP),DSN=J81Y2.LINKLIB,UNIT=(TAPE,,DEFER),
//          VOL=SER=LVD001,LABEL=(2,SL)
//SYSUT2 DD DISP=OLD,DSN=SYS1.LINKLIB
//SYSIN DD * COPY INDD=((SYSUT1,R)),OUTDD=SYSUT2
//*
  
```

Figure 3-2 Sample JCL of DSR Installation

Installation from the PC

1. Prepare a dataset to receive data from the PC, as follows:
 - Type of format: FB
 - Length of record: 80 bytes
 - Length of block: 800 bytes
 - Primary allocation quantity: 1 cylinder
 - Secondary allocation quantity: 1 cylinder
2. Use ftp to send an unloaded format file, using the 3270 emulator software in the PC. On the TSO panel, select Send to Host.
3. On the File Send panel, specify the following items:
 - File name in the PC
 - Dataset name in the host
 - Type of transfer is binary. Need screen capture in English
 - Logical record length is 80.
4. Translate an unloaded format file from the PC to a PDS (Partition Data Set) using IEHMOVE (see Figure 3-3). When this program is executed, the DSR load modules HRULVDP and HRULVDX are produced in the PDS.
5. Copy the DSR load modules to an authorized library using IEBCOPY (see Figure 3-4)



Note: If you install this product in a library other than 'SYS1.LINKLIB', you need to register it as an authorized program library (see Figure 3-5).

```
//COPYJOB JOB
//LABEL2 EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//SYSUT1 DD DISP=OLD,DSN=DSR.LINK.TEST3
//SYSUT2 DD DISP=OLD,DSN=SYS1.LINKLIB
//SYSIN DD *
COPY INDD=( (SYSUT1,R) ),OUTDD=SYSUT2
//*
```

Figure 3-3 Copying the DSR Load Modules Using IEBCOPY


```

//LOAD      JOB MSGCLASS=X
//STEP1     EXEC PGM=IEHMOVE
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD UNIT=3390,VOL=SER=LVD82F,DISP=SHR
//DD1       DD UNIT=3390,VOL=SER=LVD82F,DISP=SHR
//DD2       DD UNIT=3390,VOL=SER=LVD82F,DISP=SHR
//SYSIN     DD *
            COPY PDS=DSR.LOAD.LVD164,
                TO=3390=LVD82F,
                FROM=3390=LVD82F,
                RENAME=DSR.LINK.TEST3
                CATLG
            X
            X
            X
            X
/*
//

```

Figure 3-4 Sample JCL Translating Unloaded Format File to Partition Data Set

```

//COPYJOB   JOB
//LABEL2    EXEC PGM=IEBCOPY
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DISP=OLD,DSN=DSR.LINK.TEST3
//SYSUT2    DD DISP=OLD,DSN=SYS1.LINKLIB
//SYSIN     DD *
            COPY INDD= ((SYSUT1,R) ),OUTDD=SYSUT2
/*
//

```

Figure 3-5 Sample JCL Copying DSR Load Modules to Authorized Library

Confirming the Utility (DSR) Version

To confirm the DSR version:

1. Check a Cartridge label, which is an install medium.
2. Check a JOB LOG. Figure 3-6 shows a format of description in JOB LOG. This format appears in each page in SYSPRINT.

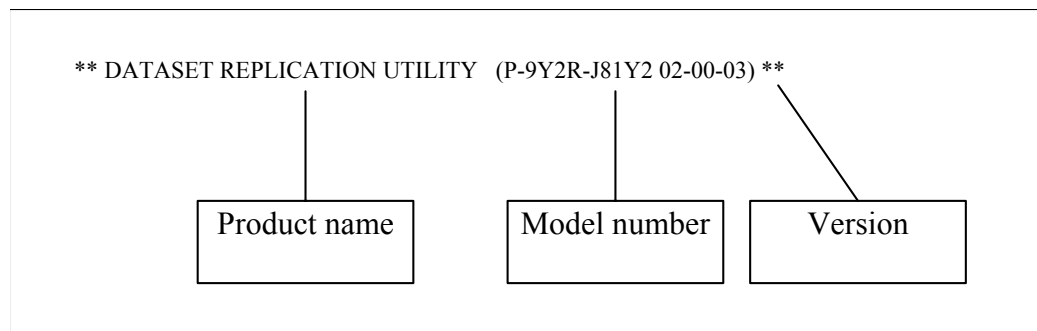


Figure 3-6 Display Format in JOB LOG

Performing DSR Operations

This chapter provides instructions and examples for completing Hitachi Dataset Replication for IBM z/OS operations.

- [JCL Examples](#)
- [User Exit Routines](#)
- [Messages](#)
- [Storage Calculations](#)



WARNING: DSR executes no special process regarding data protection. Use an exit routine and rewrite the information, if necessary.



WARNING: DSR rewrites only OS management information (VTOC, VVDS, and VTOCIX), and has no API for the application to use a target volume. Use an exit routine and rewrite the information, if necessary.

JCL Examples

Figure 4-1 shows a sample DSR system configuration. The JCL examples in the following sections are based on this sample configuration.

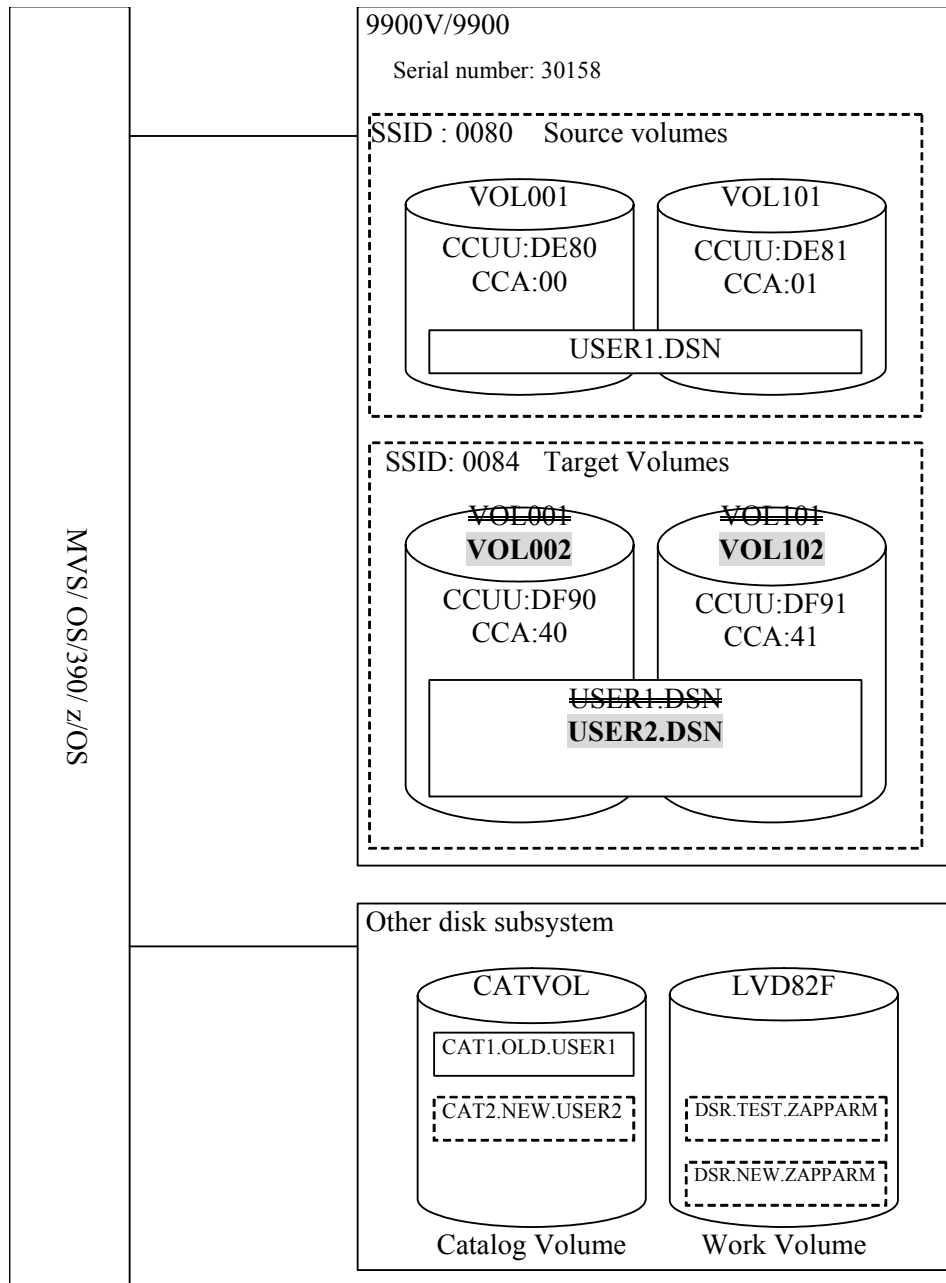


Figure 4-1 DSR System Configuration

JCL Example for Prepare Function

Figure 4-2 shows an example of JCL for the prepare function (based on sample system configuration shown in Figure 4-1).

```
//SAMPLE JOB
(1) //UTL0 EXEC PGM=HRULVDP, PARM=' FUNC (MAKEPARM) ,LINECNT (60) ', REGION=4096K
(2) //SYSRINT DD SYSOUT=*
(3) //SYSABEND DD SYSOUT=*
(4) //ZAPPARM DD DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, DISP=(NEW,KEEP),
// DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL,(1,1,10)),
// VOL=SER=DSR82F
(5) //DUMPLIST DD SYSOUT=*
(6) //WORK01 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
(7) //WORK02 DD DISP=(NEW,DELETE), DSN=&&WORK02, SPACE=(CYL(1,1)), UNIT=SYSDA,
// DCB=(BLKSIZE=12100)
(8) //SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, 30158, 00,
VOL002, DF90, 0084, 30158, 40, HMRCF, 3390)
CHGVOL(VOL101, DE81, 0080, 30158, 01,
VOL102, DF91, 0084, 30158, 41, HMRCF, 3390)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//
```

Figure 4-2 JCL Example for the Prepare Function

(1) EXEC statement

Program: Specify 'MAKEPARM' in HRULVDP (Prepare function).
Specify the region size that is calculated in [Memory Calculations](#).

(2) SYSRINT DD statement

Specify a dataset to store some messages from DSR.

(3) SYSABEND DD statement

Specify a dataset to store ABEND DUMP in case of abnormal end by DSR job.

(4) ZAPPARM DD statement

Specify a dataset to store parameters for AMASPZAP and IDCAMS utilities that are used by DSR in the divide and the unify operations.

In this example, a new dataset: "DSR.TEST.ZAPPARM" is allocated.

(5) DUMPLIST DD statement

Specify a dataset to store dump list of VVDS and VTOC. This dump list shows the replaced parts in the divide operation.

(6) WORK01 DD statement: Alternate SYSIN DD statement for ADRDSSU or AMASPZAP utility.

Specify a dataset that DSR specifies in SYSIN DD statement for ADRDSSU or AMASPZAP utility.

(7) WORK02 DD statement: Alternate SYSPRINT DD statement for ADRDSSU or AMASPZAP utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for ADRDSSU or AMASPZAP utility.



Note: You must specify DCB parameter. If you do not specify DCB parameter, the prepare function takes much time.

(8) SYSIN DD statement

Specify parameter for DSR:

CATALOG: Specify a user catalog (CAT1.OLD.USER1) used by the source volume as well as a new user catalog (CAT2.NEW.USER2) created for the target volume.

CHGVOL: Specify a volume serial number that is allocated to the source volume and the target volume, as well as other volume information. You need to specify all the volumes if a dataset is stored in several volumes.

CHGDSN: Specify a dataset name that is stored in the source volume, and specify the dataset name after a rewrite in the target volume.

JCL Example for Volume Divide Function

Figure 4-3 and Figure 4-4 show examples of JCL for the volume divide function (based on sample system configuration shown in Figure 4-1). Figure 4-3 shows an example of when volume status is NOT checked before the volume divide function. Figure 4-4 shows an example of when volume status is checked before the volume divide function.

```
//SAMPLE JOB
(1) //UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (DIVIDE) , LINECNT (60) ' , REGION=4096K
(2) //SYSPRINT DD SYSOUT=*
(3) //SYSABEND DD SYSOUT=*
(4) //ZAPPARM DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, VOL=SER=LVD82F
(5) //WORK03 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
(6) //WORK04 DD SYSOUT=*
(7) //WORK05 DD SYSOUT=*
(8) //WORK06 DD SYSOUT=*
(9) //WORK07 DD SYSOUT=*
(10) //SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, 30158, 00, -
VOL002, DF90, 0084, 30158, 40, HMRCF, 3390)
CHGVOL(VOL101, DE81, 0080, 30158, 01, -
VOL102, DF91, 0084, 30158, 41, HMRCF, 3390)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//
```

Figure 4-3 JCL Example for Divide Function (volume status not checked)

(1) EXEC statement

Program: Specify "DIVIDE" in HRULVDX (Volume divide function).
Specify the region size that is calculated in [Memory Calculations](#).

(2) SYSPRINT DD statement

Specify a dataset to store some messages from DSR.

(3) SYSABEND DD statement

Specify a dataset to store messages in case of abnormal end by DSR job.

(4) ZAPPARM DD statement

Specify a dataset, which is created on the prepare operation, to store parameters for AMASPZAP and IDCAMS utilities that are used by DSR.

(5) WORK03 DD statement: Alternate SYSIN DD statement for ICKDSF utility.

Specify a dataset that DSR specifies in SYSIN DD statement for ICKDSF utility.

(6) WORK04 DD statement: Alternate SYSPRINT DD statement for ICKDSF utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for ICKDSF utility.

(7) WORK05 DD statement: Alternate SYSPRINT DD statement for AMASPZAP utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for AMASPZAP utility.

(8) WORK06 DD statement: Alternate SYSPRINT DD statement for IDCAMS utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for IDCAMS utility.

(9) WORK07 DD statement: Alternate SYSPRINT DD statement for IEHPROG utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for IEHPROG utility.

(10) SYSIN DD statement

Specify parameter for DSR:

CATALOG: Specify a user catalog (CAT1.OLD.USER1) used by the source volume as well as a new user catalog (CAT2.NEW.USER2) created for the target volume.

CHGVOL: Specify a volume serial number that is allocated to the source volume and the target volume, as well as other volume information. You need to specify all the volumes if a dataset is stored in several volumes.

CHGDSN: Specify a dataset name that is stored in the source volume, and specify a dataset name after a rewrite in the target volume.

You may specify SYSIN file the same as the one used in the prepare operation.


```

//SAMPLE JOB
//UTL0 EXEC PGM=HRULVDP, PARM=' FUNC (MAKEPARM) , LINECNT (60) ' , REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW, KEEP) ,
// DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120) , SPACE=(CYL, (1, 1, 10)) ,
// VOL=SER=DSR82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW, DELETE) , DSN=&&WORK01, SPACE=(CYL(1, 1)) , UNIT=SYSDA
//WORK02 DD DISP=(NEW, DELETE) , DSN=&&WORK02, SPACE=(CYL(1, 1)) , UNIT=SYSDA,
// DCB=(BLKSIZE=12100)
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, 30158, 00, -
VOL002, DF90, 0084, 30158, 40, HMRCF, 3390)
CHGVOL(VOL101, DE81, 0080, 30158, 01, -
VOL102, DF91, 0084, 30158, 41, HMRCF, 3390)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (DIVIDE) , LINECNT (60) ' , REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
(1) //ZAPPARM DD DISP=SHR, DSN=DSR.NEW.ZAPPARM, VOL=SER=LVD82F
(2) //ZAPOLD DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, VOL=SER=LVD82F
//WORK03 DD DISP=(NEW, DELETE) , DSN=&&WORK01, SPACE=(CYL(1, 1)) , UNIT=SYSDA
//WORK04 DD SYSOUT=*
//WORK05 DD SYSOUT=*
//WORK06 DD SYSOUT=*
//WORK07 DD SYSOUT=*
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, -
CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, 30158, 00, -
VOL002, DF90, 0084, 30158, 40, HMRCF, 3390)
CHGVOL(VOL101, DE81, 0080, 30158, 01, -
VOL102, DF91, 0084, 30158, 41, HMRCF, 3390)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//

```

Figure 4-4 JCL Example for Divide Function (volume status is checked)

(1) ZAPPARM DD statement

Specify a dataset to store parameters for AMASPZAP and IDCAMS utilities that are used by DSR.

The sample above shows the latest parameter created by the prepare function (corresponding to step: UTL0) before the execution of the volume divide function.

(2) ZAPOLD DD statement

Specify the dataset you have created in advance to store the parameters for AMASPZAP and IDCAMS utilities.

You should check whether the dataset is right.

DSR compares the datasets that are specified in ZAPPARM and ZAPOLD parameters. If the results of the comparison disagree, DSR stops the process.

JCL Example for Volume Unify Function

Figure 4-5 shows an example of JCL for the volume unify function (based on sample system configuration shown in Figure 4-1).

```
//SAMPLE JOB
(1) //UTL2 EXEC PGM=HRULVDX, PARM=' FUNC (UNIFY) , LINECNT (60) ' , REGION=4096K
(2) //SYSPRINT DD SYSOUT=*
(3) //SYSABEND DD SYSOUT=*
(4) //ZAPPARM DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, VOL=SER=LVD82F
(5) //WORK03 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
(6) //WORK04 DD SYSOUT=*
(7) //WORK05 DD SYSOUT=*
(8) //WORK06 DD SYSOUT=*
(9) //SYSIN DD *
    CATALOG (CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
    CHGVOL (VOL001, DE80, 0080, 30158, 00, -
            VOL002, DF90, 0084, 30158, 40, HMRCF, 3390)
    CHGVOL (VOL101, DE81, 0080, 30158, 01, -
            VOL102, DF91, 0084, 30158, 41, HMRCF, 3390)
    CHGDSN (USER1.DSN, USER2.DSN)
/*
//
```

Figure 4-5 JCL Example for Unify Function

(1) EXEC statement

Program: Specify "UNIFY" in HRULVDX (Volume unify function).
Specify the region size that is calculated in [Memory Calculations](#).

(2) SYSPRINTDD statement

Specify a dataset to store some messages from DSR.

(3) SYSABEND DD statement

Specify a dataset to store ABEND DUMP in case of abnormal end by DSR job.

(4) ZAPPARM DD statement

Specify a dataset, which is created in the prepare operation, to store the parameters for AMASPZAP and IDCAMS utilities that are used by DSR.

(5) WORK03 DD statement: Alternate SYSIN DD statement for ICKDSF utility.

Specify a dataset that DSR specifies in SYSIN DD statement for ICKDSF utility.

(6) WORK04 DD statement: Alternate SYSPRINT DD statement for ICKDSF utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for ICKDSF utility.

(7) WORK05 DD statement: Alternate SYSPRINT DD statement for AMASPZAP utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for AMASPZAP utility.

(8) WORK06 DD statement: Alternate SYSPRINT DD statement for IDCAMS utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for IDCAMS utility.

(9) SYSIN DD statement

Specify parameter for DSR:

CATALOG: Specify a user catalog (CAT1.OLD.USER1) used by the source volume and a new user catalog (CAT2.NEW.USER2) created for the target volume.

CHGVOL: Specify a volume serial number that is allocated to the source volume and the target volume, as well as other volume information. You need to specify all the volumes if a dataset is stored in several volumes.

CHGDSN: Specify a dataset name that is stored in the source volume and a dataset name after a rewrite in the target volume.

You may specify SYSIN file the same as the one used in the prepare operation.

JCL Example for Volume Backup Function

Figure 4-6 shows an example of JCL for the volume backup function (based on sample system configuration shown in Figure 4-1).

```
//SAMPLE JOB
(1) //UTL2 EXEC PGM=HRULVDX, PARM=' FUNC (BACKUP) , LINECNT (60) '
(2) //SYSPRINT DD SYSOUT=*
(3) //SYABEND DD SYSOUT=*
(4) //WORK03 DD DISP=(NEW,DELETE) , DSN=&&WORK01 , SPACE=(CYL(1,1)) , UNIT=SYSDA
(5) //WORK04 DD SYSOUT=*
(6) //SYSIN DD *
CHGVOL(VOL001,DE80,0080,30158,00, -
VOL002,DE90,0084,30158,40,HMRCF,3390)
CHGVOL(VOL101,DE81,0080,30158,01, -
VOL102,DE91,0084,30158,41,HMRCF,3390)
//
```

Figure 4-6 JCL Example for Backup Function

(1) EXEC statement

Program: Specify "BACKUP" in HRULVDX (Volume backup function). Specify the region size that is calculated in [Memory Calculations](#).

(2) SYSPRINTDD statement

Specify a dataset to store some messages from DSR.

(3) SYSABEND DD statement

Specify a dataset to store ABEND DUMP in case of abnormal end by DSR job.

(4) WORK03 DD statement: Alternate SYSIN DD statement for ICKDSF utility.

Specify a dataset that DSR specifies in SYSIN DD statement for ICKDSF utility.

(5) WORK04 DD statement: Alternate SYSPRINT DD statement for ICKDSF utility.

Specify a dataset that DSR specifies in SYSPRINT DD statement for ICKDSF utility.

(6) SYSIN DD statement

Specify a parameter for DSR:

CHGVOL: Specify a volume serial number that is allocated to the source volume and the target volume, as well as other volume information.

JCL Example for Volume Unify after Volume Backup Function

Figure 4-7 shows an example of JCL for the volume unify function after volume backup (based on sample system configuration shown in Figure 4-1). Example of JCL for the volume unify function after the volume backup function can use the same DD statement and SYSIN data as the example of JCL for volume backup function. The function name of UNIFY should be specified in PARM statement only.

```
//SAMPLE JOB
(1) //UTL2 EXEC PGM=HRULVDX, PARM=' FUNC (UNIFY) , LINECNT (60) '
(2) //SYSPRINT DD SYSOUT=*
(3) //SYABEND DD SYSOUT=*
(4) //WORK03 DD DISP=(NEW, DELETE) , DSN=&&WORK01 , SPACE=(CYL(1,1)) , UNIT=SYSDA
(5) //WORK04 DD SYSOUT=*
(6) //SYSIN DD *
    CHGVOL(VOL001,DE80,0080,30158,00, -
           VOL002,DE90,0084,30158,40,HMRCF,3390)
    CHGVOL(VOL101,DE81,0080,30158,01, -
           VOL102,DE91,0084,30158,41,HMRCF,3390)
//
```

Figure 4-7 JCL Example for Unify Function after Volume Backup

Other JCL Examples

Example 1:

If COPY (YES) option is specified, DSR executes initial copy by using PPRC command. This example shows that three target volumes are created for VOL001 of the source volume. The first pair (1) executes initial copy and divide operation. The second and third pairs [(2) and (3)] execute initial copy only, because NOP option is specified in each CHGVOL parameter. Third pair (3) is waiting for completion of initial copy, because WAIT option is specified in CHGVOL parameter. Other volume pairs [(1) and (2)] are changed from simplex status to split status immediately.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (DIVIDE) , COPY (YES) ' , REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, VOL=SER=LVD82F
//WORK03 DD DISP=(NEW,DELETE) , DSN=&&WORK01, SPACE=(CYL(1,1)) , UNIT=SYSDA
//WORK04 DD SYSOUT=*
//WORK05 DD SYSOUT=*
//WORK06 DD SYSOUT=*
//WORK07 DD SYSOUT=*
//SYSIN DD *
    CATALOG (CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
(1) CHGVOL (VOL001, DE80, 0080, 30158, 00, -
      VOL002, DF90, 0084, 30158, 40, HMRCF, 3390)
(2) CHGVOL (VOL001, DE80, 0080, 30158, 00, -
      VOL003, DF92, 0084, 30158, 42, HMRCF, 3390, NOP)
(3) CHGVOL (VOL001, DE80, 0080, 30158, 00, -
      VOL004, DF93, 0084, 30158, 43, HMRCF, 3390, NOP, WAIT)
    CHGVOL (VOL101, DE81, 0080, 30158, 01, -
      VOL102, DF91, 0084, 30158, 41, HMRCF, 3390)
    CHGDSN (USER1.DSN, USER2.DSN)
/*
//
```

Example 2:

If TrueCopy Synchronous pair is the target of the divide function, you should specify HRC option in CHGVOL parameter. This example JCL shows the case of TrueCopy Synchronous pair.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (DIVIDE) , COPY (YES) ' , REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, VOL=SER=LVD82F
//WORK03 DD DISP=(NEW, DELETE) , DSN=&&WORK01, SPACE=(CYL(1,1)) , UNIT=SYSDA
//WORK04 DD SYSOUT=*
//WORK05 DD SYSOUT=*
//WORK06 DD SYSOUT=*
//WORK07 DD SYSOUT=*
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, 30158, 00, -
VOL002, DF90, 0084, 30158, 40, HRC, 3390)
CHGVOL(VOL101, DE81, 0080, 30158, 01, -
VOL102, DF91, 0084, 30158, 41, HRC, 3390)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//
```

Example 3:

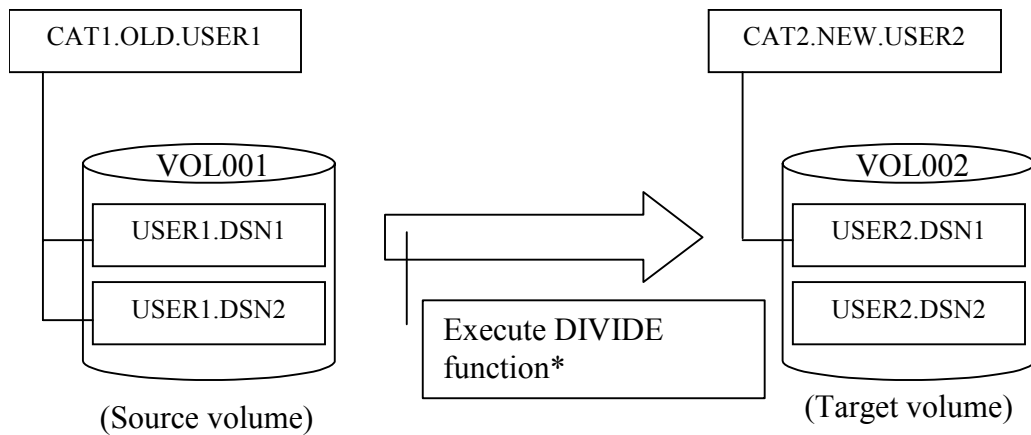
If TrueCopy Asynchronous pair is the target of the divide function, you should specify HRCA option and special order ("AGxx0") in CHGVOL parameter. This example JCL shows the case of TrueCopy Asynchronous pair. The volume pairs belong to X'15' of consistency group ID. A first job step, which is UTL1, executes an initial copy, and a second job step, which is UTL2, executes a divide operation.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (DIVIDE) , COPY (YES) ' , REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, VOL=SER=LVD82F
//WORK03 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
//WORK04 DD SYSOUT=*
//WORK05 DD SYSOUT=*
//WORK06 DD SYSOUT=*
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, AG150, 00, -
VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
CHGVOL(VOL101, DE81, 0080, AG150, 01, -
VOL102, DF91, 0084, 30158, 41, HRCA, 3390, NOP)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//UTL2 EXEC PGM=HRULVDX, PARM=' FUNC (DIVIDE) ' , REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DISP=SHR, DSN=DSR.TEST.ZAPPARM, UNIT=SYSDA, VOL=SER=LVD82F
//WORK03 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
//WORK04 DD SYSOUT=*
//WORK05 DD SYSOUT=*
//WORK06 DD SYSOUT=*
//WORK07 DD SYSOUT=*
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, AG150, 00, -
VOL002, DF90, 0084, 30158, 40, HRCA, 3390)
CHGVOL(VOL101, DE81, 0080, AG150, 01, -
VOL102, DF91, 0084, 30158, 41, HRCA, 3390)
CHGDSN(USER1.DSN, USER2.DSN)
/*
//
```


Example 4:

This example shows the usage of SELECT parameter. If SELECT parameter is specified, DSR creates only a parameter to define a dataset specified by SELECT parameter to a temporary catalog. In case of this JCL, DSR renames HQL (High Level Qualifier), which is 'USER1', to 'USER2' in the target volume and registers 'USER2.DSN1' to the temporary catalog, which is 'CAT2.NEW.USER2'.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARAM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW,KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL,(1,1,10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW,DELETE), DSN=&&WORK02, SPACE=(CYL(1,1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100)
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, AG150, 00, -
        VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
CHGDSN(USER1, USER2)
SELECT(CAT1.OLD.USER1, USER1.DSN1)
/*
//
```

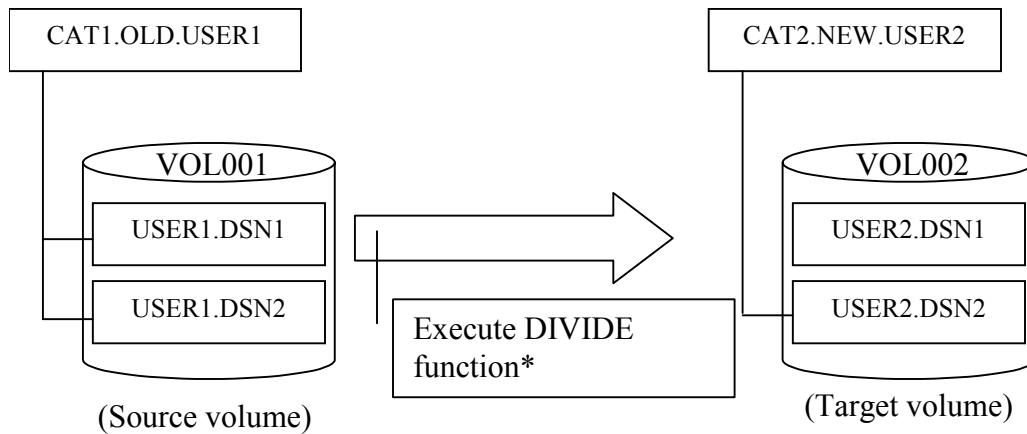


* When a user executes DIVIDE function, the user should specify the same dataset of ZAPPARM DD statement as MAKEPARAM function.

Example 5:

This example shows the usage of EXCLUDE parameter. If EXCLUDE parameter is specified, DSR does not create a parameter to define a dataset specified by EXCLUDE parameter to a temporary catalog. In case of this JCL, DSR renames HQL (High Level Qualifier), which is 'USER1', to 'USER2' in the target volume and does not register 'USER2.DSN1' to the temporary catalog, which is 'CAT2.NEW.USER2'.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARAM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW,KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL,(1,1,10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW,DELETE), DSN=&&WORK02, SPACE=(CYL(1,1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100)
//SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, AG150, 00, -
        VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
CHGDSN(USER1, USER2)
EXCLUDE(CAR1.OLD.USER1, USER1.DSN1)
/*
//
```

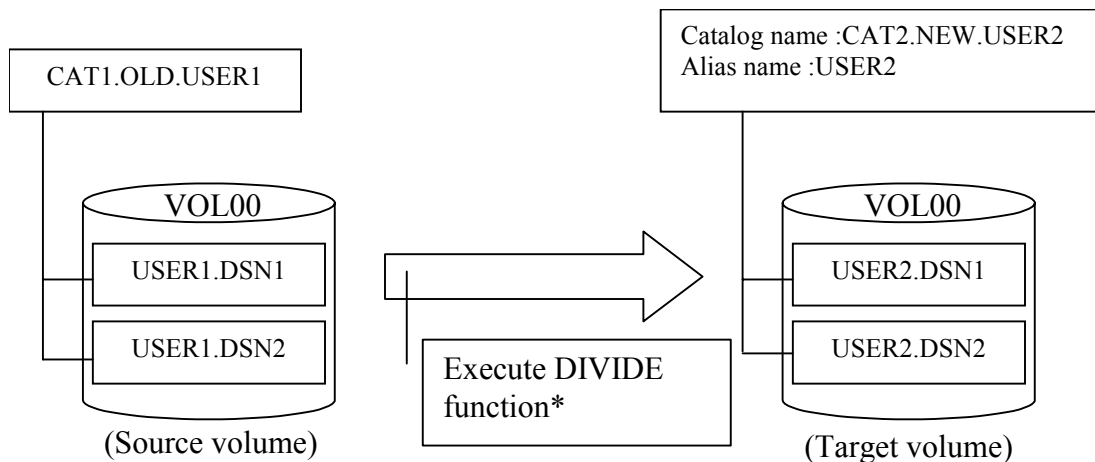


* When a user executes DIVIDE function, the user should specify the same dataset of ZAPPARM DD statement as MAKEPARAM function.

Example 6:

This example shows the usage of ALIAS parameter. If ALIAS parameter is specified, DSR creates a parameter to define an alias name specified by ALIAS parameter to a temporary catalog. In case of this JCL, DSR renames HQL (High Level Qualifier), which is 'USER1', to 'USER2' in target volume and registers 'USER2.DSN1' and 'USER2.DSN2' to the temporary catalog, which is 'CAT2.NEW.USER2'. And then DSR defines an alias name, which is 'USER2', to the temporary catalog.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW, KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL, (1, 1, 10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW, DELETE), DSN=&&WORK01, SPACE=(CYL(1, 1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW, DELETE), DSN=&&WORK02, SPACE=(CYL(1, 1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100) //SYSIN DD *
CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
CHGVOL(VOL001, DE80, 0080, AG150, 00, -
VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
CHGDSN(USER1, USER2)
ALIAS (CAR2 .NEW .USER2, USER2)
/*
//
```

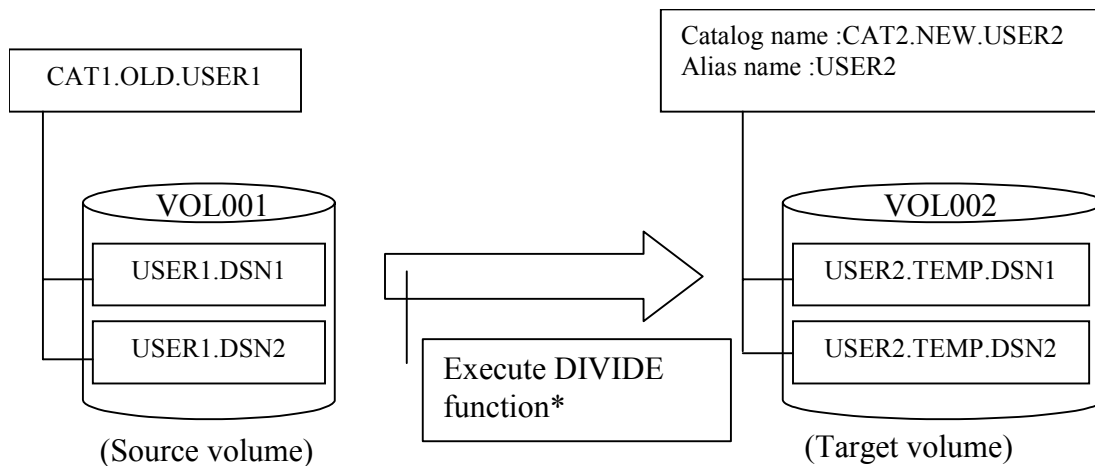


* When a user executes DIVIDE function, the user should specify the same dataset of ZAPPARM DD statement as MAKEPARM function.

Example 7:

This example shows the usage of CHGDSN parameter. If the third operand of CHGDSN parameter is specified, DSR extends a dataset name in the target volume. In case of this JCL, DSR renames HQL (High Level Qualifier), which is 'USER1', to 'USER2.TEMP' in the target volume and registers 'USER2.TEMP.DSN1' and 'USER2.TEMP.DSN2' to the temporary catalog, which is 'CAT2.NEW.USER2'.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARAM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW,KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL,(1,1,10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW,DELETE), DSN=&&WORK02, SPACE=(CYL(1,1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100)
//SYSIN DD *
          CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
          CHGVOL(VOL001, DE80, 0080, AG150, 00, -
                VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
          CHGDSN(USER1, , USER2.TEMP)
          ALIAS(CAT2.NEW.USER2, USER2)
/*
//
```

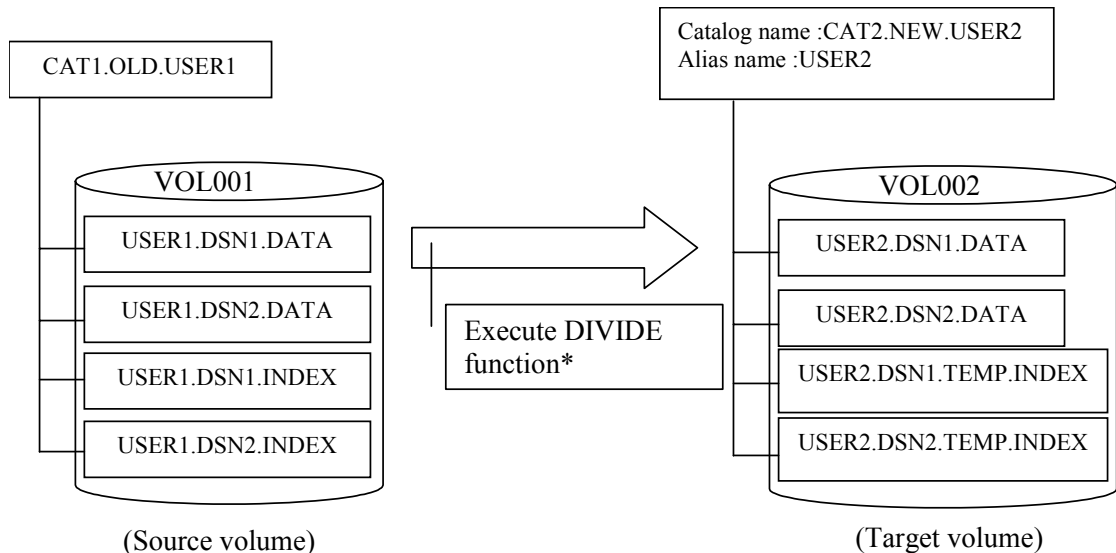


* When a user executes DIVIDE function, the user should specify the same dataset of ZAPPARM DD statement as MAKEPARAM function.

Example 8:

This example shows the usage of CHGDSN parameter. If CHGDSN parameter with the wildcard option is specified, DSR renames plural dataset names, which match to the content of CHGDSN parameter, in the target volume. In case of this JCL, DSR renames 'USER1.*.DATA' to 'USER2.*.DATA' in the target volume and extends 'USER1.*.INDEX' to 'USER2.*.TEMP.INDEX' in the target volume. And then DSR registers these datasets to the temporary catalog, which is 'CAT2.NEW.USER2'.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW, KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL, (1, 1, 10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW, DELETE), DSN=&&WORK01, SPACE=(CYL(1, 1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW, DELETE), DSN=&&WORK02, SPACE=(CYL(1, 1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100)
//SYSIN DD *
          CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
          CHGVOL(VOL001, DE80, 0080, AG150, 00, -
                VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
          CHGDSN(USER1.*.DATA, USER2.*.DATA)
          CHGDSN(USER1.*.INDEX, USER2.*.TEMP.INDEX)
          ALIAS(CAT2.NEW.USER2, USER2)
/*
//
```

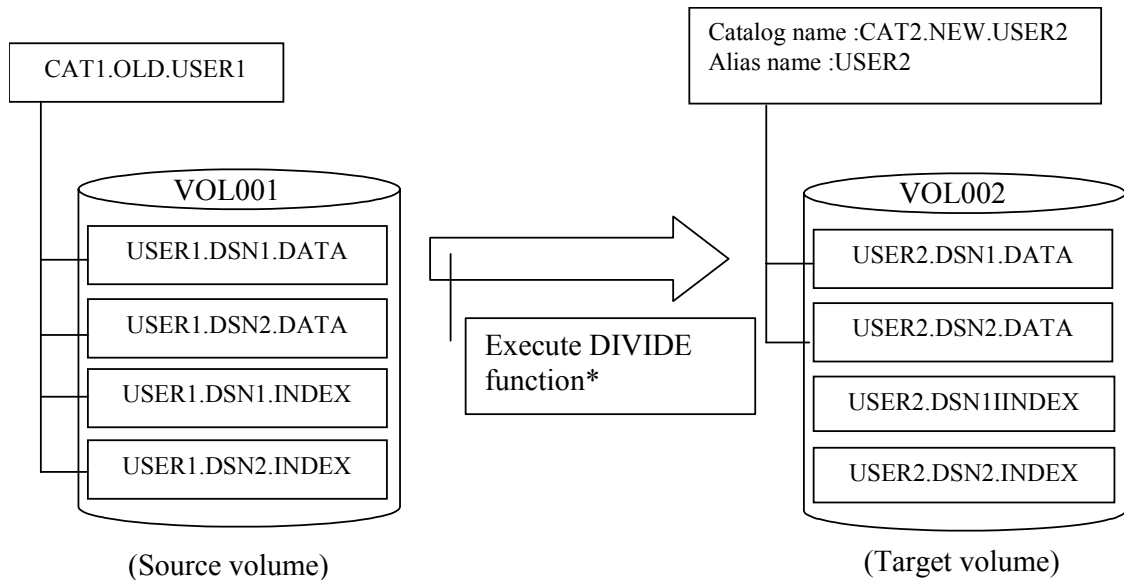


* When a user executes DIVIDE function, the user should specify the same dataset of ZAPPARM DD statement as MAKEPARM function.

Example 9:

This example shows the usage of CHGDSN and SELECT parameter. If both CHGDSN and SELECT with the wildcard option is specified, DSR registers plural dataset names, which match to the content of SELECT parameter, to the temporary catalog. In case of this JCL, DSR renames the datasets from 'USER1' to 'USER2' and selects 'USER1.*.DATA' in the source volume. And then DSR registers 'USER2.*.DATA' in the target volume to the temporary catalog, which is 'CAT2.NEW.USER2'.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW, KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL, (1, 1, 10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW, DELETE), DSN=&&WORK01, SPACE=(CYL(1, 1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW, DELETE), DSN=&&WORK02, SPACE=(CYL(1, 1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100)
//SYSIN DD *
          CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
          CHGVOL(VOL001, DE80, 0080, AG150, 00, -
                VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
          CHGDSN(USER1, USER2)
          SELECT(CAT1.OLD.USER1, USER1.*.DATA)
          ALIAS(CAT2.NEW.USER2, USER2)
/*
//
```

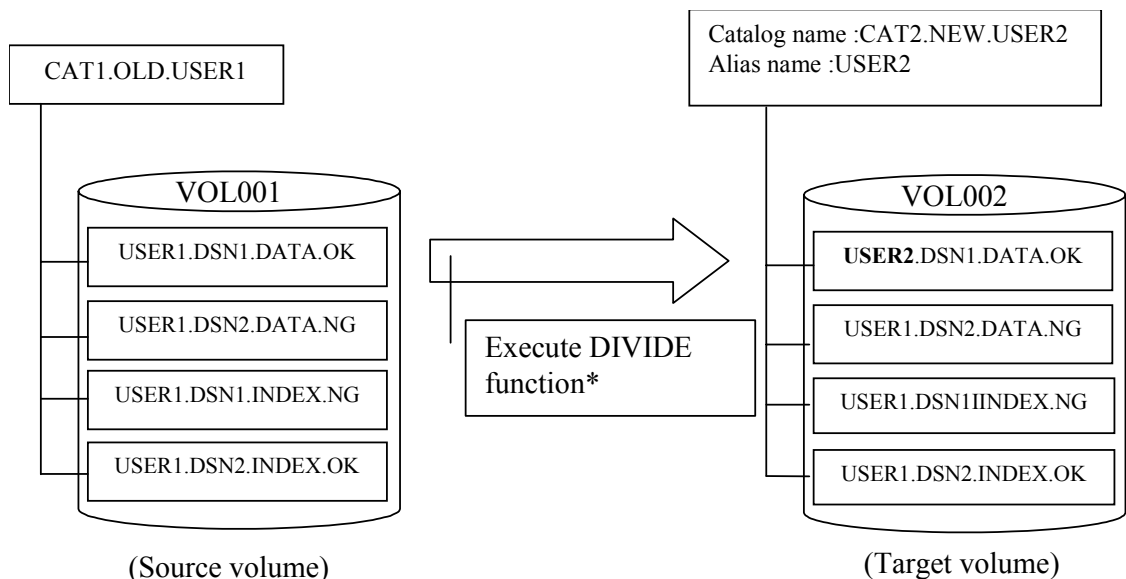


* When a user executes DIVIDE function, the user must specify the same dataset of ZAPPARM DD statement as MAKEPARM function.

Example 10:

This example shows the usage of CHGDSN and CHGSELECT/CHGEXCLUDE parameter. If both CHGDSN and CHGSELECT/CHGEXCLUDE with the wildcard option is specified, DSR renames plural dataset names, which match to the content of CHGSELECT/CHGEXCLUDE parameter, and all datasets existing in target volume are register to the temporary catalog. In case of this JCL, DSR applies the content of CHGDSN, which is renamed from 'USER1' to 'USER2', to dataset that has 'USER1.DATA1' in prefix and does not has 'NG' in suffix.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (MAKEPARAM) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=DSR.NEW.ZAPPARM, UNIT=SYSDA, DISP=(NEW,KEEP),
//          DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120), SPACE=(CYL,(1,1,10)),
//          VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//CDSNLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW,DELETE), DSN=&&WORK01, SPACE=(CYL(1,1)), UNIT=SYSDA
//WORK02 DD DISP=(NEW,DELETE), DSN=&&WORK02, SPACE=(CYL(1,1)), UNIT=SYSDA,
//          DCB=(BLKSIZE=12100)
//SYSIN DD *
          CATALOG(CAT1.OLD.USER1, CAT2.NEW.USER2, CATVOL, 20, 5, 3390)
          CHGVOL(VOL001, DE80, 0080, AG150, 00, -
                VOL002, DF90, 0084, 30158, 40, HRCA, 3390, NOP)
          CHGDSN(USER1, USER2)
          CHGSELECT(CAT1.OLD.USER1, USER1.DSN1)
          CHGEXCLUDE(CAT1.OLD.USER1, *.*.*.NG)
          ALIAS(CAT2.NEW.USER2, USER2)
/*
//
```

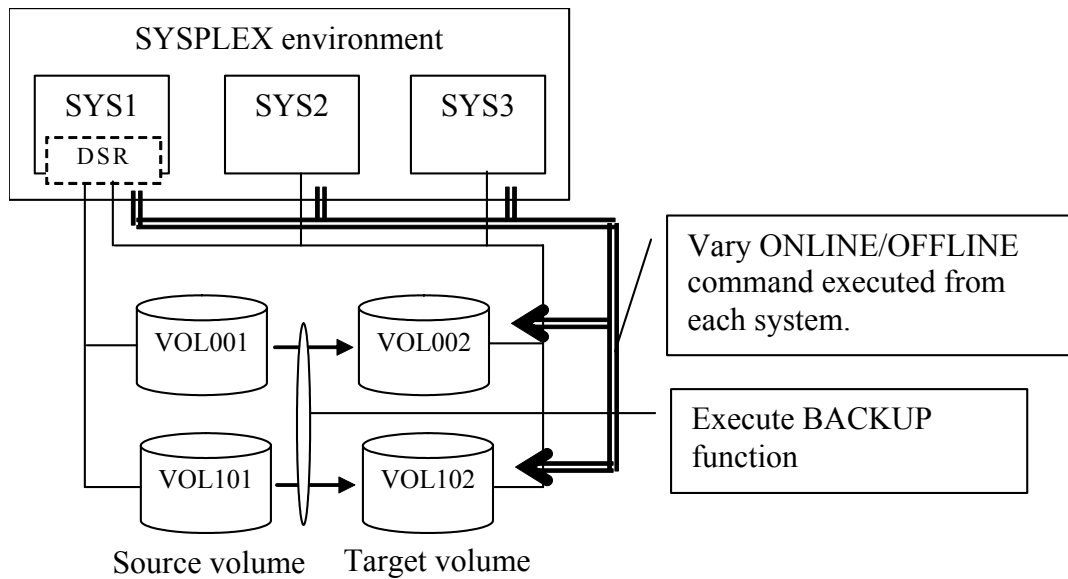


* When a user executes DIVIDE function, the user must specify the same dataset of ZAPPARM DD statement as MAKEPARAM function.

Example 11:

This example shows the usage of ROUTE parameter. If SYSPLEX environment is constructed, DSR issues 'VARY device ONLINE/OFFLINE' system command to other system by using ROUTE system command. In case of this JCL, DSR issues VARY ONLINE command from SYS1 system. And then VARY command is issued from all the systems (SYS1, SYS2 and SYS3) that consist of SYSPLEX environment based on specifying ROUTE parameter.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (BACKUP) ,LINECNT (60) '
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//WORK03 DD DISP=(NEW,DELETE), DSN=&&WORK01,SPACE=(CYL(1,1)),UNIT=SYSDA
//WORK04 DD SYSOUT=*
//SYSIN DD *
CHGVOL(VOL001,DE80,0080,30158,00,-
VOL002,DE90,0084,30158,40,HMRCF,3390)
CHGVOL(VOL101,DE81,0080,30158,01,-
VOL102,DE91,0084,30158,41,HMRCF,3390)
ROUTE(*ALL)
//
```



Example 12:

This example shows the usage of CHGVOL parameter if controller emulation is 2105 type. When volume pair is controlled by 2105 type, user must specify LCU (logical control unit) number for each volume (source and target volumes) by using CHGVOL parameter. When source and target volumes exist in LCU: 00, user specify '00' in CHGVOL parameter like as sample JCL.

```
//SAMPLE JOB
//UTL1 EXEC PGM=HRULVDX, PARM=' FUNC (BACKUP) , LINECNT (60) '
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//WORK03 DD DISP=(NEW,DELETE) , DSN=&&WORK01, SPACE=(CYL(1,1)) , UNIT=SYSDA
//WORK04 DD SYSOUT=*
//SYSIN DD *
CHGVOL(VOL001,DE80,0080,30158,00, -
VOL002,DE90,0084,30158,40,HMRCF,3390,,,00,00)
CHGVOL(VOL101,DE81,0080,30158,01, -
VOL102,DE91,0084,30158,41,HMRCF,3390,,,00,00)
//
```

User Exit Routines

Table 4-1 lists and describes the user exit routines. For the sequence and timing which DSR calls each exit routine, refer to [Volume Divide Function](#), [Volume Backup Function](#), and [Volume Unify Function](#).

Table 4-1 User Exit Routines

User Exit Routine	Call Timing	Meaning
HRULVDUA	DSR calls this exit routine after DSR splits a source volume and a target volume.	DSR does not need the source volume. DSR calls this exit routine after each volume completes the process.
HRULVDUB	DSR calls this exit routine after DSR rewrites the volume serial number and the dataset name in the target volume.	DSR completes rewriting OS management information in the target volume. DSR calls this exit routine after each volume completes the process.
HRULVDOC	DSR calls this exit routine after DSR creates and registers datasets in the target volume.	DSR completes all the volume divide function process. DSR calls this exit routine after each volume completes the process.
HRULVDU1	DSR calls this exit routine after DSR executes the volume unify function.	DSR does not need the source volume. DSR calls this exit routine after each volume completes the process.
HRULVDUZ	DSR calls this exit routine after DSR completes all process.	Complete the volume divide function or the volume unify function.

Usage of user exits:

- **Load:** DSR loads a user exit routine when you register them in LINK library or LPA library.
- **Connection to a user exit routine:** Each user exit routine must be registered in the authorized program library. Calling attributes must be reentrant and reusable.

DSR calls the exit routine with 8 as a protection key and a storage protection key of a program, and the execution mode is AMODE=31 (RMODE=ANY).

- **Register:** DSR stores information in the following registers:
 Register 1 DSR stores a top of the address in a parameter list.
 Register 0,2-12 Reserved
 Register 13 Address of register stored area
 Register 14 Return address
 Register 15 Entry address

HRULVDUA

- **Purpose**

You can use this exit point to restart a job that uses a source volume. DSR does not access the source volume after this point.

- **Register library**

Register this exit routine in a Link List or LPA List dataset or a dataset concatenated to "SYS1.LINKLIB" or "SYS1.LPALIB".

- **Attributes**

- Authorized program, reentry and reusable attributes.
- Protection key and Storage protection key of a program: 8
- Execution mode: AMODE = 31, RMODE = ANY

- **Entry name**

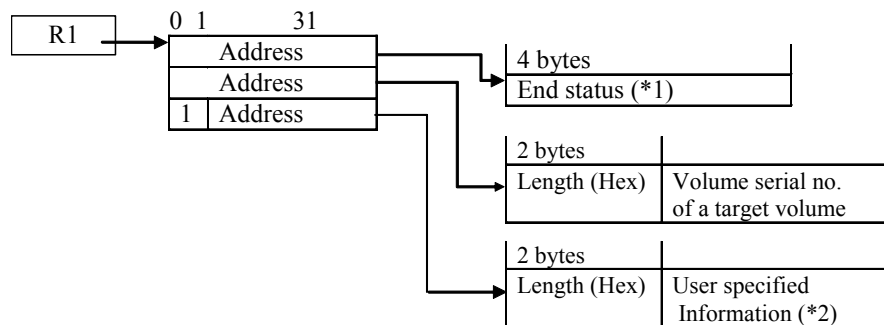
HRULVDUA

- **Call timing**

DSR calls this exit routine right after splitting a source and target volume.

- **Register contents**

(a) Register 1 at the top of the address in the parameter list.



*1 End status:

0x00 : Normal end (Successful)

0x04 : Abnormal end, a volume divide process is failed.

*2 User specified information:

Max. length: 8 characters (bytes). If less than 8 bytes, DSR inserts spaces.

(b) Register 13: Address of register stored area.

(c) Register 14: Return address

(d) Register 15: Entry address

- **Output:** None



Note: This exit point is called for every volume.

HRULVDUB

- **Purpose**

You can use this exit routine to restart a job that uses a source volume, or to start other jobs.

DSR completes rewriting the OS management information in a target volume.

- **Register library**

Register this exit routine in a Link List or LPA List dataset or a dataset concatenated to "SYS1.LINKLIB" or "SYS1.LPALIB"

- **Attributes**

- Authorized program, reentry and reusable attributes.
- Protection key and Storage protection key of a program: 8
- Execution mode: AMODE = 31, RMODE = ANY

- **Entry name**

HRULVDUB

- **Call timing**

DSR calls this exit routine immediately after DSR updates all the dataset names in a target volume.

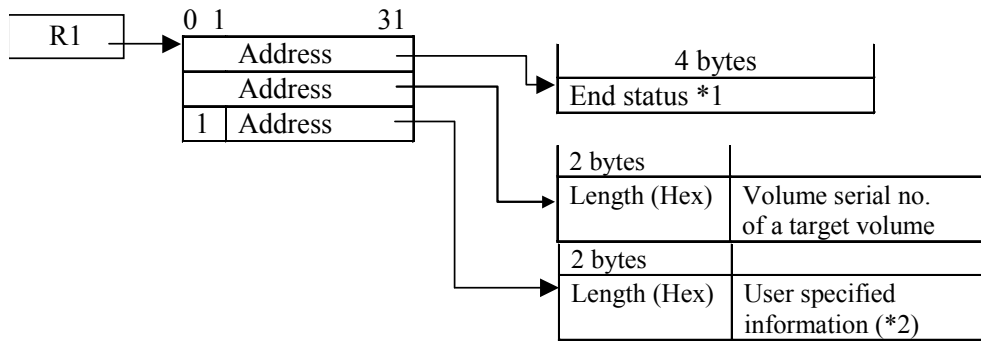
- **Register contents**

- (a) Register 1: A top of the address in the parameter list.
- (b) Register 13: Address of register stored area.
- (c) Register 14: Return address
- (d) Register 15: Entry address

- **Output:** None



Note: This exit point is called for every volume.



*1 End status:

0x00 : Normal end (Successful)

0x04 : Abnormal end

DSR detected either of the following errors:

- DSR failed to change a volume serial number of a target volume, or
- A change in device status to online.

*2 User-specified information:

Maximum length is 8 characters (bytes). If less than 8 bytes, DSR inserts spaces.

HRULVDUC

- **Purpose**

You can use this exit routine to restart a job that uses a source volume, or start other jobs that use a target volume.

DSR completes all the process for a target volume.

- **Register library**

Register this exit routine in a Link List or LPA List dataset or a dataset concatenated to "SYS1.LINKLIB" or "SYS1.LPALIB".

- **Attributes**

- Authorized program, reentry and reusable attributes.
- Protection key and Storage protection key of a program: 8
- Execution mode: AMODE = 31, RMODE = ANY

- **Entry name**

HRULVDUC

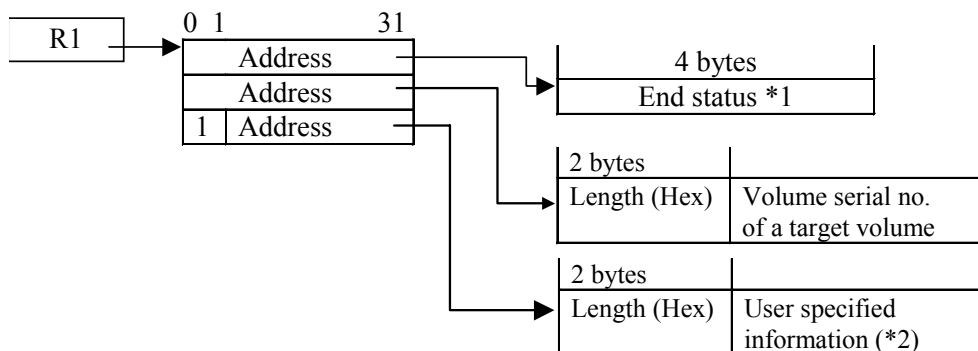
- **Call timing**

DSR calls this exit routine immediately after DSR registers all the datasets in a target volume in a user catalog.

- **Register contents**

(a) Register 1

A top of address in the parameter list.



*1 End status:

0x00 : Normal end (Successful): DSR could register all datasets in a target volume to a user catalog.

0x04 : Abnormal end: DSR failed to register the dataset in a target volume.

*2 User specified information:

Max. length is 8 characters (bytes). If less than 8 bytes, DSR inserts spaces.

- (b) Register 13: Address of register stored area
- (c) Register 14: Return address
- (d) Register 15: Entry address
- **Output:** None



Note: This exit point is called for every volume.

For processing multiple volume datasets and alternate index, use HRULVDUZ exit point because the catalog registration is not completed.

HRULVDU1

- **Purpose**

You can use this exit point to start a job when executing the volume unify function. DSR does not need a target volume.

- **Register library**

Register this exit routine in a Link List or LPA List dataset or a dataset concatenated to "SYS1.LINKLIB" or "SYS1.LPALIB".

- **Attributes**

Authorized program, reentry and reusable attributes.

Protection key and Storage protection key of a program: 8

Execution mode: AMODE = 31, RMODE = ANY

- **Entry name**

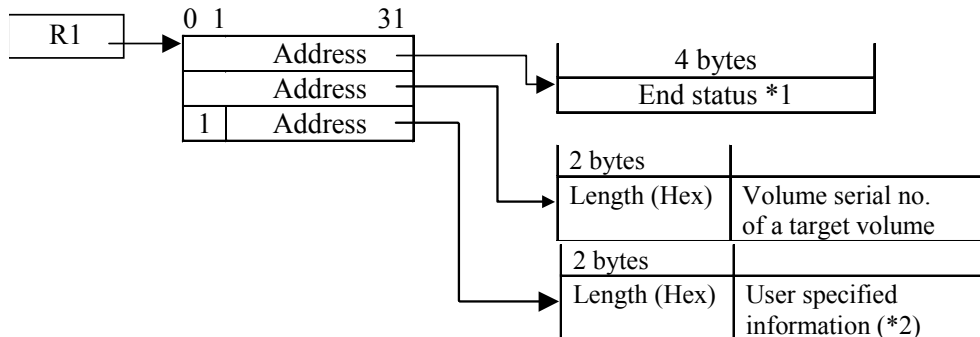
HRULVDU1

- **Call timing**

DSR calls this exit routine immediately after DSR changes the device status to offline.

- **Register contents**

(a) Register 1: A top of address in the parameter list.



*1 End status:

0x00 : Normal end (Successful)

- DSR could delete the user catalog that is created at the volume divide function.
- DSR could change the device status to offline.
- DSR could execute a resynchronize command to the storage system.

0x04 : Abnormal end

- DSR failed to delete the user catalog and to change the device status to offline.
- DSR failed to execute a resynchronize command to the storage system.

*2 User specified information:
Maximum length is 8 characters (bytes). If less than 8 bytes, DSR inserts spaces.

- (b) Register 13: Address of register stored area.
- (c) Register 14: Return address
- (d) Register 15: Entry address
- **Output:** None



Note: This exit routine is called for every volume.

HRULVDUZ

- **Purpose**

You can use this exit routine to start a job. DSR finishes all the process at this point.

- **Register library**

Register this exit routine in a Link List or LPA List dataset or a dataset concatenated to "SYS1.LINKLIB" or "SYS1.LPALIB".

- **Attributes**

Authorized program, reentry and reusable attributes.

Protection key and Storage protection key of a program: 8

Execution mode: AMODE = 31, RMODE = ANY.

- **Entry name**

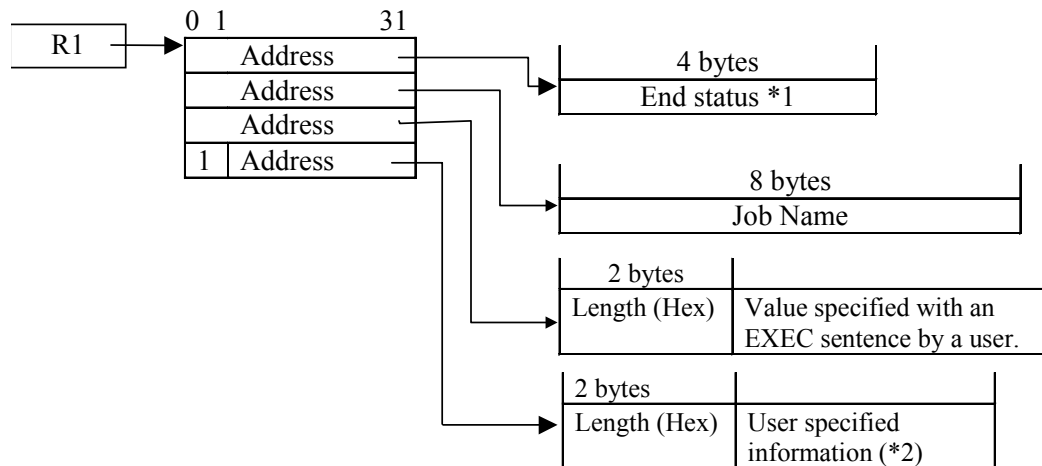
HRULVDUZ

- **Call timing**

DSR calls this exit routine immediately after DSR completes all the process.

- **Register contents**

(a) Register 1: A top of address in the parameter list.



*1 End status:

0x00 : Normal end (Successful): DSR completes all the process.

0x04 : Abnormal end: DSR detects some errors and stops the process.

*2 User specified information:

Maximum length is 8 characters (bytes). If less than 8 bytes, DSR inserts spaces.

- (b) Register 13: Address of register stored area.
- (c) Register 14: Return address
- (d) Register 15: Entry address

- **Output:** None



Note: This exit point is called when all the process is completed. But DSR does not call the exit point when DSR detects parameter errors or initial errors, and so on.

Error Message in an Exit Routine

DSR displays a message: LVD099I when DSR detects some errors in an exit routine that is made by a user (see Figure 4-8).

```
15.02.58 JOB07588 ---- WEDNESDAY, 06 JAN 1999 ----
15.02.58 JOB07588 IRR010I USERID IUSER4 IS ASSIGNED TO THIS JOB.
15.02.59 JOB07588 ICH70001I IUSER4 LAST ACCESS AT 15:02:03 ON WEDNESDAY,
JANUARY
    6, 1999
15.02.59 JOB07588 $HASP373 PCLBASE1 STARTED - INIT B8 - CLASS A - SYS LPA3
15.02.59 JOB07588 IEF403I PCLBASE1 - STARTED - TIME=15.02.59
15.03.00 JOB07588 IEA630I OPERATOR PCLBASE1 NOW ACTIVE, SYSTEM=LPA3
,LU=PCLBASE1
15.03.01 JOB07588 LVD099I USER EXIT ROUTINE (HRULVDUA) ABEND ... OUTPUT MESSAGE
15.03.01 JOB07588 IEA995I SYMPTOM DUMP OUTPUT
SYSTEM COMPLETION CODE=0C1 REASON CODE=00000001
TIME=15.03.00 SEQ=04866 CPU=0000 ASID=002B
PSW AT TIME OF ERROR 078C2000 000FEF4C ILC 2 INTC 01
ACTIVE LOAD MODULE ADDRESS=000FEED0
OFFSET=0000007C
NAME=LVDUEX01
DATA AT PSW 000FEF46 - B0900A23 0000C0B6 07004510
GPR 0-3 00002898 0003169D 000FFD38 800FFD3C
GPR 4-7 00000005 0790A020 00000004 000FFD58
GPR 8-11 00000000 07907800 000FFD44 00005B00
GPR 12-15 500FEED6 00005B00 80FD5F80 00000000
END OF SYMPTOM DUMP
15.03.01 JOB07588 IEE501I CONSOLE PCLBASE1 FAILED, REASON=ABTERM. ALL ALTERNATES
UNAVAILABLE, CONSOLE IS NOT SWITCHED
15.03.01 JOB07588 IEA631I OPERATOR PCLBASE1 NOW INACTIVE, SYSTEM=LPA3
,LU=PCLBASE1
15.03.01 JOB07588 PCLBASE1.STEP1 #01 (HRULVDX ) STEP-ENDED CC=0004
15.03.01 JOB07588 IEF404I PCLBASE1 - ENDED - TIME=15.03.01
15.03.01 JOB07588 $HASP395 PCLBASE1 ENDED
```

Figure 4-8 Example of DSR Error Message

Examples of Exit Routines

Figure 4-9 and Figure 4-10 show the output examples of exit routines. The source code of this example routine is stored in distribution media.

```
12.32.32 JOB02723 $HASP373 DIVIDE3  STARTED - INIT A4  - CLASS A - SYS LPA1
12.32.32 JOB02723 IEF403I DIVIDE3 - STARTED - TIME=12.32.32
12.32.32 JOB02723 IEA630I OPERATOR DIVIDE3 NOW ACTIVE,  SYSTEM=LPA1  , LU=DIVIDE3
12.32.32 JOB02723 LVDU01I HRULVDUA EXIT,COND=0000,VOL=SA1023,USR=DIVIDE3
                                     --- Message from the example exit routine
12.32.33 JOB02723 LVDU03I HRULVDUC EXIT,COND=0000,VOL=SA1023,USR=DIVIDE3
                                     --- Message from the example exit routine
12.32.33 JOB02723 LVDU99I HRULVDUZ EXIT,COND=0000,JOB=DIVIDE3 @BACK,USR=DIVIDE3
                                     --- Message from the example exit routine
12.32.33 JOB02723 IEA631I OPERATOR DIVIDE3 NOW INACTIVE, SYSTEM=LPA1  , LU=DIVIDE3
12.32.33 JOB02723 DIVIDE3 .STEP0 #01 (HRULVDX ) STEP-ENDED CC=0000
12.32.33 JOB02723 IEF404I DIVIDE3 - ENDED - TIME=12.32.33
12.32.33 JOB02723 $HASP395 DIVIDE3  ENDED
```

Figure 4-9 Example of Output List for Volume Backup Function Process

```
22.29.50 JOB02677 $HASP373 UNIFY    STARTED - INIT A4  - CLASS A - SYS LPA1
22.29.50 JOB02677 IEF403I UNIFY  - STARTED - TIME=22.29.50
22.29.50 JOB02677 IEA630I OPERATOR UNIFY  NOW ACTIVE,  SYSTEM=LPA1  , LU=UNIFY
22.29.55 JOB02677 LVDU81I HRULVDU1 EXIT,COND=0000,VOL=SA1012,USR=UNIFY
                                     --- Message from the example exit routine
22.29.56 JOB02677 LVDU81I HRULVDU1 EXIT,COND=0000,VOL=SA1013,USR=UNIFY
                                     --- Message from the example exit routine
22.29.58 JOB02677 LVDU99I HRULVDUZ EXIT,COND=0000,JOB=UNIFY @UNIF,USR=UNIFY
                                     --- Message from the example exit routine
22.29.58 JOB02677 IEA631I OPERATOR UNIFY  NOW INACTIVE, SYSTEM=LPA1  , LU=UNIFY
22.29.58 JOB02677 UNIFY  .STEP0 #01 (HRULVDX ) STEP-ENDED CC=0000
22.29.58 JOB02677 IEF404I UNIFY  - ENDED - TIME=22.29.58
22.29.58 JOB02677 $HASP395 UNIFY    ENDED
```

Figure 4-10 Example of Output List for Volume Unify Function Process

Exit Routine Sample Program

The following program list is an example of the exit routine. The source code of it is stored in distribution media. You can see the message in Figure 4-9 and Figure 4-10 when you assemble this source program:

```

HRULVDUA CSECT
*****
*
*  FUNC      -  HRULVDX EXIT A
*
*  INPUT     -  R1  PARMLIST ADDR
*                PARMLIST  +0 STATUS ADDR
*                    +4 SUB VOL ADDR
*                    +8 USER DATA ADDR
*                STATUS    4-BYTE
*                SUBVOL    2-BYTE (LENGTH)
*                    6-BYTE (VSN)
*
*                R13 REG SAVE
*                R14 RETURN AADR
*                R15 ENTRY ADDR
*
*  OUTPUT    -  NONE
*
*****
**
*****
*  REG EQU
*****
R0      EQU   0
R1      EQU   1
R2      EQU   2
R3      EQU   3
R4      EQU   4
R5      EQU   5
R6      EQU   6
R7      EQU   7
R8      EQU   8
R9      EQU   9
R10     EQU  10
R11     EQU  11          DATA REG
R12     EQU  12          BASE REG
R13     EQU  13
R14     EQU  14
R15     EQU  15
*****
*
*  PROC
*
*****
*                STM   R14,R12,12(R13)
*
*                BALR  R12,0          SET BASE REG ADDR

```

```

        USING *,R12                BASE R12
        USING WORKAREA,R11        BASE R11
*
        LR    R10,R1              SAVE PARM REG
*
        LA    R3,WORKLEN          GET WORK AREA SIZE
*                                  GET WORK AREA
        GETMAIN R, LV=(R3)
*
        LR    R11,R1              GET WORKAREA ADDR
        LR    R0,R11              *
        LA    R1,WORKLEN          *
        LA    R2,0                 *
        LA    R3,0                 *
        MVCL  R0,R2              CLAEER WORK AREA
*
        ST    R13,4(,R11)         SAVE R13(CALL'S)
        ST    R11,8(,R13)        SAVE R13
        LR    R13,R11            SET WORK AREA ADDR
*
*****
* MAKE WTO PARM
*****
BEGIN    DS    0H
*
        TM    8(R10),X'80'
        BZ    PARMERR
*
        L     R2,0(,R10)
        L     R3,4(,R10)
        MVC   WORKA3(2),2(R2)
        UNPK  WORKA5(5),WORKA3(3)
        TR    WORKA5(4),TRLTBL-240
*
        MVC   LVEX0WTO(59),WTOMSG
        MVC   LVEXWTX2(4),WORKA5
        MVC   LVEXWTX4(6),SPACE6
        LH    R4,0(,R3)
        LTR   R4,R4
        BZ    PARMERR
        BCTR  R4,0
        EX    R4,COPYVSN
*
        L     R3,8(,R10)
        MVC   LVEXWTX6(8),2(R3)
*****
*
*****
        LA    R1,LVEX0WTO
        WTO   MF=(E,(1))
        B     ENDPROC
PARMERR   DS    0H
        WTO   'LVDU01I HRLVDDUA EXIT,INPUT PARAMETER INVALID'
        DC    A(0)
*
ENDPROC   DS    0H

```

```

*
*      L      R13,4(,R13)          GET CALLER'S R13
*
*      LA      R0,WORKLEN
*      LR      R1,R11
*      FREEMAIN R,LV=(R0),A=(R1)
*
*      SR      R15,R15
*      RETURN  (14,12),RC=(15)
*****
COPYVSN MVC   LVEXWTX4(0),2(R3)
*****
* DC
*****
SPACE6 DC    CL6'      '
WTOMSG WTO   'LVDU01I HRULVDUA EXIT,COND=XXXX,VOL=VVVVVV,USR=UUUUUUU-
              ',MF=L
*
TRLTBL DC    CL16'0123456789ABCDEF'
*****
* DS
*****
WORKAREA DSECT
REGSAVE1 DS   18F          REG SAVE AREA
REGSAVE2 DS   18F          REG SAVE AREA
LVEXOWTO DS   0F          WTO PARM
LVEXWLEN DS   H           WTO LENGTH
LVEXWFLG DS   H
LVEXWTX1 DS   CL27
LVEXWTX2 DS   CL4
LVEXWTX3 DS   CL5
LVEXWTX4 DS   CL6
LVEXWTX5 DS   CL5
LVEXWTX6 DS   CL8
WORKA3 DS     CL3
WORKA5 DS     CL5
WORKEND DS    0H
WORKLEN EQU   WORKEND-WORKAREA
END

```


Messages

Return Codes

Table 4-2 lists and describes the return codes of DSR.

Table 4-2 Return Codes

Return Code	Meaning
0	All commands were executed successfully.
4	A minor error occurred, but it does not affect the command execution. Process goes on, but an alert message will be displayed.
8	An error occurred during the command execution, and then the process ends abnormally. The following commands will be executed, if exist.
12	A serious error occurred during command execution. The process ends abnormally and the following processes will be skipped.



Note: If "4" is returned as a return code, check the error messages from DSR. Rerun the JOB after that. At this time, if you rerun in the middle of DSR processing, specify (change) FUNC parameter of PARM operand in EXEC statement appropriately.

Message Format

LVDnnnt

Message text

LVD : Standard 3-character component name (LVD) prefix.

nnn : Message number. This number is unique to each message.

t : Type code. This code identifies either the console operator type or the SYSPRINT message severity. For console messages, the types are:

A Action: Operator must perform specific action.

D Decision: Operator must choose alternative action.

E Eventual: Operator must perform action.

I Information: No operator action is required.

Table 4-3 Allocation of Message Numbers

Message Number	Meaning
001 - 099	Messages from common process
100 - 199	Messages from the divide process
200 - 299	Messages from the unify process
300 - 399	(Reserved)
400 - 499	Messages from the prepare process

Messages Common to all DSR Processes

LVD001I

FUNCTION(function name) COMPLETED [, {LISTING | EXECUTING } ({TYPE1 | TYPE2 | TYPE3})]

The specified function was completed.

When MAKEPARM, DIVIDE, BACKUP and UNIFY appear in the function name, the message surrounded by brackets is indicated.

LISTING or EXECUTING shows the one that DSR uses programs.

- LISTING: HRULVDP program
- EXECUTING: HRULVDX program
- TYPE1, TYPE2 or TYPE3 show the one that DSR uses to get DUMP list
- TYPE1: ADRDSSU program
- TYPE2: AMASPZAP program
- TYPE3: EXCP macro

System Action: Complete processing

LVD002I

FUNCTION(function name) COMPLETED WITH WARNING [, {LISTING | EXECUTING } ({TYPE1 | TYPE2 | TYPE3})]

The specified function was completed, but some minor errors were included.

When MAKEPARM, DIVIDE, BACKUP and UNIFY appear in the function name, the message surrounded by brackets is indicated.

LISTING or EXECUTING shows the one that DSR uses programs.

- LISTING: HRULVDP program
- EXECUTING: HRULVDX program
- TYPE1, TYPE2 or TYPE3 show the one that DSR uses to get DUMP list.
 - TYPE1: ADRDSSU program
 - TYPE2: AMASPZAP program
 - TYPE3: EXCP macro

Operator Response: Examine output messages before this message. If you need to correct an error, you should remove an error factor and then resubmit the job.

LVD003I

INVALID PARM – parameter

On the parameter indicated in message text, the specified parameter is not defined, or the information described in parameter is improper.

System Action: The job ends.

Operator Response: Examine parameter name and description of the content in the parameter and remove an error factor.

LVD004I

INVALID CONTINUATION FOUND, PARM SCAN TERMINATED

There is a continuous line symbol (',') in the parameter, but there is no description after this.

System Action: The job ends.

Operator Response: Correct the parameter to describe necessary information.

LVD005I

OVER CONTINUE LINE

Number of continuing parameter field overflows: 20 lines.

System Action: The job ends.

Operator Response: Correct the number of continuing parameter field less than 20 lines.

LVD006I

INSUFFICIENT STORAGE FOR INITIALIZATION

DSR could not keep enough memory to analyze the parameter.

System Action: The job ends.

Operator Response: Increase the user region size. Refer to [Memory Calculations](#).

LVD007I

UTILITY ABNORMALLY TERMINATED

Internal conflict error has occurred.

System Action: The job ends.

Operator Response: Obtain an ABEND dump. Call your customer engineer.

LVD008I

PARAM SPECIFIED BEFORE – parameter

The parameter, indicated in the message text, is defined repeatedly.

System Action: The job ends.

Operator Response: Delete unnecessary parameter.

LVD009I

NOT FOUND PARAM – parameter

The essential parameter indicated in the message text is not defined.

System Action: The job ends.

Operator Response: Describe the required parameter in SYSIN file.

LVD010I

dd name DATASET macro name ERROR, RC = xx

In processing a dataset specified by dd name, an error occurred in macro indicated in the message text.

xx : Return code from macro (Hex).

System Action: The job ends.

Operation Response: Refer to IBM manual: *OS/390 DFSMS Macro instructions for datasets (SC26-4747)*, and fix the error factor according to RC = xx.

LVD011I

dd name DD OPEN ERROR, RC = xx

While trying to open a dataset that was specified by dd name, an error occurred in OPEN macro.

xx : Return code from macro (Hex).

System Action: The job ends.

Operator Response: Refer to manual: *OS/390 DFSMS Macro instructions for datasets (SC26-4747)*, and fix the error factor according to RC = xx.

LVD012I

MODULE(load module name) NOT FOUND

DSR could not find a load module indicated in the message text.

System Action: The job ends.

Operator Response: Confirm whether the load module (HRULVDX or HRULVDP) is installed in SYS1.LINKLIB or the user library (it must be authorized library).

LVD013I

EXIT MODULE(exit module name) NOT USED

DSR could not find the exit module indicated in the message text. In this case, the exit module name indicated in the message text corresponds to the exit routine.

System Action: DSR process continues.

Operator Response: If the exit routine is used, confirm whether the load module (HRULVDUA, HRULVDB, HRULVDUC, HRULVDU1 or HRULVDUZ) is installed in the same location as HRULVDP and HRULVDX.

If the exit routine is not used, ignore this message.

LVD014I

DD(dd name) NOT FOUND

A dd name indicated in the message text is not specified.

System Action: The job ends.

Operator Response: Specify dd statement indicated in the message text additionally.

LVD015I

MEMBER(member name) NOT EQUAL,LINECOUNT(line number)

In case of comparing the contents of the datasets specified in ZAPPARM and ZAPOLD DD statements, compare the errors in the member indicated in the message text. Line number is shown as the top line of unmatched data.

System Action: The job ends.

Operator Response: There is a possibility that the dataset configuration is changed in a source volume (S-VOL). Confirm whether the configuration is correct. If it is correct, use ZAPPARM to execute the divide operation. If it is incorrect, fix the dataset configuration in S-VOL and execute the prepare operation again.

LVD016I

dd name (member name) DATA SET macro name ERROR, RC = xx, RS = yy

In processing a member name indicated in the message text, an error occurred in a macro name indicated in the message text.

xx: Return code (Hex).

yy: Detailed error code (Hex).

System Action: The job ends.

Operator Response: Refer to IBM manual: *OS/390 DFSMS Macro instructions for datasets (SC26-4747)*, and fix the error factor according to RC = xx and RS = yy.

LVD017I

dd name (member name) NOT FOUND

In case of comparing the contents of datasets specified in ZAPARM and ZAPOLD DD statements, a member name indicated in the message text was not found in ZAPARM or ZAPOLD DD statement.

System Action: The job ends.

Operator Response: Confirm whether a member name exists in ZAPARM and ZAPOLD DD statements.

LVD020I

INVALID CATALOG NAME

Existing catalog name and a new catalog name are the same.

System Action: The job ends.

Operator Response: Change (Confirm) the existing catalog name or a new catalog name.

LVD021I

VOLUME(volume serial number, ccuu) NOT FOUND

Volume specified with a parameter does not exist. The causes are as follows:

- Specified volume serial number or the device number is incorrect.
- Specified volume is not defined in the system.
- Specified volume is offline status.

System Action: The job ends.

Operator Response: Confirm a reason and fix the problem of the relationship between a volume serial number and ccuu.

LVD022I

SAME DATA(parameter value) IN parameter name PARM, CNT= number

A parameter value indicated in the message text is specified in several parameters.

`CNT = ' indicates duplication counts.

`parameter name' and `parameter value' indicate the following contents:

Parameter Name	Parameter Value
CATALOG	Existing catalog name corresponding to CATALOG parameter
CHGVOL	Source volume name corresponding to CHGVOL parameter
CHGDSN	Old-DSN corresponding to CHGDSN parameter

System Action: The job ends.

Operator Response: Confirm the content of the parameter and fix the description of the parameter value.

LVD023I

SAME DATA(parameter value) IN (parameter name1, parameter name2) PARM

A parameter value indicated in the message text is used in parameter name1 and parameter name2.

`parameter name1 or 2' and `parameter value' indicate the following contents:

Parameter Name	Parameter Value
CATALOG	Existing catalog name corresponding to CATALOG parameter
CHGVOL	Source volume name corresponding to CHGVOL parameter
CHGDSN	Old-DSN corresponding to CHGDSN parameter

System Action: The job ends.

Operator Response: Confirm the content of the parameter and fix the description of the parameter value.

LVD025I

FUNCTION(function name) NOT COMPLETED [,LISTING({TYPE1 | TYPE2})]

Some errors occurred in the specified function.

When MAKEPARM DIVIDE, BACKUP or UNIFY appear in the function name, the message surrounded by brackets is indicated.

LISTING or EXECUTING shows the one that DSR uses programs.

- LISTING: HRULVDP program
- EXECUTING: HRULVDX program
- TYPE1 or TYPE2 or TYPE3 show the one that DSR uses to get DUMP list.
 - TYPE1: ADRDSSU program
 - TYPE2: AMASPZAP program
 - TYPE3: EXCP macro

System Action: The job ends.

Operator Response: Examine output messages before this message. Remove error factors and then resubmit the job.

LVD026I

SPECIFY {
SELECT
EXCLUDE
CHGSELECT
CHGEXCLUDE
VOLUME
CHGVOL
} AND {
CHGSELECT/CHGEXCLUDE
SELECT/EXCLUDE
VOLUME
CHGVOL
COPY (YES)
ZAPOPT (1)
} PARM EXCLUSIVELY

The SELECT/EXCLUDE parameter and CHGSELECT/CHGEXCLUDE parameter, which are an exclusive parameter, are specified simultaneously.

The CHGVOL parameter and VOLUME parameter, which is an exclusive parameter, is specified simultaneously.

The VOLUME parameter and COPY(YES) option, which is an exclusive parameter, is specified simultaneously.

System Action: The job ends.

Operator Response: Take a countermeasure in the following steps:

- a. Specify only SELECT/EXCLUDE or CHGSELECT/CHGEXCLUDE parameter and then resubmit the job.
- b. Specify only VOLUME or CHGVOL parameter and then resubmit the job.
- c. Change VOLUME parameter to CHGVOL parameter and then resubmit the job.
- d. Specify only ZAPOPT(1) option and then resubmit the job.

LVD027I

VOLUME(ccuu) IS OFFLINE OR NOT DISK

Specified volume is offline status or is not disk device.

System Action: The job ends.

Operator Response: Modify the content of VOLUME parameter and resubmit the job.

LVD028I

ALREADY SET UP TEMP CATALOG

A temporary catalog name is already specified to another existing catalog with other CATALOG parameter.

System Action: The job ends.

Operator Response: Modify the content of CATALOG parameter and resubmit the job.

LVD029I

DUPLICATE CATALOG PARM

CATALOG parameter, which is same combination of existing and new catalog name, is duplicated. CATALOG parameter cannot be specified twice.

System Action: The job ends.

Operator Response: Modify the combination of CATALOG parameters and then resubmit the job.

LVD030I

ALREADY SPECIFIED CATALOG NAME(catalog name)

Catalog name indicated in message text is already specified to other CATALOG parameter or used as temporary catalog. New catalog name and temporary catalog name cannot be specified as same name even if CATALOG parameter is different.

System Action: The job ends.

Operator Response: Modify CATALOG parameter and then resubmit the job.

LVD031I

INVALID CHGSELECT OR CHGEXCLUDE PARM, CATALOG NAME(catalog name)

CHGSELECT and CHGEXCLUDE parameters cannot be specified when existing catalog and new catalog name is same one in indicated CATALOG parameter.

System Action: The job ends.

Operator Response: Delete CHGSELECT and CHGEXCLUDE parameters and then resubmit the job.

LVD032I

NOT FOUND CHGDSN PARM, CATALOG NAME(catalog name)

No CHGDSN parameter is specified even though the catalog name indicated in message text is same name between new catalog and existing catalog. In case of specifying same catalog name in CATALOG parameter, user must specify CHGDSN parameter to rename all datasets managed by object catalog.

System Action: The job ends.

Operator Response: Add CHGDSN parameter and then resubmit the job.

LVD050I

SYSTEM UTILITY (utility name , requirement code) ERROR, RC = xx

An error occurred in the utility name indicated in the message text.

System Action: The job ends.

Operator Response: Confirm a job log of the utility and fix the error factor of the utility name. Refer to IBM message code, which is output by the utility indicated in the message text. Refer to [Sample of JOB LOG \(DSR\)](#).

LVD051I

SYSTEM MACRO(macro name , requirement code) ERROR, RC= xx, RS = yy

An error occurred in a macro name indicated in the message text.

xx: Return code (Hex)

yy: Detailed error code (Hex)

System Action: The job ends.

Operator Response: Refer to IBM manual: *OS/390 DFSMS Macro instructions for datasets (SC26-4747)*, and fix the error factor according to RC = xx and RS = yy.

LVD052I

SYSTEM MACRO(macro name , requirement code) ERROR, RC1= xx, RC2=yy,
RS = zz

An error occurred in a macro name indicated in the message text.

xx: Return code 1 (Hex)

yy: Return code 2 (Hex)

yy: Detailed error code (Hex)

System Action: The job ends.

Operator Response: Refer to IBM manual: *OS/390 DFSMS Macro instructions for datasets (SC26-4747)*, and fix the error factor according to RC1 = xx, RC2 = yy and RS = zz.

LVD053I

SUBTASK(task number) ABNORMALLY TERMINATED

Utility ended abnormally.

System Action: The job ends.

Operation Response: Please get ABEND DUMP and send it to the Hitachi Data Systems Technical Support Center.

LVD080I

INSUFFICIENT STORAGE

DSR could not keep enough memory to analyze the parameter or to work.

This message is WTO message.

System Action: The job ends.

Operator Response: Increase the user region size. Refer to [Memory Calculations](#).

LVD081I

LVD081I VOLUME(volume serial number, ccuu) WAITING FOR SUSPEND

DSR is waiting for a suspended message (IEA494I) because the volume pair is split pending. This message is displayed on the console every ten minutes.

This message is WTO message.

System Action: DSR process continues.

Operator Response: Confirm the device status whether the split process is completed.

LVD082I

RETRY PPRC COMMAND, VOLUME(volume serial number, ccuu)

DSR reissues PPRC command. This message is WTO message.

System Action: DSR failed to issue PPRC command. The command is issued once again based on PTRYPPRC control statement.

LVD099I

USER EXIT ROUTINE(Exit routine name) ABEND

Some errors occurred in an exit routine. This message is WTO message.

System Action: The job ends.

Operator Response: Check load module (user own coding program) installed in the exit routine, and modify it.

Messages from the Divide Process

LVD102I

DS (volume serial number, dataset name) UPDATE ERROR

DSR failed to update a dataset (VTOC or VVDS) in the volume.

System Action: The job ends.

Operator Response: There is a possibility that the contents of a target volume (T-VOL) were changed. Recovery process is as follows:

- Change the status of the T-VOL to offline (Vary offline T-VOL).
- Resynchronize the S-VOL and the T-VOL.
- Execute the prepare operation.
- Resubmit the job (divide operation).

LVD103I

VOLUME(volume serial number) NOT ONLINE

DSR could not change the volume status to online.

System Action: DSR process continues.

Operator Response: There is a possibility that the same volume serial number is already online under the same system. Recovery process is as follows. Choose one of them.

- (1) Change the status of the same serial number to offline, and then execute the divide operation with NODELPAIR option.
- (2) Change to another volume serial number for T-VOL on CHGVOL parameter and take process as follows:
 - Resynchronize the S-VOL and the T-VOL.
 - Execute the prepare operation (change the volume serial number for T-VOL on CHGVOL parameter).
 - Resubmit the job (divide operation).

LVD104I

VOLUME(volume serial number) NOT SUSPEND

DSR failed a split process in the specified volume.

System Action: DSR process continues.

Operator Response: Confirm the S-VOL and the T-VOL status by DEVSERV command and fix the device status by using ICKDSF with PPRC command. If PPRC command of ICKDSF reports an error with LVD050I, refer to the job log and correct CHGVOL parameter.

LVD105I

SELECT VOLUME NOT FOUND

DSR could select no CHGVOL parameter.

System Action: Job ends.

Operator Response: Remove NOP option specified in CHGVOL parameters, which is the target for the divide and the unify operation, and then resubmit a job.

LVD107I

VOLUME(volser, ccuu) NOT DUPLEX

A status of specified volume is not DUPLEX.

System Action: DSR process continues.

Operator Response: Examine volume status and then resubmit a job.

LVD108I

INVALID RECAT PARM(existing catalog name, new catalog name)

A specified RECAT parameter is invalid.

System Action: DSR process continues.

Operator Response: Delete the indicated RECAT parameter and then resubmit a job.

LVD109I

VOLUME(volume serial number) {VTOC | VVDS } UPDATE COMPLETED

A specified RECAT parameter is invalid.

System Action: VTOC or VVDS on specified volume is updated normally.

LVD110I

VOLUME(volume serial number) {VTOC | VVDS } UPDATE NOT COMPLETED

VTOC or VVDS on a specified volume is not updated normally.

System Action: Job ends.

Operator Response: Check a target volume status.

LVD111I

VOLUME(volume serial number) {VTOC | VVDS } (cchhr) VERIFY ERROR

A part (cchhr) of VTOC or VVDS on a specified volume was not same as previous condition when prepare (MAKEPARM) operation is executed.

System Action: DSR process continues.

Operator Response: Check a target volume status.

Messages from the Unify Process

LVD201I

CATALOG(catalog name) NOT DELETE

DSR failed to delete the specified user catalog.

System Action: DSR process continues.

Operator Response: There is a possibility that all datasets under a user catalog for a T-VOL are not deleted. If DELETE command of IDCAMS reports an error (LVD050I), refer to the job log and confirm the dataset names that are not deleted from the user catalog. Then delete the datasets by using IDCAMS and execute the unify operation with NOPAIR option again. In this case, the unify operation ends abnormally, but the user catalog is deleted normally.

LVD202I

VOLUME(volume serial number) NOT OFFLINE

DSR could not change the volume status to offline.

System Action: DSR process continues.

Operator Response: There is a possibility that other job is allocated to this volume. Confirm the volume status. If the volume status is "allocation", release "allocation" and then execute the unify operation again. If the volume status is free (online status), execute the unify operation again. In this case, the unify operation ends abnormally, but the T-VOL becomes offline status and is resynchronized normally.

LVD203I

VOLUME(volume serial number) I/O ERROR [, 'SENSE BYTE']

When DSR demanded I/O from a disk drive unit, the system generated I/O error.

An input / output error happened during the I/ O operation to the disk drive unit.

System Action: DSR process continues.

Operator Response: Investigate the cause of an error from this SENSE BYTE and if necessary After taking countermeasures, execute the command again.

LVD204I

VOLUME(volume serial number) DKC NOTSUPPORT, $\left\{ \begin{array}{l} \text{HITAC} \\ \text{HMRCF} \\ \text{HRC} \\ \text{HRCA} \end{array} \right\}$

DSR executed to the disk drive unit which is not supporting the function.

System Action: DSR process continues.

Operator Response: Re-execute DSR to the disk drive unit which is supporting the function.

LVD205I

VOLUME(volume serial number) UNABLE TO EXECUTE FOR DKC KIND= the kind of disk drive unit , VER= a version number

DSR executed to the disk drive unit which is not supporting the function.

The kind of disk drive unit:

02:9900, 03:9900V, 04:TagmaStore USP/NSC, 05:USP V/VM

System Action: DSR process continues.

Operator Response: Call customer engineer and check micro program version of disk drive unit.

LVD206I

VOLUME(volume serial number) $\left\{ \begin{array}{l} \text{PRICUI} \\ \text{SECCUI} \end{array} \right\}$ PARM ERROR

The information described in CHGVOL parameter is improper.

System Action: DSR process continues.

Operator Response: The parameter specified to be CHGVOL is improved and DSR is re-performed.

Messages from the Prepare Process

LVD400I

DS (dataset name, volume serial number) READ ERROR

DSR failed to read a dataset in the specified volume. This error occurred when VTOC and VVDS were read only.

The causes are as follows:

- VVDS in the specified volume does not exist.
- No dataset in the specified volume (VTOC) exists.
- I/O error occurred in reading VVDS or VTOC.

System Action: DSR process continues.

Operator Response: In the case of (1) or (2), ignore this message. In the case of (3), confirm the status of VVDS and VTOC. If PRINT command of ADRDSSU or AMASPZAP reports an error with LVD050I, refer to the job log and then fix an error factor for the I/O error or call your customer engineer if necessary.

LVD401I

DS (dataset name, volume serial number) NOT FOUND IN CATALOG

A dataset indicated in the message text does not exist in the catalog. This happens only for VSAM dataset.

System Action: DSR process continues, but a parameter is not created for this dataset.

Operator Response: VSAM dataset indicated in the message text exists in VVDS, but the VSAM dataset does not exist in the catalog. If this VSAM dataset corresponding to the S-VOL is necessary, execute to register in catalog using DEFINE command with RECATALOG option by IDCAMS utility and then execute the prepare operation again. If the VSAM dataset is unnecessary, ignore this message.

LVD402I

DS (dataset name) MAKEPARAM ERROR

The prepare operation is not executed for a dataset name indicated in the message because all volumes of the multiple volume dataset are not defined.

This message appears with LVD403I.

System Action: DSR process continues, but the parameter is not created for this dataset.

Operator Response: Specify CHGVOL parameter for a volume indicated by LVD403I message, or exclude a dataset indicated by this message by using EXCLUDE parameter.

LVD403I

VOLUME (volume serial number) NOT FOUND IN CHGVOL PARAM

CHGVOL parameter corresponding to a volume serial number indicated in the message text is not defined.

System Action: DSR process continues, but parameter is not created for this volume.

Operator Response: Specify CHGVOL parameter of the volume serial number indicated in the message text additionally.

LVD407I

NOT USE CHGDSN(Old-DSN, [New-DSN1,] [New-DSN2])

CHGDSN parameter indicated in the message text was not used.

System Action: DSR process continues.

Operator Response: Examine the dataset name indicated by Old-DSN to exist in DUMPLIST, and modify the content of CHGDSN parameter.

LVD408I

{ SELECT | EXCLUDE | ALIAS | CHGSELECT | CHGEXCLUDE | RECAT } (existing or new catalog name) NOT FOUND IN CATALOG PARAM

An existing or a new catalog name indicated in the message text was not specified by CATALOG parameter.

System Action: Job ends.

Operator Response: Examine whether an existing or a new catalog name is correct or not. If it is correct, add CATALOG parameter. If it is incorrect, modify the existing or the new catalog name in SELECT, EXCLUDE, CHGSELECT, CHGEXCLUDE, ALIAS, or RECAT parameter.

LVD409I

NOT USE { SELECT | EXCLUDE| CHGSELECT| CHGEXCLUDE } (existing catalog name, Old-DSN)

SELECT or EXCLUDE parameter indicated in message text was not used.

System Action: DSR process continues.

Operator Response: Examine whether Old-DSN exists in the original catalog or not. If Old-DSN is wrong, specify the correct dataset name in SELECT, EXCLUDE, CHGSELECT or CHGEXCLUDE parameter.

LVD411I

GDG BASE(existing catalog name, existing gdg base name) INCOMPLETE

Only a part of the volumes, in which GDS managed by GDG BASE name in the message text exists, is specified. DSR will not reproduce the same GDG configuration as the source catalog in the temporary catalog.

System Action: DSR process continues.

Operator Response: Examine the source catalog list about GDG BASE indicated in message text, and specify the volumes corresponding to each GDS by using CHGVOL parameter.

LVD412I

DSNAME CHANGED, Old-DSN, New-DSN

A dataset (Old-DSN) will be renamed to New-DSN, and New-DSN will be registered in a user catalog.

This is the information message.

System Action: DSR process continues.

Operator Response: Confirm the dataset names both Old-DSN and New-DSN in the message text.

LVD413I

CATALOG ACCESS ERROR(return code, reason code, module id) FOR CATALOG(existing catalog name)

When the DSR was gathering a catalog information, an error was detected during accessing to a catalog indicated in the message text.

Both 'return code' and 'reason code' are shown in an IDC3009I message section of the IBM document *OS/390 MVS System Messages, Vol 3*.

This message is output with LVD414I message. Refer to LVD414I message for the detailed information.

System Action: DSR process continues.

Operator Response: Examine the specified CATALOG parameter and the existing catalog names, and then fix the problem.

LVD414I

CATALOG ACCESS ERROR(return code, reason cod, module id) FOR DATASET(dataset name)

When the DSR was gathering catalog information, an error was detected during accessing to a dataset in the specified catalog.

Both 'return code' and 'reason code' are shown in an IDC3009I message section of the IBM document *OS/390 MVS System Messages, Vol. 3*.

System Action: DSR process continues.

Operator Response: Examine whether a dataset indicated in the message text is necessary or not. If the dataset is necessary, examine the error factor from 'return code' and 'reason code' by using IBM manual and fix the problem. Then execute JOB again.

If the dataset is not necessary, ignore this message.

LVD415I

DS(dataset name) CAN NOT CHANGE DSN

DSR could not rename a dataset indicated in the message text. This is because the full length of the dataset name is over 44 characters, or one qualifier of the dataset is over 8 characters due to the content of CHGDSN parameter.

System Action: DSR process continues.

Operator Response: Examine the description of CHGDSN parameter and fix the problem. Then execute JOB again.

LVD416I

SMS INITIAL STATUS, VOLUME (source volume)

A volume indicated in the message text is in SMS initial status.

System Action: DSR process continues.

Operator Response: Determine whether the volume is translated to SMS or NON-SMS volume, and fix this volume status. If the volume is not necessary, omit the CHGVOL parameter related to the volume. Then execute JOB again.

LVD417I

NO ENTRY FOR CATALOG(existing catalog name, dataset information)

No entry related to the dataset information exists in a catalog, which is indicated in the message text.

System Action: Job ends.

Operator Response: Examine an existing catalog name and the dataset information specified by SELECT parameter, and fix the contents. Then execute JOB again.

LVD418I

NOT SELECT DS(existing catalog name, dataset information)

A VSAM dataset, NONVSAM data, or alternate index (AIX) having a PATH or ALIAS was not selected from an existing catalog indicated in message text.

Only an alternate index (AIX), which is related to VSAM dataset indicated in the message text, was selected.

System Action: DSR process continues.

Operator Response: Examine the dataset information in an existing catalog list, and determine whether a dataset indicated in the message text is necessary or not. If the dataset is necessary, you should modify SELECT or EXCLUDE to select the dataset or add a volume by CHGVOL parameter, in which the dataset exists. Then execute JOB again. If the dataset is not necessary, ignore this message.

LVD419I

NOT USE CHGVOL(source volume name, target volume name)

Parameters for the volumes specified by CHGVOL parameter were not created in ZAPPARM DD statement.

System Action: DSR process continues.

Operator Response: Examine the specified SELECT, EXCLUDE or CATALOG parameter, and fix the contents of the parameter. Then execute JOB again.

LVD420I

ONE DOES NOT EXIST TARGET DATASET

An object dataset does not exist by specifying of a SELECT parameter and an EXCLUDE parameter.

System Action: Job ends.

Operator Response: Examine the content of SELECT and EXCLUDE and fix the content of the parameter. Then execute JOB again.

LVD421I

NOT USE CHGSMS(before management class, before storage class, after management class, after storage class)

Change of the SMS class specified with the CHGSMS parameter was not applied.

System Action: DSR process continues.

Operator Response: Examine whether the management class and storage class which were specified by a CHGSMS parameter are registered into the ACS routine and fix the contents of a parameter. Then execute JOB again.

LVD422I

DSNAME NOT CHANGED, data set name

A data set name indicated in the message text is not changed by CHGDSN parameter. User must change the data set to register to original catalog

System Action: DSR ends.

Operator Response: Confirm the content of CHGDSN parameter and modify the content of CHGDSN parameter and then execute JOB again.

LVD423I

DS(data set name) CAN NOT RECATALOG, dataset name

A dataset indicated in the message text must be changed the name of dataset to register to original catalog. But the dataset name is not specified to rename by CHGDSN parameter.

System Action: Job ends.

Operator Response: Confirm the content of CHGDSN parameter and modify the CHGDSN parameter and then execute JOB again.

LVD424I

DS(data set name) CAN NOT RECATALOG, DSNAME DUPLICATED

A dataset indicated in the message text can not be registered to specified catalog, because the same dataset name exists in the specified catalog.

System Action: Job ends.

Operator Response: Confirm the content of CATALOG parameter and modify not to register the dataset to current catalog and then execute JOB again.

LVD425I

VOLUME(volume serial number) { VTOC | VVDS } READ COMPLETED

VTOC or VVDS on a specified volume is updated normally.

System Action: DSR process continues.

LVD426I

VOLUME(volume serial number) { VTOC | VVDS } READ NOT COMPLETED

VTOC or VVDS on a specified volume is not updated normally.

System Action: Job ends.

Operator Response: Check a target volume status.

Storage Calculations



Note: Make sure to round up the calculated value in the following calculations.

Capacity of a Dataset

WORK01 (RECFM=FB,LRECL=80,BLKSIZE=3120)

Number of tracks for WORK01(X1) = 1 TRK (Maximum of 2 lines)

Number of cylinders (Y1) = 1CYL

WORK02 (RECFM=FBA,LRECL=121,BLKSIZE=121)

<Information required in advance>

Number of tracks for VTOC (A2) = 14

Number of tracks for VVDS (E2) = 10

Number of output lines per track (M2) = 75 <In case of 3390>

Number of tracks per cylinder (N2) = 15 <In case of 3390>

<Formula>

- VTOC

Number of output lines (B2) = $7 \times (50 \times A2) + 6$

Number of required tracks (C2) = $B2 / M2$

Number of required cylinders (D2) = $C2 / N2$

- VVDS

Number of output lines (F2) = $130 \times (12 \times E2) + 6$

Number of required tracks (G2) = $F2 / M2$

Number of required cylinders (H2) = $G2 / N2$

Number of required tracks for WORK02 (X2) = MAX (C2, G2)

Number of required cylinders for WORK02 (Y2) = MAX (D2, H2)

<Example> Number of tracks for VTOC = 14 TRK, Number of tracks for VVDS = 10 TRK

(B2) 4906 lines = $7 \times (50 \times 14) + 6$

(C2) 66 TRK = $4906 / 75$

(D2) 5 CYL = $66 / 15$

(F2) 15606 lines = $130 \times (12 \times 10) + 6$

(G2) 209 TRK = $15606 / 75$

(H2) 14 CYL = $209 / 15$

(X2) 209 TRK = MAX (66, 209)

(Y2) 14 CYL = MAX (5, 14)

WORK03 (RECFM=FB,LRECL=80,BLKSIZE=3120)

Number of required tracks for WORK03 (X3) = 1 TRK (Maximum 2 lines)

Number of required cylinders for WORK03 (Y3) = 1CYL

WORK04 (SYSOUT)

<Information required in advance>

When DELPAIR is executed, the number of output lines is 18 (at normal end).

When REFORMAT is executed, the number of output lines is 14 (at normal end).

When ESTPAIR is executed, the number of output lines is 25-30 (at normal end).

Number of required tracks for WORK04 (X4) = 1 TRK (About 30 lines)

Number of required cylinders for WORK04 (Y4) = 1 CYL

WORK05 (SYSOUT)

<Information required in advance>

Number of datasets in a volume (A5)

Number of output lines per track (M5) = 75 <In case of 3390>

Number of tracks per cylinder (N5) = 15 <In case of 3390>

<Formula>

Output lines (B5) = $17 + 12 \times A5$

Number of required tracks for WORK05 (X5) = $B5 / M5$

Number of required cylinders for WORK05 (Y5) = $X5 / N5$

<Example> In case that the number of datasets is 10

(B5) 137 lines = $17 + 12 \times 10$

(X5) 2 TRK = $137 / 75$

(Y5) 1CYL = $2 / 15$

WORK06 (SYSOUT)

<Information required in advance>

Number of datasets per volume (A6)
Number of multiple volume datasets (F6)
Average number of volumes for multiple volume datasets (G6)
Number of output lines per track (M6) = 75 <In case of 3390>
Number of tracks per cylinder (N6) = 15 <In case of 3390>

<Formula>

Output lines (B6) = $2 + 8 \times A6$
Number of output lines for header (C6) = $2 \times B6 / 60$
Number of required tracks (D6) = $(B6 + C6) / M6$
Number of required cylinders (E6) = $D6 / N6$

Output lines (H6) = $2 + (5 + G6 / 5 + 2 \times G6) \times F6$
Number of output lines for header (I6) = $2 \times H6 / 60$
Number of required tracks (J6) = $(H6 + I6) / M6$
Number of required cylinders (K6) = $J6 / N6$

Number of required tracks for WORK06 (X6) = MAX (D6, J6)

Number of required cylinders for WORK06 (Y6) = MAX (E6, K6)

<Example> Number of datasets per volume=10, Number of datasets for a multiple volume =10, Number of average volumes =3.

(B6) 82 lines = $2 + 8 \times 10$
(C6) 4 lines = $2 \times 82 / 60$
(D6) 2 TRK = $(82 + 4) / 75$
(E6) 1CYL = $2 / 15$

(H6) 62 lines = $2 + (5 + 3/5 + 2 \times 3) \times 5$
(I6) 4 lines = $2 \times 62 / 60$
(J6) 1TRK = $(62 + 4) / 75$
(K6) 1CYL = $1 / 15$

(X6) 2TRK = MAX (2, 1)
(Y6) 1CYL = MAX (1, 1) WORK07 (SYSOUT)

<Information required in advance>

Number of datasets per volume (A7)
Number of multiple volume datasets (F7)
Average number of volumes for multiple volume datasets (G7)
Number of output lines per track (M7) = 75 <In case of 3390>
Number of tracks per cylinder (N7) = 15 <In case of 3390>

<Formula>

Output lines	(B7) = 2 + 8 × A7
Number of output lines for header	(C7) = 2 × B7 / 60
Number of required tracks	(D7) = (B7 + C7) / M7
Number of required cylinders	(E7) = D7 / N7
Output lines × G7) × F7	(H7) = 2 + (5 + G7 / 5 + 2
Number of output lines for header	(I7) = 2 × H7 / 60
Number of required tracks	(J7) = (H7 + I7) / M7
Number of required cylinders	(K7) = J7 / N7
<u>Number of required tracks for WORK07</u>	(X7) = MAX (D7, J7)
<u>Number of required cylinders for WORK07</u>	(Y7) = MAX (E7, K7)

(8) ZAPPARM (RECFM=FB,LRECL=80,BLKSIZE=3120)

<Information required in advance>

Target volume pairs	(AA)
Number of datasets per volume	(BA)
Number of multiple volume datasets	(CA)
Average number of datasets for multiple volume dataset	(DA)
Number of output lines per track	(LA) = 510 <In case of 3390>
Number of cylinders per track	(MA) = 15 <In case of 3390>
Number of members per block	(NA) = 15 <In case of 3390>

< Formula per a volume>

Number of SYSIN output lines for AMASPZAP	(EA) = 3 × (15 + 9 × BA)
Number of SYSIN output lines for IDCAMS	(FA) = 2 × (4 × BA)
Number of SYSIN output lines for IDCAMS (for multiple volume dataset or Alternate index):	(GA) = (3 + DA / 5) × CA
Total output lines	(HA) = AA × (EA + FA + GA) + 8
Number of required tracks for ZAPPARM	(XA) = HA / LA
Number of required cylinders for ZAPPARM	(YA) = XA / MA
Number of required directories for ZAPPARM	(ZA) = (5 × AA + 3) / NA

<Example> Number of volumes=2, Number of datasets per volume=10,
Number of multiple volume datasets=5, Average number of volumes=3

(EA)	315 lines = 3 × (15 + 9 × 10)
(FA)	80 lines = 2 × (4 × 10)
(GA)	20 lines = (3 + 3 / 5) × 5
(HA)	838 lines = 2 × (315 + 80 + 20) + 8
(XA)	2 TRK = 838 / 510
(YA)	1 CYL = 2 / 15
(ZA)	1 BLOCK = (5 × 2 + 3) / 15

Memory Calculations

HRULVDP

User region (Less than 16 MB)

<Information required in advance>

Memories for this utility (A1)
Memories to execute AMASPZAP (B1)

< Formula >

$$\underline{M1} = A1 + B1 + 32 \text{ (KB)}$$

Extension user region (More than 16 MB)

<Information required in advance>

Memories to execute AMASPZAP (B2)
Number of volumes (C2)
Number of datasets (D2)
Number of SYSIN records (E2) (without a continuing parameter field)

< Formula >

$$\begin{aligned} \underline{M2} &= B2 \\ &+ (256 \times C2 / 4064) \times 4096 \\ &+ (128 \times D2 / 4064) \times 4096 \\ &+ (128 \times (E2 + 2) / 4064) \times 4096 \\ &+ 256 \text{ (KB)} \end{aligned}$$

HRULVDX

(1) User region (Less than 16 MB)

<Information required in advance>

Memories for this utility	(A3)
Memories to execute ICKDSF	(B3)
Memories to execute AMASPZAP	(C3)
Memories to execute IDCAMS	(D3)

< Formula >

$$M3 = A3 + B3 + C3 + D3 + 32 \text{ (KB)}$$

(2) Extension user region (Less than 16MB)

<Information required in advance>

Memories to execute ICKDSF	(B4)
Memories to execute AMASPZAP	(C4)
Memories to execute IDCAMS	(D4)
Number of volumes	(E4)
Number of datasets	(F4)
Number of SYSIN records	(G4) (without a continuing parameter field)

< Formula >

$$\begin{aligned} M4 = & B4 + C4 + D4 \\ & + (256 \times E4 / 4064) \times 4096 \\ & + (128 \times F4 / 4064) \times 4096 \\ & + (128 \times (G4 + 2) / 4064) \times 4096 \\ & + 256 \text{ (KB)} \end{aligned}$$

Samples

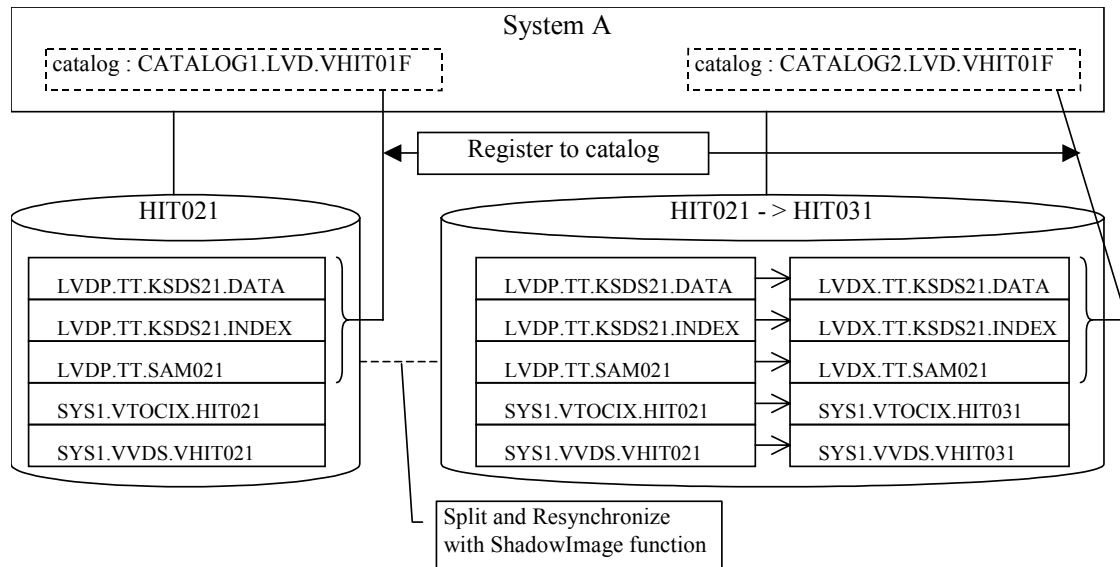
This chapter provides examples for many of the Hitachi Dataset Replication for IBM z/OS operations.

- [Sample of DUMPLIST and ZAPPARM](#)
- [Sample JCL For Deleting a User Catalog](#)
- [Sample of CDSNLIST](#)
- [Sample of JOB LOG \(DSR\)](#)

Sample of DUMPLIST and ZAPPARM

Sample Storage System Configuration and Sample JCL

In case of executing a JCL corresponding to the following system configuration, output formats of ZAPPARM and DUMPLIST are shown as follows.



```
//SAMPLE JOB
//UTL0 EXEC PGM=HRLVDP, PARM=' FUNC (MAKEPARM) , LINECNT (60) ', REGION=4096K
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//ZAPPARM DD DSN=LVD.TEST.ZAPPARM, UNIT=SYSDA, DISP=(NEW, KEEP) ,
// DCB=(RECFM=FB, LRECL=80, BLKSIZE=3120) , SPACE=(CYL, (1, 1, 10)) ,
// VOL=SER=LVD82F
//DUMPLIST DD SYSOUT=*
//WORK01 DD DISP=(NEW, DELETE) , DSN=&&WORK01, SPACE=(CYL(1, 1)) , UNIT=SYSDA
//WORK02 DD DISP=(NEW, DELETE) , DSN=&&WORK02, SPACE=(CYL(1, 1)) , UNIT=SYSDA,
// DCB=(BLKSIZE=12100)
//SYSIN DD * CATALOG(CATALOG1.DSR.VHIT01F, -
CATALOG2.DSR.VHIT01F, HIT01F, 5, 1, 3390)
CHGVOL(HIT021, 2121, 0080, 10028, 21, -
HIT031, 2131, 0080, 10028, 31, HMRCF, 3390)
CHGDSN(LVDP.TT.SAM021, LVDX.TT.SAM021)
CHGDSN(LVDP.TT.KSDS21, LVDX.TT.KSDS21)
CHGDSN(LVDP.TT.KSDS21.DATA, LVDX.TT.KSDS21.DATA)
CHGDSN(LVDP.TT.KSDS21.INDEX, LVDX.TT.KSDS21.INDEX)
/*
//
```


Sample of DUMPLIST

In the following DUMPLIST for VVDS and VTOC, each line with '*' mark on the top shows data strings that will be replaced by DSR. The upper line is shown as old data, and the bottom line is shown as new data. This sample is a part of the results of executing JCL of [Sample Storage System Configuration and Sample JCL](#).

```
( DUMP LIST of VVDS )
1 ** DATASET REPLICATION UTILITY (P-9Y2R-J81Y2 02-00-04) ** DUMP INFORMATION 2004-08-11, 17:15:12 PAGE 0001
*** DSNAME(SYS1.VVDS.VHIT021)
** CCHHR(0007000001) LENGTH(001000)
(000000) 0FF80078 E5E5C3D9 00000000 00000000 00000000 C3C1E3C1 D3D6C7F1 * 8 VVCR CATALOG1*
* C3C1E3C1 D3D6C7F2 * CATALOG2*
(000020) 4BD3E5C4 4BE5C8C9 E3F0F1C6 40404040 40404040 40404040 40404040 40404040 *.DSR.VHIT01F *
* 4BD3E5C4 4BE5C8C9 E3F0F1C6 *.DSR.VHIT01F *

(continue DUMPLIST of VVDS)

*** END OF LIST
```

```
( DUMP LIST of VTOC )
1 ** DATASET REPLICATION UTILITY (P-9Y2R-J81Y2 02-00-04) ** DUMP INFORMATION 2004-08-11, 17:22:47 PAGE 0004
*** DSNAME(FORMAT4.DSCB)
** CCHHR(0000000101) LENGTH(00008C)
(000000) 04040404 04040404 04040404 04040404 04040404 04040404 04040404 04040404 * *
(000020) 04040404 04040404 04040404 F4000000 0E3202B5 0D0B0000 000F8901 0001005B * 4 $ *
(000040) 000FE5A2 00000030 0000322D 00000000 00000000 00000000 00000000 00000000 * V *
(000060) 00000000 00000000 00010000 00000100 00000E00 00000000 00000000 00000000 * *
(000080) 00000000 00000000 00000000 * *
** CCHHR(0000000102) LENGTH(00008C)
(000000) 05050505 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * *
(000020) 00000000 00000000 00000000 F5000000 00000000 00000000 00000000 00000000 * 5 *
(000040) 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * *
(000060) TO (00007F) SAME AS ABOVE * *
(000080) 00000000 00000000 00000000 * *
** CCHHR(0000000103) LENGTH(00008C)
(000000) E2E8E2F1 4BE5E3D6 C3C9E74B C8C9E3F0 F2F14040 40404040 40404040 40404040 *SYS1.VTOCIX.HIT021 *
* E2E8E2F1 4BE5E3D6 C3C9E74B C8C9E3F0 F3F1 *SYS1.VTOCIX.HIT031 *
(000020) 40404040 40404040 40404040 F1C8C9E3 F0F2F100 0163005D 00000001 0000C9C2 * 1HIT021 ) IB *
* C8C9E3 F0F3F1 * HIT031 *
(000040) D4D6E2E5 E2F24040 40404000 00000000 00004000 80000800 08000000 00008000 *MOSVS2 *
(000060) 0000000E 15E5A200 00810000 01000000 01000E00 00000000 00000000 00000000 * V *
(000080) 00000000 00000000 00000000 * *
** CCHHR(0000000104) LENGTH(00008C)
(continue DUMPLIST of VTOC)

*** END OF LIST
```

Sample and Contents of ZAPPARM Members

Members, created by DSR, in a dataset (DSR.TEST.ZAPPARM) specified by ZAPPARM DD statement are shown as follows. This sample is a result of executing JCL of [Sample Storage System Configuration and Sample JCL](#).

- ADCATLG: Parameters for deleting a user catalog for a T-VOL are stored in this member (Figure 5-1).
- ADHIT021: Parameters for deleting datasets from a user catalog for a T-VOL are stored in this member (Figure 5-2).
- ARHIT021: Parameters for registering datasets in a user catalog for a T-VOL are stored in this member (Figure 5-3).
- AUCATLG: Parameters for defining a user catalog for a T-VOL are stored in this member (Figure 5-4).
- ZCHIT021: Parameters for updating VTOC area of a T-VOL are stored in this member (Figure 5-5).
- ZSHIT021: Parameters for updating VVDS area of a T-VOL are stored in this member (Figure 5-6).
- PRLVD037: Parameters for changing datasets name of GDG/GDS for a T-VOL are stored in this member (except SMS environment) (Figure 5-7).
- ADTEMPGDG: Parameter for deleting GDG registered temporarily for a T-VOL are stored in this member (only SMS environment) (Figure 5-8).
- PRMULTI: Parameters for changing datasets, which are multiple volume datasets of GDG/GDS for a T-VOL are stored in this member (Figure 5-9).
- ARMUTI: Parameters for registering datasets, which are multiple volume datasets, alternate index datasets and ALTER command, in a user catalog for a T-VOL are stored in this member.



Note: In case of this sample (JCL of [Sample Storage System Configuration and Sample JCL](#)), ARMUTI is not created.

```
000001  DELETE CATALOG2.DSR.VHIT01F USERCATALOG
```

Figure 5-1 **Contents of ADCATLG**

```
000001  DELETE LVDX.TT.KSDS21 CLUSTER NSCR -  
000002    CATALOG(CATALOG2.DSR.VHIT01F)  
000003  DELETE LVDX.TT.SAM021 NONVSAM NSCR -  
000004    CATALOG(CATALOG2.DSR.VHIT01F)
```

Figure 5-2 **Contents of ADHIT021**

```

000001 DEFINE CLUSTER -
000002 (NAME (LVDX.TT.KSDS21) -
000003 VOLUMES (HIT031) INDEXED RECATALOG) -
000004 CATALOG (CATALOG2.DSR.VHIT01F)
000005 DEFINE NONVSAM -
000006 (NAME (LVDX.TT.SAM021) -
000007 VOLUMES (HIT031) DEVICETYPE (3390) NORECATALOG) -
000008 CATALOG (CATALOG2.DSR.VHIT01F)

```

Figure 5-3 Contents of ARHIT021

```

000001 DEFINE USERCATALOG -
000002 (NAME (CATALOG2.DSR.VHIT01F) -
000003 CYL(5,1) VOLUME (HIT01F) IFCATALOG)

```

Figure 5-4 Contents of AUCATLG

```

000001 CCHHR 0000000103
000002 VER 00 E2E8E2F14BE5E3D6C3C9E74BC8C9E3F0F2F1
000003 REP 00 E2E8E2F14BE5E3D6C3C9E74BC8C9E3F0F3F1
000004 VER 2D C8C9E3F0F2F1000005 REP 2D C8C9E3F0F3F1
000006 CCHHR 0000000104
000007 VER 00 D3E5C4D74BE3E34BE2C1D4F0F2F1
000008 REP 00 D3E5C4E74BE3E34BE2C1D4F0F2F1
000009 VER 2D C8C9E3F0F2F1
000010 REP 2D C8C9E3F0F3F1
000011 CCHHR 0000000105
000012 VER 00 D3E5C4D74BE3E34BD2E2C4E2F2F14BC4C1E3C1
000013 REP 00 D3E5C4E74BE3E34BD2E2C4E2F2F14BC4C1E3C1
000014 VER 2D C8C9E3F0F2F1
000015 REP 2D C8C9E3F0F3F1
000016 CCHHR 0000000106
000017 VER 00 E2E8E2F14BE5E5C4E24BE5C8C9E3F0F2F1
000018 REP 00 E2E8E2F14BE5E5C4E24BE5C8C9E3F0F3F1
000019 VER 2D C8C9E3F0F2F1
000020 REP 2D C8C9E3F0F3F1
000021 CCHHR 0000000107
000022 VER 00 D3E5C4D74BE3E34BD2E2C4E2F2F14BC9D5C4C5E7
000023 REP 00 D3E5C4E74BE3E34BD2E2C4E2F2F14BC9D5C4C5E7
000024 VER 2D C8C9E3F0F2F1
000025 REP 2D C8C9E3F0F3F1

```

Figure 5-5 Contents of ZCHIT021

```

000001 CCHHR 0007000001
000002 VER 18 C3C1E3C1D3D6C7F14BD3E5C44BE5C8C9E3F0F1C6
000003 REP 18 C3C1E3C1D3D6C7F24BD3E5C44BE5C8C9E3F0F1C6
000004 CCHHR 0007000002
000005 VER 0B E2E8E2F14BE5E5C4E24BE5C8C9E3F0F2F1
000006 REP 0B E2E8E2F14BE5E5C4E24BE5C8C9E3F0F3F1
000007 VER 1E E2E8E2F14BE5E5C4E24BE5C8C9E3F0F2F1
000008 REP 1E E2E8E2F14BE5E5C4E24BE5C8C9E3F0F3F1
000009 VER 32 E2E8E2F14BE5E5C4E24BE5C8C9E3F0F2F1
000010 REP 32 E2E8E2F14BE5E5C4E24BE5C8C9E3F0F3F1
000011 CCHHR 0007000003
000012 VER 0B D3E5C4D74BE3E34BD2E2C4E2F2F14BC4C1E3C1
000013 REP 0B D3E5C4E74BE3E34BD2E2C4E2F2F14BC4C1E3C1
000014 VER 20 D3E5C4D74BE3E34BD2E2C4E2F2F1
000015 REP 20 D3E5C4E74BE3E34BD2E2C4E2F2F1
000016 VER 30 C3C1E3C1D3D6C7F14BD3E5C44BE5C8C9E3F0F1C6
000017 REP 30 C3C1E3C1D3D6C7F24BD3E5C44BE5C8C9E3F0F1C6
000018 VER 45 D3E5C4D74BE3E34BD2E2C4E2F2F1
000019 REP 45 D3E5C4E74BE3E34BD2E2C4E2F2F1
000020 VER 0168 D3E5C4D74BE3E34BD2E2C4E2F2F14BC9D5C4C5E7
000021 REP 0168 D3E5C4E74BE3E34BD2E2C4E2F2F14BC9D5C4C5E7
000022 VER 017E D3E5C4D74BE3E34BD2E2C4E2F2F1
000023 REP 017E D3E5C4E74BE3E34BD2E2C4E2F2F1
000024 VER 018E C3C1E3C1D3D6C7F14BD3E5C44BE5C8C9E3F0F1C6
000025 REP 018E C3C1E3C1D3D6C7F24BD3E5C44BE5C8C9E3F0F1C6
000026 VER 01A3 D3E5C4D74BE3E34BD2E2C4E2F2F1
000027 REP 01A3 D3E5C4E74BE3E34BD2E2C4E2F2F1

```

Figure 5-6 Contents of ZSHIT021

```

000001 RENAME DSNAME=LVD01G.GDG01.LVD037.G0001V00,
000002 NEWNAME=RMG01G.GDG01.CMG037.TEMP.G0001V00,
000003 VOL=3390=LVD03B

```

Figure 5-7 Contents of PRLVD037

```

000001 DELETE D5S1M1G3.GDG01.SMS311 GDG FORCE -
000002 CATALOG (UCAT11.CMG.LVD03F)

```

Figure 5-8 Contents of ADTEMPGDG

```

000001 RENAME DSNAME=LVD02G.MUL.GDG01.LVD0378.G0001V00,
000002 NEWNAME=LVD02G.MUL.RMG01.TEMP.LVD0378.G0001V00,
000003 VOL=3390=(LVD03B,LVD03C)
000004 RENAME DSNAME=LVD02G.MUL.GDG01.LVD0378.G0003V00,
000005 NEWNAME=LVD02G.MUL.RMG01.TEMP.LVD0378.G0003V00,
000006 VOL=3390=(LVD03B,LVD03C)

```

Figure 5-9 Contents of PRMULTI

Sample JCL for Deleting a User Catalog for a T-VOL

Figure 5-10 shows a sample JCL for deleting a user catalog for a T-VOL.

```
//SAMPLE JOB
//DELDS1 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN DD DISP=SHR,DSN='Data set specified by ZAPPARM DD statement(ADvolser)'
/*
:
:
//DELCAT EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN DD DISP=SHR,DSN='Data set specified by ZAPPARM DD statement(ADCATLG)'
/*
//
```

Figure 5-10 Sample JCL for Deleting a User Catalog for a T-VOL

Confirm the dataset names that are not deleted from a user catalog for a T-VOL, and use an ADvolser member in the dataset (PDS) specified by ZAPPARM DD statement to delete the datasets. And then delete the user catalog by using ADCATLG member.

Sample of CDSNLIST

CDSNLIST shows dataset name before change and dataset name after change. User can confirm how dataset name is changed on volume DIVIDE function executing. Figure 5-11 shows sample list of CDSNLIST.

BEFORE DSN	AFTER DSN
----- ----- HSK1.TEST.AIX HSK1.TEST.AIX.DATA HSK1.TEST.AIX.INDEX HSK1.TEST.CLUSTER HSK1.TEST.CLUSTER.DATA HSK1.TEST.CLUSTER.INDEX HSK1.TEST2.CLUSTER HSK1.TEST2.CLUSTER.DATA HSK1.TEST2.CLUSTER.INDEX	----- ----- HSK1.TEST.AIX HSK1.TEST.AIX.DATA HSK1.TEST.AIX.INDEX HSK2.TEST.CLUSTER HSK2.TEST.CLUSTER.DATA HSK2.TEST.CLUSTER.INDEX HSK1.TEST2.CLUSTER.TEST HSK1.TEST2.CLUSTER.TESTDATA ***** CAN NOT CHANGE DSN *****

Figure 5-11 Contents of CDSNLIST



Notes:

- The dataset name is sorted in 44 bytes of short order.
 - When a dataset name is not changed, same dataset name is displayed in each BEFORE DSN and AFTER DSN.
 - When a dataset name is not able to change, it is displayed as "***** CAN NOT CHANGE DSN *****."
(LVD415I message is output in SYSPRINT.)
-

Sample of JOB LOG (DSR)

Contents of JOB LOG in case of executing the volume divide function is as follows. In the JOB LOG, there are messages by DSR, and the results of the other utility, which is called by DSR, are indicated. In case of errors, you should check the messages from DSR first. And then if LVD050I error occurred, in the JOB LOG you should check the result of the utility indicated by LVD050I and fix some problems.

Figure 5-12 shows the case which PPRC command is failed.

```
JES2 JOB LOG -- SYSTEM LPA1 -- NODE N1

22.16.48 JOB09111 ---- THURSDAY, 29 JUN 2000 ----
22.16.48 JOB09111 IRR010I USERID HSKUSR0 IS ASSIGNED TO THIS JOB.
22.16.49 JOB09111 ICH70001I HSKUSR0 LAST ACCESS AT 22:16:08 ON THURSDAY, JUNE 29, 2000
22.16.49 JOB09111 $HASP373 DIVIDE STARTED - INIT A1 - CLASS A - SYS LPA1
22.16.49 JOB09111 IEF403I DIVIDE - STARTED - TIME=22.16.49
22.16.49 JOB09111 IEA630I OPERATOR DIVIDE NOW ACTIVE, SYSTEM=LPA1 , LU=DIVIDE

22.16.50 JOB09111 IOS000I 5850,86,CMD,27,0E00,,00000000,SA1010,DIVIDE ,
800000009000000F58632201010000002310080000A40F0F00004CC200000000
22.16.50 JOB09111 IOS000I 5851,86,CMD,27,0E00,,00000000,SA1011,DIVIDE ,
80000000D100000F58632201010000002310180000A40F0F00004CC300000000

22.16.50 JOB09111 LVDU01I HRULVDUA EXIT,COND=0004,VOL=SA1012,USR=DIVIDE
22.16.50 JOB09111 LVDU01I HRULVDUA EXIT,COND=0004,VOL=SA1013,USR=DIVIDE
22.16.50 JOB09111 LVDU99I HRULVDUZ EXIT,COND=0004,JOB=DIVIDE @DIVI,USR=DIVIDE
22.16.50 JOB09111 IEA631I OPERATOR DIVIDE NOW INACTIVE, SYSTEM=LPA1 ,LU=DIVIDE
22.16.50 JOB09111 DIVIDE .STEP0 #01 (HRULVDX ) STEP-ENDED CC=0004
22.16.50 JOB09111 IEF451I DIVIDE STEP0 - ENDED BY CC 0004 - TIME=22.16.50
22.16.50 JOB09111 $HASP395 DIVIDE ENDED

----- JES2 JOB STATISTICS -----
29 JUN 2000 JOB EXECUTION DATE
89 CARDS READ
207 SYSOUT PRINT RECORDS
0 SYSOUT PUNCH RECORDS
14 SYSOUT SPOOL KBYTES
0.02 MINUTES EXECUTION TIME
1 //DIVIDE JOB CLASS=A,MSGCLASS=X,TIME=1440,COND=(0,NE)
2 //STEP0 EXEC PGM=HRULVDX,REGION=4096K,
// PARM='FUNC (DIVIDE) ,LINECNT (0) '
3 //STEPLIB DD DSN=DSR.LINKLIB,DISP=SHR
4 //SYSPRINT DD SYSOUT=*
5 //ZAPPARM DD DSN=DSR.TEST.ZAPPARM2,DISP=OLD,UNIT=SYSDA
6 //WORK03 DD DISP=(NEW,DELETE) ,DSN=&&WORK03,SPACE=(CYL,(1,1)),
// UNIT=SYSDA
7 //WORK04 DD SYSOUT=*
8 //WORK05 DD SYSOUT=*
9 //WORK06 DD SYSOUT=*
10 //WORK07 DD SYSOUT=*
11 //WORK08 DD SYSOUT=*
12 //SYSIN DD *
```

PPRC command failed

Figure 5-12 Sample of JOB LOG (continues on next page)

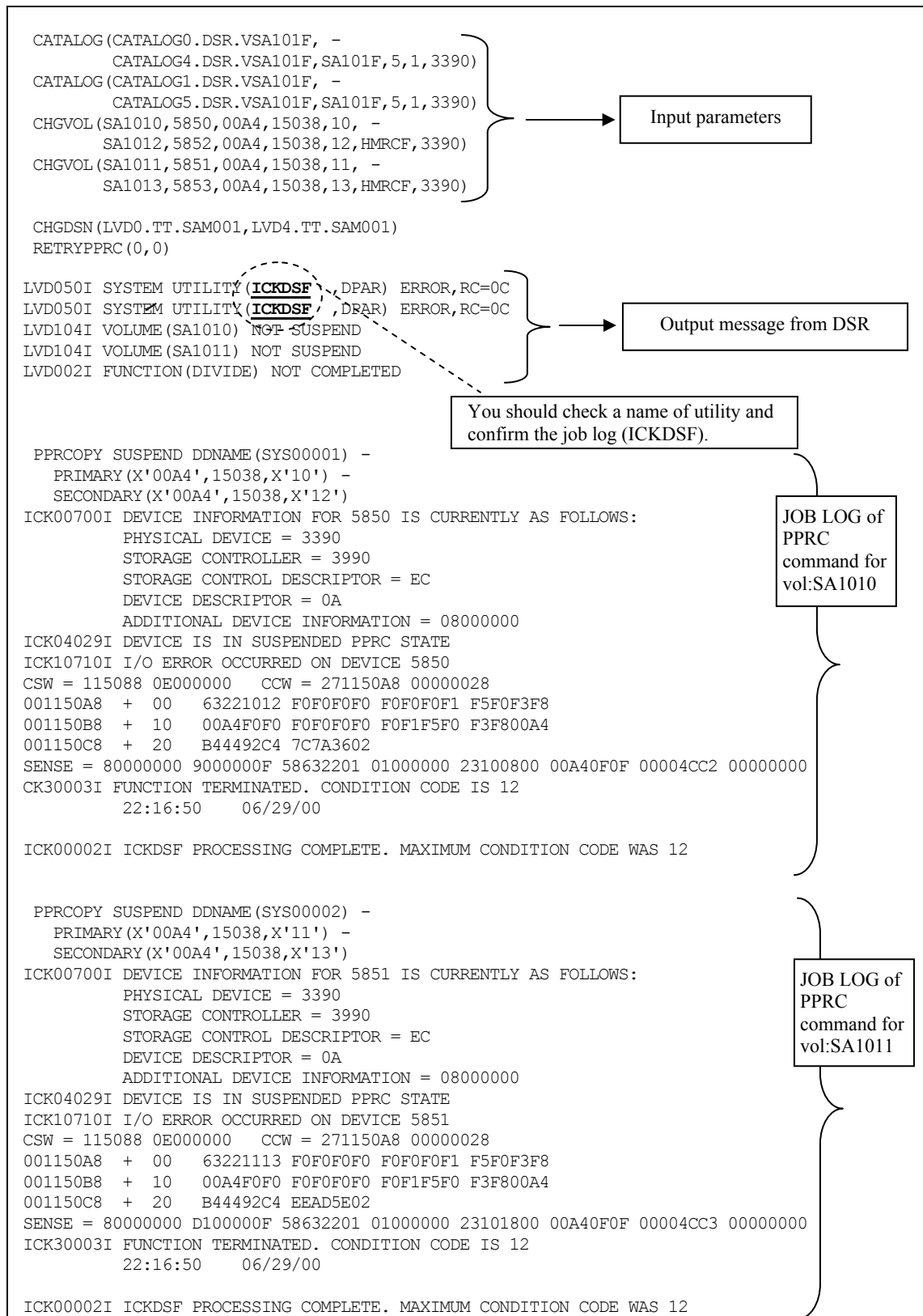


Figure 5-12 Sample of JOB LOG (continued)

Troubleshooting

This chapter provides troubleshooting information for Hitachi Dataset Replication for IBM z/OS and instructions for calling technical support.

- [Troubleshooting](#)
- [Calling the Hitachi Data Systems Support Center](#)

Troubleshooting

Problem Determination: The easiest way to determine an DSR error as opposed to another type of error is to execute SPUFI against the failing component. If SPUFI fails, then a local systems/communication problem exists and should be resolved before notifying the Hitachi Data Systems Support Center. If you need to call the Hitachi Data Systems Support Center, please see [Calling the Hitachi Data Systems Support Center](#) for instructions.

Collecting Error Information: If you experience an DSR error, you need to collect two types of information:

- Detail error log for DSR:
 - For DSR 02-00-XX or higher, specify the following in an EXEC statement:
EXEC PGM=HRULVDP,PARM='FUNC(function name *1),DEBUG(PRINT),SNAP(ON)'
*1: function name is MAKEPARM, DIVIDE, BACKUP or UNIFY.
- Catalogue list for the primary and secondary catalogue:
 - Use the LISTC command of the IDCAMS utility and specify the following command:
LISTC CAT(catalogue name) ALL

ABEND Codes: Table 6-1 lists and describes the ABEND codes for the DSR functions.

Table 6-1 ABEND Codes for DSR Functions

ABEND Code	Description
S0C4	A program interruption occurred, but no routine had been specified to handle this type of interruption. Please notify the Hitachi Data Systems Support Center.

Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The exact content of any error messages displayed on the host system(s).
- The exact content of any error messages displayed by Storage Navigator.
- The service information messages (SIMs), including reference codes and severity levels, displayed by Storage Navigator and/or logged at the host.

If you need to report an error in Hitachi Dataset Replication or have a question about Hitachi Dataset Replication, please be prepared to provide the version, release, and modification level of your Hitachi Dataset Replication software. See the SYSPRINT Output listing from the DSR execution in question. Figure 6-1 shows the format of the SYSPRINT heading line in the output list; the version, release, and modification level are underlined.

DATASET REPLICATION UTILITY	(<u>P-9Y2R-J81Y2</u> <u>02-00-04</u>)
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Figure 6-1 **SYSPRINT Heading Line**

The Hitachi Data Systems customer support staff is available 24 hours/day, seven days a week. If you need technical support, please call:

- United States: (800) 446-0744
- Outside the United States: (858) 547-4526



Acronyms and Abbreviations

ABEND	abnormal end
ACS	automatic class selection
AIX	alternate index
BLK	block
CCA	channel connection address
DAM	direct-access method
DASD	direct-access storage device
DDF	Dynamic Display Facility
DFP	Data Facility Product
DFSMS	Data Facility Storage Management Storage System
DKC	disk controller
DSF	Device Support Facilities
DSR	Hitachi Dataset Replication for IBM z/OS
ESA	Enterprise Systems Architecture
ESDS	entry-sequenced dataset
FBA	fixed-block architecture
GB	gigabyte
GDG	generation data group
GDS	generation dataset
HDS	Hitachi Data Systems
HMRCF	Hitachi Multi-RAID Coupling Feature (old name for ShadowImage)
HQL	high-level qualifier
HRC	Hitachi Remote Copy (another name for TrueCopy)
HRCA	Hitachi Remote Copy Asynchronous
I/O	input/output
ICF	Integrated Catalog Facility
ICKDSF	A DSF command used to perform media maintenance
ID	identification
IDCAMS	access method services (a component of Data Facility Product)
ISAM	index sequential access method
JCL	job control language

JES	job entry storage system
KB	kilobyte
KSDS	key sequential dataset
LCU	logical control unit
LDS	linear dataset
LVD	Logical Volume Divider (another name for Dataset Replication)
MB	megabyte
MVS	Multiple Virtual Storage
NL	non labeled
NSC	Hitachi TagmaStore Network Storage Controller
OBID	(data) object identifier
OS	operating system
OS/390	Operating System/390
PAM	partitioned access method
PB	petabyte
PDS	partitioned dataset
PPRC	Peer-to-Peer Remote Copy
PSID	(data) pageset identifier
PTF	program temporary fix
R	release
RAID	redundant array of independent disks
RECFM	record format
RRDS	relative record dataset
S/390	System/390
SAM	sequential access method
SIM	service information message
SMS	Storage Management Storage System
SPUFI	SQL processor using file input
SQL	Structured Query Language
SSID	storage system ID
S-VOL	source volume
TB	terabyte
TRK	track
T-VOL	target volume
USP	Universal Storage Platform
V	version
VOLSER	volume serial number
VSAM	virtual storage access method
VSN	volume serial number
VTOC	volume table of contents
VTOCIX	volume table of contents index
VVDS	VSAM volume dataset

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MK-96RD648-01