



# Hitachi Copy Manager for IBM<sup>®</sup> TPF Administrator's Guide

Hitachi Universal Storage Platform V  
Hitachi Universal Storage Platform VM  
Hitachi TagmaStore<sup>®</sup> Universal Storage Platform  
Hitachi TagmaStore<sup>®</sup> Network Storage Controller  
Hitachi Lightning 9900<sup>™</sup> V Series  
Hitachi Lightning 9900<sup>™</sup>

## FASTFIND LINKS

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# Preface

This document describes and provides instructions for using the Hitachi Copy Manager for IBM® TPF functions with 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](#)
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**Notice:** The use of Hitachi Copy Manager for IBM® TPF 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 direct-access storage device (DASD) systems and their basic functions.
- The user is familiar with the Hitachi RAID storage system(s) (e.g., Universal Storage Platform V/VM, TagmaStore USP) 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*, MK-96RD635).
- The user is familiar with the Hitachi ShadowImage feature.
- The user is familiar with the Hitachi TrueCopy feature.
- The user is familiar with the Hitachi Universal Replicator feature.
- The user is familiar with data replication requirements.
- The user is familiar with the IBM Transaction Processing Facility (TPF) and IBM z/OS<sup>®</sup> operating systems.

## Product Version

This document revision applies to Copy Manager for TPF version BB and higher.

## Document Revision Level

Revision	Date	Description
MK-92RD129-00	November 2002	Initial Release
MK-92RD129-01	February 2004	Revision 1, supersedes and replaces MK-92RD129-00
MK-92RD129-02	August 2004	Revision 2, supersedes and replaces MK-92RD129-01
MK-92RD129-03	February 2007	Revision 3, supersedes and replaces MK-92RD129-02
MK-92RD129-04	May 2008	Revision 4, supersedes and replaces MK-92RD129-03
MK-92RD129-05	April 2009	Revision 5, supersedes and replaces MK-92RD129-04
MK-92RD129-06	August 2009	Revision 6, supersedes and replaces MK-92RD129-05



## Changes in this Revision

- Changed the term “offline command device” to “offline control device.”
- Updated RCU operations to include the creation of a command device in a control unit.
- Updated the section on migration to version B9 to now state migration to version B9 or higher from version prior than B9.
- Updated the VM modification section to describe the VM APAR VM64425. Removed the unsupported volume VM updates (removed the HCPTUD updates).

## 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 sections in that chapter.

Chapter	Description
<a href="#">Overview of Copy Manager for TPF</a>	Provides a general overview of Copy Manager for TPF and describes Copy Manager for TPF copy functions and operations.
<a href="#">Installing Copy Manager for TPF</a>	Describes the system requirements for Copy Manager for TPF use, and the tasks required for installation planning, installation, defining control records, and migrating to the current version.
<a href="#">Preparing for Copy Manager for TPF Operations</a>	Describes how to prepare for Copy Manager for TPF's operational use, including defining copy needs, the volumes to be copied as a list of copy pairs, and the Copy Manager set configuration definition records.
<a href="#">Performing Copy Operations</a>	Provides sample usage of ShadowImage, TrueCopy, and Universal Replicator in TPF and use of the TPF operator commands. Describes copy operations when using Copy Manager for TPF for offline volumes and for RCUs.
<a href="#">ShadowImage Record Read Function</a>	Provides an overview of the ShadowImage Record Read Function and explains the FDRSC Macro including sample use and a sample program.
<a href="#">Troubleshooting</a>	Covers general troubleshooting information.
<a href="#">Acronyms and Abbreviations</a>	Defines the acronyms and abbreviations used in this document.
<a href="#">Index</a>	Lists the topics in this document in alphabetical order.

## Referenced Documents

- Other Hitachi Copy Manager for TPF documents:
  - *Hitachi Copy Manager for IBM® TPF Messages and Codes*, MK-92RD130
  - *Hitachi Copy Manager for IBM® TPF Operations Guide*, MK-92RD131
- Hitachi Universal Storage Platform V/VM documents:
  - *User and Reference Guide*, MK-96RD635
  - *Hitachi TrueCopy for IBM® z/OS® User's Guide*, MK-96RD623
  - *Hitachi Universal Replicator for IBM® z/OS® User's Guide*, MK-96RD625
  - *Hitachi ShadowImage for IBM® z/OS® User's Guide*, MK-96RD619
  - *Storage Navigator User's Guide*, MK-96RD621
- Hitachi TagmaStore™ Universal Storage Platform and Network Storage Controller documents:
  - *Universal Storage Platform User and Reference Guide*, MK-94RD231
  - *Network Storage Controller User and Reference Guide*, MK-95RD279
  - *Hitachi TrueCopy for IBM® z/OS® User and Reference Guide*, MK-94RD214
  - *Hitachi Universal Replicator for IBM® z/OS® User's Guide*, MK-94RD224
  - *Hitachi ShadowImage for IBM® z/OS® User's Guide*, MK-94RD212
  - *Storage Navigator User's Guide*, MK-94RD206
- Hitachi Lightning 9900™ V Series documents:
  - *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
  - *Storage Navigator User's Guide*, MK-92RD101
- Hitachi Lightning 9900™ documents:
  - *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
  - *Remote Console User's Guide*, MK-90RD003
- IBM® document: *z/VM: CP Planning and Administration*, SC24-6043

## Document Conventions





The term “Hitachi RAID storage system” refers to all supported Hitachi storage systems, unless otherwise noted.

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

This document uses the following typographic conventions:

Convention	Description
<b>Bold</b>	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click <b>OK</b> .
<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> <b>Note:</b> 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> <b>Note:</b> 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 = 1,000<sup>2</sup> bytes
- 1 GB = 1,000<sup>3</sup> bytes
- 1 TB = 1,000<sup>4</sup> bytes
- 1 PB = 1,000<sup>5</sup> bytes

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

- 1 KB = 1,024 (2<sup>10</sup>) bytes
- 1 MB = 1,024 KB or 1,024<sup>2</sup> bytes
- 1 GB = 1,024 MB or 1,024<sup>3</sup> bytes
- 1 TB = 1,024 GB or 1,024<sup>4</sup> bytes
- 1 PB = 1,024 TB or 1,024<sup>5</sup> 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 message(s) displayed on the host system(s).
- The exact content of any error message(s) displayed on Storage Navigator.
- The service information messages (SIMs), including reference codes and severity levels, logged at the host and displayed by Storage Navigator.

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: [doc.comments@hds.com](mailto:doc.comments@hds.com). Include the document title, number, and revision, and refer to specific section(s) and paragraph(s) whenever possible.

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



# Overview of Copy Manager for TPF

This chapter provides an overview of Hitachi Copy Manager for IBM® TPF.

- [Introduction](#)
- [Copy Manager for TPF Operations](#)
- [Components of Copy Manager](#)
- [Copy Manager for TPF Processing](#)
- [Additional Copy Functions Supported by Copy Manager](#)
- [Maintaining Database Integrity](#)

## Introduction

The Hitachi Copy Manager for IBM® TPF software enables Transaction Processing Facility (TPF) users to control DASD copy functions on Hitachi RAID storage systems from TPF. Without TPF control, you must use either the DASD storage system itself (e.g., Storage Navigator or SVP) or another platform, such as VM or MVS, that can issue copy commands. For many, using another platform is not an option, because the production TPF system DASD is not connected to any operating system other than TPF.

Hitachi Copy Manager for TPF provides a TPF interface that is simple to install and use. With one TPF operator entry, the TPF user can control the following sessions on the following Hitachi products for IBM z/OS® over the entire TPF complex: ShadowImage (local copy), synchronous TrueCopy (remote copy), asynchronous TrueCopy (remote copy) or Universal Replicator (remote copy). Copy Manager for TPF enables users to establish, split, delete, or resync those sessions with one entry. As there are no TPF control program changes, Copy Manager for TPF requires minimal effort to incorporate into a TPF complex.

Hitachi Copy Manager for TPF can be used for the following applications:

- **Backups for Disaster Recovery** – creating a copy of data that can be restored to a given point in time, in case the primary data is lost or corrupted.
- **Checkpoints** – This is similar to backups, except that the “copy” is only retained for a short duration. For example, at the beginning of a major software change, a customer may wish to create a copy of the database. If the cut over to the new software fails and causes unrecoverable data corruption, the checkpoint can be used to refresh the system to the point before the change was implemented.
- **Creation of test systems** – Many TPF sites have half test systems (i.e., test systems that are made up of prime modules only, no duplicates). The process to restore these systems from tape is long and arduous, takes many people-hours, and relies on magnetic tape that can often fail. In a fraction of the time, ShadowImage and/or Universal Replicator and/or TrueCopy can be utilized to restore a half test system.



This document covers Hitachi Copy Manager for TPF operations on the following Hitachi RAID storage systems. The TPF operator interface for Copy Manager for TPF is the same for all storage system types.

- Hitachi Universal Storage Platform V (USP V)  
Universal Storage Platform VM (USP VM)
- Hitachi TagmaStore<sup>®</sup> Universal Storage Platform (USP)  
Hitachi TagmaStore<sup>®</sup> Network Storage Controller (NSC)
- Hitachi Lightning 9900<sup>™</sup> V Series
- Hitachi Lightning 9900<sup>™</sup>

This document assumes that the user is familiar with the basic concepts of ShadowImage, Universal Replicator and TrueCopy as detailed in the user documents for those features (see [Referenced Documents](#) in front matter). Information from these documents is not repeated in this document.

## Copy Manager for TPF Operations

Hitachi ShadowImage, Hitachi TrueCopy, and Hitachi Universal Replicator operate within the storage control units the same on the TPF operating environment as they do in other mainframe operating environments. Copy Manager for TPF controls the initiation, monitoring, and termination of the copy functions.

## Components of Copy Manager for TPF

The ShadowImage, Universal Replicator, and TrueCopy components are described in the storage system-specific user documents (e.g., *Hitachi Universal Storage Platform V/VM Universal Replicator for IBM z/OS® User's Guide*, *Hitachi TagmaStore USP/NSC ShadowImage for IBM z/OS User's Guide*).

In addition to the ShadowImage, Universal Replicator, and TrueCopy components, the following components are required for Copy Manager:

- TPF Assembler e-type segments
- TPF fixed-file records
- A VM table update for VM testing
- Copy Manager User Exits (optional)

## Assembler E-Type Segments

The TPF assembler segments control the copy functions performed by the control unit. For ShadowImage, Universal Replicator, and TrueCopy, the Hitachi TPF software acquires status from and issues commands to the control unit to perform copy functions. The Hitachi TPF code initiates the copy processing in the Hitachi RAID control unit, and then the ECB exits. Thus no TPF host cycles are required for the copy function.

The TPF assembler segments also provide the tools to build and maintain the local or remote replication configurations. These tools allow the TPF customer to build, modify, display or delete their replication configurations.

See [Installing the Copy Manager for TPF Software](#) for further information.

## TPF Fixed-File Records

Fixed-file records must be allocated that contain the Copy Manager control records and the Copy Manager configuration records. See [Installing the Copy Manager for TPF Software](#) for further information.

## VM Requirements for Testing

If VM APAR VM64425 is applied, then no VM modifications are required for the use of Copy Manager.

If VM APAR VM64425 is not applied, then the Hitachi channel commands that control the copy functions require a change to a VM table to process. See [Installing the Copy Manager for TPF Software](#) for further information.

## Copy Manager User Exits (Optional)

Copy Manager provides five user exits. These user exits enable the TPF installation to provide additional security or provide installation-specific programming before and after the split or delete actions. See [Installing the Copy Manager for TPF Software](#) for further information.

## Copy Manager for TPF Processing

Copy Manager processing is performed using TPF operator entries from the TPF operator console. For further information on using Copy Manager's commands to control and monitor the ShadowImage and/or Universal Replicator and/or TrueCopy volume pairs, see [Performing Copy Operations](#). Also see the *Copy Manager for TPF Operations Guide* for detailed information on the format of each Copy Manager TPF entry.

Your Hitachi Data Systems representative can also perform ShadowImage, Universal Replicator and TrueCopy operations for you by using the control unit's service processor (SVP) or by using Storage Navigator. Please contact your Hitachi Data Systems account team for further information on ShadowImage, Universal Replicator, and TrueCopy configuration services.

### ShadowImage Set/Reset Reserve Attribute Operation – Not Required

The ShadowImage set reserve attribute operation reserves a volume so that it can be used as a target volume (T-VOL). The ShadowImage reset reserve attribute operation unreserves a volume so that it can be varied online and accessed by hosts.

When the Copy Manager commands are used to establish ShadowImage pairs, the T-VOLs do not need to be reserved. The TPF commands require only that potential T-VOLs be offline to the host.

## Additional Copy Functions Supported by Copy Manager

Copy Manager also supports the following copy functions:

- At-time split with asynchronous remote or local copy
- ShadowImage record read
- TPF offline volume operations (support local or remote copy operations for volumes that are offline (not mounted) to the TPF system.
- Remote control unit (RCU) operations (support of local or remote copy operations in an RCU).



**Note:** The following processes are not supported: concurrent copy (CC), extended remote copy (XRC), and peer-to-peer remote copy (PPRC).

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### At-Time Split with Asynchronous Remote or Local Copy

The at-time split function allows an installation to create a true point-in-time copy of an installation's TPF database. The at-time split function allows an installation to pre-determine the time of a database split. For example, the installation may request to split a database on March 1, 2010, at 22:30. The asynchronous remote or local copy function allows for at-time split. The Copy Manager software provides a single functional entry to set a time for the at-time split function. See [Performing At-Time Split with Asynchronous Local or Remote Copy – PRESET TPF Command](#) for an example of the use of the at-time split function with the asynchronous remote or local copy function.

### ShadowImage Record Read

Copy Manager provides a TPF macro (**FDRSC**) that allows the installation to write programs that will read a TPF record from a ShadowImage volume. See [ShadowImage Record Read Function](#) for information on this function and an example program using the **FDRSC** macro.

## TPF Offline Volume Operations

Copy Manager provides a configuration definition record (OFFREC) that defines an offline volume control device for a control unit.

To initiate the control unit's copy functions, Copy Manager sends the control unit a "copy command". Copy Manager uses TPF's normal I/O processing to send its copy commands to a control unit via a TPF online (mounted) volume.

Each pair in a set's pair configuration record (PAIRREC) defines a volume for Copy Manager to use for its I/O processing. Copy Manager sends its copy commands to the control unit via the defined volume in the set's PAIRREC.

If the defined volume in the set's PAIRREC is offline (not mounted) to TPF, Copy Manager provides an alternative method for the TPF installation to define a volume to be used for Copy Manager's I/O. The Copy Manager name of the alternative TPF volume is the offline volume control device.

The TPF installation may define an offline volume control device for each control unit in the TPF system. The offline volume control device must be an online TPF volume. Copy Manager uses the control unit's offline volume control device in place of any TPF volume that is offline to TPF.

The offline volume control devices are define by the Copy Manager ZFDRS OFFREC command.

See [Copy Operations When Using TPF Offline Volumes](#) for information on this function and for an example of procedures to enable this function.

## RCU Operations

Copy Manager provides a configuration definition record (RCUREC) that defines the RCU sequence of command devices.

The RCU command devices are used in a series of RCU hops. These command devices are used to send a copy command to the remote "target" control unit. The copy command "hops" from one control to another via each control unit's RCU command device.

The sequence of control unit hops along with each control unit's command device location is define by the Copy Manager ZFDRS RCUREC command.

See [Copy Operations When Using RCUs](#) for information on this function and for an example of procedures to enable this function.

## Maintaining Database Integrity

The entire TPF database is treated as one group or set for ESTABLISH, RESUME/RESYNC, REVERSE RESUME/RESYNC, SPLIT, and DELETE functions. The volume pairs for the entire database must be included in one set in order to maintain and ensure update sequence consistency. If using ShadowImage or TrueCopy Synchronous, depending on the user's needs, a logging tape may be required during the SPLIT operation. If using the TrueCopy asynchronous or ShadowImage asynchronous with At-Time Split, no logging tapes are required.



**Note:** If you want to delete a ShadowImage, TrueCopy, or Universal Replicator pair in duplex mode and maintain synchronization between the volumes, you must first SPLIT (suspend) the volume pairs and then DELETE them. This two-step process ensures that all changes held in the S-VOL "track change table" are written to the T-VOLs to maintain the database integrity.

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# Installing Copy Manager for TPF

This chapter provides information on system requirements, software installation, and the preparation required for TPF operations.

This chapter discusses the following topics:

- [System Requirements](#)
- [Planning for Installing Copy Manager](#)
- [Installing the Copy Manager for TPF Software](#)
- [Copy Manager Control Records](#)
- [Defining the Copy Manager Control Records](#)
- [Defining the Copy Manager Configuration Records](#)
- [Migration to Copy Manager from Versions prior to B9](#)
- [Restrictions for TPF](#)

## System Requirements

ShadowImage, TrueCopy, and Universal Replicator require the same preparations as do the other z/OS and S/390 operating environments. For this information please refer to the appropriate ShadowImage, TrueCopy, or Universal Replicator user's guide.

The Copy Manager system requirements consist of the TPF operating system and the DASD storage system(s) hosting the copy pairs. The system requirements for Copy Manager are:

- Hitachi RAID storage system(s): Copy Manager supports the following storage systems:
  - Universal Storage Platform V/VM
  - Universal Storage Platform, Network Storage Controller
  - Lightning 9900V
  - Lightning 9900
- ShadowImage (for mainframe) and/or TrueCopy (for mainframe) and/or Universal Replicator (for mainframe) license(s). The ShadowImage and/or TrueCopy and/or Universal Replicator feature(s) must be enabled on each Hitachi storage system that will have active copy pairs. For information and instructions on enabling these features, please refer to the *Storage Navigator User's Guide* or *Remote Console User's Guide* for the storage system, or contact your Hitachi Data Systems representative.
- TPF operating system, version 4.1 or later (including z/TPF)
- No specific PUT level is required. No TPF Control Program changes are required.

## Planning for Installing Copy Manager

To install the software required for Copy Manager for TPF, ECB programs must be allocated and fixed-file records must be allocated.

### Set Usage

A set is a grouping of ShadowImage, Universal Replicator, or TrueCopy pair definitions. In TPF, a set generally represents the copy pair configuration of a TPF production system or TPF test system.

For example, a set named BACKUP1 might represent a ShadowImage copy pair configuration for a TPF production system. This configuration would define each of the TPF production volumes (these volumes are called the source volumes) and the location of where to copy these volumes (these volumes are called the target volumes).

A maximum of 58 sets are allowed per TPF system.

Prior to installation, perform the following tasks:

1. Define the number of sets you plan to use on the specific TPF system. Hitachi Data Systems recommends that you consult with HDS TPF Engineering during this planning stage.
2. Determine the number of source volumes to be used in each set. Include spare TPF volumes if there are plans to copy spare volumes.
3. Define each set's name. The name may be one to 16 alpha-numeric characters.
4. Make a list or chart that shows each set's name and its corresponding number of source volumes.

SET NAME	SOURCE VOLUME COUNT

## ECB Program Allocation

Copy Manager uses the 36 4-K ECB programs. The 36 4-K ECB programs must be allocated for Copy Manager. The programs are named BHD0-BHD9 and BHDA-BHDZ.

The Copy Manager programs are written in Assembler language. Thirty-four of the programs are shipped in object only format. Two programs are shipped in source format.

## Fixed-File Record Use

Two types of fixed-file records are used in Copy Manager: control records and set configuration definition records. For ease of installation, it is recommended that the required fixed-file records be identified (FACE type, ordinal, and record ID) prior to installation.

## Control Record Planning

Two control records are used by Copy Manager: COPYMGR and SETREC. COPYMGR and SETREC are each a single 4K record. Each record's fixed-file location is defined to Copy Manager during the Copy Manager installation process.

Copy Manager supports any customer FACE type, ordinal range, and record ID. If the installation site wishes suggestions for these values, HDS suggests:

- Suggested FACE type is #HDSCM0.
- Suggested ordinal number are ordinal 0 and ordinal 1.
- Suggested record ID is C'HD'.

Prior to installation, perform the following tasks.

1. Identify and record below the location of the COPYMGR primary system control record.

COPYMGR FACETYPE \_\_\_\_\_

COPYMGR ORDINAL \_\_\_\_\_

COPYMGR RECORD ID \_\_\_\_\_

2. Identify and record below the location of the SETREC control record.

SETREC FACETYPE \_\_\_\_\_

SETREC ORDINAL \_\_\_\_\_

SETREC RECORD ID \_\_\_\_\_

## Configuration Record Planning

Three configuration records are used by Copy Manager: OFFREC, RCUREC, and PAIRREC. OFFREC contains the Offline Volume Command device definitions. RCUREC contains the Remote Control Unit Command device definitions. PAIRREC contains all of the Copy Pair's definitions for a set.

### OFFREC and RCUREC Configuration Records

OFFREC and RCUREC are each a single 4K fixed-file record. OFFREC and RCUREC's fixed-file location is defined to Copy Manager during the Copy Manager installation process.

Copy Manager supports any customer FACE type, ordinal range, and record ID. If the installation site wishes suggestions for these values, HDS suggests:

- Suggested FACE type is #HDSCM0.
- Suggested ordinal numbers are ordinal 2 and ordinal 3.
- Suggested record ID is C'HD'.

Prior to installation, perform the following tasks.

3. Identify and record below the location of the OFFREC configuration definition record.

OFFREC FACETYPE \_\_\_\_\_

OFFREC ORDINAL \_\_\_\_\_

OFFREC RECORD ID \_\_\_\_\_

4. Identify and record below the location of the RCUREC configuration definition record.

RCUREC FACETYPE \_\_\_\_\_

RCUREC ORDINAL \_\_\_\_\_

RCUREC RECORD ID \_\_\_\_\_

## PAIRREC Configuration Definition Record(s)

A single set's copy pair configuration is defined in a group of fixed-file records. These records are called the "Copy Pair Configuration Definition Records" (PAIRRECs). A set's PAIRRECs must all be the same FACE type and record ID. A set's PAIRRECs must use a consecutive ordinal range.

For example, a set named BUILDTESTSYS1 may use FACE type HDSCM0, record ID C'HD", and ordinals 50-65.

A single fixed-file PAIRREC will contain 58 source /target pairs. To determine the number of fixed-file records to use for a set's copy pair configuration, simply divide the number of source volumes pairs by 58, rounded up.

For example, if a set named DAILYPRODUCTION1 had 1000 source volumes, you would calculate the need for  $1000/58 = 17.24$  records. You would plan to allocate a minimum of 18 fixed-file records in a consecutive ordinal range.

Prior to installation, do the following:

1. Determine the following information for each set:
  - Set name (1- to 16-character name)
  - Number of source volumes in the set
  - Number of PAIRREC records required for the set
  - Facetype of the set
  - Record ID of the set
  - Starting ordinal of the set
  - Ending ordinal of the set. It is common for Copy Manager customers to pad the number of ordinals to a round increment. For example, if a set requires 18 fixed-file records, allocating each set 20 or 50 (or some multiple of 10) ordinals is a common practice.
2. Using the information in step 1, make a chart or list identifying each set's configuration record location.

SET NAME	SOUCE VOLUME COUNT	NUMBER OF PAIRRECs	FACETYPE	RECORD ID	STARTING ORDINAL NUMBER	ENDING ORDINAL NUMBER

3. Calculate (sum) the total number of fixed-file records required for all of the sets to be used in the TPF system.

# Installing the Copy Manager for TPF Software

The following required tasks must be completed in order to successfully install the Copy Manager software:

- [Task 1. Allocate and Initialize Fixed Records](#)
- [Task 2. Allocate 36 Program Segments: BHD0-BHD9, BHDA-BHDZ](#)
- [Task 3. Update the Source Code in Copy Manager Program BHDZ](#)
- [Task 4. Update the Source Code in Copy Manager Program BHDF](#)
- [Task 5. Assemble BHDZ and BHDF](#)
- [Task 6. Load the 36 Copy Manager Programs to the TPF System](#)
- [Task 7. Create the ZFDRS Message and Program Reference](#)
- [Task 8. Update VM Tables for VM Testing of Supported Devices](#)

## Task 1. Allocate and Initialize Fixed Records

The Copy Manager database consists of two types of logical records: the system control records and the system configuration records. The task required to allocate and initialize these fixed-file records follow. Use the information gathered during the planning process to complete the following task.

1. Using the information gathered during the installation planning process, determine the total number of fixed-file records required for the Copy Manager set copy pair configuration definition records (PAIRRECs).
2. The total number of fixed-file records that the TPF installation will need for Copy Manager will be the number of fixed-file records for the PAIRRECs plus the two configuration records (OFFREC and RCUREC) plus the two Copy Manager control records (COPYREC and SETREC).
3. Decide if existing unused fixed-file records will be used or if new fixed-file records will be allocated.
4. If new fixed-file records are to be allocated, update the FCTB to add the fixed-file records required by Copy Manager. Hitachi Data Systems recommends that the FACE type and ordinal range identified during the installation planning process be use. The fixed-file records attributes are: Processor Common, I-stream Common, and Subsystem Common.
5. Initialize the Copy Manager fixed-file records using ZIFIL or a similar function. Use the record ID(s) identified during the installation planning process during the fixed-file record initializations.

## Task 2. Allocate 36 Program Segments: BHD0-BHD9, BHDA-BHDZ

Thirty-four (34) of the 36 Copy Manager e-type assembler segments are delivered in object code only (OCO) format.



**Note:** BHDF and BHDZ are shipped as source. Instructions for the installation of BHDF and BHDZ follow.

---

Recommended (default) program names: BHD0-9, BHDA-Z (31bit, KEY0, RESTRICT). If the installation site requires a different program naming convention, Hitachi Data Systems TPF Engineering will need the name of the segments in order to generate the object code.

## Task 3. Update the Source Code in Copy Manager Program BHDZ

The TPF program BHDZ defines the TPF installation's Copy Manager password, defines the location of the Copy Manager system control record (COPYMGR) and defines if the TPF installation will use user exits or will not use user exits.



### Notes:

- **Modifying BHDZ after Copy Manager is installed.** After BHDZ has been loaded, the TPF installation may change the location of the system control record or change the password or change the use of user exits. Simply modify BHDZ to reflect the changes and assemble and load the new BHDZ.
  - **If the TPF customer requests,** Hitachi Data Systems TPF Engineering will update BHDZ with the customer's defined password and Copy Manager system control record location. Hitachi Data Systems TPF Engineering will then assemble BHDZ and ship BHDZ as OCO as part of the Copy Manager program OCO shipment.
- 

The TPF installation must update the data portion in each of the following five assembler lines of code in BHDZ.

1. Copy Manager's password; must be 8 bytes, data field name is CUST\_PW.  
`CUST_PW DC C'SECRETXX' CUSTOMER MUST MODIFY, MUST BE 8 BYTES`
2. Copy Manager's system control record (COPYMGR) FACETYPE; must be 8 bytes, data field name is CUST\_FAC.  
`CUST_FAC DC C'#HDSCM0 ' CUSTOMER MUST MODIFY, MUST BE 8 BYTES`
3. Copy Manager's system control record (COPYMGR) record ID; must be 2 bytes, data field name is CUST\_RID.  
`CUST_RID DC C'HD' CUSTOMER MUST MODIFY, MUST BE 2 BYTES`



4. Copy Manager's system control record (COPYMGR) ordinal; must be full word (4 bytes), data field name is CUST\_ORD.

CUST\_ORD DC F'100' CUSTOMER MUST MODIFY, MUST BE 4 BYTES

5. Copy Manager's user exit use indicator. If = x'00', then the user exit will not be used (entered). If = x'FF', then the user exit will be used (entered). must be 1 byte. Data field name is CUST\_UXT

CUST\_UXT DC X'FF' CUSTOMER MUST MODIFY, MUST BE 1 BYTE

#### Task 4. Update the Source Code in Copy Manager Program BHDF

Copy Manager provides five user exits. The user exit entry point is **BHDF**. Source for **BHDF** is provided to the installation. **BHDF** provides a branch table that will branch to each of the five skeleton user exits. The installation may want to modify these skeleton user exit routines in **BHDF** to provide support for installation-specific requirements. Contact Hitachi Data Systems TPF Engineering for guidance when writing the user exits.



**Note:** If user exits will be used, BHDZ must be updated to allow the use of user exits.

---

There are minimal programming restrictions when writing the user exit. Copy Manager will save its ECB contents and detach its data level before entering the user exit.

The user exit may be loaded using the installation's normal assembly and load procedures. The following is a description of the five user exits in Copy Manager.

1. **Security User Exit:** A user exit is provided at the beginning of the Copy Manager package. This user exit is intended to allow the installation to provide additional security for the ZFDRS entry.
2. **Split User Exits:** A user exit is provided both before and after Copy Manager issues the split pair command. These user exits are intended to allow the installation to support additional functionality before and/or after a split command has been issued. For example, an installation may wish to flush VFA or start a logging process before a split command is issued.
3. **Delete User Exits:** A user exit is provided both before and after Copy Manager issues the delete pair command. These user exits are intended to allow the installation to support additional functionality before and/or after a delete command has been issued. For example, an installation may wish to flush VFA or start a logging process before a delete command is issued.

## Task 5. Assemble BHDZ and BHDF

Use the TPF installation's normal procedures to assemble TPF ECB assembler programs.

## Task 6. Load the 36 Copy Manager Programs to the TPF System

Use the TPF installation's normal load procedures to load the 36 Copy Manager programs to the TPF system that will use Copy Manager.

## Task 7. Create the ZFDRS Message and Program Reference

Use the TPF z-message ZFDRS. Contact Hitachi Data Systems TPF Engineering for the program name of the ZFDRS Parser. If the recommended program names were used, the name of the parser will be BHD7.

```
ZFMSG ADD ZFDRS P-BHD7
```



**Note:** If **APAR 27728** has been applied, support for the ZFDRS functional entry already exists at the installation. As an alternative to the ZFMSG entry, the installation may modify UDRS to issue an ENTNC to xxxx. Contact Hitachi Data Systems TPF Engineering for the program name of the ZFDRS parser or to investigate other programming options for this APAR.

---

## Task 8. Update VM Tables for VM Testing of Supported Devices



**Note:**

- If **VM APAR VM64425** has been applied, then no VM modifications are required for TPF Copy Manager.
  - If assistance is required to apply the following VM modifications, contact Hitachi Data Systems TPF Engineering.
- 

1. If Copy Manager will be used on VM on supported channels, update the VM tables for VM testing of supported devices. Unsupported channels will work without making any changes to VM.
2. CCW x'83' and x'84' are needed for control of ShadowImage, TrueCopy and Universal Replicator. Chapter 16 of the *IBM z/VM V4R4.0 CP Planning and Administration* manual (SC24-6043-01) addresses CCW translation. It instructs where to find the files and which macros need to be coded to handle these CCWs in VM. The IBM manuals are online at:  
[http://publibz.boulder.ibm.com/cgi-bin/bookmgr\\_OS390/BOOKS/HCSG0A10/2.15?SHELF=EZ2VM11B&DT=20030616164613&FS=FALSE](http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/HCSG0A10/2.15?SHELF=EZ2VM11B&DT=20030616164613&FS=FALSE)

3. Local modifications need to be made to HCPTDD, HCPTMD, and HCPGDS to allow STATUS MODIFIER on these CCWs. If the CCWs are not in these tables, VM will incorrectly translate them to something unrecognizable by the control unit.
4. Prepare a local mod to the appropriate module:
  - ✓ Dedicated Disks: HCPTDD
  - ✓ MDISK: HCPTMD
  - ✓ Linked Disks: HCPGDS
5. Create an auxfile representing the changes (HCPTDD AUXLCL). The file will contain one line describing the change:

**EXAMPLE for changing HCPTDD:**

A00001HP HDS UM00001 \* Changes for special TPF CCWs

6. Then edit HCPTDD to make the changes:

```
HCPDDPCD CCW=83, =====> SPECIAL CODE FOR HDS
                        VALID=YES,
                        STATMOD=NO,
                        RONLY=NO,
                        SPECIAL=NO,
                        PREPROC=NO,
                        LAST=NO
                                                    SPACE 1
HCPDDPCD CCW=84, =====> SPECIAL CODE FOR HDS
                        VALID=YES,
                        STATMOD=NO,
                        RONLY=NO,
                        SPECIAL=NO,
                        PREPROC=NO,
                        LAST=NO
```

7. Assemble the module to create the new text.

**EXAMPLE for HCPTMD:**

```
HCPMDPCD CCW=83, =====> SPECIAL CODE FOR HDS
                        VALID=YES,
                        STATMOD=NO,
                        RONLY=NO,
                        SPECIAL=NO,
                        LAST=NO
                                                    SPACE 1
HCPMDPCD CCW=84, =====> SPECIAL CODE FOR HDS
                        VALID=YES,
                        STATMOD=NO,
                        RONLY=NO,
                        SPECIAL=NO,
                        LAST=NO
```

**DESCRIPTION of HCPGDS:**

8. Alter the branch table **GSDATBL** in **HCPGDS** as follows: change the two HDS opcodes to **DASTOP** (from **DACMFJ**).

## Copy Manager Control Records

The Copy Manager database consists of two control records and three configuration definition records. The following are descriptions of these Copy Manager records:

- **COPYMGR:** The Copy Manager primary system control record.
  - COPYMGR is an index record that contains pointers to the Copy Manager records SETREC, OFFREC and RCUREC. This record also contains the Copy Manager system default record ID.
  - When a record ID is an option for a Copy Manager entry (ZFDRS entry), and if a record ID is not specified, the Copy Manager system default record ID is used.
  - The location of this record is defined in the Copy Manager TPF program, BHDZ.
- **SETREC:** The set index control record.
  - SETREC is an index record that defines every SET to be used for a TPF System. SETREC contains the following information for each set.
    - The set's name.
    - The location of the first fixed-file record used for the set's copy pair configuration definition record (PAIRREC).
    - The set's copy characteristics.
  - The set's name is a variable length name containing 1 to 16 alphanumeric characters.
  - The set index control record contains the location of the set's PAIRREC(s). The first fixed-file record location of a set's PAIRREC is defined in SETREC using the record's FACE type, starting ordinal number and record ID.
  - The set index control record also describes the characteristics of each set. For example, if a set is using a Universal Replicator copy, that characteristic is specified in the set index control record.
  - The location of the set index control record (SETREC) is defined in the COPYMGR record. To define the location of SETREC, use the Copy Manager entry: "ZFDRS COPYMGR ADD SETREC ...".

- **OFFREC:** The offline volume control device configuration definition record.
  - When a TPF volume is offline (not mounted), TPF will not send an I/O to that volume. For example, a spare volume is not mounted to TPF, therefore, TPF cannot send I/O to that volume. To perform copy function for a TPF offline volume, Copy Manager uses an offline volume control device. An offline volume control device is simply a TPF online (mounted) symbolic device address (SDA) on the same control unit as the offline (not mounted) volume. Copy Manager will send its copy commands for the offline volume via the offline volume control device.
  - The offline volume control device configuration definition record (OFFREC) defines each control unit's control devices.
  - The offline volume control device configuration definitions include the serial number of the control unit with which to use this control device, the name of the set with which this control device will be used, and the SDA of the control device.
  - The location of the offline volume control device configuration definition record is defined in the COPYMGR record. To define the location of OFFREC, use the Copy Manager entry: "ZFDRS COPYMGR ADD OFFREC ...".
- **RCUREC:** The RCU command device configuration definition record.
  - When controlling copy functions at a remote location via TPF production control units, the copy commands must "hop" from the production control unit through one of more RCUs until the copy command reaches the target control unit. The copy commands must be sent to an RCU command device in each of the series of control units being "hopped" through. For example, if the TPF production control unit is control unit 1, control unit 1 is connected to control unit 2, the control unit 2 is connected to control unit 3. Control unit 3 is the target control unit on which Copy Manager will control the copy function. Then control units 1, 2, and 3 all must have a command device. When Copy Manager sends a copy function to control unit 3, the copy command will be sent to control unit 1's RCU command device, then to control unit 2's RCU command device, and finally to RCU 3's RCU command device.
  - The RCU command device configuration definition record describes the order of the hops and describes each command devices location in each control unit. See [RCU Operations](#) for further details.
  - The location of the RCU command device configuration definition record (RCUREC) is defined in the COPYMGR record. To define the location of RCUREC, use the Copy Manager entry: "ZFDRS COPYMGR ADD RCUREC ...".

- **PAIRREC:** The copy pair configuration definition record.
  - The set copy pair configuration definition record is a group of fixed-file records (or a single fixed-file record) that contains all the volume pair definitions for a single set. To perform local copy or remote copy functions in a control unit, the control unit must know what volume to copy from (the source volume) and what volume to copy to (the target volume). The source (copy from) and target (copy to) volumes are called a copy pair. The PAIRREC contains the information that describes the control unit's location of each of the volumes in a copy Pair. See [Creating the Copy Pair Configuration Definition Records](#) for more information.
  - Each record in a set's copy pair configuration definition record (PAIRREC) may contain up to 58 copy pair definitions.
  - A set may contain one or more fixed-file records for a PAIRREC (the records are in sequential fixed-file record ordinal order).
  - The number of fixed-file records to be used for a PAIRREC is defined during the Copy Manager installation planning process.
  - To define the location of a set's configuration definition record, use the Copy Manager entry: "ZFDRS SETREC ADD ...".

## Defining the Copy Manager Control Records

Two control records are used in Copy Manager. The two Copy Manager control records must be defined and initialized prior to using Copy Manager operationally.

Below is a list of required tasks that define each record's location and the tasks required to initialize each control record.

- [Task 1. Initialize the COPYMGR Record](#)
- [Task 2. Define the Copy Manager System's Default Record ID](#)
- [Task 3. Define the SETREC Location to COPYMGR](#)
- [Task 4. Initialize SETREC](#)

**Important:** The required task must be completed in the specified order to successfully install Copy Manager.

### Task 1. Initialize the COPYMGR Record

The location of the COPYMGR primary system control record was defined in the BHDZ Copy Manager program during the software installation. The Copy Manager password was defined in the BHDZ Copy Manager program during the software installation.

To initialize the COPYMGR record, enter the following on the TPF system:

```
ZFDRS COPYMGR INIT PASSWORD-pppppppp
```

See the *Copy Manager for TPF Operations Guide* for a description of this Copy Manager command.

### Task 2. Define the Copy Manager System's Default Record ID

The Copy Manager password was defined in the BHDZ Copy Manager program during the software installation.

1. To define the Copy Manager default record ID, enter the following on the TPF system:

```
ZFDRS COPYMGR DEFAULTRECORDID RECID-rrrr
```

2. After this command is completed, enter:

```
ZFDRS COPYMGR DISPLAY
```

This display will show the default record ID and the COPYMGR record's location.

See the *Copy Manager for TPF Operations Guide* for descriptions of these Copy Manager commands.

### Task 3. Define the SETREC Location to COPYMGR

To define the SETREC control record's location, you will need to know the SETREC FACE type, ordinal, and record ID. This fixed-file record location information was defined during the planning for the installation of Copy Manager process.

1. Using the SETREC planned FACE type, ordinal, and record ID, enter the following on the TPF system:

```
ZFDRS COPYMGR SETREC ADD FACETYPE-ffffff ORDINAL-nn RECID-rrrr
```



**Note:** The FACE type in this Copy Manager command does not contain the # sign. For example, for FACE type #HDSCM0, use FACETYPE-HDSCM0.

---

2. After this command is completed, enter:

```
ZFDRS COPYMGR DISPLAY
```

This display will now show the location of the SETREC control record.

See the *Copy Manager for TPF Operations Guide* for description of these Copy Manager commands.

### Task 4. Initialize SETREC

1. To initialize the SETREC record, enter the following on the TPF system:

```
ZFDRS SETREC INIT PASSWORD-ppppppppp
```

2. After this command is completed, enter:

```
ZFDRS SETREC DISPLAY LOCAL
```

The reply will state that the record is empty.

3. After this command is completed, enter:

```
ZFDRS SETREC DISPLAY REMOTE
```

The reply will state that the record is empty.

See the *Copy Manager for TPF Operations Guide* for a description of this Copy Manager command.



## Defining the Copy Manager Configuration Records

Three configuration records are used in Copy Manager. The three Copy Manager configuration records must be defined and initialized prior to using Copy Manager operationally.

Below is a list of required tasks that define each record's location and the tasks required to initialize each control record.

- [Task 1. Define the OFFREC Location to COPYMGR](#)
- [Task 2. Define the RCUREC Location to COPYMGR](#)
- [Task 3. Initialize OFFREC](#)
- [Task 4. Initialize RCUREC](#)
- [Task 5. Define the Required Sets to SETREC](#)
- [Task 6. Initialize Each Set's PAIRREC](#)

**Important:** The required task must be completed in the specified order to successfully install Copy Manager.

### Task 1. Define the OFFREC Location to COPYMGR

To define the OFFREC record's location, you will need to know the OFFREC FACE type, ordinal, and record ID. This fixed-file record location information was defined during the planning process for the installation of Copy Manager.

1. Using the planned OFFREC FACE type, ordinal, and record ID, enter the following on the TPF system:

```
ZFDRS COPYMGR OFFREC ADD FACETYPE-ffffff ORDINAL-nn RECID-rrrr
```



**Note:** The FACE type in this Copy Manager command does not contain the # sign. For example, for FACE type #HDSCM0, use FACETYPE-HDSCM0.

---

2. After this command is completed, enter:

```
ZFDRS COPYMGR DISPLAY
```

This display will now show the location of the OFFREC control record.

See the *Copy Manager for TPF Operations Guide* for description of these Copy Manager commands.

## Task 2. Define the RCUREC Location to COPYMGR

To define the RCU command device configuration definition record's location, you will need to know the RCUREC FACE type, ordinal, and record ID. This fixed-file record location information was defined during the Planning for the Installation of Copy Manager process.

1. Using the planned RCUREC FACE type, ordinal, and record ID, enter the following on the TPF system:

```
ZFDRS COPYMGR RCUREC ADD FACETYPE-ffffff ORDINAL-nn RECID-rrrr
```



**Note:** The FACE type in this Copy Manager command does not contain the # sign. For example, for FACE type #HDSCM0, use FACETYPE-HDSCM0.

---

2. After this command is completed, enter:

```
ZFDRS COPYMGR DISPLAY
```

This display will now show the location of the RCUREC configuration definition record.

See the *Copy Manager for TPF Operations Guide* for a description of these Copy Manager commands.

## Task 3. Initialize OFFREC

1. To initialize the OFFREC record, enter the following on the TPF system:

```
ZFDRS OFFREC INIT PASSWORD-pppppppp
```

2. After this command is completed, enter:

```
ZFDRS OFFREC DISPLAY
```

The reply will state that the record is empty.

See the *Copy Manager for TPF Operations Guide* for a description of this Copy Manager command.

## Task 4. Initialize RCUREC

1. To initialize RCUREC, enter the following on the TPF system:

```
ZFDRS RCUREC INIT PASSWORD-pppppppp
```

2. After this command is completed, enter:

```
ZFDRS RCUREC DISPLAY
```

The reply will state that the record is empty.

See the *Copy Manager for TPF Operations Guide* for a description of this Copy Manager command.

## Task 5. Define the Required Sets to SETREC

During the installation planning process, each set to be used by Copy Manager was defined, each set's first copy pair configuration definition record location was defined, and each set's copy characteristics were defined. Use the information recorded during the installation planning when defining each set to the set index control record.

The following are examples of set definitions with different copy characteristics. The required copy characteristic parameter is in the ZFDSR entry.

1. To define a ShadowImage synchronous (local copy) set in the set index control record, enter the following on the TPF system

```
ZFDRS SETREC L SETNAME-nnnnnnnnnnnnnnnnn FACETYPE-ffffff
ORDINAL-nn RECIF-rrrr (copy characteristic options)
```

2. To define a ShadowImage asynchronous (local copy) set in the set index control record, enter the following on the TPF system

```
ZFDRS SETREC L SETNAME-nnnnnnnnnnnnnnnnn FACETYPE-ffffff
ORDINAL-nn RECIF-rrrr ASYNC (copy characteristic options)
```

3. To define a TrueCopy synchronous (remote copy), set in the set index control record, enter the following on the TPF system

```
ZFDRS SETREC R SETNAME-nnnnnnnnnnnnnnnnn FACETYPE-ffffff
ORDINAL-nn RECIF-rrrr (copy characteristic options)
```

4. To define a TrueCopy asynchronous (remote copy), set in the set index control record, enter the following on the TPF system

```
ZFDRS SETREC R SETNAME-nnnnnnnnnnnnnnnnn FACETYPE-ffffff
ORDINAL-nn RECIF-rrrr ASYNC (copy characteristic options)
```

5. To define a Universal Replicator (remote copy) set in the set index control record, the enter the following on the TPF system

```
ZFDRS SETREC R SETNAME-nnnnnnnnnnnnnnnnn FACETYPE-ffffff
ORDINAL-nn RECIF-rrrr HUR (copy characteristic options)
```



**Note:** The FACE type in this Copy Manager command does not contain the # sign. For example, for FACE type #HDSCM0, use FACETYPE-HDSCM0.

---

6. After each add command is completed, enter:

```
ZFDRS SETREC DISPLAY
```

See the *Copy Manager for TPF Operations Guide* for a description of these Copy Manager commands and the copy characteristic's options.

The copy characteristic options are required to use the following features of Copy Manager: at-time split, async TrueCopy, Universal Replicator, remote control operations, and TPF offline volume operations.

## Task 6. Initialize Each Set's PAIRREC

Every set's PAIRREC must be initialized. Do the following for each set:

1. Initialize the set's copy pair configuration definition record(s) using Copy Manager's **ZFDRS CONFIG INIT** command. Use the **LOCAL** option for ShadowImage sets, and use the **REMOTE** option for TrueCopy or Universal Replicator sets.

```
ZFDRS L COnfig INIT SETNAME-nnnnnnnnnnnnnnnnnn PASSWORD-ppppppppp
```

2. After the command completes, enter:

```
ZFDRS L COnfig DISPLAY SETNAME-nnnnnnnnnnnnnnnnnn
```

The reply will state that the set is empty.

```
ZFDRS R COnfig INIT SETNAME-nnnnnnnnnnnnnnnnnn PASSWORD-ppppppppp
```

3. After the command completes, enter:

```
ZFDRS R COnfig DISPLAY SETNAME-nnnnnnnnnnnnnnnnnn
```

The reply will state that the set is empty.

See the *Copy Manager for TPF Operations Guide* for a description of these Copy Manager commands.

## Migration to Copy Manager from Versions prior to B9

The installation of Copy Manager version B9 or higher from a version prior to B9 requires a migration step. This section describes that step.



**Note:** *Hitachi Data Systems RECOMMENDS THAT* the TPF installation consult with Hitachi Data Systems TPF Engineering to construct a Copy Manager migration script.

---

Version B9 of Copy Manager introduces one new control record.

The new control record adds an additional layer to the control record structure. Prior to Copy Manager version B9, the only Copy Manager control record was the set index control record.

The internal structures of the set index control record (SETREC) and the set's copy pair configuration definition record (PAIRREC) have not changed. The migration steps described in this chapter take advantage of the record's internal structures not changing.

The migration steps allow the TPF installation to migrate from a version prior to B9 to version B9 or higher of Copy Manager without the need to redefine existing set definitions in the set index control record nor redefine the pair definitions in the set copy pair configuration definition records.

The following is an overview of the Copy Manager version B9 migration technique and tasks:

Background information that was used to develop the migration steps:

- Prior to version B9, the set index control record location was defined in a Copy Manager's ECB segment. This definition was removed in version B9.
- Version B9 of Copy Manager has a new primary system control record called COPYMGR. This record is an index record containing a pointer to the Set Index Record's (SETREC) fixed-file record.
- The set index control record internals have not changed. Therefore, the set index control record's pointers to each set's copy pair configuration definition records remain correct and valid.
- The fixed-file location of COPYMGR is now defined in the Copy Manager ECB segment – BHDZ. This segment is sent as source code. The TPF installation must define the COPYMGR fixed-file record location in BHDZ.

The technique and tasks used to migrated to version B9 of Copy Manager:

- The basic technique used in the migration is to define the COPYMGR control record in an unused fixed-file record. Then define the set index control record in the COPYMGR record to the same location used prior to Copy Manager Version B9. This technique allows the set index control record and each set's copy pair configuration definition records to remain unchanged.
- Define the COPYMGR record to use an unused fixed-file record.

**Important:** Do not use the same fixed-file record that was used by the set index control record or any of the set copy pair configuration definition records.

- Initialize the COPYMGR record.
- Initialize the COPYMGR record's default record ID.
- Define the set index control record (SETREC) in COPYMGR to point to the same fixed-file record location that was used in prior versions of Copy Manager.

At this point, the prior set index control record and each set's copy pair configuration definition records are intact and will be correctly used by Copy Manager version B9 (or higher).

During the migration to version B9 (or higher) of Copy Manager, the SETREC and the CONFIG records should not be initialized.

## Restrictions for TPF

The following data management functions are not supported by TPF:

- Cache Residency Manager, FlashAccess
- XRC
- Concurrent Copy
- Volume Port Security, SANTinel – S/390
- Volume Migration, CruiseControl





# Preparing for Copy Manager TPF Operations

Preparing Copy Manager's operational use requires that the TPF installation site define their copy needs, define the volumes to be copied as a list of copy pairs, and then define the Copy Manager set copy pair configuration definition records. This chapter describes each of the above steps.

This chapter discusses the following topics:

- [Preparing Copy Manager for Operational Use](#)
- [Preparing for TPF ShadowImage Operations](#)
- [Preparing for TPF TrueCopy or Universal Replicator Operations](#)
- [Creating the Copy Pair Configuration Definition Records](#)

## Preparing Copy Manager for Operational Use

Preparing Copy Manager to be used for TPF operations requires that the TPF installation define the copy operations that will be used and define each copy set volume pairs in a set's copy pair configuration definition record.

To define the copy operations to be used, Hitachi Data Systems recommends that you work with the HDS account team and the HDS TPF Engineering staff.

**Performance considerations:** Please read the performance considerations that are described in the ShadowImage and TrueCopy documentation for the storage system.

**Planning:** Work with your Hitachi Data Systems representative to plan the ShadowImage, TrueCopy, and/or Universal Replicator processing. The number of database copies and the usage of the copies will determine how the TPF configuration sets are built.

## Preparing for TPF ShadowImage Operations

Preparing for TPF ShadowImage operations involves the following:

- **Identify the volumes:** Identify the volumes that will become S-VOLs and T-VOLs as described in the ShadowImage documentation for the storage system.
- **Create configuration tables:** For TPF, additional information is required to create the configuration tables (see [Table 3-1](#) and [Table 3-2](#)).

## Preparing for TPF TrueCopy or Universal Replicator Operations

Preparing for TPF TrueCopy or Universal Replicator operations involves the following:

- **Identify the volumes:** Identify the volumes that will become M-VOLs and R-VOLs as described in the TrueCopy documentation for the storage system.
  - The TPF information required to identify the TrueCopy M-VOLs and R-VOLs is similar to the TPF information required for the ShadowImage pairs. However, for TrueCopy the target (remote) serial number is also required, since the source and target (main and remote) volumes reside on different physical control units. If you are performing TrueCopy asynchronous operations, the consistency group IDs are also required. If you are performing Universal Replicator operations, the consistency group IDs and the journal group numbers are also required.
  - For TrueCopy it is not required that the M-VOL be online to TPF. The M-VOL may be a ShadowImage target that is offline to TPF, as shown in [Figure 3-1](#) below. In this case, you must select an active TPF module on the same control unit as the M-VOL for TPF I/O. It is suggested that you use the ShadowImage source volume that was utilized to create the TrueCopy volume if you are using TrueCopy Synchronous. This allows the TrueCopy I/O activity to be spread out over many volumes on the control unit, and will also provide some unity for operations between the ShadowImage configuration and the TrueCopy configuration. TrueCopy asynchronous may copy the data directly from the production volumes to the remote target volumes.
- **Perform TrueCopy or Universal Replicator configuration:**
  - TPF does not currently have a way to configure the main control units, RCUs, and paths for TrueCopy or Universal Replicator. TPF also does not have a way to define consistency group ID's, journals, journal numbers, and RCU operation command devices. These activities must be done using the storage systems software (the SVP or Storage Navigator) as described in the TrueCopy or Universal Replicator documentation for the storage system.
  - It is suggested that you take the steps described in the TrueCopy or Universal Replicator documentation, so that you can process TrueCopy operations from the Storage Navigator/Remote Console (or SVP) as a backup for the Copy Manager processing.

## Creating the Copy Pair Configuration Definition Records

Each Copy Manager set has its copy pairs (source and target) described in a set copy pair configuration definition record (PAIRREC). The information in this record describes the location of the source volume and the target volume. The information also includes a device number used by Copy Manager to both reference the pair when editing the pair's characteristics and to send its copy command for a copy pair. If the device number is offline to TPF (not mounted), and if the set has been defined as eligible to use offline volume operations (see ZFDRS SETREC in the *Copy Manager for TPF Operations Guide*), then Copy Manager sends its copy command for the copy pair to an offline volume command device. This command device is defined in the offline volume command device configuration definition record. See [Copy Operations When Using TPF Offline Volumes](#) and see ZFDRS OFFREC in the *Copy Manager for TPF Operations Guide*).

Below is a list of the tasks required tasks to define a set's configuration definition record. Repeat these tasks for each set to be defined.

- [Task 1. Define the Set's Copy Characteristics](#)
- [Task 2. Define Each Volume Pair for a Set](#)
- [Task 3. Add the Local Copy or Remote Copy Pair Definition to a Set's PAIRREC](#)

### Task 1. Define the Set's Copy Characteristics

1. If the copy characteristics for the set was not defined during the installation's defining the Copy Manager control records process, the set's copy characteristics must be defined now.
2. Use the Copy Manager ZFDRS SETREC CHANGE entry to define a set's copy characteristics. The characteristic options are:

HUR/NOHUR (default NOHUR)

ASYNC/NOASYNC (default NOASYNC)

OFFLINE/NOOFFLINE (default NOOFFLINE)

HOPCONTROLUNIT/NOHOPCONTROLUNIT (default NOHOPCONTROLUNIT)

Hitachi Data Systems recommends that the HDS TPF Engineering staff be consulted before setting a copy characteristic.

3. To define a copy characteristic for a local copy set (ShadowImage), use the following Copy Manager command. The example below defines the local set as eligible for offline volume use.

```
ZFDRS SETREC CHANGE LOCAL SETNAME-nnnnnnnnnnnnnnnnn OFFLINE
```

4. After the entry completes, enter:

```
ZFDRS SETREC DISPLAY LOCAL
```

5. To define a copy characteristic for a remote copy set (TrueCopy or Universal Replicator), use the following Copy Manager command. The example below defines the remote copy set to a Universal Replicator remote copy.

```
ZFDRS SETREC CHANGE LOCAL SETNAME-xxxxxxxxxxxxxxxxnnnnn HUR
```

6. After the entry completes, enter:

```
ZFDRS SETREC DISPLAY
```

## Task 2. Define Each Volume Pair for a Set

For each pair in a set, the location for each pair must be obtained before a ShadowImage or TrueCopy pair can be defined. The following information is required to define a pair's location :

- **Device address of source volume:** Symbolic device address (SDA) that the TPF system uses to access that device.
- **Source volume device number:** Logical device number that the control unit uses for the source volume on that LCU.
- **Source serial number:** Serial number of the physical control unit on which the source volume resides.
- **Source logical control unit:** LCU on which the source volume resides.
- **Source storage system ID:** SSID on which the source volume resides.
- **Remote serial number (TrueCopy only):** Serial number of the physical control unit on which the TrueCopy remote volume resides.
- **Target/remote volume device number:** Logical device number that the control unit uses for the target/remote volume on that LCU.
- **Target/remote logical control unit:** LCU on which the target/remote volume resides.
- **Target/remote storage system ID:** SSID on which the target/remote volume resides.
- **Consistency Group ID:** Consistency group ID for TrueCopy asynchronous or Universal Replicator pairs.
- **Journal Group number:** Journal group number for Universal Replicator pairs.
- **Comment:** A 6-byte comment field.
- **Source volume will be copied or the source volume will not be copied.**

### Task 3. Add the Local Copy or Remote Copy Pair Definition to a Set's PAIRREC

Use Copy Manager's **ZFDRS COnfig ADD** command. For each volume pair in a set, use a **ZFDRS COnfig ADD** command to add that pair to the set's copy pair configuration definition record(s). See the *Copy Manager for TPF Operations Guide* for the format of this command.

ShadowImage sync (without ATTIME split) example:

```
ZFDRS L CO ADD SET-SISET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001
TV-0C TL-00 TSS-8001 COMMENT-HD1006
```

ShadowImage async (using ATTIME split) example:

```
ZFDRS L CO ADD SET-SISET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001
TV-0C TL-00 TSS-8001 CG-5 COMMENT-HD1006
```

TrueCopy Sync example:

```
ZFDRS R CO ADD SET-TCSET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001
TSE-44627 TV-06 TL-00 TSS-1001 COMMENT-HD1006
```

TrueCopy async example:

```
ZFDRS R CO ADD SET-TCSET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001
TSE-44627 TV-06 TL-00 TSS-1001 CG-5 COMMENT-HD1006
```

Universal Replicator example:

```
ZFDRS R CO ADD SET-TCSET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001
TSE-44627 TV-06 TL-00 TSS-1001 CG-5 JNLG-3 COMMENT-HD1006
```



**Note:** If a group of pairs use the same LCUs, serial numbers and SSIDs, consider using the COUNT option or the LASTDEV option when using the ZFDRS CONFIG ADD command. The COUNT (and LASTDEV) option allows for a range of pairs to be added. See the *Copy Manager for TPF Operations Guide* for further information about this option.

---

Figure 3-1 shows an example of a control unit configured for TPF ShadowImage operations. Table 3-1 shows the identification of volumes as S-VOLs and T-VOLs for the sample configuration shown in Figure 3-1.

Serial Number 33516	LCU 0	LCU 1	LCU 2	LCU 3
	SSID 0088	SSID 0099	SSID 00AA	SSID 00BB
Addressable to TPF	1000 00	1040 00	1080 00	10C0 00
	1001 01	1041 01	1081 01	10C1 01
	1002 02	1042 02	1082 02	10C2 02
	1003 03	1043 03	1083 03	10C3 03
	1004 04	1044 04	1084 04	10C4 04
	1005 05	1045 05	1085 05	10C5 05
Not addressable to TPF	06	06	06	06
	07	07	07	07
	08	08	08	08
	09	09	09	09
	0A	0A	0A	0A
	0B	0B	0B	0B
	SSID 00CC	SSID 00DD	SSID 00EE	SSID 00FF

The devices in light green are addressable by TPF, and their TPF symbolic device address (SDA) shows in the first column. If the device number in light green is not mounted to TPF (offline) or not addressable to TPF, see the section titled "Copy Operations when using TPF offline volumes".

The devices in gray are not addressable to TPF and are the ShadowImage T-VOLs for the online (light green) TPF devices.

There are four logical control units (LCUs). Each LCU has two storage system IDs (SSIDs).

The second column of each LCU represents the LDEV address within that LCU.

**Figure 3-1 Example of ShadowImage Configuration**

**Table 3-1 Configuration Information for TPF ShadowImage Example Above**

SDA Adrs	S-VOL Serial No.	S-VOL LDEV	S-VOL LCU	S-VOL SSID	T-VOL LDEV	T-VOL LCU	T-VOL SSID
1000	33516	00	0	0088	06	0	00CC
1001	33516	01	0	0088	07	0	00CC
Etc.	33516	...	...	...	...	...	...
1005	33516	05	0	0088	0B	0	00CC
1040	33516	00	1	0099	06	1	00DD
1041	33516	01	1	0099	07	1	00DD
1042	33516	02	1	0099	08	1	00DD

[Figure 3-2](#) shows an example of an RCU configured for TPF TrueCopy or Universal Replicator operations. It contains two copies of the database that are being used as two separate test system databases. [Table 3-2](#) shows sample TPF TrueCopy configuration information. The M-VOLs are the ShadowImage volumes in [Figure 3-1](#), and the R-VOLs are the light-blue volumes in [Figure 3-2](#).

Serial Number 35502	LCU 0		LCU 1	
	SSID A400		SSID A401	
Test System 1	1000 00	1001 01	1040 00	1041 01
	1002 02	1003 03	1042 02	1043 03
	1004 04	1005 05	1044 04	1045 05
Test System 2	1020 06	1021 07	1060 06	1061 07
	1022 08	1023 09	1062 08	1063 09
	1024 0A	1025 0B	1064 0A	1065 0B
	SSID A600		SSID A601	

The devices in light-blue are the TrueCopy R-VOLs.

The devices in gray are a second copy of the data base. Either copy may be T-VOL for TrueCopy from the gray volumes in [Figure 3-1](#). ShadowImage may be performed from light-blue to gray or from gray to light-blue.

**Figure 3-2 Example of TrueCopy Configuration: RCU with Two Copies of Database**

**Table 3-2 Configuration Information for TPF TrueCopy Example Above**

SDA Adrs	M-VOL Serial No.	M-VOL LDEV	M-VOL LCU	M-VOL SSID	R-VOL Serial No.	R-VOL LDEV	R-VOL LCU	R-VOL SSID
1000	33516	06	0	00CC	35502	00	0	A400
1001	33516	07	0	00CC	35502	01	0	A400
Etc.	33516	...	...	...	35502	...	...	...
1005	33516	0B	0	00CC	35502	05	0	A400
1040	33516	06	1	00DD	35502	00	1	A401
1041	33516	07	1	00DD	35502	01	1	A401
1042	33516	08	1	00DD	35502	02	1	A401



# Performing Copy Operations

This chapter provides sample usage of ShadowImage, TrueCopy, and Universal Replicator in TPF.

This chapter discusses the following topics:

- ❑ [Example Usage of ShadowImage and TrueCopy in TPF](#)
- ❑ [Example Usage of TrueCopy Asynchronous in TPF](#)
- ❑ [Example Usage of Universal Replicator in TPF](#)
- ❑ [TPF Operator Commands](#)
- ❑ [Preparing for Volume Pair Operations - CONFIG TPF Command](#)
- ❑ [Validating the Configuration Tables - STATUS TPF Command](#)
- ❑ [Displaying Status Using Filters - STATUS TPF Command](#)
- ❑ [Adding Volume Pairs with TPF - ESTABLISH TPF Command](#)
- ❑ [Monitoring a Copy Session with TPF - STATUS TPF Command](#)
- ❑ [Splitting ShadowImage, TrueCopy, and Universal Replicator Copy Pairs - SPLIT TPF Command](#)
- ❑ [Resuming ShadowImage, TrueCopy, and Universal Replicator Copy Pairs - RESUME TPF Command](#)
- ❑ [Reverse Resuming ShadowImage, TrueCopy, and Universal Replicator Copy Pairs - REVERSE TPF Command](#)
- ❑ [Deleting ShadowImage, TrueCopy, and Universal Replicator Copy Pairs with TPF - DELETE TPF Command](#)
- ❑ [Performing At-Time Split with Asynchronous Local or Remote Copy - PRESET TPF Command](#)
- ❑ [Copy Operations When Using TPF Offline Volumes](#)
- ❑ [Copy Operations When Using RCUs](#)

## Example Usage of ShadowImage and TrueCopy in TPF

This section describes an example of Copy Manager operations. The control units and configurations described in [Figure 3-1](#) and [Figure 3-2](#) are utilized.

For this example, shown in [Figure 4-1](#), the site has a ShadowImage copy in each of their production control units and also has a TrueCopy link to their test system databases.

The first process is to create a ShadowImage copy of the production database. The pairs of this copy are deleted, and the volumes are used as the main volumes (M-VOLs) in the TrueCopy process to build a test system database. You can create multiple copies of the test system database with a TrueCopy process from the production ShadowImage copy.

On the test system control units, ShadowImage is used to provide two copies of the test system database.

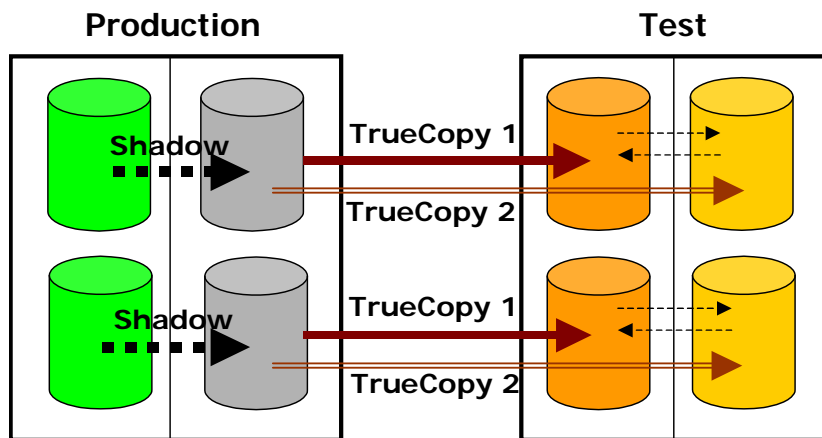


Figure 4-1 Example of ShadowImage and TrueCopy Configuration

## Example Usage of TrueCopy Asynchronous in TPF

This section describes an example of Copy Manager operations. The control units and configurations described in [Figure 3-1](#) and [Figure 3-2](#) are utilized.

For this example, shown in [Figure 4-2](#), the site copies directly from their production TPF control unit using a TrueCopy asynchronous link to their test system databases.

The process is to create a TrueCopy asynchronous copy of the production database directly to the test system database or a remote disaster recovery site. A preset time is set in the control units for when the pairs will automatically split. Once they are split, the test system volumes may be used. Without deleting the TrueCopy asynchronous pairs, additional copies of the test system database can be created using ShadowImage.

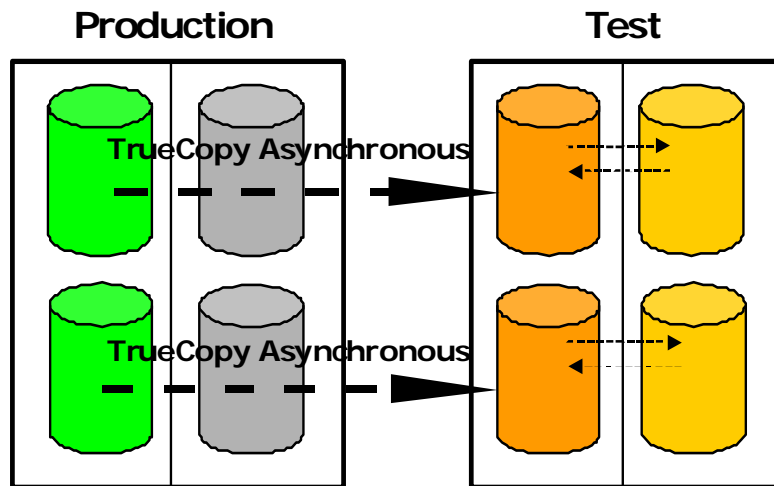


Figure 4-2 Example of TrueCopy Asynchronous Configuration

## Example Usage of Universal Replicator in TPF

This section describes an example of Copy Manager operations. The control units and configurations described in [Figure 3-1](#) and [Figure 3-2](#) are utilized.

For this example, shown in [Figure 4-3](#), the site copies directly from their production TPF control unit using a Universal Replicator link to their DR site.

The process is to create a Universal Replicator copy of the production database directly to a remote test system database or a remote disaster recovery site. Once the pairs are duplex, the pairs may be left duplex for DR needs or may be split to build a test system. Once the pairs are split, the test system volumes may be used. Without deleting the Universal Replicator pairs, additional copies of the test system or DR database can be created using ShadowImage.

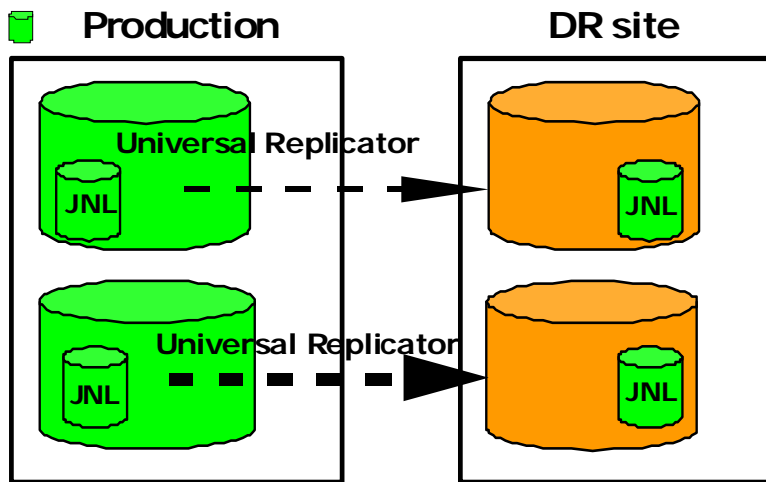


Figure 4-3 Example of Universal Replicator Configuration

## TPF Operator Commands

ShadowImage, TrueCopy, and Universal Replicator may be controlled from the TPF operator console using the TPF operator commands beginning with ZFDRS. These TPF operator commands are common to all three copy processes. TPF uses the term **LOCAL (L)** for ShadowImage and the term **REMOTE (R)** for TrueCopy or Universal Replicator as parameters of the ZFDRS entry command. The ZFDRS entry formats are a TPF industry standard that have been developed by the TPF Users Group.

[Table 4-1](#) lists and describes the basic TPF ZFDRS commands supported by Copy Manager. The detailed formats for these entries are given in the *Copy Manager for TPF Operations Guide*. This guide conforms to the IBM Operations Guide standards and will be used by TPF operators as a stand-alone document. An additional document, *Copy Manager for TPF Messages and Codes*, is an associated stand-alone document for TPF operator's reference.

Basic formats for the TPF ZFDRS entries and sample outputs are provided in the following sections. Please note that the command parameters may be shortened as shown in the sample displays.

The Storage Navigator/Remote Console or SVP may always be used in a TPF complex to control copy functions. The TPF entries are an additional option for this control. Even when a TPF entry has been used to initiate a copy function, the Storage Navigator/Remote Console (or SVP) may be used to filter display, split, resume, and/or delete copy pairs. Likewise, when a copy function is initiated from the Storage Navigator/Remote Console (or SVP), TPF entries may be used to control subsequent copy actions.

**Table 4-1 TPF ZFDRS Commands**

Copy Operation	TPF Entry	Function	Restrictions
Set Reserve Attribute (Reserve)	Not Required	Sets the reserve attribute of the specified volume.	The specified volume must be simplex and offline to host.
Reset Reserve Attribute (Unreserve)	Not required	Resets reserve attribute of the specified volume.	The specified volume must be simplex.
Add Pair (duplex request)	ZFDRS ESTablish	Adds a pair, starts initial copy operation.	The specified volume must be simplex.
Split Pair	ZFDRS SPLit	Splits (suspends) a pair	The specified volume must be duplex or pending.
Normal Resync Pair	ZFDRS RESume	Resynchronizes a pair.	The specified volume must be split.
Reverse Resync Pair	ZFDRS REVerse	Resynchronizes a pair from the target to the source.	The specified volume must be split.
Delete Pair (Simplex Request)	ZFDRS Delete	Deletes a pair, changes status to simplex.	The specified volume cannot be simplex.
At-Time Split	ZFDRS Preset	Defines, deletes, and queries preset point-in-time split.	The specified volume (async only) must be duplex or pending.

## Preparing for Volume Pair Operations - CONFIG TPF Command

The development and validation of the CONFIG table is the most critical and difficult part of the TPF copy processing. The entry to ADD items to the CONFIG table is long and is therefore most easily processed using console automation.

The set's copy pair configuration definition record(s) hold all information needed to manage all ShadowImage, TrueCopy, or Universal Replicator sessions. These records enables multiple copy sessions over multiple DASD control units to be controlled by a single TPF Z-entry.

A TPF system can have 58 sets defined. Each set would refer to a separate copy set or consistency group as explained in [Example Usage of ShadowImage and TrueCopy in TPF](#).

The CONFIG command is a TPF operator entry that is used to set up, alter, delete, and display a set's copy pair configuration definition record(s) within TPF. Once the copy pair configuration information is entered and validated, it does not have to be changed until a DASD configuration change is made at the TPF site. TPF database changes are infrequent. The TPF CONFIG entry to add, delete, or alter the configuration table is a user entry. However, it is recommended that the table information is validated by a Hitachi Data Systems representative.

[Figure 4-4](#) shows a sample display of a ShadowImage CONFIG table. [Figure 4-5](#) shows a sample display of a ShadowImage CONFIG ADD command.

```

zfdrs 1 co display set-set1
CSMP0097I 14.20.49 CPU-A SS-BSS SSU-BSS IS-01
FDRS0053I 14.20.49 BEGIN LOCAL COPY DISPLAY - SET=SET1
DEV  SOURCE SER#  SV SL  SSSID TARGET SER#  TV  TL  TSSID CG  COMM  PRE SRCE
2000 000000020041 00 00  2000 000000020041 00  0A  200A 00          N  N  _
2001 000000020041 01 00  2000 000000020041 01  0A  200A 00 HD1001  N  N
2002 000000020041 02 00  2000 000000020041 02  0A  200A 00          N  N
2003 000000020041 03 00  2000 000000020041 03  0A  200A 00          N  N  _
2004 000000020041 04 00  2000 000000020041 04  0A  200A 00          N  N
2005 000000020041 05 00  2000 000000020041 05  0A  200A 00          N  N
2006 000000020041 06 00  2000 000000020041 FF  0A  200A 00          N  N  _
2007 000000020041 07 00  2000 000000020041 07  0A  200A 00          N  N
2008 000000020041 08 00  2000 000000020041 FD  0A  200A 00          N  N
2009 000000020041 09 00  2000 000000020041 09  0A  200A 00          N  N  _
200A 000000020041 0A 00  2000 000000020041 0A  0A  200A 00          N  N
200B 000000020041 0B 00  2000 000000020041 0B  0A  200A 00          N  N
200C 000000020041 0C 00  2000 000000020041 0C  0A  200A 00          N  N  _
200D 000000020041 0D 00  2000 000000020041 0D  0A  200A 00          N  N
200E 000000020041 0E 00  2000 000000020041 0E  0A  200A 00          N  N
200F 000000020041 0F 00  2000 000000020041 0F  0A  200A 00          N  N  _
MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+

```

**Figure 4-4 Sample ZFDRS CONFIG DISPLAY Command Entry and Response**

```

zfdrs 1 config add set-SET1 d-1006 sse-33516 sv-06 sl-00 sss-0088 tv-0c tl-00 tss-00cc
comment-HD1006
CSMP0097I 12.26.03 CPU-B SS-BSS SSU-BSS IS-01
FDRS0020I 12.26.03 LOCAL COPY ITEM ADDED+

```

**Figure 4-5 Sample ZFDRS CONFIG ADD Command Entry and Response**

## Validating the Configuration Tables – STATUS TPF Command

After the set's copy pair configuration definition records are created, test them for accuracy. Each set's configuration should be validated separately. Ask your Hitachi Data Systems representative to create the pairs on the TPF system Storage Navigator/Remote Console (or SVP).

To perform this validation, enter a status request for the appropriate set that had a copy function initiated by the Hitachi Data Systems representative:

**ZFDRS LOCAL STATUS SET-*setname***

All of the devices should return with a status of DUPLEX or PENDING DUPLEX, depending on the progress of the copy operation.

If there are any devices in the SIMPLEX or INVALID state, the configuration table contains one or more errors. Display the devices with SIMPLEX and INVALID states as follows:

**ZFDRS LOCAL STATUS SET-*setname* SIMPLEX**

**ZFDRS LOCAL STATUS SET-*setname* INVALID**

Ask your Hitachi Data Systems representative to look at the devices that are in the SIMPLEX and/or INVALID state to make sure that the correct devices are paired. Verify the accuracy of the data values in the set's copy pair configuration definition record.



**Note:** If TPF initiates a copy command to an incorrectly defined pair, a TPF error message may appear for each of these pairs. This could cause system problems.

---

When all devices show the correct status in the STATUS display, the set's configuration is correct and is ready for use.



## Displaying Status Using Filters – STATUS TPF Command

The **STATUS** TPF command is equivalent to the FILTER DISPLAY on the Storage Navigator/Remote Console (or SVP). The STATUS command allows you to display the status of the copy pairs contained in a specified set. The filter options for the STATUS command are:

- STATUS ALL displays all items in the table.
- STATUS of a specific copy state allows you to filter the display to show all volumes that are in a specified copy state (see [Monitoring a Copy Session with TPF – STATUS TPF Command](#), such as: DUPLEX, SPLIT, SIMPLEX, etc.
- STATUS of specific devices allows you to filter the display to show a specific DEVICE or a specific SSID.

[Figure 4-6](#) shows a sample of a ShadowImage STATUS entry and response.

```
zfdrs 1 status set-set1
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS - SET=SET1
SIMPLEX          -    50
DUPLEX           -    0
PENDING DUPLEX  -    0
SPLIT BY OPER   -    0
SPLIT BY EXC    -    0
PENDING SPLIT   -    0
QUICK SPLIT     -    0
RE-SYNC         -    0
REV RE-SYNC     -    0
INVALID         -    0
END OF LOCAL COPY STATUS+
```

**Figure 4-6** Sample ZFDRS STATUS Command Entry and Response

Figure 4-7 shows a sample display of a filtered ShadowImage STATUS entry and response. Note that the filtered status display has a differential value. The TPF differential value is a decrementing value which will decrement from 99% when the initial copy is established to 0% when the DUPLEX state is reached. Compare this to the differential value shown on the Storage Navigator/Remote Console (and SVP) which is an incrementing value designating copy completion.

```

zfdrs 1 status set-set2 simplex
CSMP0097I 13.21.34 CPU -B SS-BSS  SSU-BSS  IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS  - SET=SET2
VOLUMES THAT ARE STATUS OF SIMPLEX
DEV  SOURCE SER#  SVOL SLCU  SSSID TARGET SER#  TVOL  TLCU TSSID % DIFFERENTIAL
1000 00000003 3516 00 00 0088 00000003 3516 06 00 00CC 0%
1001 00000003 3516 01 00 0088 00000003 3516 07 00 00CC 0%
1002 00000003 3516 02 00 0088 00000003 3516 08 00 00CC 0%
1003 00000003 3516 03 00 0088 00000003 3516 09 00 00CC 0%
1004 00000003 3516 04 00 0088 00000003 3516 0A 00 00CC 0%
1005 00000003 3516 05 00 0088 00000003 3516 0B 00 00CC 0%
1040 00000003 3516 00 01 0099 00000003 3516 06 01 00DD 0%
1041 00000003 3516 01 01 0099 00000003 3516 07 01 00DD 0%
1042 00000003 3516 02 01 0099 00000003 3516 08 01 00DD 0%
1043 00000003 3516 03 01 0099 00000003 3516 09 01 00DD 0%
1044 00000003 3516 04 01 0099 00000003 3516 0A 01 00DD 0%
1045 00000003 3516 05 01 0099 00000003 3516 0B 01 00DD 0%
MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+

```

**Figure 4-7 Sample ZFDRS Filtered STATUS Command Entry and Response**

## Adding Volume Pairs with TPF – ESTABLISH TPF Command

The **ESTABLISH** TPF command allows you to add (establish) one or more volume pairs. This command issues an Establish Pair command to a device in a set's copy pair configuration definition record. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*. The command can be issued to all, some, or one device in a chosen set. The command also allows you to set the copy pace.



**Note:** The use of the "FAST" pace option should only be used in TPF test environments. Hitachi Data Systems recommends that a TPF site does **not** use the "FAST" pace option in their TPF production environment.

The ESTABLISH command can be issued only to volumes in the SIMPLEX state. The ESTABLISH command will establish the ShadowImage or TrueCopy pairs and start copying data from the source/main volume (S-VOL or M-VOL) to the target/remote volume (T-VOL or R-VOL). During this initial copy, the pairs will be in the PENDING DUPLEX state. Once initial copy is complete, the pairs will be in the DUPLEX state, and the control unit will continue to copy updates made to the source/main volume to the target/remote volume.

[Figure 4-8](#) shows a sample display of a ShadowImage ESTABLISH entry and response.

```
zfdrs 1 est set-set7
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0035I 13.21.34 LOCAL COPY SYNCHRONIZATION STARTED
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS - SET=SET7
SIMPLEX          -      0
DUPLEX           -      0
PENDING DUPLEX  -     50
SPLIT BY OPER   -      0
SPLIT BY EXC    -      0
PENDING SPLIT   -      0
QUICK SPLIT     -      0
RE-SYNC         -      0
REV RE-SYNC     -      0
INVALID         -      0
END OF LOCAL COPY STATUS+
```

**Figure 4-8** Sample ZFDRS ESTABLISH Command Entry and Response

## Monitoring a Copy Session with TPF – STATUS TPF Command

To monitor the status of the ShadowImage, TrueCopy, or Universal Replicator initial copy process, use the **STATUS** TPF command with the **PENDDUPLEX** parameter.

[Figure 4-9](#) shows the status of a ShadowImage session (initial copy operation) in progress.

```
zfdrs 1 status set-set2
CSMP0097I 13.21.34 CPU -B SS-BSS  SSU-BSS  IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS  - SET=SET2
VOLUMES THAT ARE STATUS OF SIMPLEX
DEV  SOURCE SER#  SVOL SLCU  SSSID TARGET SER#  TVOL  TLCU  TSSID % DIFFERENTIAL
1000 000000033516 00 00 0088 000000033516 06 00 00CC 55%
1001 000000033516 01 00 0088 000000033516 07 00 00CC 55%
1002 000000033516 02 00 0088 000000033516 08 00 00CC 56%
1003 000000033516 03 00 0088 000000033516 09 00 00CC 55%
1004 000000033516 04 00 0088 000000033516 0A 00 00CC 56%
1005 000000033516 05 00 0088 000000033516 0B 00 00CC 56%
1040 000000033516 00 01 0099 000000033516 06 01 00DD 56%
1041 000000033516 01 01 0099 000000033516 07 01 00DD 56%
1042 000000033516 02 01 0099 000000033516 08 01 00DD 56%
1043 000000033516 03 01 0099 000000033516 09 01 00DD 56%
1044 000000033516 04 01 0099 000000033516 0A 01 00DD 56%
1045 000000033516 05 01 0099 000000033516 0B 01 00DD 56%
MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+
```

**Figure 4-9** Sample Monitor Display using ZFDRS STATUS Command

## Splitting ShadowImage, TrueCopy, and Universal Replicator Copy Pairs – SPLIT TPF Command

The **SPLIT** TPF command issues a Split Pair command to the devices in a set's copy pair configuration definition record. The command can be issued to all, some, or one device in a chosen set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*. The command can be issued to all, some, or one device in a chosen set.

The SPLIT command can be issued only to copy pairs that are in the DUPLEX state. When the command is issued, the pairs will momentarily be in the QUICK SPLIT or the PENDING SPLIT state while the control unit copies any pending writes, then they will be in the SPLIT BY OPERATION state. This means that the updates made to the S-VOL are no longer being copied to the T-VOL, but the control unit is keeping track of the updates so the pair can be synchronized quickly later when a RESUME command is issued.

[Figure 4-10](#) shows a sample display of a ShadowImage SPLIT entry and response.

```
zfdrs 1 split set-set7
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0064I 13.21.34 LOCAL COPY PAIR SPLIT STARTED+
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0032I 13.21.34 LOCAL COPY PAIRS SPLIT+
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS - SET=SET7
SIMPLEX          -      0
DUPLEX           -      0
PENDING DUPLEX  -      0
SPLIT BY OPER   -      8
SPLIT BY EXC    -      0
PENDING SPLIT   -     42
QUICK SPLIT     -      0
RE-SYNC         -      0
REV RE-SYNC     -      0
INVALID         -      0
END OF LOCAL COPY STATUS+
```

**Figure 4-10** Sample ZFDRS SPLIT Command Entry and Response

## Resuming ShadowImage, TrueCopy, and Universal Replicator Copy Pairs – RESUME TPF Command

The **RESUME** TPF command issues a Resume Pair command to the devices in a set's copy pair configuration definition record. The command can be issued to all, some, or one device in a chosen set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*. The command can be issued to all, some, or one device in a chosen set. The command also allows you to set the copy pace.



**Note:** The use of the "FAST" pace option should only be used in TPF test environments. Hitachi Data Systems recommends that a TPF site does **not** use the "FAST" pace option in their TPF production environment.

The RESUME command can be issued only to SPLIT pairs. When a RESUME command is issued to a copy pair, the control unit will copy all the data that was updated on the S-VOL/M-VOL since the time the pair was split. For ShadowImage, the pairs are in the RESYNCHRONIZING state during the time of this copy. For TrueCopy or Universal Replicator, the pairs are in the PENDING DUPLEX state during the time of this copy. When this copy is complete, the pairs will be in the DUPLEX state.

[Figure 4-11](#) shows a sample display of a ShadowImage RESUME entry and response.

```
zfdrs 1 resume set-set7
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0036I 13.21.34 LOCAL COPY PAIRS RESUMED+
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS - SET7
SIMPLEX          -      0
DUPLEX           -     18
PENDING DUPLEX  -      0
SPLIT BY OPER   -      0
SPLIT BY EXC    -      0
PENDING SPLIT   -      0
QUICK SPLIT     -      0
RE-SYNC         -     32
REV RE-SYNC     -      0
INVALID         -      0
END OF LOCAL COPY STATUS+
```

**Figure 4-11** Sample ZFDRS RESUME Command Entry and Response

## Reverse Resuming ShadowImage, TrueCopy, and Universal Replicator Copy Pairs - REVERSE TPF Command

[Figure 4-11](#) shows a sample display of an ShadowImage REVERSE entry and response. The **REVERSE** TPF command issues a Reverse Resume Pair command to the devices in a set's copy pair configuration definition record. The command can be issued to all, some, or one device in a chosen set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*. The command can be issued to all, some, or one device in a chosen set. The command also allows you to set the copy pace.



**Note:** The use of the "FAST" pace option should only be used in TPF test environments. Hitachi Data Systems recommends that a TPF site does **not** use the "FAST" pace option in their TPF production environment.

The REVERSE command can be issued only to SPLIT pairs. When a REVERSE command is issued to a copy pair, the control unit will copy back all the data from the T-VOL/R-VOL that was updated on the S-VOL/M-VOL since the time the pair was split. The pairs are in the REVERSE RESYNCHRONIZING state during the time of this copy. When this copy is complete, the pairs will be in the DUPLEX state.

[Figure 4-11](#) shows a sample display of an ShadowImage REVERSE entry and response.

```
zfdrs 1 reverse set-set7
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0036I 13.21.34 LOCAL COPY PAIRS REVERSED+
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS - SET7
SIMPLEX          -    0
DUPLEX           -   18
PENDING DUPLEX  -    0
SPLIT BY OPER   -    0
SPLIT BY EXC    -    0
PENDING SPLIT   -    0
QUICK SPLIT     -    0
RE-SYNC         -    0
REV RE-SYNC     -   32
INVALID         -    0
END OF LOCAL COPY STATUS+
```

**Figure 4-12** Sample ZFDRS REVERSE Command Entry and Response

## Deleting ShadowImage, TrueCopy, and Universal Replicator Copy Pairs with TPF – DELETE TPF Command

The **DELETE** TPF command issues a Delete Pair command to the devices in a set's copy pair configuration definition record. The command can be issued to all, some, or one device in a chosen set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*. The command can be issued to all, some, or one device in a chosen set.

The DELETE command can be issued only to SPLIT pairs. The controller will allow this command to be issued to devices in any state except SIMPLEX. The Copy Manager requires a bypass parameter for devices not in the SPLIT state. If DUPLEX pairs are deleted, the control unit does not complete the copy of any pending I/O; it immediately breaks the pairs and stops copying updates from the S-VOL to the T-VOL. To maintain data integrity on the T-VOL, only SPLIT pairs should be deleted. When the delete is complete, the pairs will be in the SIMPLEX state.

[Figure 4-13](#) shows a sample display of a ShadowImage DELETE entry and response.

```
zfdrs 1 delete set-set7
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0039I 13.21.34 LOCAL COPY PAIRS DELETED+
CSMP0097I 13.21.34 CPU-B SS-BSS SSU-BSS IS-01
FDRS0042I 13.21.34 START OF LOCAL COPY STATUS - SET=SET7
SIMPLEX          -    50
DUPLEX           -    0
PENDING DUPLEX  -    0
SPLIT BY OPER   -    0
SPLIT BY EXC    -    0
PENDING SPLIT   -    0
QUICK SPLIT     -    0
RE-SYNC         -    0
REV RE-SYNC     -    0
INVALID         -    0
END OF LOCAL COPY STATUS+
```

**Figure 4-13** Sample ZFDRS DELETE Command Entry and Response



## Performing At-Time Split with Asynchronous Local or Remote Copy – PRESET TPF Command

The at-time split function allows for a true point-in-time copy of the TPF database. The **PRESET** TPF command issues a command to split the asynchronous pairs at a specific date and time. The command is issued to all of the pairs of a given set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*.

[Figure 4-14](#) shows a sample of the entry to set up a point-in-time split for asynchronous remote copy.

```
ZFDRS R PRESET DEF SET-POINTINTIME TIME-221500 DATE-102003
```

**Figure 4-14** Sample ZFDRS PRESET Command Entry and Response

## Copy Operations When Using TPF Offline Volumes

This section describes how to use Copy Manager when the device number in a set's copy pair configuration definition record (PAIRREC) is a TPF offline volume. A TPF offline volume is a volume that is not mounted to TPF or is not defined to TPF.

Copy Manager sends a control unit "copy commands". These "copy commands" control and monitor the copy functions in the control unit. The copy commands are special purpose CCW's and must be sent to the control unit using normal TPF I/O paths. To send a copy command to a control unit, Copy Manager must send the copy command to a TPF volume (SDA) that is both a volume in the control unit and is a volume mounted to TPF. These are same TPF I/O processing rules that are used for general I/O (read/write) functions in TPF.

In the set copy pair configuration definition record (PAIRREC) , a device number is assigned to each copy pair. Copy Manager uses that copy pair's device number as the default SDA for Copy Manager's I/O path. Copy Manager sends it's I/O (copy command) to a control unit via the copy pair's device number.

If the copy pair device number is not online to TPF, Copy Manager uses a predefined offline volume control device for Copy Manager's copy I/O processing. If an offline volume control device is not defined, Copy Manager issues an error stating that the volume is not mounted, and the copy pair will show a status of invalid.

A single offline volume control device is defined for each control unit (serial number). The Copy Manager ZFDRS OFFREC command is used to define an offline volume control device.

To define an offline volume control device, the following information is required:

- The serial number of the control unit
- The Set name that this control device is associated with, and the TPF SDA of a mounted (online) volume that is assigned to the control unit with the specified serial number.

To use the offline volume operation:

1. Define the set as offline eligible. Use the following Copy Manager command to change a set's copy characteristics to offline:

- For a ShadowImage set:

```
ZFDRS SETREC CHANGE L SETNAME-nnnnnnnnnnnnnnnnn OFFLINE
```

- For a TrueCopy or Universal Replicator set:

```
ZFDRS SETREC CHANGE R SETNAME-nnnnnnnnnnnnnnnnn OFFLINE
```

2. Define the offline volume control device for each of the set's control units. Use the following Copy Manager command:

```
ZFDRS OFFREC ADD SETNAME-nnnnnnnnnnnnnnnnn SERIAL-ssssssss SDA-dddd
```

See the *Copy Manager for TPF Operations Guide* for a description of the ZFDRS OFFREC and ZFDRS SETREC Copy Manager commands.

## Copy Operations When Using RCUs

This section describes how to use Copy Manager when using RCUs for controlling copy operations.

RCU copy operations require the use of RCU command devices. These command devices are defined in the control unit by consulting HD Engineering and by using TPF Copy Manager commands. The RCU command devices allow a copy command sent from TPF to “hop” from control unit to control unit until the copy command reaches it’s target control unit.

The use of RCU copy operations in TPF require that the each RCU command device be defined to Copy Manager. The Hitachi Data Systems engineers and the Hitachi Data Systems TPF Engineering will provide the TPF installation with the information required to define the remote copy command devices.

To use the RCU copy operations:

1. Define the set as RCU eligible. Use the following Copy Manager command to change a set’s copy characteristics to allow RCU operations.
  - For a ShadowImage set:  
`ZFDRS SETREC CHANGE L SETNAME-xxxxxxxxxxxxxxxx HOPCONTROLUNIT`
  - For a TrueCopy or Universal Replicator set:  
`ZFDRS SETREC CHANGE R SETNAME-xxxxxxxxxxxxxxxx HOPCONTROLUNIT`
2. Define the RCU’s command devices. In the following Copy Manager command, R0, R1, R2, R3, R4, and R5 command devices are defined. The R0 command device is the command device for the local (TPF online) control unit. The others are hop control units that may or may not be needed. The last command device is the TAR command device. This is the command device of the RCU that will perform the copy operations (the target control unit). Every RCU definition must have at minimum an R0 and a TAR command device defined.

The following Copy Manager command defines a simple one-hop RCU’s command devices.

```
ZFDRS RCUREC ADD TARSER-tttttt TARV-vv TARL-ll R0SER-rrrrr R0V-  
ww R0L-mm
```

3. To create a command device in control unit, use the ZFDRS RCUREC CDVDEF Copy Manager command. Contact Hitachi Data Systems TPF Engineering for the required steps to correctly create a command device in a control unit.

**Note:** The creation of a command device in a control unit is a one time operation. Once create, the command device should not be changed without consulting Hitachi Data Systems TPF Engineering.

See the *Copy Manager for TPF Operations Guide* for a description of the ZFDRS RCUREC and the ZFDRS SETREC Copy Manager commands.

# ShadowImage Record Read Function

This chapter provides an overview of the ShadowImage record read function and explains the FDRSC Macro, including sample use and a sample program.

This chapter discusses the following topics:

- [Overview of the ShadowImage Record Read Function](#)
- [FDRSC Macro](#)
- [Sample Use of the FDRSC Macro](#)
- [Sample Program Using the FDRSC Macro](#)

## Overview of the ShadowImage Record Read Function

The ShadowImage record read function provides a TPF macro (**FDRSC**) that reads a TPF record from a ShadowImage volume. Some example uses of this function include writing programs that restore a selected database from a ShadowImage copy, displaying a specific TPF record on a ShadowImage copy, or comparing a TPF production record with its corresponding ShadowImage record.

To use this macro, an installation must write their own programs using **FDRSC**. Please contact the Hitachi Data System TPF Engineering group for information on sample programs that use **FDRSC**. The Hitachi Data Systems TPF Engineering group is also available to provide an installation with assistance during their development of programs that will use the **FDRSC** macro.

## FDRSC Macro

The format of the **FDRSC** macro abides by the TPF User's Group requirements.

### FDRSC Macro

```
FDRSC Dx  
CElFXx - set name  
CElFax - file address, MCHR address
```

## Sample Use of the FDRSC Macro

The following is a sample program (ZSIR) to compare a production record to a "captured" ShadowImage record. The program reads the production record, then uses the **FDRSC** macro to read the ShadowImage record. The program compares the two records and prints the differences. This sample program allows the coverage programmer to specify the ShadowImage set that they want to use for the comparison.

```
zsir compare single set-set1 faddr-3419400A  
CSMP0097I 22.48.27 CPU-A SS-BSS SSU-BSS IS-01  
Shadow Image Record Comparison  
File Address - 3419400A  
Set Name - SET1  
SHADOW - 00000000 - C3D20FC0 C3C9D4D5 00744018 0C000000  
PRODUCTION - 00000000 - C3D20FC0 C3C9D4D5 F0000009 00000000  
SHADOW - 00000010 - 00000022 54005408 40004008 40104018  
PRODUCTION - 00000010 - 00000022 11105408 40004008 40104018  
SHADOW - 00000FF0 - 00000000 00000000 00000000 0000001B  
PRODUCTION - 00000FF0 - 00000000 00000000 00000000 00000013  
Shadow Image Record Comparison Completed+
```

## Sample Program Using the FDRSC Macro

```
BEGIN NAME=CSIR,VERSION=T1

*
*   build FDRSC Parameters
*
MVC  CE1FA7(4),FILEADR          (move in file address)
MVC  CE1FX7(4),SETNM           (move in set name)
FDRSC D7
L    R7,CE1CR7
EXITC

*****
*   CONSTANTS
*****
FILEADR  DC  XL4'3419400C
SETNM    DC  CL4'SET1'

FINIS
END
```





# Troubleshooting

This chapter covers general troubleshooting information. The following topics are discussed:

- [Immediate Halt of ShadowImage, TrueCopy, or Universal Replicator Session](#)
- [Troubleshooting](#)
- [Calling the Support Center](#)

## Immediate Halt of ShadowImage, TrueCopy, or Universal Replicator Session

To bypass normal procedures and end ShadowImage, TrueCopy, or Universal Replicator sessions (e.g., the TPF system is unavailable):

- If the TPF system is available:  
Use the delete pair command with BP:  
ZFDRS L DEL SET-*setname* BP or ZFDRS R DEL SET-*setname* BP
- If the TPF system is not available:  
Contact your Hitachi Data Systems representative to stop ShadowImage, TrueCopy, or Universal Replicator at the control unit SVP.

## Troubleshooting

The *Copy Manager for TPF Messages and Codes* document lists the error codes output by the Copy Manager software. This document is maintained in the standard IBM format and may be utilized by coverage and operations as a standalone document.

For troubleshooting information on copy operations, please refer to the applicable user's guide (e.g., *ShadowImage for IBM z/OS User's Guide*), or contact your Hitachi Data Systems representative.

For general troubleshooting information, please refer to the *Hitachi Universal Storage Platform V/VM User and Reference Guide* for the storage system, or contact your Hitachi Data Systems representative.

If you need to call the Hitachi Data Systems Support Center, please refer to [Calling the Support Center](#) for information and instructions.

[Table 6-1](#) shows the command acceptance for each TrueCopy pair status. [Table 6-2](#) shows the command acceptance for each ShadowImage status. [Table 6-2](#) shows the command acceptance for each Universal Replicator status.

**Table 6-1 Command Acceptance for each TrueCopy Pair Status**

Command Type	Current Volume	Simplex	Duplex-P	Duplex	Suspend
Define TCz path	S-VOL	Accept	Accept	Accept	Accept
	T-VOL	—	Accept	Accept	Accept
Remove TCz path	S-VOL	Accept	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9
	T-VOL	—	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9
Define TCz/SIz pair	S-VOL	Accept	C211/01/0F/12	C211/01/0F/12	C211/01/0F/12
	T-VOL	—	69F5/01/0E	69F5/01/0E	69F5/01/0E
Resume TCz/SIz pair	S-VOL	C21A/01/0F/11	C21A/01/0F/12	C21A/01/0F/12	Accept
	T-VOL	—	69F5/01/0E	69F5/01/0E	69F5/01/0E
Suspend single TCz/SIz pair	S-VOL	C055/01/0F/1B	Accept	Accept	C195/01/0F/19
	T-VOL	—	C0F1/01/0F/1C	Accept	C0C5/01/0F/19
Remove TCz/SIz pair	S-VOL	Accept	Accept	Accept	Accept
	T-VOL	—	Accept *	Accept *	Accept *
Sense TCz path status	S-,T-VOL	Accept	Accept	Accept	Accept
Sense TCz/SIz pair status	S-,T-VOL	Accept	Accept	Accept	Accept
Report all SIz paired LVIs	S-,T-VOL	Accept	Accept	Accept	Accept

Else Accept: Error code / Key code / Format message / Reason code

\* P-VOL status is Suspend, and S-VOL status is Simplex.

**Table 6-2 Command Acceptance for each ShadowImage Pair Status**

Command Type	Current Volume	Simplex	Duplex-P	Duplex	Split-P	V-Split	Suspend	Resync or Resync-Rev.
Define pair	S-VOL 2pair	Accept	2343/01/0F/E8	2343/01/0F/E8	2343/01/0F/E8	2343/01/0F/E8	2343/01/0F/E8	2343/01/0F/E8
	S-VOL 3pair	—	2332/01/0F/12	2332/01/0F/12	2332/01/0F/12	2332/01/0F/12	2332/01/0F/12	2332/01/0F/12
	T-VOL	—	23A0/01/04	23A0/01/04	23A0/01/04	23A0/01/04	23A0/01/04	23A0/01/04
	T-VOL → Simplex	—	2337/01/0F/E8	2337/01/0F/E8	2337/01/0F/E8	2337/01/0F/E8	2337/01/0F/E8	2337/01/0F/E8
Resume pair	SVOL	233A/01/0F/11	2310/01/0F/E8	2310/01/0F/E8	2354/01/0F/E8	Accept	Accept	2310/01/0F/E8
	T-VOL	—	2310/01/0F/E8	2310/01/0F/E8	2354/01/0F/E8	Accept	Accept	2310/01/0F/E8
Suspend single pair	S-VOL	2333/01/0F/1B	Accept	Accept	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8
	T-VOL	—	Accept	Accept	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8
Suspend multiple pair	S-VOL	2344/01/0F/1B	2310/01/0F/E8	Accept	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8
	T-VOL	—	2310/01/0F/E8	Accept	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8	2310/01/0F/E8
Remove pair	S-VOL	2333/01/0F/1B	Accept *	Accept *	Accept *	2353/01/0F/E8	Accept *	Accept *
	T-VOL	—	Accept *	Accept *	Accept *	2353/01/0F/E8	Accept *	Accept *
Sense pair status	S-,T-VOL	Accept	Accept	Accept	Accept	Accept	Accept	Accept

Else Accept: Error code / Key code / Format message / Reason code

\* The data between P-VOL and S-VOL is not synchronized.

**Table 6-3 Command Acceptance for each Universal Replicator Pair Status**

Command Type	Current Volume	Simplex	Duplex-P	Duplex	Suspending	Suspend	SSWS	Deleting
Create a path	P-VOL	Accept	Accept	Accept	Accept	Accept	-	Accept
	S-VOL	-	Accept	Accept	Accept	Accept	Accept	Accept
Remove a path	P-VOL	Accept	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9	-	C126/01/0F/E9
	S-VOL	-	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9	C126/01/0F/E9
Create a pair	P-VOL	Accept	4612/01/0F/11	4612/01/0F/11	4612/01/0F/11	4612/01/0F/11	-	4612/01/0F/11
	S-VOL	4600/01/04	4600/01/04	4600/01/04	4600/01/04	4600/01/04	4600/01/04	4600/01/04
Suspend pair	P-VOL	4617/01/0F/15	Accept	Accept	Not Accept	Not Accept	-	Not Accept
	S-VOL	4617/01/0F/15	Accept	Accept	Not Accept	Not Accept	Not Accept	Not Accept
Suspend pair Reverse	P-VOL	4617/01/0F/15	4619/01/0F/16	4619/01/0F/16	4619/01/0F/16	4619/01/0F/16	-	4619/01/0F/16
	S-VOL	4617/01/0F/15	Accept	Accept	Not Accept	Accept	Accept	Not Accept
Resume pair	P-VOL	4617/01/0F/15	Not Accept	Not Accept	Not Accept	Accept	-	Not Accept
	S-VOL	4617/01/0F/15	Not Accept	Not Accept	Not Accept	Not Accept	Not Accept	Not Accept
Remove pair	P-VOL	4617/01/0F/15	Accept	Accept	Not Accept	Accept	-	Not Accept
	S-VOL	4617/01/0F/15	Accept	Accept	Not Accept	Accept	Accept	Not Accept
Sense path status	P,S-VOL	Accept	Accept	Accept	Accept	Accept	Accept	Accept
Sense pair status	P,S-VOL	Accept	Accept	Accept	Accept	Accept	Accept	Accept
Sense all SIZ pairs status	P,S-VOL	Accept	Accept	Accept	Accept	Accept	Accept	Accept

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

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

BHDF	An “e-type” program that is used for user exits
CCW	channel command word
CU	control unit
DASD	direct-access storage device
DEV	device
ECB	entry control block
HDS	Hitachi Data Systems
HUR	Hitachi Universal Replicator/Hitachi Universal Replicator for IBM z/OS
LCU	logical control unit
LDEV	logical device
LVI	logical volume image
MCU	main control unit (for TrueCopy for z/OS)
M-VOL	main volume (for TrueCopy for z/OS)
MVS	Multiple Virtual Storage
NSC	Hitachi TagmaStore Network Storage Controller
OCO	object code only
P-VOL	primary volume (for Universal Replicator for z/OS)
RCU	remote control unit (for TrueCopy for z/OS)
R-VOL	remote volume (for TrueCopy for z/OS)
SDA	symbolic device address
SIz	Hitachi ShadowImage for IBM z/OS
SIM	service information message
SLCU	source logical control unit
SSER	source serial number
SSID	storage system identification
S-VOL	source volume (for ShadowImage for z/OS) secondary volume (for Universal Replicator for z/OS)
SVP	service processor
S/390	System/390

TCz	Hitachi TrueCopy for IBM z/OS
TPF	Transaction Processing Facility
T-VOL	target volume (for ShadowImage for z/OS)
URz	Hitachi Universal Replicator for IBM z/OS
USP	Hitachi TagmaStore Universal Storage Platform
USP V	Hitachi Universal Storage Platform V
USP VM	Hitachi Universal Storage Platform VM
VFA	virtual file access
VM	Virtual Machine
VM/ESA	Virtual Machine/Enterprise Systems Architecture
XRC	Extended Remote Copy



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