

Hitachi Copy Manager for IBM® TPF

BI_2

Administrator's Guide

This document describes and provides instructions for installing and using the Hitachi Copy Manager for IBM® TPF software with Hitachi RAID storage systems.

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Preface

This document describes and provides instructions for installing and using the Hitachi Copy Manager for IBM® TPF software with Hitachi RAID storage systems.

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

Intended Audience

This document is intended for system administrators, Hitachi Vantara representatives, and authorized service providers who are involved in installing, configuring, and operating the Hitachi RAID storage systems.

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 (for example, Virtual Storage Platform F1500).
- The user is familiar with Hitachi ShadowImage, Hitachi TrueCopy, and Hitachi Universal Replicator.
- The user is familiar with data replication requirements.
- The user is familiar with the IBM® Transaction Processing Facility operating system (TPF, z/TPF) and the IBM® host system (z/OS®, S/390®).
- The user is familiar with IBM® TPF DASD I/O concepts and support.

Product Version

This document revision applies to Copy Manager for TPF version BI_2 or later.

Changes in this Revision

- Add set ENABLE/DISABLE parameter/option for SETREC.
- Add FORCEALLPATHS parameter/option for PATH
- Add FIRSTDEV, LASTDEV, DEVA, DEVB, and SHOWAB parameters for pair status requests.
- Add FIRSTDEV, LASTDEV, DEVA, DEVB, and SHOWAB parameters for monitor requests.
- Add CCW 27 18 02 (Read cache write id) to UTILITY CCW.
- Add SITEOPTION DIAGNOSTIC to control if the CCW parameters are displayed when an IO error is encountered.
- Add ONLYSYSH option (only system heap requested, no record read requested) for the FDRSC macro.
- Add the failed CCW parameters to the IO error display (SITEOPTION controlled).
- Add the pair information in the IO error display.
- Add SSB 23A3 to the IO error description.
- Qualified Copy Manager support for the VSP 5000 series.
- Update pair status display to show copy percent if no prior replication request saved.
- Update FDRSC FREEHEAP to only free system heap. setname, FARF address, and data level use are no longer validate for FDRSC FREEHEAP request.
- Correction for HUR and TC sets. Ignore the SITEOPTION VERIFYTVOFFLINE for HUR and TC sets.
- Correct EXCTG STATUS display when no EXCTG is defined/active.
- Correct utility program prefix messages.
- Correct miscellaneous help screens.
- Miscellaneous Copy Manager manual updates.
- Correction of administrator's guide's incorrect use of the term DBAREArc to use DBREC.
- Update the FDRSC programming requirement/recommendation.

Referenced Documents

- 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 Virtual Storage Platform 5000 series documents:
 - *Hitachi TrueCopy for Mainframe User Guide*, MK-98RD9029
 - *Hitachi ShadowImage for Mainframe User Guide*, MK-98RD9027
 - *Hitachi Universal Replicator for Mainframe User Guide*, MK-98RD9031
 - *System Administrator Guide for VSP 5000 Series*, MK-98RD9009
- Hitachi Virtual Storage Platform G1000, G1500, F1500 documents:
 - *Hitachi TrueCopy for Mainframe User Guide*, MK-92RD8018
 - *Hitachi ShadowImage for Mainframe User Guide*, MK-92RD8020
 - *Hitachi Universal Replicator for Mainframe User Guide*, MK-92RD8022
 - *Mainframe System Administrator Guide*, MK-92RD8016
- Hitachi Virtual Storage Platform documents:
 - *User and Reference Guide*, MK-90RD7042
 - *Hitachi ShadowImage for Mainframe User Guide*, MK-90RD7023
 - *Storage Navigator User Guide*, MK-90RD7027
 - *Hitachi TrueCopy for Mainframe User Guide*, MK-90RD7030
 - *Hitachi Universal Replicator for Mainframe User Guide*, MK-90RD7031
- IBM® document: *z/VM: CP Planning and Administration*, SC24-6043

Document Conventions





This document uses the following terminology conventions:

Convention	Description
Hitachi RAID storage system, storage system	Refers to all supported models of the Hitachi RAID storage systems unless otherwise noted.
TPF	Refers to all IBM® TPF operating systems (TPF, z/TPF) unless otherwise noted.

This document uses the following typographic conventions:

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

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

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

Convention for Storage Capacity Values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 KB	1,000 bytes
1 MB	1,000 ² bytes
1 GB	1,000 ³ bytes
1 TB	1,000 ⁴ bytes
1 PB	1,000 ⁵ bytes
1 EB	1,000 ⁶ bytes

Logical storage capacity values (for example, logical device capacity, cache capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	Mainframe: 870 KB Open-systems: <ul style="list-style-type: none">▪ OPEN-V: 960 KB▪ Other than OPEN-V: 720 KB
1 KB	1,024 bytes
1 MB	1,024 KB or 1,024 ² bytes
1 GB	1,024 MB or 1,024 ³ bytes
1 TB	1024 GB or 1,024 ⁴ bytes
1 PB	1,024 TB or 1,024 ⁵ bytes
1 EB	1,024 PB or 1,024 ⁶ bytes

Accessing Product Documentation

Product user documentation is available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting Help

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Thank you!

Overview of Hitachi Copy Manager for IBM® 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 Functions and Features Supported by Copy Manager](#)
- [Customized Reference Messages for I/O errors displays and path group id displays](#)
- [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 (for example, Storage Navigator) or another platform, such as VM or MVS™, that can issue copy commands. For many TPF customers, using a platform other than TPF is not an option.

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), or Universal Replicator (asynchronous remote copy). Copy Manager for TPF enables users to establish, split, delete, or resync those sessions with one entry. Copy Manager for TPF also enables users to dynamically define and monitor path definitions for remote copy operations. 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 want 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.
- **Selective TPF Database Restore** –The TPF records on a backed up volume can be read by a TPF program using the Copy Manager ShadowImage read function. This function allows the TPF customer to read TPF records from a ShadowImage target volume using TPF FARF addressing. The ShadowImage read function provides a TPF macro and C function called FDRSC. FDRSC works similar to the TPF FIND macro. A use of FDRSC along with TPF FILE macros allows a TPF installation’s coverage or systems staffs to write TPF programs that can restore selected TPF records or selected TPF databases. This powerful function can save a TPF installation from doing a full database restore when TPF records are corrupted. See [ShadowImage Record Read](#) for more information about this feature.

- **Creation of test systems** – Many TPF sites have half-test systems (that is, test systems that are made up of prime modules only, no duplicates). The 3process 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, 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 Virtual Storage Platform 5000 series
- Hitachi Virtual Storage Platform G1000, G1500 (VSP G1000, G1500)
- Hitachi Virtual Storage Platform F1500 (VSP F1500)
- Hitachi Virtual Storage Platform (VSP)

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 the preface). 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. Copy Manager also provides controls to monitor and define path definitions that are used for TrueCopy or HUR operations.

Components of Copy Manager for TPF

The ShadowImage, Universal Replicator, and TrueCopy components are described in the storage system-specific user documents (for example, *Hitachi Universal Replicator for Mainframe User's Guide*).

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

- TPF Assembler ECB-type segments
- TPF fixed-file records
- A VM table update for VM testing
- TPF macro and TPF C header (optional)
- TPF Assembler C function (optional)
- 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 more 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 more information.

VM Requirements for Testing

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 more information.

Assembler Macro, C Function and C Header (Optional)

An Assembler macro, C Function and C header are available if the TPF site plans to use the Read Shadow Image Record (FDRSC) feature from an assembler or C program.

An Assembler macro and related DSECTs are available if the TPF site plans to use the Mainframe Analytics Macro (HDSMAM) feature from a TPF assembler program. This macro and its sample programs are provided on request. See [Installing the Copy Manager for TPF Software](#) for more information.

Copy Manager User Exits (Optional)

Copy Manager provides twelve user exits. These user exits enable the TPF installation to provide installation-specific programming before and after the establish, split or delete actions, or after the preset define entry. The user exits also provide installation specific programming when after a monitor status scan determines the current status of all the copy pairs in a set. See [Installing the Copy Manager for TPF Software](#) for more information.

Copy Manager for TPF Processing

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

Your Hitachi Vantara representative can also perform ShadowImage, TrueCopy, and Universal Replicator operations using Storage Navigator or the service processor (SVP) for the control unit. Please contact your Hitachi Vantara account team for more information about ShadowImage, TrueCopy, and Universal Replicator 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 unreserve's 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 Functions and Features Supported by Copy Manager

Copy Manager also supports the following functions and features:

- At-time split with asynchronous local copy
- ShadowImage record read
- Mainframe Analytics Macro
- Clip TPF volume VSN
- TPF offline volume operations (support of 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)
- TPF DataBase Areas
- Customized Reference Messages for I/O errors displays and path group id displays
- CREATEPAIR set build details recorded in a history database



Note: The following processes are not supported: Concurrent Copy (CC), Extended Remote Copy (XRC), and Peer-To-Peer Remote Copy (PPRC).

At-Time Split with Asynchronous ShadowImage

The at-time split function allows an installation to create a true point-in-time copy of an installation's ShadowImage TPF database. The at-time split function allows an installation to pre-determine the time of a database split. For example, the installation can request to split a database on March 1, 2014, at 22:30. The asynchronous ShadowImage 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 ShadowImage – PRESET TPF Command](#) for an example of the use of the at-time split function with the asynchronous ShadowImage copy function.

When the split function is used with HUR, it allows the TPF site to create a true point-in-time split in remote locations (control units). Contact the Hitachi Vantara TPF Engineering staff to discuss the options available for creating point-in-time database copies in remote control units when using HUR.

ShadowImage Record Read

Copy Manager provides a TPF macro (fdrsc.mac) and a TPF C Function (fdrsc), C header (hdsio.h) that allows the installation to write programs that read a TPF record from a local control unit's ShadowImage volume. See [ShadowImage Record Read Function](#) for information about this function and an example program using the **FDRSC** macro and fdrsc C function.

Mainframe Analytics Macro support

Copy Manager provides a TPF macro (hdsam.mac) that allows the installation to write programs to query the control unit's performance statistics. Sample programs and the macro/dsects are provided on request. Sample use of this macro is provided using the Copy Manager functional entry, ZFDRS MAR. For access to this macro and sample programs along with consultation on how best to use this macro in a TPF production environment, contact the Hitachi Vantara TPF Engineering group.

Clip TPF Volume VSN

Copy Manager provides an operator entry that allows the TPF installation to “clip” a TPF VSN. A “clip” alters the first two characters of a TPF volume’s VSN. The CLIP command writes an updated VSN record (cylinder 0, track 0, record 3) with the new VSN to a local control unit’s (VSP and later) ShadowImage target volume. The clip does not alter the VTOC. The clip command is primarily used for test system creation, because it provides an easy method to change the VSNs of a TPF test system. See the description of the ZFDRS CLIP command in the *Copy Manager for TPF Operations Guide*.

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 I/O. The Copy Manager name of the alternative TPF volume is the “offline volume control device”.

The TPF installation can 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 defined by the Copy Manager ZFDRS OFFREC command.

Copy Manager provides an option (ALLOFFLINE) to always use the OFFREC control device, regardless if a set’s pair source (I/O) volume pair is mounted. The use of ALLOFFLINE provides two advantages for the use of Copy Manager.

- If the control device in OFFREC is a TPF-mounted general file, the use of ALLOFFLINE moves all the Copy Manager for TPF replication commands (I/O’s) off of the TPF production volumes.
- The use of ALLOFFLINE allows the pair definitions in a set to use any number (SDA) as the pair’s device number instead of TPF mounted SDAs. This allows for an easier use of a second TPF system to control another TPF system’s replication.

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

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 defined by the Copy Manager ZFDRS RCUREC command.

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

TPF Database Areas

Copy Manager provides a tool for managing sets. This set management tool is for TPF installations that need flexibility in creating multiple directions or combinations of copy sets. The tool provides the TPF installation with the ability to define multiple TPF logical databases instead of defining a fixed copy pair configuration.

These TPF logical databases are called database areas. The database area can be a local or remote back up a production or test system, a production TPF system or a Test TPF system.

Each database area has a description of each logical volume location in the database. This volume definition feature allows Copy Manager to dynamically define copy pairs for ShadowImage, TrueCopy and HUR sets.

The database area has an optional feature to define the ports to be used by the database area when the database area is to be used for TrueCopy or HUR sets. This optional port definition feature allows Copy Manager to dynamically define control unit path definitions for TrueCopy and HUR sets.

Once the database areas are defined by Copy Manager, the TPF installation can easily:

- Create a ShadowImage set of copy pairs between any two database areas.
- Create a TrueCopy set of copy pairs and port definitions between any two database areas.
- Create an HUR set of copy pairs and port definitions between any two database areas.

See [Copy Operations with Database Areas](#) for more details.

Customized Reference Messages for I/O errors displays and path group id displays

Copy Manager provides a message database that allows a site to provide customized descriptions (messages) for specified I/O errors and specified path group id CPU serial numbers.

The reference message database is built using the ZFDRS REFREC entry. The reference message database use is activated using the Copy Manager REFMESSAGE site option.

Record the history of CREATEPAIR set builds.

Copy Manager provides a history database that allows a site to record the history of the use of CREATEPAIR. This history records the set name created, timestamp of the create, and the source, target, and online database areas used in creating pairs for a new set.

The reference message database is initialized or displayed using the ZFDRS HISREC entry. The history recording is activated using the Copy Manager HISTORY site option.

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 HUR with EXCTG, logging tapes might not be required. If using ShadowImage asynchronous with At-Time Split, logging tapes might not be required. If using TrueCopy Synchronous or HUR in combination with ShadowImage asynchronous with At-Time Split, logging tapes might not be required.

A TPF installation's VFA writes activity should be one of the topics consider when determining the need for logging tapes across any SPLIT operation.



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.

Installing Copy Manager for TPF

This chapter provides information about system requirements, software installation, and the preparation required for Copy Manager 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](#)
- ❑ [Migration to Copy Manager from Versions prior to BD](#)
- ❑ [Migration to Copy Manager from Versions prior to BE](#)
- ❑ [Migration to Copy Manager from Versions prior to BF](#)
- ❑ [Migration to Copy Manager from versions prior to BH](#)
- ❑ [Migration to Copy Manager from versions prior to BI](#)
- ❑ [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 guide.

The Copy Manager system requirements apply to the TPF operating system and the DASD storage systems hosting the copy pairs. The system requirements for Copy Manager are:

- Hitachi RAID storage systems: Copy Manager supports the following storage systems:
 - Hitachi Virtual Storage Platform 5000 series
 - Hitachi Virtual Storage Platform G1000/G1500/F1500
 - Hitachi Virtual Storage Platform
- ShadowImage (for mainframe), TrueCopy (for mainframe), and/or Universal Replicator (for mainframe) licenses. The ShadowImage, TrueCopy, and/or Universal Replicator features must be enabled on each Hitachi storage system that will have active copy pairs. For information about enabling these features, see the *Storage Navigator User Guide* for the storage system, or contact your Hitachi Vantara representative.
- z/TPF operating system.
- 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 40 sets is 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 Vantara recommends that you consult with Hitachi Vantara 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 can be from 1 to 16 alphanumeric characters.
4. Make a list or chart that shows each set's name and its corresponding number of source volumes. For example:

SET NAME	SOURCE VOLUME COUNT

Database Area Usage (optional)

The use of database areas is an optional tool that can be used to dynamically create Copy Manager sets. Database areas have shown to be a valuable tool for TPF sites that need to change their pair definitions in a set or need to frequently build new sets.

A database area is a logical grouping of volumes. For example, the TPF production system would be a database area. Other examples of database areas include a TPF test system or all of the volumes in the backup copy of a TPF production system.

In Copy Manager, a database area would be used to define one half of a copy pair set. The Copy Manager CREATEPAIRs entry builds the copy pairs in a Copy Manager set by using two database areas. For example, a database area named "backup_1" might represent the volumes that back up the TPF system. This database area would define the location of each of the volume in the backup volume grouping.

A maximum of 40 database areas is allowed per TPF system.

Prior to installation, perform the following tasks:

1. Define the number of database areas you plan to use on the specific TPF system. Hitachi Vantara recommends that you consult with Hitachi Vantara TPF Engineering during this planning stage.
2. Determine the number of volumes to be used in each database area. Include spare TPF volumes if there are plans to copy spare volumes.
3. If remote copy (TrueCopy or HUR) is planned, determine the number of path items in the database area. For TrueCopy, one path item for each SSID and serial number combination. For HUR, one path item per serial number and HUR path ID combination. You must consult with Hitachi Vantara TPF Engineering during this planning stage.
4. Define each database area's name. The name can be from 1 to 16 alphanumeric characters.
5. Make a list or chart that shows each database area's name and its corresponding number of source volumes plus pair definitions. For example:

DATABASE AREA NAME	VOLUME COUNT PLUS PATH ITEM COUNT

ECB Program Allocation

Copy Manager uses (108) 4-K ECB programs. The (108) 4-K ECB programs must be allocated for Copy Manager. The programs are named YHD0-YHD9, YHDA-YHDZ, YHE0-YHE9, YHEA-YHEZ, YHG0-YHG9, and YHGA-YHGZ. Programs YHDD and YHGW are AMODE=64. The remaining 106 programs are 31-bit assembler.

The Copy Manager programs are written in Assembler language. One hundred six programs are shipped in object-only format. Two programs are shipped in source format. Five sample programs that demonstrate the use of the Mainframe Analytics Macro (HDSMAM) are available on request in source format.

FDRSC, Read ShadowImage Record support (optional)

Copy Manager provides both assembler program interface and C program interface to the read ShadowImage record feature (FDRSC).

The Assembler program interface to the read ShadowImage record feature is through the use of the FDRSC macro.

The C program interface to the read ShadowImage record feature is through the use of the fdrsc C function.

The fdrsc C function is written in Assembler language.

The FDRSC macro (fdrsc.mac), the fdrsc C or CPP function (cfdrsc.asm) and its supporting header (hdsio.h) is shipped in source format.

HDSMAM, Mainframe Analytics Macro support (optional)

Copy Manager provides an assembler program interface to the mainframe analytics performance database query feature. The TPF macro name is HDSMAM.

The Assembler program interface is through the use of the HDSMAM macro.

For source copies of the HDSMAM macro and its related DSECTs, sample programs, contact the Hitachi Vantara TPF Engineering group.

Fixed-File Record Use

Two types of fixed-file records are used in Copy Manager: control records and system 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

Five control records are used by Copy Manager: COPYMGR, SETREC, DBREC, REFREC and HISREC. COPYMGR, SETREC, DBREC, REFREC, and HISREC are each a single 4K record.

The COPYMGR control record contains the overall TPF system's Copy Manager options/definitions. The COPYMGR record also contains the locations of other four control records and locations of three of the configuration records. SETREC contains the definition of each set for a TPF system. The SETREC includes the location of each set's PAIRRECs and the set's copy attributes. DBREC contains the definition of each database area for a TPF system. The DBREC includes the location of each database area's DBAREArcs and attributes of that database area. REFREC contains the definition of each reference message defined by the TPF system. The use of REFREC is enabled by use of a siteoption. HISREC contains the history record of CREATEPAIRs actions. The use of HISREC is enabled by using a siteoption.

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. The suggested values are:

- FACE type: #HDSCM0
- Ordinal numbers: 0, 1, 2, 3, and 4
- Record ID: 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 _____
3. Identify and record below the location of the DBREC control record.
DBREC FACETYPE _____
DBREC ORDINAL _____
DBREC RECORD ID _____
4. Identify and record below the location of the REFREC control record.
REFREC FACETYPE _____

- REFREC ORDINAL _____
- REFREC RECORD ID _____
5. Identify and record below the location of the HISREC control record.
- HISREC FACETYPE _____
- HISREC ORDINAL _____
- HISREC RECORD ID _____

Configuration Record Planning

Five configuration records are used by Copy Manager: OFFREC, RCUREC, EXCREC, PAIRREC, and DBAREAREC. OFFREC contains the Offline Volume Command device definitions. RCUREC contains the Remote Control Unit Command device definitions. EXCREC contains the Extended Consistency Group definitions. PAIRREC contains all of the Copy Pair's definitions for a set. DBAREAREC contains the volume definitions for a database area.

OFFREC, RCUREC, and EXCREC Configuration Records

OFFREC, EXCREC, and RCUREC are each a single 4K fixed-file record. OFFREC, EXCREC, 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. The suggested values are:

- FACE type: #HDSCM0
- Ordinal numbers: 5, 6, and 7
- Record ID: C'HD'

Prior to installation, perform the following tasks.

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

OFFREC FACETYPE _____

OFFREC ORDINAL _____

OFFREC RECORD ID _____
2. Identify and record below the location of the RCUREC configuration definition record.

RCUREC FACETYPE _____

RCUREC ORDINAL _____

RCUREC RECORD ID _____
3. Identify and record below the location of the EXCREC configuration definition record.

EXCREC FACETYPE _____

EXCREC ORDINAL _____

EXCREC RECORD ID _____

PAIRREC Configuration Definition Records

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 contains 58 source/target pairs. To determine the number of fixed-file records to use for a set's copy pair configuration, 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 alphanumeric characters)
- 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 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.
- (optional) Define the maximum ordinal number

- Using the information in step 1, make a chart or list identifying each set's configuration record location.

SET NAME	SOURCE VOLUME COUNT	NUMBER OF PAIRRECS	FACETYPE	RECORD ID	STARTING ORDINAL NUMBER	ENDING ORDINAL NUMBER	MAXIMUM ALLOWED ORDINAL NUMBER (opt.)

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

DBAREArc Configuration Definition Records (Optional)

A single database's volume configuration is defined in a group of fixed-file records. These records are called the "Database Area Volume Configuration Definition Records" (DBAREArcs, often called DBA's because of the DBAREArc abbreviation in the ZFDRS entry). A database's DBAREArcs must all be the same FACE type and record ID. A database area's DBAREArcs must use a consecutive ordinal range. For example, a database area named TESTSYS1 may use FACE type HDSCM0, record ID C'HD", and ordinals 150-165.

A single fixed-file DBAREArc contains 58 volume and path definitions (items). To determine the number of fixed-file records to use for a database area's, divide the sum of the volume definitions and the path items by 58 and round up the result. For example, if a database area named PRODUCTION1 has 1008 items (1000 volumes plus 8 path items), you would calculate the need for $1008/58 = 17.38$ records, so you would plan to allocate a minimum of 18 fixed-file records in a consecutive ordinal range.

Prior to installation, do the following:

- Determine the following information for each database area:
 - Database area name (1 to 16 alphanumeric characters)
 - Number of volumes in the database area
 - (optional) Determine the number of path items in the database area. For TrueCopy, one path item for each SSID and serial number combination. For HUR, one path item per serial number and HUR path ID combination.
 - Number of DBAREArc records required for the database area
 - Facetype of the database area
 - Record ID of the database area
 - Starting ordinal of the database area

- Ending ordinal of the database area. It is common to pad the number of ordinals to a round increment. For example, if a database area requires 18 fixed-file records, allocating each database area 20 or 50 (or some multiple of 10) ordinals is a common practice.
 - (optional) Define the maximum ordinal number
2. Using the information in step 1, make a chart or list identifying each database area's configuration record location.

DATABASE AREA NAME	VOLUME COUNT	(optional) PATH ITEM COUNT	NUMBER OF DBAREARECS	FACETYPE	RECORD ID	STARTING ORDINAL NUMBER	ENDING ORDINAL NUMBER	MAXIMUM ALLOWED ORDINAL NUMBER (opt.)

3. Calculate (sum) the total number of fixed-file records required for all of the database areas 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 \(108\) Program Segments: YHD0-YHD9, YHDA-YHDZ, YHE0-YHE9, YHEA-YHEZ](#)
- [Task 3. Update the Source Code in Copy Manager Program YHDZ](#)
- [Task 4. Update the Source Code in Copy Manager Program YHDF](#)
- [Task 5. Assemble YHDZ and YHDF. Optionally, assemble C or CPP function cldrsc](#)
- [Task 6. Load the Copy Manager Programs to the TPF System](#)
- [Task 7 \(optional\). Load the Read ShadowImage Record macro and C header](#)
- [Task 8. Create the ZFDRS Message and Program Reference](#)
- [Task 9. 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. Using the information gathered during the installation planning process, determine the total number of fixed-file records required for the Copy Manager database area configuration definition records (DBAREArcs).
3. The total number of fixed-file records that the TPF installation needs for Copy Manager is the number of fixed-file records for the PAIRRECs plus the number of fixed file records for the DBAREArcs plus the three configuration records (OFFREC, EXCREC, and RCUREC) plus the five Copy Manager control records (COPYREC, SETREC, DBREC, REFREC, and HISREC).
4. Decide if existing unused fixed-file records will be used, or if new fixed-file records will be allocated.
5. If new fixed-file records are to be allocated, update the FCTB to add the fixed-file records required by Copy Manager. Hitachi Vantara 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.

6. Initialize the Copy Manager fixed-file records using ZIFIL or a similar function. Use the record IDs identified during the installation planning process during the fixed-file record initializations.

Task 2. Allocate (108) Program Segments: YHD0-YHD9, YHDA-YHDZ, YHE0-YHE9, YHEA-YHEZ, YHG0-YHG9, YHGA-YHGZ

One hundred six (106) of the 108 Copy Manager e-type assembler segments are delivered in object code only (OCO) format.



Note: YHDF and YHDZ are shipped as source. Instructions for the installation of YHDF and YHDZ follow.

Recommended (default) program names: YHD0-9, YHDA-Z, YHE0-9, YHEA-Z, YHG0-YHG9, YHGA-YHGZ (KEY0, RESTRICT). One hundred six (106) of the 108 program segments are 31-bit. YHDD, YHGW are AMODE=64. If the installation site requires a different program naming convention, Hitachi Vantara TPF Engineering needs the name of the segments in order to generate the object code.

Task 3. Update the Source Code in Copy Manager Program YHDZ

The TPF program YHDZ defines the TPF installation's Copy Manager password, defines the location of the Copy Manager system control record (COPYMGR).



Notes:

- **Modifying YHDZ after Copy Manager is installed.** After YHDZ has been loaded, the TPF installation can change the location of the system control record or change the password. To reflect the changes, modify YHDZ, and assemble and load the new YHDZ.
 - **If the TPF customer requests,** Hitachi Vantara TPF Engineering will update YHDZ with the customer's defined password and Copy Manager system control record location. Hitachi Vantara TPF Engineering will then assemble YHDZ and ship YHDZ as OCO as part of the Copy Manager program OCO shipment.
-

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

1. Copy Manager password; must be 8 bytes, data field name is CUST_PW.
`CUST_PW DC C'SECRETX' CUSTOMER MUST MODIFY, MUST BE 8 BYTES`
2. Copy Manager 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 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 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

Task 4. Update the Source Code in Copy Manager Program YHDF



Note: An optional copy of YHDF is shipped as OCO. The OCO version of YHDF that is shipped has all the Copy Manager user exits disabled. Using the shipped OCO version of YHDF is a valid option if no Copy Manager users exits are being used.

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



Note: If user exits will be used, the COPYMGR site option, USEREXITON must be set to on.

There are minimal programming restrictions when writing the user exit. Copy Manager saves its ECB contents and detaches its data level before entering the user exit. The user exit can be loaded using the installation's normal assembly and load procedures. The following is a description of the user exits in Copy Manager.

- **Split User Exits (2):** 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 or after a split command has been issued. For example, an installation may want to flush VFA or start a logging process before a split command is issued.
- **RESUME (RESYNC) User Exits (2):** A user exit is provided both before and after Copy Manager issues the resume (resync) pair command. These user exits are intended to allow the installation to support additional functionality before or after a resume (resync) command has been issued.

- **Delete User Exits (2):** 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 or after a delete command has been issued. For example, an installation may want to flush VFA or start a logging process before a delete command is issued.
- **PRESET DEFINE User Exit (1):** A user exit is provided after Copy Manager issues the preset define pair command. This user exit is intended to allow the installation to support additional functionality after a preset define command has been issued. This user exit is passed the preset time using TOD format in registers 2 and 3. The Preset define Time Out Value is passed to the user exit Register 4.



Note: The TOD that is passed to the user exit in registers 2 and 3 is calculated using the STCK instruction. The TOD being sent to the user exit is the UT (GMT) time of the operator inputted preset time.

- **MONITOR User Exit (3):** A user exit is provided after the Copy Manager monitor determine one of three overall status of all the pairs in a set. The user exit is sent a status indicator stating if all the pairs in the set being monitored are duplex, split or mixed status. This user exit is intended to allow the installation to support additional functionality after the monitor program determines the overall pair status of the pairs in a set.

Task 5. Assemble YHDZ and optionally YHDF. Optionally, assemble C or CPP function cfdrc

Use the TPF installation's normal procedures to assemble TPF ECB assembler programs and C or CPP functions.

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

Use the TPF installation's normal load procedures to load the 108 Copy Manager programs to the TPF system that will use Copy Manager.

Optionally, Use the TPF installation's normal load procedures to load the C or CPP function fdrsc (cfdrc.asm) to the TPF system that will use Copy Manager

Task 7 (optional). Load the Read ShadowImage Record macro and C header

Use the TPF installation's normal load procedures to load the macro fdrsc.mac and the C header hdsio.h to the installations preferred directories.

Task 8. Create the ZFDRS Message and Program Reference

Use the TPF z-message ZFMSG. Contact Hitachi Vantara TPF Engineering for the program name of the ZFDRS Parser. If the recommended program names were used, the name of the parser is YHD7.

ZFMSG ADD ZFDRS P-YHD7

Task 9. Update VM Tables for VM Testing of Supported Devices



Note:

- If **VM APAR VM64425** has been applied, then the xxxGDS modifications are not required for TPF Copy Manager.
- If assistance is required to apply the following VM modifications, contact Hitachi Vantara 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
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 incorrectly translates 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 should 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 **GDSDATBL** in **HCPGDS** as follows: change the two HDS opcodes to **DASTOP** (from **DACMFJ**).



Note: During testing of the VM CCW changes with a second-level TPF system, the TPF volumes on the second-level VM system are supported, but the TPF volumes on the first-level VM system are not supported.

Copy Manager Control Records

The Copy Manager database consists of five control records and five configuration definition 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 COPYMGR record contains indicators for site unique operational options. These options allow the TPF installation to define configure Copy Manager's optional programming logic rules to better meet the TPF installations operational needs.
 - The COPYMGR record contains default values to be used when defining set(s) using Copy Manager's ZFDRS SETREC entry.
 - This record's location is defined in Copy Manager TPF program YHDZ.
- **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 set copy type (ShadowImage, TrueCopy or HUR)
 - The location of the first and last fixed-file record used for the set's copy pair configuration definition record (PAIRREC).
 - Optionally, The maximum ordinal location of the fixed-file records used for the set's copy pair configuration definition record (PAIRREC).
 - The number of pairs in the set's copy pair definition record.
 - The set's copy characteristics.
 - Default values to be used for defining a copy pair when using Copy Manager's ZFDRS CONFIG or ZFDRS CREATEPAIR entries.
 - 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 PAIRRECs. 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 EXCTG or ASYNC, 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 ...".

- **DBREC:** The database area index control record.
 - This record must be defined and initialized, but the use of this record is optional.
 - DBREC is an index record that defines every database area to be used for a TPF System. DBREC contains the following information for each database area.
 - The database area's name.
 - The location of the first and last fixed-file record used for the database area's volume configuration definition record (DBAREArc).
 - Optionally, The maximum ordinal location of the fixed-file records used for the database area's volume configuration definition record (DBAREArc).
 - The number of volumes in the database area's volume definition record.
 - The database area's name is a variable-length name containing 1 to 16 alphanumeric characters.
 - The database area index control record contains the location of the database areas DBAREArcs. The first fixed-file record location of a database area's DBAREArc is defined in DBREC using the record's FACE type, starting ordinal number, and record ID.
 - The location of the database area index control record (DBREC) is defined in the COPYMGR record. To define the location of DBREC, use the Copy Manager entry: "ZFDRS COPYMGR ADD DBREC ...".
- **REFREC:** The reference message control record.
 - This record must be defined and initialized, but the use of this record is optional.
 - REFREC is an index record with up to combined total of 40 customized I/O error and path group id messages. When an I/O error is encountered that matches an I/O error reference code, that customized message will be displayed as part of the Copy Manager I/O error display. When displaying a volume's path group id, a customized message will be display if a path group id message code has a matching CPU serial number.
 - To enable the use of the Reference Message database, the COPYMGFR site option REFMESAGE must be set to on.
 - REFREC contains the following information for each database area.
 - The message type (I for I/O error, p for path group id).
 - The message code. An up to 8-digit code that represents an I/O error or a CPU serial number.
 - A customized message up to 80 characters.

- The location of the reference message database control record (REFREC) is defined in the COPYMGR record. To define the location of REFRFC, use the Copy Manager entry: "ZFDRS COPYMGR ADD REFRFC ...".
- **HISREC:** The history recording database control record.
 - This record must be defined and initialized, but use of this record is optional.
 - HISREC is a push-down stack record with up to 40 history recordings. When the site option HISTORY is set to ON, Copy Manager will record CREATEPAIR events in the history database. This history includes the set name created, timestamp of the create, and the source, target, and online database areas used in creating pairs for a new set. The history database can be displayed or initialized using the ZFDRS HISREC entry.
 - To enable the use of the History recording database, the COPYMGR site option HISTORY must be set to ON.
 - HISREC contains the following information for each CREATEPAIR entry.
 - The CREATEPAIR set name
 - The CREATEPAIR timestamp
 - The CREATEPAIR source database area name
 - The CREATEPAIR target database area name
 - The CREATEPAIR target online area name
 - The location of the history recording database control record (HISREC) is defined in the COPYMGR record. To define the location of HISREC, use the Copy Manager entry: "ZFDRS COPYMGR ADD HISREC ...".
 -
- **OFFREC:** The offline volume control device configuration definition record.
 - This record must be defined and initialized, but the use of this record is optional.
 - When a TPF volume is offline (not mounted), TPF does 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 sends 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 ...`
- If a set needs to use OFFREC, the set must have the set option OFFLINE set to on.
- The set option ALLOFFLINE is different from the set option OFFLINE. The use of the set option ALLOFFLINE will force all the SET's replication I/O to be directed to the OFFREC control device. *Contact Hitachi Vantara TPF Engineering if considering the use of the set option ALLOFFLINE.*
- **RCUREC:** The RCU command device configuration definition record.
 - This record must be defined and initialized, but the use of this record is optional.
 - 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, 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 is 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 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 ...`
- **EXCREC:** The Extended Consistency Group configuration definition record.
 - This record must be defined and initialized, but the use of this record is optional.
 - When using EXCTG in HUR, there are many interrelated components that must be identified prior to executing the command to start using the extended consistency group. Some of the components for the entire extended consistency group include defining the EXCTG number, the journal ID number, the Mirror ID number, and identifying the supervisor control unit serial number. The EXCTG also has components for each HUR control unit in the group. Some of the components to be defined for each control unit include journal group IDs, control unit serial numbers, and arbitration command device locations. Most of the information required to define an EXCTG must be supplied by the

Hitachi Vantara local support team and by Hitachi Vantara TPF Engineering.

- The EXCTG configuration definition record describes the components of the EXCTG layout and the relationships between the components. See [HUR Copy Operations with Extended Consistency Groups](#) for details.
- The location of the EXCTG configuration definition record (EXCREC) is defined in the COPYMGR record. To define the location of EXCREC, use the Copy Manager entry: `ZFDRS COPYMGR ADD EXCREC ...`
- **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 the following:
 - 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.
 - Optional for TPF sites that plan to use Copy Manager to define and monitor TrueCopy or HUR paths (links). To perform remote copy path definitions or monitoring, the control unit must know the local control unit port ids and remote control unit port id's to be used by the TrueCopy or HUR copy pairs. For HUR, the control unit must also know the HUR Path ID. The PAIRREC contains the information that describes the local and remote control unit's port id's for each copy pair. And, PAIRREC contains the HUR Path ID for each HUR copy pairs. See [Creating the Copy Pair Configuration Definition Records](#) for more information.
 - Each copy pair definition contains the copy pair volume information and optionally the copy pair path information. A copy pair's volume and path information are in a single copy pair definition.
 - Each record in a set's copy pair configuration definition record (PAIRREC) can contain up to 58 copy pair definitions.
 - A set can 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 ...`
- **DBAREArec:** The database area configuration definition record (Optional).
 - The database area configuration definition record is a group of fixed-file records (or a single fixed-file record) that contains the following:

- All the volume definitions for a single database area. The DBAREArc volume definitions are used by the Copy Manager entry ZFDRS CREATEPAIR to create copy pairs in a set. A database area describes a database that can either be used as a target or a source in a set's copy pair configuration. The database area volume description contains the information required to define a source or target volume's location in a control unit. See [Creating the Copy Pair Configuration Definition Records](#) for more information.
- Optional for TPF site's that plan to use Copy Manager to define and monitor TrueCopy or HUR paths (links). To perform remote copy path definitions or monitoring, the control unit must know the local control unit port ids and remote control unit port id's to be used by the TrueCopy or HUR copy pairs. For HUR, the control unit must also know the HUR Path ID. The DBAREArc contains the information that describes a volume's port id when used as either a local or remote (source or target) volume. Unlike PAIRREC, in DBAREArc the path definitions are separated from the volume definitions. The path definitions for TrueCopy are identified by SSID and Serial number. The path definitions for HUR are identified by HUR path ID and serial number. The ZFDRS CREATEPAIR will build the path definitions in the PAIRREC based on the path definitions in the DBAREArc. See [Creating the Copy Pair Configuration Definition Records](#) for more information.
- The volume definition and path definitions are in separate records.
- Each record in a database area's volume configuration definition record (DBAREArc) can contain up to a combination of 58 volume and path definitions.
- A database area can contain one or more fixed-file records for a DBAREArc (the records are in sequential fixed-file record ordinal order).
- The number of fixed-file records to be used for a DBAREArc is defined during the Copy Manager installation planning process.
- To define the location of a database area's configuration definition record, use the Copy Manager entry: ZFDRS DBREC 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](#)
- [Task 5. Define the DBREC Location to COPYMGR](#)
- [Task 6. Initialize DBREC](#)
- [Task 7. Define the REFREC Location to COPYMGR](#)
- [Task 8. Initialize REFREC](#)
- [Task 9. Define the HISREC Location to COPYMGR](#)
- [Task 10. Initialize HISREC](#)
- [Task 11. Define the COPYMGR Default Siteoptions](#)
- [Task 12 \(Optional\) Define the COPYMGR SET definition defaults to be used by SETREC](#)

Important: The required tasks 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 YHDZ Copy Manager program during the software installation. The Copy Manager password was defined in the YHDZ Copy Manager program during the software installation.

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

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

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 YHDZ 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 DEFAULTRECID RECID-rrrr
```

2. After this command is completed, enter:

```
ZFDRS COPYMGR DISPLAY
```

This display shows 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 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-ffffffff 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.



Note: Using special characters for the facetype.

Copy Manager uses BPKDC to parse the ZFDRS input message. FACETYPE uses the KC option in BPKDC. When entering special characters in the facetype field, see the IBM® TPF General Service Manual for BPKDC for restrictions and requirements when using special characters in a character (C) field. For example, to enter a \$ in a name, you would use \$\$ to enter one \$ character.

Example: to enter a FACETYPE of #TE\$ST123, you would use the parameter FACETYPE-TE\$\$ST123.

Copy Manager adds a # sign to the beginning of the facetype value. To use two # signs for the facetype, the ## must be used. For example, to use the facetype ##TEST123, the facetype parameter must be FACETYPE-##TEST123. In this example, BPKDC decodes the ## to one # sign, and Copy Manager prefixes the facetype value with the second # sign.

2. After this command is completed, enter: `ZFDRS COPYMGR DISPLAY`

The display now shows the location of the SETREC control record.

See the *Copy Manager for TPF Operations Guide* for descriptions 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-pppppppp BP
```

2. After this command is completed, enter: `ZFDRS SETREC DISPLAY CONFIG`
The reply states 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 DBREC Location to COPYMGR

To define the DBREC control record's location, you need to know the DBREC 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 DBREC planned FACE type, ordinal, and record ID, enter the following on the TPF system:

```
ZFDRS COPYMGR DBREC 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.



Note: Using special characters for the facetype.

Copy Manager uses BPKDC to parse the ZFDRS input message. FACETYPE uses the KC option in BPKDC. When entering special characters in the facetype field, see the IBM® TPF General Service Manual for BPKDC for restrictions and requirements for special characters in a character (C) field. For example, to enter a \$ in a name, use \$\$ to enter one \$ character.

Example: to enter a FACETYPE of #TE\$ST123, you would use the parameter FACETYPE-TE\$\$ST123.

Copy Manager adds a # sign to the beginning of the facetype value. To use two # signs for the facetype, the ## must be used. For example, to use the facetype ##TEST123, the facetype parameter must be FACETYPE-##TEST123. In this example, BPKDC decodes the ## to one # sign, and Copy Manager prefixes the facetype value with the second # sign.

2. After this command is completed, enter: `ZFDRS COPYMGR DISPLAY`

This display now shows the location of the DBREC control record.

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

Task 6. Initialize DBREC

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

```
ZFDRS DBREC INIT PASSWORD-pppppppp
```

2. After this command is completed, enter: ZFDRS DBREC DISPLAY

The reply states that the record is empty.

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

Task 7. Define the REFREC Location to COPYMGR

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

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

```
ZFDRS COPYMGR REFREC 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.



Note: Using special characters for the facetype.

Copy Manager uses BPKDC to parse the ZFDRS input message. FACETYPE uses the KC option in BPKDC. When entering special characters in the facetype field, see the IBM® TPF General Service Manual for BPKDC for restrictions and requirements for special characters in a character (C) field. For example, to enter a \$ in a name, use \$\$ to enter one \$ character.

Example: to enter a FACETYPE of #TE\$ST123, use the parameter FACETYPE-TE\$\$ST123.

Copy Manager adds a # sign to the beginning of the facetype value. To use two # signs for the facetype, the ## must be used. For example, to use the facetype ##TEST123, the facetype parameter must be FACETYPE-##TEST123. In this example, BPKDC decodes the ## to one # sign, and Copy Manager prefixes the facetype value with the second # sign.

2. After this command is completed, enter: ZFDRS COPYMGR DISPLAY

This display now shows the location of the REFREC control record.

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

Task 8. Initialize REFREC

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

```
ZFDRS REFREC INIT PASSWORD-pppppppp
```

2. After this command is completed, enter: `ZFDRS REFREC DISPLAY`

The reply states that the record is empty.

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

Task 9. Define the HISREC Location to COPYMGR

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

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

```
ZFDRS COPYMGR HISREC 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.



Note: Using special characters for the facetype.

Copy Manager uses BPKDC to parse the ZFDRS input message. FACETYPE uses the KC option in BPKDC. When entering special characters in the facetype field, see the IBM® TPF General Service Manual for BPKDC for restrictions and requirements for special characters in a character (C) field. For example, to enter a \$ in a name, use \$\$ to enter one \$ character.

Example: to enter a FACETYPE of #TE\$ST123, use the parameter FACETYPE-TE\$\$ST123.

Copy Manager adds a # sign to the beginning of the facetype value. To use two # signs for the facetype, the ## must be used. For example, to use the facetype ##TEST123, the facetype parameter must be FACETYPE-##TEST123. In this example, BPKDC decodes the ## to one # sign, and Copy Manager prefixes the facetype value with the second # sign.

2. After this command is completed, enter: `ZFDRS COPYMGR DISPLAY`

This display now shows the location of the HISREC control record.

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

Task 10. Initialize HISREC

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

```
ZFDRS HISREC INIT PASSWORD-pppppppp
```

2. After this command is completed, enter: ZFDRS HISREC DISPLAY

The reply states that the record is empty.

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

Task 11. Define the COPYMGR Default Siteoptions

To define a TPF installation's COPYMGR siteoptions, use the siteoption parameter on the COPYMGR entry. Examples of siteoption entries:

1. To set STOPONERR:

```
ZFDRS COPYMGR SITEOPTIONS STOPONERR
```

The reply states that the copymgr control record was changed.

2. To set SPLITRW:

```
ZFDRS COPYMGR SITEOPTIONS SPLITRW
```

The reply states that the copymgr control record was changed.

3. To set VERIFYTVOFF:

```
ZFDRS COPYMGR SITEOPTIONS VERIFYTVOFF
```

The reply states that the copymgr control record was changed.

4. To set SERRC:

```
ZFDRS COPYMGR SITEOPTIONS SERRC
```

The reply states that the copymgr control record was changed.

5. To set ECHOCHANGE:

```
ZFDRS COPYMGR SITEOPTIONS ECHOCHANGE
```

The reply states that the copymgr control record was changed.

6. To set USEREXITON:

```
ZFDRS COPYMGR SITEOPTIONS USEREXITON
```

The reply states that the copymgr control record was changed.

7. To set COMBINE:

```
ZFDRS COPYMGR SITEOPTIONS COMBINE
```

The reply states that the copymgr control record was changed.

8. To set REFMESSAGE:

```
ZFDRS COPYMGR SITEOPTIONS REFMESSAGE
```

The reply states that the copymgr control record was changed.

9. To set HISTORY:

```
ZFDRS COPYMGR SITEOPTIONS HISTORY
```

The reply states that the copymgr control record was changed.

10. To set FDRSCCE1FA:

(Set this site option only if FDRSC uses the CE1FAx for the FARF address. Contact Hitachi Vantara TPF Engineering to discuss the setting of this site option.)

```
ZFDRS COPYMGR SITEOPTIONS FDRSCCE1FA
```

The reply states that the copymgr control record was changed.

11. To set DIAGNOSTIC:

```
ZFDRS COPYMGR SITEOPTIONS DIAGNOSTIC
```

The reply states that the copymgr control record was changed.

12. To set MAXCOUNT (the maxcount value is hexadecimal):

```
ZFDRS COPYMGR SITEOPTIONS MAXCOUNT-20
```

The entry set the maxcount to decimal 32, hexadecimal 20. The reply states that the copymgr control record was changed.

13. To set up the Monitor to always be started (30-second intervals):

```
ZFDRS COPYMGR SITEOPTIONS MONITOR MONTIME-30
```

The reply states that the copymgr control record was changed.

14. To set ShadowImage VERIFY TARGET volume is offline check for all ShadowImage establish and resume:

```
ZFDRS COPYMGR SITEOPTIONS VERIFYTVOFFLIN
```

The reply states that the copymgr control record was changed.

15. To set the date format:

```
ZFDRS COPYMGR SITEOPTIONS DATE-YYMMDD
```

The reply states that the copymgr control record was changed.

See the *Copy Manager for TPF Operations Guide* for a description of this Copy Manager command and for detailed descriptions of these siteoptions.

Task 12 (Optional) Define the COPYMGR SET definition defaults to be used by SETREC

To define a TPF installation's COPYMGR SET definition defaults to be used by SETREC, use the siteoption parameter on the COPYMGR entry. Examples of siteoption entries:

1. To set SETS_EXCTG:

```
ZFDRS COPYMGR SITEOPTIONS SETS_EXCTG
```

The reply states that the copymgr control record was changed.

2. To set SETS_OFFLINE:

```
ZFDRS COPYMGR SITEOPTIONS SETS_OFFLINE
```

The reply states that the copymgr control record was changed.

3. To set SETS_ALLOFFLIN:

```
ZFDRS COPYMGR SITEOPTIONS SETS_ALLOFFLINE
```

The reply states that the copymgr control record was changed.

4. To set SETS_SOURCE:

```
ZFDRS COPYMGR SITEOPTIONS SETS_SOURCE
```

The reply states that the copymgr control record was changed.

See the *Copy Manager for TPF Operations Guide* for a description of this Copy Manager command and for detailed descriptions of these siteoptions.

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. Define the EXCREC Location to COPYMGR](#)
- [Task 4. Initialize OFFREC](#)
- [Task 5. Initialize RCUREC](#)
- [Task 6. Initialize EXCREC](#)
- [Task 7. Define the Required Sets to SETREC](#)
- [Task 8. Initialize Each Set's PAIRREC](#)
- [Task 9 \(optional\). Define Database Areas to DBREC](#)
- [Task 10 \(optional\). Initialize Each Database Area's DBAREC](#)

Important: The required tasks 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 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 now shows 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 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 now shows 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. Define the EXCREC Location to COPYMGR

To define the EXCTG configuration definition record's location, you need to know the EXCREC 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 EXCREC FACE type, ordinal, and record ID, enter the following on the TPF system:

```
ZFDRS COPYMGR EXCREC 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 now shows the location of the EXCREC configuration definition record.

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

Task 4. 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 states that the record is empty.

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

Task 5. 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 states that the record is empty.

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

Task 6. Initialize EXCREC

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

```
ZFDRS EXCREC INIT PASSWORD-pppppppp
```

2. After this command is completed, enter:

```
ZFDRS EXCREC DISPLAY
```

The reply states that the record is empty.

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

Task 7. 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 ZFDRS entry.

1. To define a ShadowImage synchronous set in the set index control record, enter the following on the TPF system:

```
ZFDRS SETREC ADD SETNAME-nnnnnnnnnnnnnnnnn SI FACETYPE-ffffff  
ORDINAL-nn RECID-rrrr (copy characteristic options)
```

2. To define a ShadowImage asynchronous set in the set index control record, enter the following on the TPF system:

```
ZFDRS SETREC ADD SETNAME-nnnnnnnnnnnnnnnnn SI FACETYPE-ffffff  
ORDINAL-nn RECID-rrrr ASYNC (copy characteristic options)
```

3. To define a TrueCopy synchronous set in the set index control record, enter the following on the TPF system:

```
ZFDRS SETREC ADD SETNAME-nnnnnnnnnnnnnnnnn TC FACETYPE-ffffff  
ORDINAL-nn RECID-rrrr (copy characteristic options)
```

4. To define a Universal Replicator set in the set index control record, enter the following on the TPF system:

```
ZFDRS SETREC ADD SETNAME-nnnnnnnnnnnnnnnnn HUR FACETYPE-ffffff  
ORDINAL-nn RECID-rrrr HUR EXCTG (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.

5. After each add command is completed, enter the following three displays:

```
ZFDRS SETREC DISPLAY
```

```
ZFDRS SETREC DISPLAY CONFIG
```

```
ZFDRS SETREC DISPLAY DEFAULTS
```

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

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

Task 8. 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 the Copy Manager **ZFDRS CONFIG INIT** command.



Note: When installing Copy Manager for the first time, Hitachi Vantara TPF Engineering recommends that when initializing a configuration file to strongly consider using the BP option.

```
ZFDRS CONfig INIT SETNAME-nnnnnnnnnnnnnnnnnn PASSWORD-pppppppppp BP
```

2. After the command completes, enter:

[illegible]

The reply states that the set is empty.

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

Task 9 (optional). Define Database Areas to DBREC

During the installation planning process, each database area to be used by Copy Manager was defined. Each database area's first volume configuration definition record location was defined. Use the information recorded during the installation planning when defining each database area to the database area index control record.

The following is an example of database area definition. The required copy characteristic parameter is in the ZFDRS entry.

1. To define a Database Area in the database area index control record, enter the following on the TPF system:

```
ZFDRS DBREC ADD DBNAME-nnnnnnnnnnnnnnnnn 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 each add Database area is defined, enter:

ZFDRS DBREC DISPLAY

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

Task 10 (optional). Initialize Each Database Area's DBAREArc

Every database area's DBAREArc must be initialized. Do the following for each database area:

1. Initialize the database areas's volume configuration definition record(s) using the Copy Manager **ZFDRS DBAREA CONFIG INIT** command.

```
ZFDRS DBAREA CONfig INIT DBNNAME-nnnnnnnnnnnnnnnnnn PASSWORD-  
pppppppp
```

2. After the command completes, enter:

```
ZFDRS DBAREA CONfig DISPLAY DBNAME-nnnnnnnnnnnnnnnnn
```

The reply states 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 later from a version prior to B9 requires a migration step. This section describes that step.



Note: Consult with Hitachi Vantara 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 later 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 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 – YHDZ. This segment is sent as source code. The TPF installation must define the COPYMGR fixed-file record location in YHDZ.

The technique and tasks used to migrate 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 (and later).

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

Migration to Copy Manager from Versions prior to BD

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



Note: Consult with Hitachi Vantara TPF Engineering to construct a Copy Manager migration script.

Version BD of Copy Manager introduces a change in the format of the SETREC control record.

The new format of the SETREC control record adds space to each set's description. This extra space is to allow for future program development to allow the archiving of more information about a set's use.

This migration requires the TPF site to record the current set's characteristics. The TPF site will then need to initialize the SETREC and enter each set's characteristics again.

The following is the sequence of migration steps:

- Record the SETREC record's configuration information for each set:
ZFDRS SETREC DIS L
ZFDRS SETREC DIS R
- Initialize the SETREC configuration record:
ZFDRS SETREC INIT PASSWORD-xxxxxxxxxx
ZFDRS SETREC DIS L
ZFDRS SETREC DIS R
- Enter each set's configuration information:
ZFDRS SETREC ADD L (etc)
ZFDRS SETREC ADD R (etc)
ZFDRS SETREC DIS L
ZFDRS SETREC DIS R

Migration to Copy Manager from Versions prior to BE

The installation of Copy Manager version BE requires two migration steps. This section describes those steps.



Note: Consult with Hitachi Vantara TPF Engineering to construct a Copy Manager migration script.

Version BE of Copy Manager introduces a date format option.

When installing version BE, the date format must be defined in the siteoptions. The following Copy Manager entry will define the date format as month, day, year (MMDDYY).

```
ZFDRS COPYMGR SITEOPTION DATE-MMDDYY
```

Version BE of Copy Manager introduces the application ID to the RCUREC definitions. Prior to version BE, the APLID value was always set to 1.

If the TPF site has RCUREC definitions, the application ID must be defined as 1 for each target control unit's RCUREC definition. The following Copy Manager entry will define the a target control unit's APLID to 1. In the following example, the target control unit's serial number is 654321.

```
ZFDRS RCUREC CHA TARSER-654321 APLID-1
```

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

Migration to Copy Manager from Versions prior to BF

The installation of Copy Manager version BF requires three migration steps and one optional migration step. This section describes those steps.



Note: Consult with Hitachi Vantara TPF Engineering to construct a Copy Manager migration and fallback script.

Version BF of Copy Manager replaces the YHDZ program's user exit on/off indicator with a site option "user exit on/off" indicator.

Version BF of Copy Manager introduced several new siteoptions. Two siteoptions must be set as part of the migration. These siteoptions do not have to be altered as part of a fallback script.

When installing version BF, the site option USEREXITON must be set to match the TPF installations prior setting that was coded into program YHDZ. Note that YHDZ does not need to be changed as part of the migration. The user exit on/off indicator in YHDZ will now be ignored. Hitachi Vantara recommends that the TPF installation remove the use of the YHDZ user exit on/off indicator at their convenience.

```
ZFDRS COPYMGR SITEOPTION USEREXITON  
or  
ZFDRS COPYMGR SITEOPTION NOUSEREXITON
```

When installing version BF, the site option MAXCOUNT must be set to the site's required maximum count value that is used by the ZFDRS CONFIG ADD/CHA/REM/DIS or the ZFDRS DBA CONFIG ADD/CHA/REM/DIS entries. The recommended value is to set the max count to x'20' (decimal 32). The entry format requires the MAXCOUNT field to be entered in hexadecimal format.

```
ZFDRS COPYMGR SITEOPTION MAXCOUNT-20
```

Version BF of Copy Manager introduced a more strict use of the Copy Types. No longer are sets categorized by Remote or Local. The sets are now defined as SI or TC or HUR. As part of the migration, each set must be defined as an SI or TC or HUR set using ZFDRS SETREC CHA entry. A special case is required for HUR sets' during a fallback. Prior to falling back, the HUR set must be defined as TC (Old Remote) and after the fallback, the set must be defined as HUR, again.

Migration examples:

```
ZFDRS SETREC CHA SET_SI SI BP  
ZFDRS SETREC CHA SET_HUR HUR BP  
ZFDRS SETREC CHA SET_TC TC BP  
ZFDRS SETREC DIS  
ZFDRS SETREC DIS CONFIG
```

Fallback sequence for an HUR set definition:

Prior to code fallback:

```
ZFDRS SETREC CHA SET_HUR_SET TC BP
ZFDRS SETREC DIS TC
```

After code fallback:

```
ZFDRS SETREC R CHA SET_HUR HUR EXCTG BP
ZFDRS SETREC DIS R
```

Version BF of Copy Manager introduced the use of the HUR PATH ID for HUR PAIRS. No migration change is expected. However, Hitachi Vantara TPF Engineering advises each customer to verify that the HUR PATH ID for each HUR pair is zero. Use the ZFDRS CON DIS SET-xxx entry to verify the HUR PATH ID. The HUR PATH ID is under the "PID" column.

Verification example (HUR PATH ID):

```
ZFDRS CON DIS SET-R700_7000_HUR1
```

```
zfdrs con di set-r700_7000_hur1
CSMP0097I 11.47.29 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0052I 11.47.29 BEGIN REMOTE HUR DISPLAY - SET-R700_7000_HUR1
PAIR COUNT - 100
DEV SOURCE SER# SV SL SSSID TARGET SER# TV TL TSSID CG SJN TJN MI PID SRCE
7000 000000054118 00 00 0400 000000065423 00 40 0640 00 33 33 03 00 N _
7100 000000054118 00 01 0404 000000065423 00 41 0641 00 32 32 03 00 N _
7200 000000054118 00 02 0408 000000065423 01 40 0640 00 33 33 03 00 N
7300 000000054118 00 03 040C 000000065423 01 41 0641 00 32 32 03 00 N _
7001 000000054118 01 00 0400 000000065423 02 40 0640 00 33 33 03 00 N
```

Version BF of Copy Manager introduced the use of an HUR PATH ID default for an HUR set. No migration change is expected. However, Hitachi Vantara TPF Engineering advises each customer to verify that the default HUR PATH ID for each HUR set is zero. Use the ZFDRS SETREC DIS DEFAULTS entry to verify the default HUR PATH ID. The default HUR PATH ID is under the "HPID" column.

Verification example (default HUR PATH ID):

```
ZFDRS SETREC DIS DEFAULTS
```

```
zfdrs con di set-r700_7000_hur1
zfdrs setrec dis defaults
CSMP0097I 11.47.29 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0325I 11.47.29
BEGINNING OF SET DEFAULTS RECORD DISPLAY
COPY      DEFAULTS
SETNAME   TYPE    HOP OL SRC CG SJ TJ MI HPID
R700_7000_HUR1 HUR-EXC  N  N  Y 00 31 31 03 00
R700_7000_SI1 SI-SYNC  N  N  Y 06 00 00 00 00
R700_7000_SI2 SI-SYNC  N  N  N 07 00 00 00 00
37 ITEMS
END OF SET RECORD DISPLAY+
```


(Advisory) Version BF of Copy Manager removes the use of the PAIRREC 6 byte COMMENT field. The 6-byte field remains in the PAIREC record, and the data in that field has not been changed. However, the PAIRREC COMMENT is no longer displayed in any of the Copy Manager PAIREC displays. Hitachi Vantara TPF Engineering now considers this 6-byte area "RESERVED FOR FUTURE USE".

(Optional for RCUREC use). Version BF updates the coding logic for defining the remote control unit command devices. This change was required to support more than one remote control hop. This change will cause the installation to change remote control command device definition scripts. This change will impact the ZFDRS RCUREC CDVDIS, ZFDRS RCUREC CDVDEF and ZFDRS RCUREC CDVREM entries. The RxSER option now acts on the control unit defined by that serial number. If no RxSER parameter is entered, the command acts on the target serial number. Consult Hitachi Vantara TPF Engineering about this program logic update.

Examples:

1. Entry to display the target control unit command device

Old format:

```
ZFDRS RCUREC CDVDIS TARSER-xxxxxx ROSER-yyyyyyy
```

New format:

```
ZFDRS RCUREC CDVDIS TARSER-xxxxxx
```

2. Entry to display the local control unit command device

Old format:

```
ZFDRS RCUREC CDVDIS TARSER-xxxxxx
```

New format:

```
ZFDRS RCUREC CDVDIS TARSER-xxxxxx ROSER-yyyyyyy
```

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

Migration to Copy Manager from versions prior to BH

The installation of Copy Manager version BH requires replacement of the EXCREC definitions, one prior code load migration step, three post code load migration steps, and two possible Copy Manager script changes. This section describes those steps.



Note: Consult with Hitachi Vantara TPF Engineering to construct a Copy Manager migration and fallback script.

NEW EXCREC FORMAT:

Version BH of Copy Manager introduced a new format for the EXCREC control record. The change was required to support 64 journal groups in an EXCTG. If EXCREC is not being used, then this migration step can be skipped.

VERSION BH requires the EXCREC definition to be rebuilt. The recommended method is to change the EXCREC location to a new location (ordinal). Record the current EXCREC location. Use the following recommended procedure to migrate the EXCREC to version BH format:

1. Stop any EXCTG status displays in automation.
2. Use the following suggested entries before loading version BH Copy Manager code:

```
ZFDRS COPYMGR DIS
```

(record the ordinal location of the EXCREC)

```
ZFDRS EXCREC DIS
```

3. Load new version BH Copy Manager code.
4. Use the following suggested entries:

```
ZFDRS COPYMGR DIS
```

(record the ordinal location of the EXCREC)

```
ZFDRS COPYMGR EXCREC CHA ORD-xx
```

```
ZFDRS EXCREC DIS
```

```
ZFDRS EXCREC INIT PASSWORD-pppppppp
```

```
ZFDRS EXCREC ADD ...
```

```
ZFDRS EXCREC DIS
```

```
ZFDRS EXCTG ST SET-sssssss
```

5. Start any EXCTG status displays in automation.

If VERSION BH requires a fallback, use the following procedure to fall back to the pre version BH EXCREC format:

1. Stop any EXCTG status displays in automation.
2. Fall back version BH Copy Manager Code.

3. Use the following suggested entries:

```
ZFDRS COPYMGR DIS
ZFDRS COPYMGR EXCREC CHA ORD-zz
```

(Use the pre version BH EXCREC ordinal number recorded during the migration)

```
ZFDRS EXCREC DIS
ZFDRS EXCTG ST SET-sssssss
```

4. Start any EXCTG status displays in automation.

NEW USER EXIT:

Version BH of Copy Manager introduces a new user exit before and after the establish request. Prior to loading version BH, verify the code in YHDF is compliant with the new YHDF user exit code.

NEW CONTROL RECORD REFREC:

Version BH of Copy Manager adds a new control record, REFREC. This is the reference message database control record. After version BH code is loaded, the record must be defined to COPYMGR and initialized.

```
ZFDRS COPYMGR REFREC ADD ...
and
ZFDRS REFREC INIT PASSWORD-pppppp
```

NEW SITEOPTIONS:

Version BH of Copy Manager introduced two new siteoptions. After the version BH code is loaded, the two siteoptions should be initialized to NO as part of the migration. These siteoptions do not have to be altered as part of a fallback script.

```
ZFDRS COPYMGR SITEOPTION NOREFMESSAGE
and
ZFDRS COPYMGR SITEOPTION NOSETS_ALLOFFLIN
```

Version BH of Copy Manager introduces a new set option. After the version BH code is loaded, each set should be verified that the new set option ALLOFFLINE is set to off (N).

```
ZFDRS SETREC DIS DEFAULTS
```

VERSION BH POSSIBLE SCRIPT CHANGES:

- Version BH removed the use of the Local and Remote parameters for the ZFDRS entry. Any scripts or automation that use the Local or Remote parameters with the ZFDRS entry should be changed to no longer use the Local or Remote parameters.

- VERSION BH changed the parameter JNLGID for the ZFDRS EXCREC entry to require all 6 characters of JNLGID to be used with the ZFDRS EXCREC entry. Prior versions of Copy Manager only required the first three characters (JNL). Any scripts or automation using the ZFDRS EXCREC entry with the JNL parameters should be modified to use all 6 characters of the JNLGID parameter.
- VERSION BH changed the detailed pair status display. The status code now has the word "code" in the display. Example: (4) is now (code 4). Any scripts or automation that queries the detailed pair status display should be reviewed to see if a change is needed to the script or automation.
- VERSION BH changed the ZFDRS PATH REMOVE reply message. The message was corrected from the use of "FROM FROM" to a single "FROM". Any scripts or automation that query the detailed pair status display should be reviewed to see if a change is needed to the script or automation.

Migration to Copy Manager from versions prior to BI

The installation of Copy Manager version BI requires adding 36 new ECB programs to the TPF allocator. The installation also requires three post-code-load migration steps, and one possible Copy Manager script change. This section describes those steps.



Note: Consult with Hitachi Vantara TPF Engineering to construct a Copy Manager migration and fallback script.

Additional ECB programs:

Version BI of Copy Manager requires additional ECB programs to be allocated. The new programs are YHG0-YHG9, YHGA-YHGZ. The programs are allocated the same as the existing YHDx programs used today, that is, allocate the YHGx programs as (KEY0,RESTRICT). YHGW uses AMODE=64. The remaining YHGx programs are 31-bit.

NEW CONTROL RECORD HISREC:

Version BI of Copy Manager adds a new control record, HISREC. This is the history recording database control record. After version BI code is loaded, the record must be defined to COPYMGR and initialized.

```
ZFDRS COPYMGR HISREC ADD ...  
and  
ZFDRS HISREC INIT PASSWORD-pppppp
```

The HISREC add (and init) does not need to be removed as part of a fallback script.

NEW SITEOPTIONS:

Version BI of Copy Manager introduced two new siteoptions. After the version BI code is loaded, one siteoptions (HISTORY) should be initialized to NO as part of the migration.

```
ZFDRS COPYMGR SITEOPTION NOHISTORY
```

The siteoption FDRSCCE1FA should be set to NO if the site is not currently using the FDRSC macro/function in production. If the site is using FDRSC and using CE1Fax for the FARF address, the FDRSCCE1FA site option should be set to ON. If the site is using FDRSC and using CE1FMx for the FARF address, the FDRSCCE1FA site option should be set to OFF.

```
ZFDRS COPYMGR SITEOPTION NOFDRSCCE1FA
```

If FDRSC is being used at the TPF site in production, contact Hitachi Vantara TPF Engineering to discuss the correct setting for FDRSCCE1FA.

These site options do not need to be altered as part of a fallback script.

VERSION BI POSSIBLE SCRIPT CHANGES:

Version BI change the response of CREATEPAIR to show the number of pairs created in the set. If the HISTORY site option is set to ON, CREATEPAIR has an additional line in its response stating that a history item was recorded. Any scripts or automation that analyze the CREATEPAIR response should be studied to see if the new response will cause any script or automation changes.

Migration to Copy Manager from versions prior to BI_2

The installation of Copy Manager version BI_2 requires one optional pre-code-load migration step and two required post-code-load migration steps. This section describes those three steps.



Note: Consult with Hitachi Vantara TPF Engineering to construct a Copy Manager migration and fallback script.

Optional – rebuild FDRSC C functions

If the FDRSC C function or CPP function is being used, the C or CPP FDRSC function needs to be rebuilt. The updated cfdrc.asm c function is shipped with the Copy Manager version BI_2 code. The updated cfdrcd.asm c function is shipped with the Copy Manager version BI_2 code.

Required : NEW SITEOPTIONS:

Version BI_2 of Copy Manager introduced one new siteoption. After the version BI_2 code is loaded, one siteoption (DIAGNOSTIC) should be initialized to NO as part of the migration.

```
ZFDRS COPYMGR SITEOPTION NODISGNOSTIC
```

This site option does not need to be altered as part of a fallback script.

Required : NEW SET CHARACTERISTIC OPTION (SETREC):

Version BI_2 of Copy Manager introduced one new SET characteristic. Version BI_2 introduced the ability to disable the use of a set or enable the use of a set. After the version BI_2 code is loaded, ensure that all sets are enabled. This is verified with the SETREC DISPLAY entry. Each set is marked ENABLED or DISABLED on the right side of each set item displayed.

```
ZFDRS SETREC DISPLAY
```

To change a set to enable, use the following entry :

```
ZFDRS SETREC SET-xxxxxx ENABLE BP
```

This new site options and new set characteristic does not need to be altered as part of a fallback script.

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 for TPF Operations

Preparing for operational use of Copy Manager 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 these 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 Vantara recommends that you work with the Hitachi Vantara account team and the Hitachi Vantara TPF Engineering staff.

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

Planning: Work with your Hitachi Vantara representative to plan the ShadowImage, TrueCopy, and/or Universal Replicator processing. The number of database copies and the usage of the copies 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 or HUR documentation for the storage system.
 - The TPF information required to identify the TrueCopy or HUR M-VOLs and R-VOLs is similar to the TPF information required for the ShadowImage pairs. However, for TrueCopy or HUR, 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 Universal Replicator operations, the source and target journal group numbers are required.
 - For TrueCopy it is not required that the M-VOL be online to TPF. The M-VOL can 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 also provides some unity for operations between the ShadowImage configuration and the TrueCopy configuration.
- **Perform TrueCopy or Universal Replicator configuration:**
 - The path (control unit port use) must be defined in the control units prior to using TrueCopy or HUR. The defining of the TrueCopy and HUR paths can be done using the storage system software (Storage navigator or the SVP) as described in the TrueCopy or Universal Replicator documentation for the storage system or by using the TPF Copy Manager ZFDRS PATH commands.
 - TPF Copy Manager does not have a way to define consistency group IDs, journals, journal numbers and EXCTG groups. These activities must be done using the storage systems software (Storage Navigator or SVP) 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 Storage Navigator (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. In addition to the volume location, the PAIRREC may contain each copy pair's path use for TrueCopy and HUR sets. The PAIRREC 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 ZFDRS OFFREC in the *Copy Manager for TPF Operations Guide*.

Below is a list of the tasks required 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 Copy Pair Definition to a Set's PAIRREC](#)
- [Task 4. \(Optional\) Define Each Volume's Port use for a TrueCopy or HUR Set](#)
- [Task 5. \(Optional\) Add the Remote Copy pair's Port Definition to a Set's PAIRREC](#)

Task 1. Define the Set's Copy Characteristics

1. If the copy characteristics for the set were 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:

SI/NOSI

TC/NOTC

HUR/NOHUR

EXCTG/NOEXCTG (default NOEXCTG) : Valid only for HUR sets

ASYNCR/NOASYNCR (default NOASYNCR) : Valid on for ShadowImage sets

OFFLINE/NOOFFLINE (default NOOFFLINE)

HOPCONTROLUNIT/NOHOPCONTROLUNIT (default NOHOPCONTROLUNIT)

ENABLE/DISABLE (default ENABLE)

Hitachi Vantara recommends that the Hitachi Vantara TPF Engineering staff be consulted before setting a copy characteristic.

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

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

4. After the entry completes, enter the following three display requests:

```
ZFDRS SETREC DISPLAY
```

```
ZFDRS SETREC DISPLAY CONFIG
```

```
ZFDRS SETREC DISPLAY DEFAULTS
```

5. To define a copy characteristic for a Universal Replicator set, use the following Copy Manager command. The example below defines the set to a Universal Replicator that will use EXCTG.

```
ZFDRS SETREC CHANGE SETNAME-nnnnnnnnnnnnnnnnn HUR EXCTG BP
```

6. After the entry completes, enter the following three display requests::

```
ZFDRS SETREC DISPLAY
```

```
ZFDRS SETREC DISPLAY CONFIG
```

```
ZFDRS SETREC DISPLAY DEFAULTS
```

Task 2. Define Each Volume Pair for a Set

For each pair in a set, the location for each pair must be obtain before a ShadowImage or TrueCopy pair can be defined. The following information is required to define a pairs 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 and HUR 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 ShadowImage asynchronous.
- **Source Journal Group number:** Source control unit Journal group number for Universal Replicator pairs.
- **Target Journal Group number:** Target control unit Journal group number for Universal Replicator pairs.
- **Mirror Number:** The mirror number to be used by Universal Replicator pairs
- **Source volume is copied, or the source volume is not copied.**

Task 3. Add the Copy Pair Definition to a Set's PAIRREC

There are two methods to define a copy pair ins a set's PAIRREC. Below describes the method that updates the PAIRREC directly. The alternative method is to use database areas to create copy pair definitions in PAIRREC indirectly. See [Copy Operations with Database Areas](#) for a description of this method.

Use the Copy Manager **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 CON ADD SET-SISET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001 TV-
OC TL-00 TSS-8001
```

- ShadowImage async (using ATTIME split) example:

```
ZFDRS CON ADD SET-SISET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001 TV-
OC TL-00 TSS-8001 CG-5
```

- TrueCopy Sync example:

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

- Universal Replicator example:

```
ZFDRS CON ADD SET-TCSET1 D-1006 SSE-33516 SV-06 SL-00 SSS-4001
TSE-44627 TV-06 TL-00 TSS-1001 TJ-30 SJ-31 HPID-0
```



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 more 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 example in [Figure 3-1](#).

Serial Number 33516	LCU 0 SSID 0088	LCU 1 SSID 0099	LCU 2 SSID 00AA	LCU 3 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 [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

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 the configuration information for the example in [Figure 3-2](#). 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	Test	1000	00	1040	00
		1001	01	1041	01
		1002	02	1042	02
		1003	03	1043	03
		1004	04	1044	04
Test System 2		1005	05	1045	05
	Test	1020	06	1060	06
		1021	07	1061	07
		1022	08	1062	08
		1023	09	1063	09
		1024	0A	1064	0A
		1025	0B	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 database. Either copy can be T-VOL for TrueCopy from the gray volumes in [Figure 3-1](#). ShadowImage can be performed from light-blue to gray or from gray to light-blue.

Figure 3-2 Example of TrueCopy or Universal Replicator Configuration: RCU with Two Copies of Database

Table 3-2 Configuration Information for TPF TrueCopy/Universal Replicator Example

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

For HUR, the configuration will also need source and remote journal IDs. The journal IDs will be supplied to the TPF site by the local Hitachi Vantara support team.

Task 4. (Optional) Define Each Volume's Port use for a TrueCopy or HUR Set

This task is only valid for TrueCopy or HUR sets. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering staff be consulted prior to performing this task.

For each pair in a set, the local and remote control unit port ids must be obtained before a TrueCopy or HUR path can be defined.

TrueCopy and HUR define their path use differently.

TrueCopy defines its paths by assigning (pairing) the port id's in a local and remote control unit to an SSID/Serial Number pair. A local control unit's SSID is defined as being copied to a remote control unit's SSID and the port use between the two SSIDs are assigned (paired).

HUR defines its paths by assigning (pairing) port id's only between a local and remote control unit (between a source and target serial numbers). In addition, HUR requires an HUR path id to be assigned to these control unit (port id) pairs. A local control unit with a specified HUR path id is defined as being copied to a specified remote control unit and the port id use between the two control units (serial numbers) are assigned (paired).

The following information is required to define a paths in a TrueCopy configuration:

- **Port Id's for each Source SSID:** Up to 8 source control unit port id's for each source serial number/SSID combination. The order of the ports is important to the optimal use of the paths. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering be consulted when identifying the port id numbers and the port id PAIRREC slot.
- **Port Ids for each Target SSID:** Up to 8 target control unit port ids for each target serial number/SSID combination. The order of the ports is important to the optimal use of the paths. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering be consulted when identifying the port id numbers and the port id PAIRREC slot.
- **Device address of source volume:** Symbolic device address (SDA) of all the SDAs that access the TPF system in the Source SSID. If the TPF volumes in the source SSID have no gaps in the SDAs, one best practice is to identify the first volume in the SSID and determine the count of the remaining TPF volumes in the source SSID.

The following information is required to define a paths in an HUR configuration:



Note: See the SAID tables in [Appendix A](#) to determine the port IDs to be used when defining HUR or TrueCopy ports for Copy Manager. Hitachi Vantara recommends that Hitachi Vantara engineering be consulted prior to using the SAID tables.

- **Port Ids for each Source Serial Number (local control unit):** Up to 8 source control unit port ids for each source serial number. The order of the ports is important to the optimal use of the paths. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering be consulted when identifying the port id numbers and the port id PAIRREC slot. See the SAID tables in [Appendix A](#) for the control unit adapter ID (SAID) values.
- **Port Ids for each Target Serial Number (remote control unit):** Up to 8 target control unit port ids for each target serial number. The order of the ports is important to the optimal use of the paths. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering be consulted when identifying the port id numbers and the port id PAIRREC slot. See [Appendix A](#) for the control unit adapter ID (SAID) values.
- **HUR path id:** The HUR path id to be used within each paired source control unit, target control unit path grouping. If the configuration allows, all source/target control units can use the same path id. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering be consulted when identifying the HUR path id number. See [Appendix A](#) for the control unit adapter ID (SAID) values.
- **Device address of source volume:** Symbolic device address (SDA) of all the SDA's that access the TPF system in the Source SSID. If the TPF volumes in the source SSID have no gaps in the SDA's, one best practice is to identify the first volume in the SSID and determine the count of the remaining TPF volumes in the source SSID.

Task 5. (Optional) Add the Remote Copy pair's Port Definition to a Set's PAIRREC

This task is only valid for TrueCopy or HUR sets. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering staff be consulted prior to performing this task.

There are two methods to define a copy pair ins a set's PAIRREC. Below describes the method that updates the PAIRREC directly. The alternative method is to use database areas to create copy pair definitions in PAIRREC using ZFDRS CREATEPAIR. See [Copy Operations with Database Areas](#) for a description of this method.

It is generally easiest to first add the copy pairs (task 2,3) to a set's copy pair configuration definition record(s), then use the **ZFDRS CONfig CHA** entry to add the port id's to each copy pair.

Use the Copy Manager **ZFDRS CONfig CHA BP** command. For each volume pair in a set, use a **ZFDRS CONfig CHA ... BP** command to add that a path to a set's copy pair. When using the config change request, always use the **BP** option to reduce the risk of an I/O error. See the *Copy Manager for TPF Operations Guide* for the format of this command.

See [Appendix A](#) for the control unit adapter ID (SAID) values.

- TrueCopy example:

```
ZFDRS CON CHA SET-TCSET1 D-1006 S1-3 T1-13 S2-3 T2-14 S3-4 T3-13  
S4-4 T4-14 BP
```

- Universal Replicator example:

```
ZFDRS CON CHA SET-TCSET1 D-1006 S1-3 T1-13 S2-3 T2-14 S3-4 T3-13  
S4-4 T4-14 HURP-0 BP
```



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 more information about this option.

[Figure 3-3](#) shows an example of a local control unit configured for TPF TrueCopy or HUR operations. [Table 3-3](#) shows the identification of port id's to be used for the local control unit for a TrueCopy example in [Figure 3-3](#). [Table 3-4](#) shows the identification of port id's to be used for the local control unit for an HUR example in [Figure 3-3](#).

Serial Number 33516	LCU 0 SSID 0088	LCU 1 SSID 0099	LCU 2 SSID 00AA	LCU 3 SSID 00BB
Addressable to TPF	1000	1040	1080	10C0
	1001	1041	1081	10C1
	1002	1042	1082	10C2
	1003	1043	1083	10C3
	1004	1044	1084	10C4
	1005	1045	1085	10C5

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 [Copy Operations When Using TPF Offline Volumes](#).

There are four LCUs. Each LCU has one storage system IDs (SSIDs).

Figure 3-3 Example of a Remote Copy's Local Control Unit Configuration

Table 3-3 Port ID Information for TrueCopy's Local Control Unit Example

SSID access SDA's	S-VOL Serial No.	S-VOL SSID	S Port 1	S Port 2	S Port 3	S Port 4	S Port 5	S Port 6	S Port 7	S Port 8
1000	33516	0088	3	4						
1040	33516	0089	3	4						
1080	33516	00AA	6	7						
10C0	33516	00BB	6	7						
Next local pcu	Next source serial number	Next source ssid	Next port id 1	Next port id 2						
Etc ...	Etc ...									

Table 3-4 Port ID Information for HUR's Local Control Unit Example

Source Serial number access SDA's	S-VOL Serial No.	HUR path id	S Port 1	S Port 2	S Port 3	S Port 4	S Port 5	S Port 6	S Port 7	S Port 8
1000	33516	0	3	4						
Next local pcu	Next source serial number	0	Next port id 1	Next port id 2						
Etc ...	Etc ...									

[Figure 3-4](#) shows an example of a remote control unit configured for TPF TrueCopy or HUR operations. [Table 3-5](#) shows the identification of port id's to be used for the remote control unit for a TrueCopy example in [Figure 3-4](#). [Table 3-6](#) shows the identification of port id's to be used for the remote control unit for an HUR example in [Figure 3-4](#).

Serial Number 65423	LCU 0	LCU 1	LCU 2	LCU 3
	SSID 0188	SSID 0199	SSID 01AA	SSID 01BB
Addressable to TPF	2000	2040	2080	20C0
	2001	2041	2081	20C1
	2002	2042	2082	20C2
	2003	2043	2083	20C3
	2004	2044	2084	20C4
	2005	2045	2085	20C5

The remote control unit SDA's are not relevant to the TrueCopy or HUR configuration build.

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

Figure 3-4 Example of a Remote Copy's Remote Control Unit Configuration

Table 3-5 Port ID Information for TrueCopy's Remote Control Unit Example

SSID access SDA's	S-VOL Serial No.	S-VOL SSID	S Port 1	S Port 2	S Port 3	S Port 4	S Port 5	S Port 6	S Port 7	S Port 8
Not used	65423	0188	13	14						
Not used	65423	0189	13	14						
Not used	65423	01AA	16	17						
Not used	65423	01BB	16	17						
Next remote pcu	Next target serial number	Next target ssid	Next port id 1	Next port id 2						
Etc ...	Etc ...									

Table 3-6 Port ID Information for HUR's Remote Control Unit Example

Source Serial number access SDA's	S-VOL Serial No.	HUR path id	S Port 1	S Port 2	S Port 3	S Port 4	S Port 5	S Port 6	S Port 7	S Port 8
Not used	65423	0	13	14						
Next Remote pcu	Next target serial number	Next target path id	Next port id 1	Next port id 2						
Etc ...	Etc ...									

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 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 – MONITOR or 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 Copy Pairs – REVERSE TPF Command](#)
- ❑ [Deleting ShadowImage, TrueCopy, and Universal Replicator Copy Pairs with TPF – DELETE TPF Command](#)
- ❑ [Querying the status of a Journal in an HUR set - JNLgroup TPF Command](#)
- ❑ [Performing At-Time Split with Asynchronous ShadowImage – PRESET TPF Command](#)
- ❑ [Clipping TPF Volume VSNs – CLIP TPF Command](#)
- ❑ [Verifying ShadowImage Targets are Offline before Copying](#)

- ❑ [Defining, Deleting or Querying the status of the paths \(port ids\) in a TrueCopy or HUR set - PATHs TPF Command](#)
- ❑ [Copy Operations When Using TPF Offline Volumes](#)
- ❑ [Copy Operations When Using RCUs](#)
- ❑ [Read/Write Access to Target Volumes after Splitting Pairs](#)
- ❑ [Reversing Universal Replicator Direction](#)
- ❑ [HUR Copy Operations with Extended Consistency Groups](#)
- ❑ [Defining, Removing, or Status Query of an Extended Consistency Group to an HUR Set – EXCTG TPF Command](#)
- ❑ [Copy Operations with Database Areas](#)

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 split, 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.

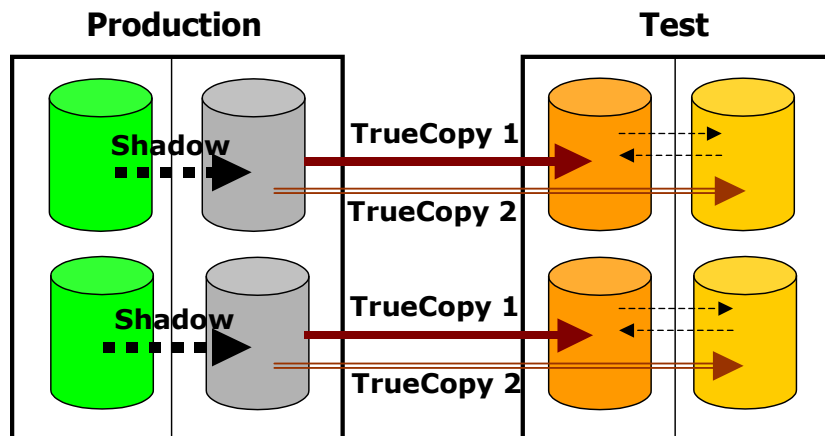


Figure 4-1 Example of ShadowImage and TrueCopy Configuration

Example Usage of 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 4-2](#), 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. This process can also be used for TPF datacenter migrations. Once the pairs are duplex, the pairs can be left duplex for DR needs, or can be split to build a test system. Once the pairs are split, the test system volumes can be used. Without deleting the Universal Replicator pairs, additional copies of the test system or DR database can be created using ShadowImage.

Universal replicator also supports extended consistency groups (EXCTG). EXCTG allows a TPF site to maintain a consistent database across multiple control units. Contact the local Hitachi Vantara support team or Hitachi Vantara TPF Engineering for more details about the use of EXCTG in TPF.

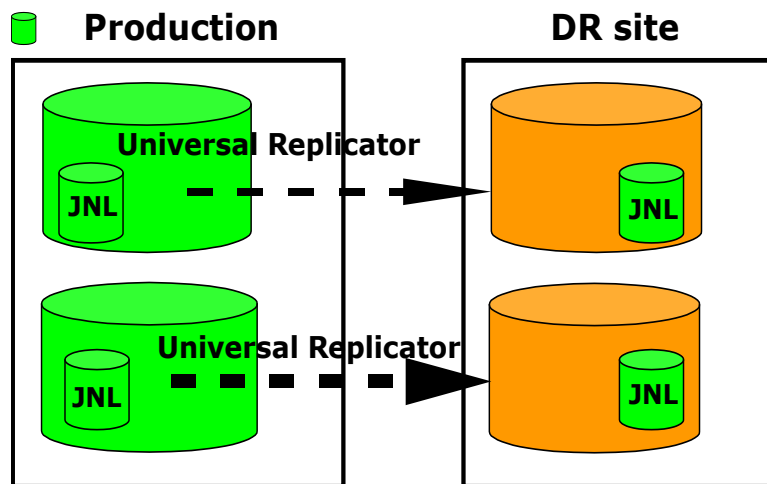


Figure 4-2 Example of Universal Replicator Configuration

TPF Operator Commands

ShadowImage, TrueCopy, and Universal Replicator can 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. 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 is 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 the 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 can be shortened as shown in the sample displays.

Storage Navigator (or the SVP) can always be used in a TPF complex to control copy functions or remote copy path definition functions. The TPF entries are an additional option for these controls. Even when a TPF entry has been used to initiate a copy or path function, Storage Navigator (or the SVP) can be used to filter display, split, resume, or delete copy pairs, or define paths and monitor path status. Likewise, when a copy or path function is initiated from Storage Navigator (or the SVP), TPF entries can be used to control subsequent copy or path 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.
Split Pair to reverse HUR direction	ZFDRS SPLit HURREV	Splits (suspends) an HUR pair from the target site and changes the HUR direction	HUR only. Pairs must be split from the HUR source site. The BP option must be used on this split entry.
Normal Resync Pair	ZFDRS RESume	Resynchronizes a pair.	The specified volume must be split.

Copy Operation	TPF Entry	Function	Restrictions
Normal Resync Pair to reverse HUR direction	ZFDRS RESume HURREV	Resynchronizes (suspends) an HUR pair from the target site and changes the HUR direction	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.
Request Pair status	ZFDRS SStatus	Queries the control units within a set to get the status of each pair in the set.	None.
Add HUR Journals to an extended consistency group	ZFDRS EXCTG	Builds an extended consistency group for an HUR set. Monitors the status of the EXCTG.	The operation is restricted to HUR sets. The HUR pairs must be defined (not simplex).
Request HUR Journal Status	ZFDRS JNLgroup	Queries the control units within an HUR set to get the status of each Journal.	The operation is restricted to HUR sets.
At-Time Split	ZFDRS Preset	Defines, deletes, and queries preset point-in-time split.	The specified volume (async only) must be duplex. Contact Hitachi Vantara TPF support for current pair restrictions.
Clip	ZFDRS CLIP	Clip a TPF Volume VSN.	Must be ShadowImage. The pairs must be split and split with the read/write option. Contact Hitachi Vantara TPF support for current pair restrictions.
Verify TV offline	ZFDRS VERIFYTVOFF	Verify a target volume is offline prior to issuing an establish or resume	Must be ShadowImage. Contact Hitachi Vantara TPF support for current pair restrictions.
PATH	ZFDRS PATH	Define paths for TrueCopy or HUR operations. Monitor the status of TrueCopy or HUR paths.	The operation is restricted to TrueCopy or HUR sets.
Read TPF record on a ShadowImage target volume	FDRSC macro and FDRSC C function supplied to the TPF customer	TPF customer can write a TPF program to use the FDRSC macro or FDRSC C function to read TPF records on a ShadowImage target volume.	Must be ShadowImage. The pairs must be split and split with the read/write option. Contact Hitachi Vantara TPF support for current pair restrictions.

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 40 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. The CONFIG command also is used to set up, alter, delete, and display a TrueCopy or HUR set's path definitions for each copy pair defined. Once the copy pair and path 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 Vantara representative.

[Figure 4-3](#) shows a sample display of a ShadowImage CONFIG table. [Figure 4-4](#) shows a sample display of a ShadowImage CONFIG ADD command.

```

zfdrs con dis set-r700_7000_si1
CSMP0097I 11.47.29 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0052I 11.47.29 BEGIN LOCAL COPY DISPLAY - SET-R700_7000_SI1
PAIR COUNT - 100
DEV  SOURCE SER#  SV  SL  SSSID TARGET SER#  TV  TL  TSSID CG  SJN TJN MI  PID SRCE
7000 000000054118 00 00 0400 000000054118 20 1C 0470 06 00 00 00 00 N _
7100 000000054118 00 01 0404 000000054118 20 1D 0474 06 00 00 00 00 N _
7200 000000054118 00 02 0408 000000054118 20 1E 0478 06 00 00 00 00 N _
7300 000000054118 00 03 040C 000000054118 20 1F 047C 06 00 00 00 00 N _
7001 000000054118 01 00 0400 000000054118 21 1C 0470 06 00 00 00 00 N _
7101 000000054118 01 01 0404 000000054118 21 1D 0474 06 00 00 00 00 N _
7201 000000054118 01 02 0408 000000054118 21 1E 0478 06 00 00 00 00 N _
7301 000000054118 01 03 040C 000000054118 21 1F 047C 06 00 00 00 00 N _
7002 000000054118 02 00 0400 000000054118 22 1C 0470 06 00 00 00 00 N _
7102 000000054118 02 01 0404 000000054118 22 1D 0474 06 00 00 00 00 N _
7202 000000054118 02 02 0408 000000054118 22 1E 0478 06 00 00 00 00 N _
7302 000000054118 02 03 040C 000000054118 22 1F 047C 06 00 00 00 00 N _
7003 000000054118 03 00 0400 000000054118 23 1C 0470 06 00 00 00 00 N _
7103 000000054118 03 01 0404 000000054118 23 1D 0474 06 00 00 00 00 N _
7203 000000054118 03 02 0408 000000054118 23 1E 0478 06 00 00 00 00 N _
7303 000000054118 03 03 040C 000000054118 23 1F 047C 06 00 00 00 00 N _
MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+

```

Figure 4-3 Sample ZFDRS CONFIG DISPLAY Command Entry and Response

```

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

```

Figure 4-4 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 Vantara representative to create the pairs on the TPF system Storage Navigator (or the SVP).

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

ZFDRS 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 STATUS SET-*setname* SIMPLEX ZFDRS STATUS SET-*setname* INVALID

Ask your Hitachi Vantara representative to look at the devices that are in the SIMPLEX 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: Copy Manager STATUS command requests the individual status of each copy pair in set's copy pair configuration definition record. For example, if a set contains 100 copy pairs, Copy Manager will issue 100 status commands to the control unit(s).

The ZFDRS STATUS entry requests the status of each copy pair in the reverse order of the copy pairs in the set's copy pair configuration record. This allows for the ZFDRS STATUS entry to be made prior to another ZFDRS copy action entry completion. For example, a ZFDRS EST entry is made, prior to the completion of the ZFDRS EST entry, several ZFDRS STATUS entries can be made to monitor the progress of the ZFDRS EST entry.



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 Storage Navigator (or the 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 – MONITOR or 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 4-5](#) shows a sample of a ShadowImage STATUS entry and response.

```
zfdrrs st set-r700_3400_si1
CSMP0097I 16.30.28 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 16.30.28 START OF LOCAL COPY STATUS - SET-R700_3400_SI1
A RESYNC      WAS ISSUED ON 12/03/13 AT 13:15:53
PERCENT LEFT TO COPY IS    1  _
SIMPLEX      -    0
DUPLEX       -    0
PENDING DUPLEX -    0
SPLIT BY OPER - 100
SPLIT BY EXC -    0
PENDING SPLIT -    0
VIRTUAL SPLIT -    0
RE-SYNC      -    0
REV RE-SYNC  -    0
INVALID      -    0
END OF LOCAL COPY STATUS+
```

Figure 4-5 Sample ZFDRS STATUS Command Entry and Response

[Figure 4-6](#) 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 decrements from 99% when the initial copy is established to 0% when the DUPLEX state is reached. Compare this to the differential value shown on Storage Navigator (and the SVP), which is an incrementing value designating copy completion.

```

zfdrs st set-r700_7000_si2 penddup
CSMP0097I 11.47.29 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 11.47.29 START OF LOCAL COPY STATUS - SET-R700_7000_SI2
AN ESTABLISH WAS ISSUED ON 06/05/15 AT 07:02:29
VOLUMES THAT ARE STATUS OF PEND DUPL (1)
DEV  SOURCE SER#  SV SL SSSID TARGET SER#  TV TL TSSID CG SJN TJN MI PID % DIFF  _
7307 000000054118 07 03 040C 000000054118 07 1F 047C 07 00 00 00 00 97%
7207 000000054118 07 02 0408 000000054118 07 1E 0478 07 00 00 00 00 96%
7107 000000054118 07 01 0404 000000054118 07 1D 0474 07 00 00 00 00 97%
7007 000000054118 07 00 0400 000000054118 07 1C 0470 07 00 00 00 00 96%
7306 000000054118 06 03 040C 000000054118 06 1F 047C 07 00 00 00 00 97%
7206 000000054118 06 02 0408 000000054118 06 1E 0478 07 00 00 00 00 97%
7106 000000054118 06 01 0404 000000054118 06 1D 0474 07 00 00 00 00 96%
7006 000000054118 06 00 0400 000000054118 06 1C 0470 07 00 00 00 00 97%
7305 000000054118 05 03 040C 000000054118 05 1F 047C 07 00 00 00 00 97%
7205 000000054118 05 02 0408 000000054118 05 1E 0478 07 00 00 00 00 97%
7105 000000054118 05 01 0404 000000054118 05 1D 0474 07 00 00 00 00 96%
7005 000000054118 05 00 0400 000000054118 05 1C 0470 07 00 00 00 00 96%
7304 000000054118 04 03 040C 000000054118 04 1F 047C 07 00 00 00 00 97%
7204 000000054118 04 02 0408 000000054118 04 1E 0478 07 00 00 00 00 97%
7104 000000054118 04 01 0404 000000054118 04 1D 0474 07 00 00 00 00 96%
7004 000000054118 04 00 0400 000000054118 04 1C 0470 07 00 00 00 00 97%
7303 000000054118 03 03 040C 000000054118 03 1F 047C 07 00 00 00 00 97%
7203 000000054118 03 02 0408 000000054118 03 1E 0478 07 00 00 00 00 96%
MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE++

```

Figure 4-6 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 Vantara recommends that a TPF site does **not** use the "FAST" pace option in their TPF production environment.

The "FAST" option is not allowed for HUR sets.

The ESTABLISH command can be issued only to volumes in the SIMPLEX state. The ESTABLISH command establishes the ShadowImage, HUR or TrueCopy pairs and starts 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 are in the PENDING DUPLEX state. Once initial copy is complete, the pairs are in the DUPLEX state, and the control unit continues to copy updates made to the source/main volume to the target/remote volume.

[Figure 4-7](#) shows a sample display of a ShadowImage ESTABLISH entry and response.

```
zfdrs est set-testset

CSMP0097I 18.26.56 CPU-A SS-BSS  SSU-SSU0 IS-01
FDRS0035I 18.26.56 LOCAL COPY ESTABLISH REQUEST ISSUED
0 ERRORS ENCOUNTERED+
CSMP0097I 18.26.56 CPU-A SS-BSS  SSU-SSU0 IS-01
FDRS0042I 18.26.56 START OF LOCAL COPY STATUS - SET-TESTSET
AN ESTABLISH WAS ISSUED ON 03/16/11 AT 13:20:56

PERCENT LEFT TO COPY IS 00 _
SIMPLEX          -    0
DUPLEX           -    0
PENDING DUPLEX   -   24
SPLIT BY OPER    -    0
SPLIT BY EXC     -    0
PENDING SPLIT    -    0
VIRTUAL SPLIT    -    0
RE-SYNC          -    0
REV RE-SYNC      -    0
INVALID          -    0
END OF LOCAL COPY STATUS+
+
```

Figure 4-7 Sample ZFDRS ESTABLISH Command Entry and Response

Monitoring a Copy Session with TPF – MONITOR or STATUS TPF Command

To monitor the status of the ShadowImage, TrueCopy, or Universal Replicator initial copy process, use the **MONITOR** TPF command. The monitor displays status at predefined intervals. The status display shows the percent of data remaining to be copied. You can also monitor the copies manually using the **STATUS** TPF command with the **PENDDUPLEX** parameter.

In addition to showing the set's pair status, the status command also displays the last copy action requested for that set. If preset is being used for ShadowImage, the last (relevant) preset split time/date is also displayed.

[Figure 4-8](#) shows the monitor start of a ShadowImage session (initial copy operation) in progress. [Figure 4-9](#) shows the status of a ShadowImage session (initial copy operation) in progress.



Note: A Monitor USER EXIT is provided to allow for TPF site unique programming when the monitor determines that every pair in the set is duplex. Split by operator or mixed status. If the USER EXIT is used, the USER EXIT is entered for every monitor increment.

```
zfdrs mon start set-r700_3400_si2 tim-13
CSMP0097I 16.30.28 CPU-A SS-BSS SSU-SSU0 IS-01
COPYMANAGER MONITOR STARTED, TIME INTERVAL IS 13 SECONDS
FDRS0042I 16.30.28 START OF LOCAL COPY STATUS - SET-R700_3400_SI2
AN ESTABLISH WAS ISSUED ON 12/11/13 AT 12:25:28
PERCENT LEFT TO COPY IS 83 _
SIMPLEX          - 0
DUPLEX           - 0
PENDING DUPLEX   - 100
SPLIT BY OPER    - 0
SPLIT BY EXC     - 0
PENDING SPLIT    - 0
VIRTUAL SPLIT    - 0
RE-SYNC          - 0
REV RE-SYNC      - 0
INVALID          - 0
END OF LOCAL COPY STATUS+
```

Figure 4-8 Sample Monitor Display using ZFDRS MONITOR Command

```

zfdrs st set-r700_7000_si2 penddup
CSMP0097I 11.47.29 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 11.47.29 START OF LOCAL COPY STATUS - SET-R700_7000_SI2
AN ESTABLISH WAS ISSUED ON 06/05/15 AT 07:02:29
VOLUMES THAT ARE STATUS OF PEND DUPL (1)
DEV  SOURCE SER#  SV SL SSSID TARGET SER#  TV TL TSSID CG SJN TJN MI PID % DIFF  _
7307 000000054118 07 03 040C 000000054118 07 1F 047C 07 00 00 00 00 97%
7207 000000054118 07 02 0408 000000054118 07 1E 0478 07 00 00 00 00 96%
7107 000000054118 07 01 0404 000000054118 07 1D 0474 07 00 00 00 00 97%
7007 000000054118 07 00 0400 000000054118 07 1C 0470 07 00 00 00 00 96%
7306 000000054118 06 03 040C 000000054118 06 1F 047C 07 00 00 00 00 97%
7206 000000054118 06 02 0408 000000054118 06 1E 0478 07 00 00 00 00 97%
7106 000000054118 06 01 0404 000000054118 06 1D 0474 07 00 00 00 00 96%
7006 000000054118 06 00 0400 000000054118 06 1C 0470 07 00 00 00 00 97%
7305 000000054118 05 03 040C 000000054118 05 1F 047C 07 00 00 00 00 97%
7205 000000054118 05 02 0408 000000054118 05 1E 0478 07 00 00 00 00 97%
7105 000000054118 05 01 0404 000000054118 05 1D 0474 07 00 00 00 00 96%
7005 000000054118 05 00 0400 000000054118 05 1C 0470 07 00 00 00 00 96%
7304 000000054118 04 03 040C 000000054118 04 1F 047C 07 00 00 00 00 97%
7204 000000054118 04 02 0408 000000054118 04 1E 0478 07 00 00 00 00 97%
7104 000000054118 04 01 0404 000000054118 04 1D 0474 07 00 00 00 00 96%
7004 000000054118 04 00 0400 000000054118 04 1C 0470 07 00 00 00 00 97%
7303 000000054118 03 03 040C 000000054118 03 1F 047C 07 00 00 00 00 97%
7203 000000054118 03 02 0408 000000054118 03 1E 0478 07 00 00 00 00 96%
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 are momentarily in the QUICK SPLIT or the PENDING SPLIT state while the control unit copies any pending writes, then they are 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 split set-prod_set1

CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0064I 18.26.56 LOCAL COPY PAIR SPLIT STARTED+
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0032I 18.26.56 LOCAL COPY SPLIT REQUEST ISSUED
0 ERRORS ENCOUNTERED+
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 18.26.56 START OF LOCAL COPY STATUS - PROD_SET1
A SPLIT          WAS ISSUED ON 03/16/11 AT 13:20:56
NO PRESET TIMESTAMP RECORDED
PERCENT LEFT TO COPY IS  0 _
SIMPLEX          -    0
DUPLEX           -    0
PENDING DUPLEX  -    0
SPLIT BY OPER   -    0
SPLIT BY EXC    -    0
PENDING SPLIT   -   24
VIRTUAL 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 be used only in TPF test environments. Hitachi Vantara recommends that a TPF site does **not** use the "FAST" pace option in their TPF production environment.
 - The use of the "HIGH" (speed) pace option should only be used in TPF test environments. Hitachi Vantara recommends that a TPF site does **not** use the "HIGH" pace option in their TPF production environment.
 - The use of the HIGH pace option requires a password. Contact Hitachi Vantara TPF Engineering for assistance in removing the password requirement.
 - The "FAST" and "HIGH" options are not allowed for HUR sets.
-



Note: The HUR-EXCTG sets must have the EXCTG defined (ZFDRS EXCTG DEFINE) prior to issuing the resume.

The RESUME command can be issued only to SPLIT pairs. When a RESUME command is issued to a copy pair, the control unit copies 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 are in the DUPLEX state.

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

```

zfdrs res set-prod_set1
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0036I 18.26.56 LOCAL COPY RESYNC/RESUME REQUEST ISSUED
0 ERRORS ENCOUNTERED+
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 18.26.56 START OF LOCAL COPY STATUS - PROD_SET1
A RESYNC WAS ISSUED ON 03/16/11 AT 13:20:56
NO PRESET TIMESTAMP RECORDED
PERCENT LEFT TO COPY IS 1 _
SIMPLEX - 0
DUPLEX - 2
PENDING DUPLEX - 0
SPLIT BY OPER - 0
SPLIT BY EXC - 0
PENDING SPLIT - 0
VIRTUAL SPLIT - 0
RE-SYNC - 22
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 Copy Pairs – REVERSE TPF Command

[Figure 4-12](#) 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 be used only in TPF test environments. Hitachi Vantara recommends that a TPF site does **not** use the "FAST" pace option in their TPF production environment.
- The use of the "HIGH" (speed) pace option should only be used in TPF test environments. Hitachi Vantara recommends that a TPF site does **not** use the "HIGH" pace option in their TPF production environment.
- The use of the HIGH pace option requires a password. Contact Hitachi Vantara TPF Engineering for assistance in removing the password requirement.
- The "FAST" and "HIGH" options are not allowed for HUR sets.
- For reverse resuming of HUR pairs, see [Reversing Universal Replicator Direction](#).
- For the use of Quick Restore, see [Restoring a TPF System using a ShadowImage Target](#).

The REVERSE command can be issued only to SPLIT pairs. When a REVERSE command is issued to a copy pair, the control unit copies 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 are in the DUPLEX state.

[Figure 4-12](#) shows a sample display of an ShadowImage REVERSE entry and response.


```

zfdrs rev set-test_set1
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0036I 18.26.56 LOCAL COPY REVERSE REQUEST ISSUED
0 ERRORS ENCOUNTERED+
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 18.26.56 START OF LOCAL COPY STATUS - TEST_SET1
A RESYNC WAS ISSUED ON 03/16/11 AT 13:20:56
NO PRESET TIMESTAMP RECORDED
PERCENT LEFT TO COPY IS 4 _
SIMPLEX - 0
DUPLEX - 7
PENDING DUPLEX - 0
SPLIT BY OPER - 0
SPLIT BY EXC - 0
PENDING SPLIT - 0
VIRTUAL SPLIT - 0
RE-SYNC - 0
REV RE-SYNC - 17
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 allows 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 are in the SIMPLEX state.

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

```
zfdrs del set-prod_set1
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0039I 18.26.56 LOCAL COPY DELETE REQUEST ISSUED
0 ERRORS ENCOUNTERED+
CSMP0097I 18.26.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0042I 18.26.56 START OF LOCAL COPY STATUS - PROD_SET1
A DELETE WAS ISSUED ON 03/16/11 AT 13:20:56
NO PRESET TIMESTAMP RECORDED
PERCENT LEFT TO COPY IS 0 _
SIMPLEX - 24
DUPLEX - 0
PENDING DUPLEX - 0
SPLIT BY OPER - 0
SPLIT BY EXC - 0
PENDING SPLIT - 0
VIRTUAL 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

Querying the status of a Journal in an HUR set - JNLgroup TPF Command

The **JNLgroup** TPF command queries the status of the journals in an HUR set. The command is issued to the entire HUR set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*.

The JNLgroup command can be issued only to an HUR set.

[Figure 4-14](#) shows a sample display of an HUR JNLgroup entry and response.

zfdrs jnlgrp st set-2x2									
CSMP0097I 13.18.32 CPU-A SS-BSS SSU-SSU0 IS-01									
FDRS0200I 13.18.32									
BEGIN JOURNAL STATUS DISPLAY FOR SET 2X2									
JNL	DATA	META	JNL	MIR	JNL	PAIRED	PAIR	TRANS	JNL
GRP	USE	USE	CAPACITY	ID	STATUS	SER NUMBER	JNLG	RATE	LOC
30	0PCT	0PCT	388GB	00	NOTUSED		00	0KB	NONE
				01	NOTUSED		00	0KB	NONE
				02	NOTUSED		00	0KB	NONE
				03	NORMAL	000000053103	30	0KB	SUPER
30	0PCT	0PCT	388GB	00	NOTUSED		00	0KB	NONE
				01	NOTUSED		00	0KB	NONE
				02	NOTUSED		00	0KB	NONE
				03	NORMAL	000000065423	30	0KB	SUPER
END OF JOURNAL STATUS DISPLAY+									

Figure 4-14 Sample ZFDRS JNLgroup Command Entry and Response

Performing At-Time Split with Asynchronous ShadowImage – 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*.



Note: If the AT TIME split is used in TPF's 1052 state, Copy Manager will issue a warning and request the BP option. When the AT TIME split is issued in 1052 state, caution should be used when anticipating or determining the Time Out value calculations. The Time Out value calculations are calculated using the STCK instruction reply.



Note: The AT TIME split can be used in combination with TrueCopy or HUR to allow for consistent remote copies. Contact Hitachi Vantara TPF Engineering for details of the use of ShadowImage At-Time split with HUR or TrueCopy.

[Figure 4-15](#) shows a sample of the entry to set up a point-in-time split for asynchronous ShadowImage.

```
zfdrs preset def set-async1 time-081500 date-031412
CSMP0097I 07.32.31 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0081I 07.32.31 PRESET COMMAND ISSUED
0 ERRORS ENCOUNTERED+
CSMP0097I 07.32.31 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0094I 07.32.31 BEGIN LOCAL COPY PRESET STATUS DISPLAY ASYNC1
SERIAL#      CGID  TIME      DATE      STATUS
000000054118  77    08.15.00  03/14/12  WAITING
END OF PRESET STATUS DISPLAY
```

Figure 4-15 Sample ZFDRS PRESET Command Entry and Response

When a preset time is entered, the ShadowImage pairs will be split based on one of two conditions:

- Condition 1: When a timestamp in an I/O is later than the preset time.
- Condition 2: When the timeout condition is met.

The timeout is the number of minutes that the control unit will wait before forcing a split. The timeout "clock" starts when the preset request is entered. If the timeout value is 30 minutes and the Copy Manager preset command was entered at 10:20, the timeout condition will be met at 10:50 (30 minutes after the preset entry was made).

Copy Manager sets a default timeout value of 10 minutes past the preset time. The default timeout value is the preset requested time minus the TPF TOD plus 10 minutes. For example, if the preset time is 11:30 and the TPF TOD is 11:10, the default timeout value will be calculated as 11:30 minus 11:10 plus 10 for a 30-minute timeout value. For this example, the pairs will be split either at 11:40 (timeout value) or when the first I/O arrives with a timestamp after 11:30.

The TPF site has an option to set a timeout value using the preset TOV or ADDTOV parameter.

Clipping TPF Volume VSNs – CLIP TPF Command

The **CLIP** TPF command clips the TPF VSN on a Local ShadowImage target volume. The command can be issued to all, some, or one device in a chosen set. The parameters and restrictions for this command are detailed in the *Copy Manager for TPF Operations Guide*.

The clipping of a set's TPF volumes is commonly used during test system builds. The Copy Manager CLIP command allows a TPF installation to easily modify the test system volumes to the test system's desired VSN.

The CLIP command updates the VSN record (cylinder 0, track 0, record 3) by altering the first two characters of the TPF volumes VSN in the VSN record. The VTOC is not updated. The CLIP bypass (BP) parameter bypasses the oldvsn verification.



Note: The CLIP DISPLAYVSN or the UTILITY DISPLAYVSN provide the customer tools to verify or display the ShadowImage target's VSNs.

[Figure 4-16](#) shows a sample display of a ShadowImage CLIP entry and response.

```
zfdrs clip set-r800_a000_sil vsn-tx oldvsn-hi
CSMP0097I 12.51.56 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0369E 12.51.56 REQUEST FOR VSN CLIP ISSUED+
CSMP0097I 12.51.57 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0171I 12.51.57 VSN CLIP IS COMPLETE
0 ERRORS ENCOUNTERED
0 SOURCE VOLUMES OFFLINE, TARGET VOLUMES NOT CLIPPED
100 TARGET VOLUMES WERE CLIPPED FROM HI TO TX +
```

Figure 4-16 Sample ZFDRS CLIP Command Entry and Response

Verifying ShadowImage Targets are Offline before Copying

The **VERIFYTVOFFLINE** Copy Manager TPF command will verify if the ShadowImage targets are offline. This entry should be made prior to doing and ShadowImage establish or a ShadowImage resume. There is a site option to allow the TPF site to automatically verify that the ShadowImage targets are offline prior to any ShadowImage establish or resume.

The VERIFYTVOFFLIN command has a detailed display option. This option allows the operator to list the volumes that are online or offline. The online detail option will list the first path group id for each online volume. Using the online option with a single device, the VERIFY TVOFFLIN command will display all of the path group ids for the pairs target volume.

The command can be issued to all, some, or one device in a chosen set. The parameters and restrictions for this command are detailed in the *Copy Manager for TPF Operations Guide*.



Note: Consider the use of the reference message database to add customized descriptions of a path group id CP serial number. The Copy Manager “ZFDRS REFREC” entry supports the building and maintenance of the site’s reference message database. See the *Copy Manager for TPF Operations Guide* for the format of the ZFDRS REFREC entry. Contact Hitachi Vantara TPF Engineering for additional assistance.



Note: The VERIFYTVOFFLINE entry has a SINGLE option that allows the TPF installation to display the online/offline status of any single volume in a control unit without the need of using a setname. The SINGLE entry uses a manual definition of the volume’s control unit location instead of the set’s definition of the volume’s control unit location. The VERIFYTVOFFLIN SINGLE may provide an installation with a tool to display the PGID on a remote control unit. See the *Copy Manager for TPF Operations Guide* for the format of the ZFDRS VERIFY SINGLE entry. Contact Hitachi Vantara TPF Engineering for additional assistance.



Note: The VERIFYTVOFFLINE entry has a SOURCE/TARGET option. This allows the operator to verify that the target (default) volumes are offline or that the source volumes are offline. The SOURCE parameter may be useful when using ShadowImage’s REVERSE RESUME (RESYNC).



Note: PATH GROUP ID (PGID): Some of the VERIFYTVOFFLINE entries will display the Path Group ID (PGID) assigned to a volume. Those PGID displays separate the PGID data fields with a description of each data field. The figure below shows the PGID separated by PGID data field and describes the PGID status byte settings. For additional information about the PATH GROUP ID, contact Hitachi Vantara TPF Engineering.

[Figure 4-17](#) shows sample displays of a ShadowImage VERIFY entry and response.

```

zfdrs ver set-r800_b000_si2
CSMP0097I 18.10.13 CPU-A SS-BSS SSU-SSU0 IS-01 _
FDRS0177I 18.10.13
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2
TARGET VOLUME OFFLINE SUMMARY COUNTS
  NUMBER OF ONLINE TARGET VOLS      :    26
  NUMBER OF OFFLINE TARGET VOLS     :    74
  NUMBER OF VOLS WITH MOUNT ERRORS  :     0
  NUMBER OF VOLS WITH I/O ERRORS    :     0
END OF VERIFY TARGET VOLUME OFFLINE DISPLAY+

```

VERIFY DISPLAYS WITHOUT USING REFREC (Reference Message Control Record)

```

zfdrs ver set-r800_b000_si2 online
CSMP0097I 18.13.41 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0177I 18.13.41
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2

```

SOURCE VOLUME	TARGET STATUS	NUMBER PATHS	FIRST PATH GROUP ID	ST	PATHID	SERNUM	CPUTYPE	TIMESTAMP	TARGET LOCATION	LCU	VOL
B000	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	00		
B001	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	01		
B002	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	02		
B003	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	03		
B004	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	04		
B005	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	05		
B006	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	06		
B007	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	07		
B008	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	08		
B009	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	09		
B00A	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	0A		
B00B	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	0B		
B00C	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	0C		
B00D	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	0D		
B00E	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	0E		
B00F	ONLINE	7	84	8800	092DE7	2965	D3F4E95B	24	0F		

MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+

```

zfdrs ver set-r800_b000_si2 offline
CSMP0097I 18.14.19 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0177I 18.14.19
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2

```

SOURCE VOLUME	TARGET STATUS	NUMBER PATHS	FIRST PATH GROUP ID	ST	PATHID	SERNUM	CPUTYPE	TIMESTAMP	TARGET LOCATION	LCU	VOL
B041	OFFLINE	0							24	21	
B042	OFFLINE	0							24	22	
B043	OFFLINE	0							24	23	
B044	OFFLINE	0							24	24	
B045	OFFLINE	0							24	25	
B046	OFFLINE	0							24	26	
B047	OFFLINE	0							24	27	
B048	OFFLINE	0							24	28	
B049	OFFLINE	0							24	29	
B04A	OFFLINE	0							24	2A	
B04B	OFFLINE	0							24	2B	
B04C	OFFLINE	0							24	2C	
B04D	OFFLINE	0							24	2D	
B04E	OFFLINE	0							24	2E	
B04F	OFFLINE	0							24	2F	

B050 OFFLINE 0
 MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+

24 30

```
zfdrs ver set-r800_b000_si2 d-b000
CSMP0097I 18.14.47 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0177I 18.14.47
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2
VOLUME B000 TARGET HAS 7 PATHS ONLINE
TARGET VOLUME LOCATION IS LCU - 24 VOL - 00
PATH GROUP ID DETAILS :
      ST PATHID SERNUM CPUTYPE TIMESTAMP _
PGID1 84 8800 092DE7 2965 D3F4E95B
PGID2 84 8800 092DE7 2965 D3F4E95B
PGID3 84 8800 092DE7 2965 D3F4E95B
PGID4 84 8800 092DE7 2965 D3F4E95B
PGID5 84 8800 092DE7 2965 D3F4E95B
PGID6 84 8800 092DE7 2965 D3F4E95B
PGID7 84 8800 092DE7 2965 D3F4E95B
PGID8 00 0000 000000 0000 00000000

END OF VERIFY TARGET VOLUME OFFLINE DISPLAY+
```

VERIFY DISPLAYS USING REFREC (Reference Message Control Record)

```
zfdrs ver set-r800_b000_si2 online
CSMP0097I 18.17.29 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0177I 18.17.29
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2
(** USE THE VERIFY D- OPTION TO GET THE PGID REFERENCE DETAIL ***)
SOURCE TARGET NUMBER FIRST PATH TARGET
VOLUME STATUS PATHS GROUP ID LOCATION
      ONLINE (ST PATHID SERNUM CPUTYPE TIMESTAMP) LCU VOL
B000 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 00
B001 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 01
B002 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 02
B003 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 03
B004 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 04
B005 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 05
B006 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 06
B007 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 07
B008 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 08
B009 ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 09
B00A ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 0A
B00B ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 0B
B00C ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 0C
B00D ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 0D
B00E ONLINE 7 84 8800 092DE7 2965 D3F4E95B 24 0E

MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+
```

```
zfdrs ver set-r800_b000_si2 offline
CSMP0097I 18.17.59 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0177I 18.17.59
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2
(** USE THE VERIFY D- OPTION TO GET THE PGID REFERENCE DETAIL ***)
SOURCE TARGET NUMBER FIRST PATH TARGET
VOLUME STATUS PATHS GROUP ID LOCATION
      ONLINE (ST PATHID SERNUM CPUTYPE TIMESTAMP) LCU VOL
B041 OFFLINE 0 24 21
B042 OFFLINE 0 24 22
B043 OFFLINE 0 24 23
B044 OFFLINE 0 24 24
B045 OFFLINE 0 24 25
B046 OFFLINE 0 24 26
B047 OFFLINE 0 24 27
B048 OFFLINE 0 24 28
```

B049	OFFLINE	0	24	29
B04A	OFFLINE	0	24	2A
B04B	OFFLINE	0	24	2B
B04C	OFFLINE	0	24	2C
B04D	OFFLINE	0	24	2D
B04E	OFFLINE	0	24	2E
B04F	OFFLINE	0	24	2F

MORE DATA AVAILABLE, ENTER ZPAGE TO CONTINUE+


```

zfdrs ver set-r800_b000_si2 d-b000
CSMP0097I 18.18.24 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0177I 18.18.24
START OF TARGET VOLUME OFFLINE VERIFICATION FOR SET-R800_B000_SI2
VOLUME B000 TARGET HAS 7 PATHS ONLINE
TARGET VOLUME LOCATION IS LCU - 24 VOL - 00
PATH GROUP ID DETAILS :
  ST PATHID SERNUM CPUTYPE TIMESTAMP
PGID1 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID2 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID3 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID4 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID5 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID6 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID7 84 8800 092DE7 2965 D3F4E95B
'PATH GROUP ID IS MVS LPAR 10'
PGID8 00 0000 000000 0000 00000000
NO REFERENCE FOUND FOR THIS PGID
END OF VERIFY TARGET VOLUME OFFLINE DISPLAY+

```


PGID field explanations:

SERNUM is the CPU Serial Number
PATH GROUP ID STATUS BYTE SETTINGS:

BITS 0-1	:	11 - grouped
	:	10 - no grouped
BIT 4	:	0 - single path mode
	:	1 - multi-path mode

Remaining bits are unused.

Figure 4-17 Sample ZFDRS VERIFY Command Entry and Response

Defining, Deleting or Querying the status of the paths (port ids) in a TrueCopy or HUR set - PATHs TPF Command

The **PATHs** TPF command queries the status of the Paths (port ids) in a TrueCopy or HUR set. The command is issued to the entire TrueCopy or HUR set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*.

The PATHs command can be issued only to a TrueCopy or HUR sets.



Note: Each “path define” command may take a long time to complete. Hitachi Vantara TPF Engineering staff recommends that the ZFDRS PATH DEFINE and ZFDRS PATH REMOVE entries be done in 1052 state.



Note: Hitachi Vantara TPF Engineering recommends that paths initially be defined using the control unit’s SVP. Then use the ZFDRS PATH STATUS command to verify the port id numbers. Following this recommendation may significantly reduce the effort when first defining and implementing a TrueCopy or HUR set’s Copy Manager path support.



Note: See the SAID tables in [Appendix A](#) to determine the port IDs to be used when defining HUR or TrueCopy ports for Copy Manager. Hitachi Vantara recommends that Hitachi Vantara engineering be consulted prior to using the SAID tables.

[Figure 4-18](#) shows a sample display of an TrueCopy PATH define, remove and status entry and response. The figure also shows an HUR path and path id status entry response.

TRUECOPY or HUR PATH DELETE ENTRY AND RESPONSE :

```
zfdrs paths del set-r700_7000_tc1
CSMP0097I 09.31.19 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0055E 09.31.19 PATH AND PORT DEFINITION REMOVED FROM THE CONTROL UNIT+
```

TRUECOPY or HUR PATH DEFINE ENTRY AND RESPONSE :

```
zfdrs path def set-r700_7000_tc2
CSMP0097I 09.47.04 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0054E 09.47.04 PATH AND PORT DEFINITION ADDED TO THE CONTROL UNIT+
```

TRUECOPY PATH STATUS ENTRY AND RESPONSE :

```
zfdrs path st set-r800_b000_tc1
CSMP0097I 13.06.45 CPU-A SS-BSS SSU-SSU0 IS-01 _
FDRS0273I 13.06.45
BEGINNING OF THE TRUE COPY PATH STATUS DISPLAY FOR SET: R800_B000_TC1
----- SOURCE -----3----- TARGET -----3PATH
SERIAL NUM LCU SSID PORT SERIAL NUM SCU SSID SSID SSID LCU PORT STATUS
_
```

```

000000010081 30 79C0 40 000000010038 07 0004 0000 0000 0000 E0 67 ACTIVE
50 77 ACTIVE
000000010081 31 79C4 40 000000010038 07 0004 0000 0000 0000 E0 67 ACTIVE
50 77 ACTIVE

000000010081 32 79C8 40 000000010038 07 75E1 0000 0000 0000 E1 67 ACTIVE
50 77 ACTIVE
000000010081 33 79CC 40 000000010038 07 75E1 0000 0000 0000 E1 67 ACTIVE
50 77 ACTIVE

END OF PATH STATUS DISPLAY+

HUR PATH STATUS ENTRY AND RESPONSE :

zfdrs path st set-r700_3400_hurl
CSMP0097I 13.58.39 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0279I 13.58.39
BEGINNING OF THE HUR PATH STATUS DISPLAY FOR SET: R700_3400_HUR1
----- SOURCE -----33----- TARGET -----33 PATH PATH
SERIAL NUM PORT SERIAL NUM PORT SCU ID STATUS

000000054118 03 000000065423 23 00 00 ACTIVE
13 33 ACTIVE
03 33 ACTIVE
13 23 ACTIVE

END OF PATH STATUS DISPLAY+

HUR PATH IF STATUS ENTRY AND RESPONSE :

zfdrs path id set-r700_3400_hurl
CSMP0097I 09.06.20 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0276I 09.06.20
BEGINNING OF THE PATHID BITMAP DISPLAY FOR SET: R700_3400_HUR1
SERIAL NUM - 000000065423 SCUID - 06
PATHID BIT = ON, HUR PATHID IN USE
PATHID BIT = X, HUR PATHID NOT IN USE
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
0 ON X X X X X X X X X X X X X X X X X X X X
20 X X X X X X X X X X X X X X X X X X X X
40 X X X X X X X X X X X X X X X X X X X X
60 X X X X X X X X X X X X X X X X X X X X

80 X X X X X X X X X X X X X X X X X X X X
100 X X X X X X X X X X X X X X X X X X X X
120 X X X X X X X X X X X X X X X X X X X X
140 X X X X X X X X X X X X X X X X X X X X
160 X X X X X X X X X X X X X X X X X X X X

180 X X X X X X X X X X X X X X X X X X X X
200 X X X X X X X X X X X X X X X X X X X X
220 X X X X X X X X X X X X X X X X X X X X
240 X X X X X X X X X X X X X X X X X X X X

END OF PATH STATUS DISPLAY+

```

Figure 4-18 Sample ZFDRS PATH 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.



Note: When using copy operations with OFFLINE volumes, you should use the Copy Manager site option STOPONERR.

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 CCWs 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 the Copy Manager I/O path. Copy Manager sends its 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 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 shows 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.



Tip: Consider using a TPF-mounted general file for the OFFREC control device. When using a remote control unit access command device (RCUREC), the command device can be a better choice for OFFREC control device than a TPF online production volume. *Consult with Hitachi Vantara TPF Engineering when deciding which volume to use as an OFFREC control device.*

The use of a TPF mounted general file as a control device can be enhanced by using the Set option ALLOFFLINE. The ALLOFFLINE will direct all Copy Manager replication I/Os to the OFFREC control device, regardless if a pair's source volume is mounted. When using the set option ALLOFFLINE, the set option OFFLINE must also be set to on. *Consult Hitachi Vantara TPF Engineering if considering the use of the set option ALLOFFLINE.*

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 SETNAME-aaaaaaaaaaaaaaaa OFFLINE
```

- For a TrueCopy or Universal Replicator set:

```
ZFDRS SETREC CHANGE SETNAME-aaaaaaaaaaaaaaaa 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-aaaaaaaaaaaaaaaa 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 RCU

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 Hitachi Vantara Engineering and by using Copy Manager for TPF 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 its target control unit.

The use of RCU copy operations in TPF require that each RCU command device be defined to Copy Manager. The Hitachi Vantara engineers and Hitachi Vantara TPF Engineering 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 SETNAME-nnnnnnnnnnnnnnnnnnnnnnn HOPCONTROLUNIT

- For a TrueCopy or Universal Replicator set:

ZFD RS SETREC CHANGE SETNAME-nnnnnnnnnnnnnnnnnnnnnnnnn 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 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 ROSEr-rrrrr ROV-ww
ROL-mm IOSDA-353F
```

3. To create a command device in control unit, use the ZFDRS RCUREC CDVDEF Copy Manager command. Contact Hitachi Vantara 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 created, the command device should not be changed without consulting Hitachi Vantara TPF Engineering.



Note: When using remote control unit operations without HUR, contact Hitachi Vantara TPF Engineering to discuss the possible need for using the NOREVERSEALLOW or NOHURTAR option for the RCU definitions.



Note: If you are planning to use the IOSDA=0 RCUREC option, Hitachi Vantara TPF Engineering recommend caution in this decision and recommends that Hitachi Vantara TPF Engineering be consulted prior to using RCUREC IOSDA=0 in a production environment. When the RCUREC IOSDA=0 is set, the duration of Status commands and other action command may be longer than using a general file mounted command device.

If you are planning to use the IOSDA=0 RCUREC option, Hitachi Vantara TPF Engineering also recommends to first monitor the service times of the remote control unit command devices while the command devices are mounted as a general files. TPF data collection will report the service times of the Copy and Status commands that are sent to the general file command device. TPF data collection allows the TPF installation to monitor the performance of the remote copy commands.

See the *Copy Manager for TPF Operations Guide* for the use of the IOSDA parameter.

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

Read/Write Access to Target Volumes after Splitting Pairs

This section describes how to use Copy Manager to allow read/write access to target volumes after splitting a pair. This section applies to ShadowImage, TrueCopy, and Universal Replicator pairs.

Copy Manager's default for all splits is to split without read/write access.

To have read/write access to a pairs target volume after a split, use one of the following Copy Manager options:

- For a TPF site, the default for all splits can be change to read/write. Use the Copy Manager siteoptions entry to change a TPF site's default.

```
ZFDRS COPYMGR SITEOPTIONS SPLITRW  
ZFDRS COPYMGR DISPLAY
```

- For a specific set's split, the TPF site's read/write default can be overridden using the splitrw option on the Copy Manager ZFDRS SPLIT command.

```
ZFDRS SPLIT SET-xxxx SPLITRW  
ZFDRS SPLIT SET-xxxx NOSPLITRW
```

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

Reversing Universal Replicator Direction

This section describes how to use Copy Manager to reverse the direction of Universal Replicator pairs. Using HUR reverse allows the TPF site to switch to the remote site without deleting the HUR pairs. This can be useful in a control switch to the remote site.

[Figure 4-19](#) shows an HUR configuration where the HUR direction is from control unit A to control unit B.

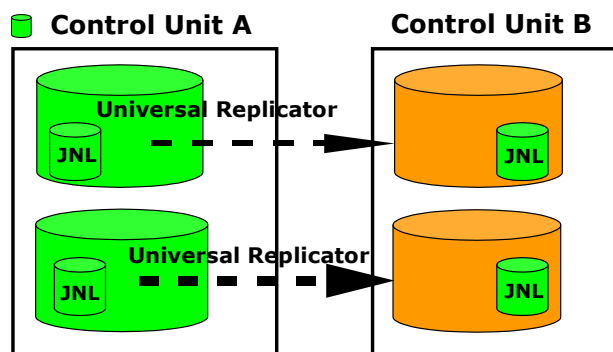


Figure 4-19 Example of Universal Replicator direct A to B

The following steps are required to switch the TPF system to the Control Unit B and to change the HUR direction from B to A.

Initial setup: Two HUR sets must be defined. One set for HUR from A to B and one HUR set from B to A. The HUR set from A to B is a normal set using the TPF systems SDAs for the A control unit. The HUR set from B to A is a normal set using the TPF systems SDAs for the B control unit. One set will be used when TPF is running on control unit A, and one set will be used when TPF is running on control unit B. For this example, the A-to-B set will be named HUR_A_TO_B, and the B-to-A set will be called HUR_B_TO_A.



Note: Ensure that the SITEOPTION SPLITRW is set to ON prior to doing the HUR split in step 1.

1. The first step is to do a normal split of the HUR pairs.

```
ZFDRS SPLIT SET-HUR_A_TO_B
```

2. Verify that the status of the HUR pairs both locally and remote are split.

```
ZFDRS ST SET-HUR_A_TO_B  
ZFDRS ST SET-HUR_A_TO_B HOPTAR
```

3. Take the TPF system running on control unit A down. **Note:** The system must be "system reset" at the HMC.
4. IPL the TPF system on the control unit B's TPF system. **Note:** You must IPL with Clear to clear out the old VFA records.

5. When the TPF system is up on the B control unit, split the HUR pairs with the HUR Reverse option. The BP option must also be used. **Note:** You must now use the B-to-A set.

```
ZFDRS ST SET-HUR_B_TO_A
ZFDRS SPLIT SET-HUR_B_TO_A HURREV BP
```

6. To complete the reverse operation, the HUR pairs must be resumed with the HUR reverse option.

```
ZFDRS RESUME SET-HUR_B_TO_A HURREV
```

7. At this time, the HUR direction is reversed. This can be verified using Storage Navigator.
8. All future HUR Copy Manager entries will now use the B-to-A set name and will NOT use HURREV anymore. Some common entries are:

```
ZFDRS SPLIT SET-HUR_B_TO_A
ZFDRS ST SET-HUR_B_TO_A
ZFDRS ST SET-HUR_B_TO_A HOPTAR
ZFDRS RESUME SET-HUR_B_TO_A
```

Note: If you plan to implement the use of reversing HUR pairs, consult Hitachi Vantara TPF Engineering.

See the *Copy Manager for TPF Operations Guide* for a description of the ZFDRS use of the HURREV option with SPLIT and RESUME.

HUR Copy Operations with Extended Consistency Groups

This section describes how to use Copy Manager when using Universal Replicator and extended consistency groups.

Extended consistency groups (EXCTG) allows an HUR solution to remain consistent across several control units. See the *Universal Replicator User Guide* for details, or contact Hitachi Vantara TPF Engineering for support.

Copy Manager supports HUR EXCTG in TPF.

To use the EXCTG in Universal Replicator copy operations:

1. Define the set as an EXCTG HUR set. Use the following Copy Manager command to change a set's copy characteristics to allow EXCTG HUR operations. For a Universal Replicator set:

```
ZFDRS SETREC CHANGE SETNAME-nnnnnnnnnnnnnnnn HUR EXCTG
```

2. Define the EXCTG configuration in the EXCREC. The EXCREC has several sections that requires detailed information regarding interaction between the journals, control units, and arbitration devices. This information is best obtained by consulting Hitachi Vantara TPF Engineering. Consult Hitachi Vantara TPF Engineering on how best to take the EXCTG configuration information and correctly define the EXCREC.

Example of an EXCREC for a 2x2 HUR configuration:

```
zfdrs excrec dis
CSMP0097I 09.48.08 CPU-A SS-BSS SSU-SSU0 IS-01
FDRS0226I 09.48.08
BEGINNING OF THE EXCTG DEFINITION CONTROL RECORD

SET NAME          FWD EXCTG  MIR      HUR SUBORD   JNLG ARBIT   SCU
REV  NUM  NUM      SERIAL      NUM  CMDV  ID
-----
2X2              R    00    00    000000054118    30  FFFF  06  EXCTG SUPER
                                000000066844    30  EF42  06
2X2              F    00    00    000000065423    30  FFFF  06  EXCTG SUPER
                                000000053103    30  FE40  06
      2 ITEMS
END OF EXCTG DEFINITION CONTROL RECORD DISPLAY+
```

3. Define the HUR journals to an EXCTG configuration. This TPF command will send a command to the supervisor control unit and tell the control unit to define an EXCTG configuration between the journal groups that are described in the EXCREC. This EXCTG TPF entry also has the option to remove the EXCTG from the HUR journal groups or query the EXCTG status of the HUR journal groups.

Note: To define an HUR EXCTG, the HUR pairs must be defined (not Simplex).

```
ZFDRS EXCTG SET-2X2 DEFINE
ZFDRS EXCTG SET-2X2 REMOVE
ZFDRS EXCTG SET-2X2 STATUS
```

The EXCREC:

An EXCREC item defines a set's EXCTG configuration. The EXCREC item contains three parts. Each of these parts can be added, changed, or removed using the Copy Manager EXCREC entry.

Part 1 - the EXCTG characteristics. This includes the EXCTG number, the direction, the mirror number, and the serial number of the supervisor DKC (control unit). This part is key'ed by set name and direction.

Part 2 - the control unit characteristics. This includes the control unit serial number and each journal group within the control unit. In general, there is only one journal group per control unit. This part is key'ed by set name, direction, and control unit serial number.

Part 3 - The control unit's journal group characteristics. This includes the journal group ID, the Arbitration Device location (LCU/volume), and the SCU ID. This part is key'ed by set name, direction, control unit serial number, and journal group ID.

Example set of entries to define the above SET-2X2 EXCREC

```
ZFDRS EXCREC ADD SET-2X2 EXC-0 MIR-0 SLSER-54118 JNLG-30 SCU-06 ARBIT-FFFF
ZFDRS EXCREC CHA SET-2X2 FOR SLSER-65423 JNLG-30 ARBIT-EF42 SCUID-06
ZFDRS EXCREC CHA SET-2X2 FOR MRSER-54118
```

Defining, Removing, or Status Query of an Extended Consistency Group to an HUR Set – EXCTG TPF Command

The **EXCTG** TPF command can issue a define EXCTG, remove EXCTG, and query the status of an extended consistency group for an HUR set. The command is issued to the entire HUR set. The parameters for this command are detailed in the *Copy Manager for TPF Operations Guide*.

The EXCTG command can be issued only to HUR pairs that are not SIMPLEX. That is, the HUR pairs **MUST** be defined. The EXCTG command requires that the EXCREC be defined correctly for the EXCTG configuration for an HUR set.



Note: When RESUME an HUR set is issued, Copy Manager verifies that the EXCTG is defined. If the EXCTG is not defined, a warning message is displayed and a BP is required to issue the RESUME.

[Figure 4-20](#) shows a sample display of an HUR EXCTG entry and response.

```
zfdrs exctg set-2x2 define
CSMP0097I 13.13.12 CPU-A SS-BSS  SSU-SSU0 IS-01
FDRS0242I 13.13.12
EXCTG DEFINED TO SET 2X2
-

zfdrs exctg set-2x2 rem
CSMP0097I 13.14.31 CPU-A SS-BSS  SSU-SSU0 IS-01
FDRS0243I 13.14.31
EXCTG REMOVED FROM SET 2X2

zfdrs exctg set-2x2 st
CSMP0097I 13.14.57 CPU-A SS-BSS  SSU-SSU0 IS-01
FDRS0220I 13.14.57
BEGIN EXCTG STATUS DISPLAY FOR SET 2X2
EXCT  CONSISTENCY  JNL SCU  JNL  JNL SERIAL ARBITRATION  ERROR
GRP   TOD         GRP ID   LOC   STATUS NUMBER    CMD DEV  CODE
-
0  00000000 00000000  30 06  SUPER   ACTIVE  54118      FFFF  0000
   31/12/01 17.00.00  30 06  SUPER   ACTIVE  66844      EF42  0000

0  00000000 00000000  30 06  SUBORD  ACTIVE  65423      FFFF  0000
   31/12/01 17.00.00  30 06  SUBORD  ACTIVE  53103      FE40  0000
-
END OF EXCTG STATUS DISPLAY+
```

Figure 4-20 Sample ZFDRS EXCTG Command Entry and Response

Copy Operations with Database Areas

This section describes how to use Copy Manager's DataBase areas to create pairs and if needed, their associated paths (port ids) in Copy Manager sets.

Copy Manager supports defining and naming TPF logical databases. The database areas allow for a more flexibility when defining copy pairs for ShadowImage or TrueCopy or HUR Copy Manager sets. Any TPF grouping (database) of target volumes can be defined as a database area. Any TPF grouping (database) of source volumes can be defined as a database area. As an example, if a TPF installation has a production TPF system with two ShadowImage targets for backups and one TrueCopy target for a test system, the TPF installation could define these four logical databases as four different database areas.

A TPF logical database is called a database area. The name of a database area is called the database name (DBNAME). The definition of the volumes in a database area is a list of the logical volume locations in the logical database. The definition of the available path (port id) use for a database area is a list of TrueCopy or HUR port id numbers in the logical database.

For volume definitions, an example would be a TPF logical database that contains 100 logical volumes. The database area would include a list of all 100 of the logical volume's LCU/volume location, the logical volume's SSID, and the serial number of the control unit where the logical volume resides. In addition, each logical volume in the database area is referenced by an numeric (hex) device number. The database area logical volumes are ordered by the device number value.

For TrueCopy path definitions, an example is a TPF logical database that contains two Serial Numbers, each with four SSIDs. For source TrueCopy paths, the database area would include a list of all the source port id's to be used by the eight different SSIDs for when the database area is to be used as source volumes in a TrueCopy pair. The database area would also include a list of all the target port id's to be used by the eight different SSIDs when the database area is to be used as target volumes in a TrueCopy pair. There would be eight TrueCopy path items in the database area definition records, one for each unique SSID/Serial Number combination. Each of the eight TrueCopy path items would contain both the source and target port ids for the associated SSID/Serial number combination.

For HUR path definitions, an example is a TPF logical database that contains two Serial Numbers. The database area would include a list of all the source port id's to be used by the two different Serial Number when the database area is to be used as the HUR source volumes in an HUR copy pair. The database area would also include a list of all the target port id's to be used by the two different Serial Numbers when the database area is to be used as target volumes in an HUR copy pair. There would be two HUR path items in the database area definition record, one for each unique Serial Number. Each of the two HUR path items would contain the source and target port ids for that Serial number combination. Additionally, each of the two HUR path items in the database area definition record would contain the HUR path id.



Note: The order of the ports is important to the optimal use of the paths. Hitachi Vantara recommends that Hitachi Vantara TPF Engineering be consulted when identifying the port id number definitions.

The Copy Manager entry CREATEPAIRs is used to build pairs (and possibly paths) for a defined Copy Manager set from two database areas. The parameters for the CREATEPAIRs entry include the set name of the Copy Manager set that the pairs are being built for, a source database area, and a target database area. The CREATEPAIRs entry will generate the pairs using the volumes in device number order from the source and target database areas. For TrueCopy and HUR sets, the CREATEPAIRs entry will generate the path definitions for each copy pair that is generated. The Device number in the set will be the device number used in the source database area.

To override using the device number in the source database area, specify an online database area (ONLINEDB) in the CREATEPAIRs request. When the online database area is specified in the CREATEPAIRs entry, Copy Manager will use the device number in the online database area, and use the source and target volume locations in the source and target database areas.

The Copy Manager DBREC entry is used to define the location and characteristics of a database area.

The Copy Manager DBAREA entry is used to define each volume location in a database area.

See the *Hitachi Copy Manager for TPF Operations Guide* for a detailed description of the DBREC and DBAREA entries.

To use the database areas in Copy Manager:

1. Define a source database area using the DBREC entry.
2. Define a target database area using the DBREC entry.
3. (optionally) Define an online database area using the DBREC entry.
4. Define the logical volumes and if required, paths in the source database area using the DBAREA entry.

5. Define the logical volumes and if required, paths in the target database area using the DBAREA entry.
6. (optionally) Define the logical volumes in the online database area using the DBAREA entry.
7. If needed, define a set for the new pairs using the SETREC entry.
8. Create the pairs for the set using the CREATEPAIRS entry.
9. The SET is now available for any appropriate Copy Manager copy operations.

Consult with Hitachi Vantara TPF Engineering for suggested methods and techniques for using database areas.

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](#)
- [ShadowImage Record Read \(FDRSC\) Performance: ECB Heap Use](#)
- [ShadowImage Record Read \(FDRSC\) Performance: System Heap Use](#)
- [ShadowImage Record Read \(FDRSC\) Macro: Programming recommendation for 31-bit assembler programs using the FDRSC macro](#)
- [FDRSC Macro](#)
- [FDRSC C or CPP function](#)
- [Sample Use of the FDRSC Macro and C or CPP function](#)
- [Sample Program Using the FDRSC Macro](#)
- [Sample Program Using the FDRSC C or CPP function](#)
- [FDRSC Macro Use Restrictions and Reminders](#)

Overview of the ShadowImage Record Read Function

The ShadowImage record read function provides a TPF macro and C or CPP Function (**FDRSC**) that reads a TPF record from a ShadowImage volume. Some example uses of this feature 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 or C function or CPP function, an installation must write their own programs using **FDRSC**. Please contact the Hitachi Data System TPF Engineering group for information about sample programs that use **FDRSC**. The Hitachi Vantara TPF Engineering group is also available to provide an installation with assistance during their development of programs that will use the **FDRSC** macro or FDRSC C or CPP function.

In version BI of Copy Manager, a change was made to use CE1FMx for the FARF addresses instead of CE1FAX. There is a siteoption (FDRSCCE1FA) that allows CE1FAX to continue to be used for the FARF address.

ShadowImage Record Read (FDRSC) Performance: ECB Heap Use

The ShadowImage record read function uses the set's pair records to determine what volume to issue the read record. The first call to FDRSC will populate an ECB heap area with the pair records. This allows the pair records to be read only one time for an ECB that may make multiple FDRSC calls. The second and subsequent FDRSC calls will verify the setname is the same set from the first call. If the set name is the same, the ECB heap area is considered valid. When the ECB heap is valid, the requested record on the ShadowImage target volume is read and returned to the caller. The use of ECB heap allows an ECB to make a high number of FDSRC calls without additional I/O overhead that may be caused by reading the same pair records multiple times.

ShadowImage Record Read (FDRSC) Performance: System Heap Use

The FDRSC function offers the option to use system heap instead of ECB heap. The use of system heap allows multiple ECBs to access the pair records without each ECB having to reread the pair records. A set's pair records are read into system heap by the first ECB using the set. Each subsequent ECB using the system heap will verify the set name in the system heap area. If the set name matches, the ECB will use the pair records in the system heap. If the setname does not match, FDRSC will return an error code.

The use of system heap allows multiple ECBs to make FDRSC calls without additional I/O overhead that might be caused by reading the set's pair records multiple times.

Consult Hitachi Vantara TPF Engineering prior to using the system heap option.

The system heap area is unique and has a token name of: HDS_XFDR (upper case) and an owner name of: hds_copymanager (lower case). Below is the GSYSC call:

```
GSYSC FRAMES=R14,TOKEN=R6,HEAP=31BIT,OWNER=R4,UNIQUE=YES
```

ShadowImage Record Read (FDRSC) Macro: Programming recommendation for 31-bit assembler programs using the FDRSC macro

This recommendation was identified after a customer had a problem using the FDRSC macro in a 31-bit assembler program.

FDRSC allows for 31-bit or 64-bit programs to use the FDRSC macro. The Copy Manager internal program logic for FDRSC processing uses some 64-bit programs.

A register with a 31-bit address within a 31-bit program could have one of more non-zero bits in the register's bits 0-31. These non-zero bits are not a problem for addressing within a 31-bit program. In 31-bit assembler programs, some instructions (for example, load address) do not clear the register's upper bits. This can cause an error when a 31-bit assembler program passes a 31-bit address in a register to a 64-bit program.

The FDRSC macro allows the setname location to be sent in a register.

Environment: A 31-bit assembler program sends the 31-bit address of the setname in a register. The register with the 31-bit setname address has one or more residual bits set on in the register's bits 0-31. When the 64-bit Copy Manager program tries to access the setname, the address in the register is not valid because of the residual bit settings. The invalid 31-bit address in the register could cause a program check (OPR-4 or CTL-4).

Requirement: When sending the address of the setname via a register, the address in the register must be valid in a 64-bit program.

Recommendation for 31-bit assembler programs: Clear all 64 bits of a register before loading the address of the setname into a register. The below example clears the register with the SGR instruction.

Example code :

```
BEGIN NAME=TEST,VERSION=AA,AMODE=31
*
*   Call FDRSC with setname in Register 6
*
SGR R6,R6
LA R6,MY_SET_NAME
FDRSC D7,SETNAME=(R6)
```

FDRSC Macro

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

FDRSC Macro

FDRSC Dx CELFMx - file address, MCHR address

Additional parameters for the FDRSC macro beyond the TPFUG requirements.

CONS - request that Copy Manager send error messages to the console. The error code is still returned in R1.

SETNAME - the set name of the set to read the ShadowImage record from. The set name can be part of the parameter or pointed to by a register. The set name can be up to 16 characters, left justified. If the setname address is sent via a register, the address in the register must be a valid address in a 64bit program.

SYSHEAP - Consult Hitachi Vantara TPF Engineering if considering the use of the system heap parameter.

Request that FDRSC use system heap for its pair records. The first FDRSC call will get the system heap area and then populate the system heap with the FDRSC's set pair records. After obtaining and populating the system heap, the FDRSC call will read the requested record. On subsequent FDRSC calls with the system heap parameter, FDRSC will access the system heap and use the pair records in system heap for its processing. This parameter is the required for each FDRSC call when system heap is expected to be used.

ONLYSYSH - Consult Hitachi Vantara TPF Engineering if considering the use of the "only" system heap parameter.

This parameter may not be valid in some programming logic. The ONLYSYSH parameter should not be used if the programmer's use of the first FDRSC call using the SYSHEAP parameter intends to read a requested record.

ONLYSYSH requests that FDRSC use system heap for its pair records. The FDRSC call with the ONLYSYSH parameter will obtain the system heap area and then populate the system heap with the FDRSC's set pair records. After obtaining and populating the system heap, FDRSC will return to the caller without reading a requested record. The ONLYSYSH parameter does not validate the caller's FARF address. On subsequent FDRSC calls with the system heap parameter(SYSHEAP), FDRSC will access the system heap and use the pair records in system heap for its processing. The ONLYSYSH parameter should only be used one time for the first FDRSC call.

FREEHEAP - Consult Hitachi Vantara TPF Engineering if considering the use of the free heap parameter.

Request that FDRSC release the system heap area. No data is returned to the caller. That is, no record is read. The caller's FARF address is not validated. If the heap is successfully freed, a return code of zero is returned to the caller. When system heap parameter is being used, this parameter is normally used after the last read record FDRSC call.

The following are the returned values in R1 :

```

R1 = 2   TPF volume for the MCHR address is not mounted
R1 = 3   TPF volume for the MCHR address is an invalid SDA, the SDA not in MFST
R1 = 4   Set is empty
R1 = 5   TPF volume for the MCHR address was not found in the set (device not in the set)
(Verify the correct setname is being used)
R1 = 6   PAIRREC find error when reading chained record
R1 = 7   FDCTC error during execution of the read ShadowImage record command
R1 = 8   ESFAC error when converting the file address to MCHR
R1 = 9   Incorrect pair status for ShadowImage read
R1 = 10  Find error reading the CopyManager control records. Or a logic error reading the
control records.
R1 = 11  PAIRREC find error when first record.(verify the correct setname is being used)
R1 = 12  problem obtaining heap storage.
R1 = 13  returned heap is corrupt.
R1 = 14  obsolete
R1 = 15  EHEAPC create error
R1 = 16  setname mismatch, the setname changed after the first FDRSC call
R1 = 17  FDRSC data level requested is in use
R1 = 18  Error obtaining system heap
R1 = 19  Error finding system heap
R1 = 20  Error Releasing system heap
R1 = 21  System heap size error, possible system heap corruption
R1 = 22  FDRSC cannot be used with a set defined as ALLOFF
R1 = 23  system heap exists when ONLYSYSH requested

```

-

Note: Only R2-R7 can be used for the address of the set name.

Examples:

```

FDRSC D3
FDRSC D3,SETNAME=PRODBKUP3
FDRSC D6,SETNAME=(R4)
FDRSC D3,SETNAME=(R4),CONS

FDRSC D3,SETNAME=(R4),SYSHEAP
FDRSC D3,SETNAME=(R4),FREEHEAP

FDRSC D3,SETNAME=(R4),ONLYSYSH
FDRSC D3,SETNAME=(R4),SYSHEAP
FDRSC D3,SETNAME=(R4),FREEHEAP

```


FDRSC C or CPP function

The format of the **FDRSC C or CPP function** uses the format in the fdrsc_parm structure in the hdsio.h header sent with the Copy Manager for TPF software.

hdsio.h (fdrsc_parm structure)

```
#ifndef __HDSIO_H__
#define __HDSIO_H__ 1
/*****
**
** HEADER FILE NAME..HDSIO
** DESCRIPTION..... HDS I/O API FUNCTION PROTOTYPES
**
**
** FUNCTION... CONTAINS HDS FUNCTION PROTOTYPES
**                AND PARAMETER DEFINITIONS
**                FOR ALL HDS I/O TPF API FUNCTIONS.
**
*****/
** version  date    comments
**
**   BF      10/2013 original version
**           02/2014 add cpp support
**   BFZ     05/2014 remove heap, change nocons to cons
**   BF6     06/2015 add reserved
**   BF7     07/2015 add system heap
**   BI2     05/2021 add only system heap (ONLYSYSH)
**
*****/
*/
/*****
** definition of fdrsc c library function parameter list
**
*****/

struct fdrsc_parm
{
    int      fdrsc_num_parm;          /* number of parms following */
                                     /* required parameter        */
    #define  FDRSC_PARM_MAX          4 /* max parameters */
    #define  FDRSC_PARM_MIN          4 /* min parameters */

    char      fdrsc_datalevel[2];     /* return record data level*/
    char      fdrsc_setname[16];      /* shadowimage setname */
    char      fdrsc_console[4];       /* CONS option*/
    char      fdrsc_sysheap[8];       /* SYSHEAP or FREEHEAP or ONLYSYSH option */
};

#ifdef __cplusplus
extern "C" {
/* #endif
    int      fdrscd(const struct fdrsc_parm *fdrsc_parm_list);
/* #ifdef __cplusplus
    }
#endif
#endif
```

The `fdrsc_parm` structure is similar to the FDRSC macro parameter use.

CE1FMx – file address

fdrsc_datalevel[2]- data level (Dx format) to return the ShadowImage record.

fdrsc_setname[16] - the set name of the set to read the ShadowImage record from. The set name can be up to 16 characters, left justified and blank filled.

fdrsc_console[4] - when set to "CONS", request that Copy Manager send error messages to the console. The error code is still returned as a return code.

fdrsc_sysheap[8] – the system heap option. Valid options are SYSHEAP, FREEHEAP. Consult Hitachi Vantara TPF Engineering prior to using this option.

Blanks: system heap will not be used.

SYSHEAP - Consult Hitachi Vantara TPF Engineering if considering the use of the system heap parameter.

Request that FDRSC use system heap for its pair records. The first FDRSC call will get the system heap area and then populate the system heap with the FDRSC's set pair records. After obtaining and populating the system heap, the FDRSC call will read the requested record. On subsequent FDRSC calls with the system heap parameter, FDRSC will access the system heap and use the pair records in system heap for its processing. This parameter is required for each FDRSC call when system heap is expected to be used.

ONLYSYSH - Consult Hitachi Vantara TPF Engineering if considering the use of the "only" system heap parameter.

This parameter may not be valid in some programming logic. The ONLYSYSH parameter should not be used if the programmer's use of the first FDRSC call using the SYSHEAP parameter intends to read a requested record.

ONLYSYSH requests that FDRSC use system heap for its pair records. The FDRSC call with the ONLYSYSH parameter will obtain the system heap area and then populate the system heap with the FDRSC's set pair records. After obtaining and populating the system heap, FDRSC will return to the caller without reading a requested record. The ONLYSYSH parameter does not validate the caller's FARF address. On subsequent FDRSC calls with the system heap parameter (SYSHEAP), FDRSC will access the system heap and use the pair records in system heap for its processing. The ONLYSYSH parameter should only be used one time for the first FDRSC call.

FREEHEAP - Consult Hitachi Vantara TPF Engineering if considering the use of the free heap parameter.

Request that FDRSC release the system heap area. No data is returned to the caller. That is, no record is read. The caller's FARF address is not validated. If the heap is successfully freed, a return code of zero is returned to the caller. When system heap parameter is being used, this parameter is normally used after the last read record FDRSC call.

The following are the C function return codes :

```
R1 = 2   TPF volume for the MCHR address is not mounted
R1 = 3   TPF volume for the MCHR address is an invalid SDA, the SDA not in MFST
R1 = 4   Set is empty
R1 = 5   TPF volume for the MCHR address was not found in the set (device not in the set)
(Verify the correct setname is being used)
R1 = 6   PAIRREC find error when reading chained record
R1 = 7   FDCTC error during execution of the read ShadowImage record command
R1 = 8   ESFAC error when converting the file address to MCHR
R1 = 9   Incorrect pair status for ShadowImage read
R1 = 10  Find error reading the CopyManager control records. Or a logic error reading the
control records.
R1 = 11  PAIRREC find error when first record.(verify the correct setname is being used)
R1 = 12  problem obtaining heap storage.
R1 = 13  returned heap is corrupt.
R1 = 14  obsolete
R1 = 15  EHEAPC create error
R1 = 16  setname mismatch, the setname changed after the first FDRSC call
R1 = 17  FDRSC data level requested is in use
R1 = 18  Error obtaining system heap
R1 = 19  Error finding system heap
R1 = 20  Error Releasing system heap
R1 = 21  System heap size error, possible system heap corruption
R1 = 22  FDRSC cannot be used with a set defined as ALLOFF
R1 = 23  system heap exists when ONLYSYSH requested

RC = 100  invalid data level.
RC = 101  invalid console option.
RC = 102  invalid SYSHEAP option
```

-

Sample Use of the FDRSC Macro and C or CPP function

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 or C function or CPP function 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 CE1FM7(4),FILEADR (move in file address)
LA R5,SETNM
FDRSC D7,SETNAME=(R5)
L R7,CE1CR7
EXITC

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

FINIS
END
```

Sample Program Using the FDRSC C or CPP function

```
#include <tpf/hdsio.h>

#define FDRSC_CONS "CONS"

struct fdrsc_parm fdrsc_parms;    /* parms to FDRSC call */

/*****
/*  set up FARF address and recid, rcc
*****/
ecbptr()->ebcid7 = 0 ;           /* zero rec id */
ecbptr()->ebcrc7 = 0 ;           /* zero rcc */
memcpy(&ecbptr()->celfm7,&ecbptr()->ebw000,4) ;

/*****
/*  send requested setname, left justified, blank filled
*****/
memcpy(fdrsc_parms.fdrsc_setname,&ecbptr()->ebx000,16) ;

/*****
/*  for testing, use data level D7
*****/
memcpy(fdrsc_parms.fdrsc_datalevel,FDRSC_DATALEVEL,2) ;

/*****
/*  set up no console option request, blank if no request made
*****/
memcpy(fdrsc_parms.fdrsc_console,FDRSC_CONS,4) ;

/*****
/*  set up no system heap option request, blank if no request made
*****/
memcpy(fdrsc_parms.fdrsc_sysheap,BLANKS,8) ;

rc = fdrsc(&fdrsc_parms) ;
```

FDRSC Macro Use Restrictions and Reminders

Restrictions:

- FDRSC can only be used on target volumes in ShadowImage sets in a local control unit.
- The ShadowImage pair status must be split with the read/write option prior to using the FDRSC macro or C/CPP function.
- The pair definition in the ShadowImage set must use the source option. The nosource pair definition option is not supported, and the offline volume option is not supported. Contact Hitachi Vantara TPF Engineering for any other current restrictions.



TPF Programmer Advisory: When a programmer requests to use system heap, FDRSC uses the system heap token: HDS_XFDR (upper case) and the owner ID is: hds_copymanager (lower case). The system heap request is UNIQUE. Programmers using FDRSC and system heap token names should be aware of the use of the FDRSC token and owner name.

TPF Mainframe Analytics Macro Function

This chapter provides an overview of the TPF macro that accesses the Mainframe Analytics database in a control unit.

This chapter discusses the following topics:

- [Overview of the ShadowImage Record Read Function](#)

Overview of the TPF Mainframe Analytics Macro Function

Copy Manager provides a TPF macro that can be used in TPF site's ECB programs to access the mainframe analytics performance database. The TPF macro name is HDSMAM. The macro will issue commands to query the control unit's performance database. This database contains performance statistics on various components of the control unit. Some examples of common use might be write pending percentage, MP use percentage. This macro does not provide the TPF unique performance information gather by TPF's data collection utility and data reduction reporting.

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

Copy Manager also provides sample entries for displaying some of the performance data. The entries are the ZFDRS MAR entries.



TPF Programmer Advisory: Some of the performance data returned is a large amount of data, exceeding the normal TPF 4k response.

Because of the amount of data being returned, the Hitachi Vantara TPF team request that the TPF site consult with the TPF Engineering team prior to use of ZFDRS MAR entries. Due to the amount of data returned, there is a concern regarding the possible TPF IO performance impact if this entry is not used with caution.

The HDSMAM macro, related DSECTS and sample source programs are available for a TPF site's use on request. This source code is not shipped with the Copy Manager release.

Overview of Methods to Restore a TPF System

This chapter provides an overview of the methods available to a TPF site to restore their TPF system from a ShadowImage target, TrueCopy target or Universal replicator (HUR) target.

This chapter discusses the following topics:

- [Restoring a TPF System using a ShadowImage Target](#)
- [Restoring a TPF System Using a TrueCopy Target](#)
- [Restoring a TPF System Using an HUR Target](#)
- [General Guidelines when Restoring a TPF System](#)

Restoring a TPF System using a ShadowImage Target

When a ShadowImage pair is split, the ShadowImage target has a snapshot of a TPF system at the time of the split. The data on the target volumes is a useable TPF system. The following are three methods of using the ShadowImage target data to recover a TPF system.



Note: Consult Hitachi Vantara TPF Engineering on the following solutions. These solutions require careful preparation by the TPF site to ensure a successful recovery.

1. IPL the ShadowImage target volumes.

Since the data on the ShadowImage target volumes is an IPL-able TPF system, the ShadowImage target volumes can be directly IPLed.

To IPL the ShadowImage target volumes, a TPF site might consider using a second IOCP to address the ShadowImage target volumes with the same SDAs as the ShadowImage source (production) system. If the TPF site chooses to not use the same SDAs as the ShadowImage source (production) system, TPF keypoint concerns might need to be addressed.

The advantage of this solution is that it allows for a very fast recovery. The source data also remains intact for further programmer investigations.

There are several issues about this solution that a TPF site would need to address. Some of the issues are: TPF performance on the ShadowImage target, potential loss of the Target (backup) data if database corruption occurs again, preparations required to start backing up the ShadowImage target once the target is used for TPF production.

2. Reverse Resync.

ShadowImage reverse resync allows the TPF site to copy the ShadowImage target data back to the source data location.



Note: To do a reverse resync, the source (production) TPF system must be down. The TPF LPAR(s) must also be system reset by the HMC.

One advantage to using the reverse resync is that the target (backup) data will remain unchanged in case there is a second database corruption.

A disadvantage of using ShadowImage reverse resync is that the resync may take a long time. The resync will copy back all data that has been change since the set was last split.

There are two methods to restore a TPF system using reverse resync.

- a. Use Hitachi Storage Navigator to reverse resync the pairs (see the *ShadowImage User Guide* for details).
- b. From a third TPF system with access to the production TPF control units, use TPF Copy Manager's REVERSE command to copy the target data back to the source data.

3. Quick Restore.

ShadowImage quick restore allows the TPF site to “flip” (re-map) the target volumes and the source volumes. During the quick restore, the TPF site has the option of updating the original source volumes with the target volume data after the quick restore (re-map) is completed. Or, the TPF site has the option of keeping the original source volume data intact after the re-map (see the swap and freeze option in the *ShadowImage User Guide*).



Note: To do a reverse resync, the source (production) TPF system must be down. The TPF LPAR(s) must also be system reset by the HMC.

Advantages of using the quick restore option include: The restore is faster than the reverse resync, the TPF site has the option of keeping the corrupted database for programmer analysis.

If the TPF site uses quick restore, the TPF site must size their ShadowImage target volumes the same as their ShadowImage source volumes to ensure no impact to their TPF performance.

There is one method to restore a TPF system using quick restore:

- a. Use Storage Navigator to do a quick restore on the pairs. The *ShadowImage User Guide* describes the Storage Navigator steps to do a quick restore and also describes how to set the swap and freeze option.

Restoring a TPF System Using a TrueCopy Target

When a TrueCopy pair is split, the TrueCopy target has a snapshot of a TPF system at the time of the split. The data on the target volumes is a useable TPF system. The following is two methods of using the TrueCopy target data to recover a TPF system.



Note: Consult Hitachi Vantara TPF Engineering on the following solutions. These solutions require careful preparation by the TPF site to ensure a successful recovery.

1. IPL the TrueCopy target volumes.

Since the data on the TrueCopy target volumes is an IPL-able TPF system, the TrueCopy target volumes can be directly IPLed.

To IPL the TrueCopy target volumes, a TPF site might consider using a second IOCP to address the TrueCopy target volumes with the same SDAs as the TrueCopy source (production) system. If the TPF site chooses to not use the same SDAs as the TrueCopy source (production) system, TPF keypoint concerns might need to be addressed.

The advantage of this solution is that it allows for a very fast recovery. The source data also remains intact for further programmer investigations.

A TPF site needs to address several issues about this solution, such as potential loss of the target (backup) data if database corruption occurs again, and preparations required to start backing up the TrueCopy target once the target is used for TPF production. Both concerns can be addressed using ShadowImage in combination with TrueCopy.

2. Reverse Resync.

TrueCopy reverse resync allows the TPF site to copy the TrueCopy target data back to the source data location.



Note: To do a reverse resync, the source (production) TPF system must be down. The TPF LPAR(s) must also be system reset by the HMC.

Advantages of using the reverse resync include: the target (backup) data will remain unchanged in case there is a second database corruption, the remote location does not require TPF host access, and the remote location can be a data warehouse.

A disadvantage of using TrueCopy reverse resync is that the resync may take a long time. The resync will copy back all data that has been changed since the set was last split.

There are two methods to restore a TPF system using reverse resync.

- Use Hitachi Storage Navigator to reverse resync the pairs (see the *TrueCopy User Guide* for details).

- From a third TPF system with access to the production remote TPF control units, use TPF Copy Manager REVERSE command to copy the target data back to the source data.

Restoring a TPF System Using an HUR Target

When an HUR pair is split, the HUR target has a snapshot of a TPF system at the time of the split. The data on the target volumes is a useable TPF system. The following two methods use the HUR target data to recover a TPF system.



Note: Consult Hitachi Vantara TPF Engineering on the following solutions. These solutions require careful preparation by the TPF site to ensure a successful recovery.

1. IPL the HUR target volumes.

Since the data on the HUR target volumes is an IPL-able TPF system, the HUR target volumes can be directly IPLed.

To IPL the HUR target volumes, a TPF site might consider using a second IOCP to address the HUR target volumes with the same SDAs as the HUR source (production) system. If the TPF site chooses to not use the same SDAs as the HUR source (production) system, TPF keypoint concerns might need to be addressed.

The advantage of this solution is that it allows for a very fast recovery. The source data also remains intact for further programmer investigations.

There are several issues about this solution that a TPF site should address, including: potential loss of the target (backup) data if database corruption occurs again, and preparations required to start backing up the HUR target once the target is used for TPF production. Both concerns can be addressed by using ShadowImage in combination with HUR.

After IPLing the HUR target TPF system, HUR has a feature that allows the HUR copy direction to be reverse without deleting the HUR pairs. For details, see the *Universal Replicator User Guide*. See the section [Reversing Universal Replicator Direction](#) for Copy Manager details.

2. HUR Reverse Resync.

HUR reverse resync allows the TPF site to copy the HUR target data back to the source data location.



Note: To do a reverse resync, the source (production) TPF system must be down. The TPF LPAR(s) must also be system reset by the HMC.

Advantages of using the reverse resync include: the target (backup) data will remain unchanged in case there is a second database corruption, the remote location does not require TPF host access, the remote location can simply be a data warehouse.

A disadvantage of using HUR reverse resync is that the resync may take a long time. The resync will copy back all data that has been change since the set was last split.

There are two methods to restore a TPF system using reverse resync.

- Use Hitachi Storage Navigator to reverse resync the pairs (see the *Universal Replicator User Guide* for details).
- From a combination of the local and remote TPF system, use TPF Copy Manager to reverse the direction of the HUR pairs. See [Reversing Universal Replicator Direction](#).

General Guidelines when Restoring a TPF System

TPF is not a friendly system for restoring a capture of a running TPF system. Below are several considerations that you need to address. This list is not comprehensive.

1. DASD copy products do not copy data in VFA. VFA data needs and use should be addressed.
2. Even in a time-consistent database, a logical sequence of writes by a TPF system could be split. Data logic inconsistency should be addressed.
3. Address the possible need for database maintenance programs in case of data logic inconsistency.
4. Consider the use of logging tapes even when the split database is time consistent.
5. Each TPF system is different, consider an analysis of the TPF system database when building the TPF procedures.

Strong recommendations when restoring a TPF system:

- When taking a TPF system down to be restored, system reset all the TPF LPARs prior staring the restore (in some restore methods, this is a requirement)
- When IPL'ing a newly restored TPF system IPL with clear (HMC LOAD CLEAR). This will clear the old VFA data so that VFA will be freshly populated with the restored database's data.

Troubleshooting

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

- [Immediate Halt of ShadowImage, TrueCopy, or Universal Replicator Session](#)
- [Reducing TPF Operator Console Messages](#)
- [Troubleshooting](#)
- [Calling Customer Support](#)

Immediate Halt of ShadowImage, TrueCopy, or Universal Replicator Session

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

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

Reducing TPF Operator Console Messages

To reduce the number of TPF operator console messages:

- Set the Copy Manager siteoption STOPONERR.
- Use the Copy Manager Monitor to monitor a copy operation's progress or the non-filtered Copy Manager Status command instead of using the Copy Manager status command with a filter option.

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 can be utilized by coverage and operations as a standalone document.

For troubleshooting information for copy operations, please refer to the applicable user guide (for example, *ShadowImage for Mainframe User Guide*), or contact your Hitachi Vantara representative.

For general troubleshooting information, please refer to the User and Reference Guide for the storage system (for example, *Hitachi Virtual Storage Platform User and Reference Guide*), or contact your Hitachi Vantara representative.

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

[Table 8-1](#) shows the command acceptance for each TrueCopy pair status. [Table 8-2](#) shows the command acceptance for each ShadowImage status. [Table 8-3](#) shows the command acceptance for each Universal Replicator status.

Table 8-1 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 8-2 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 8-3 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 Customer Support

If you need call customer support, make sure to provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The exact content of any error messages displayed on the host systems.
- The exact content of any error messages 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 Vantara customer support staff is available 24 hours a day, seven days a week. If you need technical support, please log on to Hitachi Vantara Support Connect for contact information:

https://support.hitachivantara.com/en_us/contact-us.html

Control Unit Adapter ID (SAID) Tables

Table A-1 SAID values for PATH LINK (CL1)

Packg local	Port	SAID	Packg local	Port	SAID	Packg local	Port	SAID	Packg local	Port	SAID
1PC (Basic)	CL1-A	X'0000'	1PJ (Add4)	CL1-J	X'0008'	1PA (DKA Basic)	CL9-A	X'0080'	1PG (DKA Add2)	CL9-J	X'0088'
	CL3-A	X'0020'		CL3-J	X'0028'		CLB-A	X'00A0'		CLB-J	X'00A8'
	CL5-A	X'0040'		CL5-J	X'0048'		CLD-A	X'00C0'		CLD-J	X'00C8'
	CL7-A	X'0060'		CL7-J	X'0068'		CLF-A	X'00E0'		CLF-J	X'00E8'
	CL1-B	X'0001'		CL1-K	X'0009'		CL9-B	X'0081'		CL9-K	X'0089'
	CL3-B	X'0021'		CL3-K	X'0029'		CLB-B	X'00A1'		CLB-K	X'00A9'
	CL5-B	X'0041'		CL5-K	X'0049'		CLD-B	X'00C1'		CLD-K	X'00C9'
	CL7-B	X'0061'		CL7-K	X'0069'		CLF-B	X'00E1'		CLF-K	X'00E9'
1PD (Add1)	CL1-C	X'0002'	1PK (Add5)	CL1-L	X'000A'	1PB (DKA Add1)	CL9-C	X'0082'	1PH (DKA Add3)	CL9-L	X'008A'
	CL3-C	X'0022'		CL3-L	X'002A'		CLB-C	X'00A2'		CLB-L	X'00AA'
	CL5-C	X'0042'		CL5-L	X'004A'		CLD-C	X'00C2'		CLD-L	X'00CA'
	CL7-C	X'0062'		CL7-L	X'006A'		CLF-C	X'00E2'		CLF-L	X'00EA'
	CL1-D	X'0003'		CL1-M	X'000B'		CL9-D	X'0083'		CL9-M	X'008B'
	CL3-D	X'0023'		CL3-M	X'002B'		CLB-D	X'00A3'		CLB-M	X'00AB'
	CL5-D	X'0043'		CL5-M	X'004B'		CLD-D	X'00C3'		CLD-M	X'00CB'
	CL7-D	X'0063'		CL7-M	X'006B'		CLF-D	X'00E3'		CLF-M	X'00EB'
1PE (Add2)	CL1-E	X'0004'	1PL (Add6)	CL1-N	X'000C'	-	-	-	-	-	-
	CL3-E	X'0024'		CL3-N	X'002C'	-	-	-	-	-	-
	CL5-E	X'0044'		CL5-N	X'004C'	-	-	-	-	-	-
	CL7-E	X'0064'		CL7-N	X'006C'	-	-	-	-	-	-
	CL1-F	X'0005'		CL1-P	X'000D'	-	-	-	-	-	-
	CL3-F	X'0025'		CL3-P	X'002D'	-	-	-	-	-	-
	CL5-F	X'0045'		CL5-P	X'004D'	-	-	-	-	-	-
	CL7-F	X'0065'		CL7-P	X'006D'	-	-	-	-	-	-
1PF (Add3)	CL1-G	X'0006'	1PM (Add7)	CL1-Q	X'000E'	-	-	-	-	-	-
	CL3-G	X'0026'		CL3-Q	X'002E'	-	-	-	-	-	-
	CL5-G	X'0046'		CL5-Q	X'004E'	-	-	-	-	-	-
	CL7-G	X'0066'		CL7-Q	X'006E'	-	-	-	-	-	-
	CL1-H	X'0007'		CL1-R	X'000F'	-	-	-	-	-	-
	CL3-H	X'0027'		CL3-R	X'002F'	-	-	-	-	-	-
	CL5-H	X'0047'		CL5-R	X'004F'	-	-	-	-	-	-
	CL7-H	X'0067'		CL7-R	X'006F'	-	-	-	-	-	-

Table A-2 SAID values for PATH LINK (CL2)

Packg local	Port	SAID	Packg local	Port	SAID	Packg local	Port	SAID	Packg local	Port	SAID
2PC (Basic)	CL2-A	X'0010'	2PJ (Add4)	CL2-J	X'0018'	2PA (DKA Basic)	CLA-A	X'0090'	2PG (DKA Add2)	CLA-J	X'0098'
	CL4-A	X'0030'		CL4-J	X'0038'		CLC-A	X'00B0'		CLC-J	X'00B8'
	CL6-A	X'0050'		CL6-J	X'0058'		CLE-A	X'00D0'		CLE-J	X'00D8'
	CL8-A	X'0070'		CL8-J	X'0078'		CLG-A	X'00F0'		CLG-J	X'00F8'
	CL2-B	X'0011'		CL2-K	X'0019'		CLA-B	X'0091'		CLA-K	X'0099'
	CL4-B	X'0031'		CL4-K	X'0039'		CLC-B	X'00B1'		CLC-K	X'00B9'
	CL6-B	X'0051'		CL6-K	X'0059'		CLE-B	X'00D1'		CLE-K	X'00D9'
	CL8-B	X'0071'		CL8-K	X'0079'		CLG-B	X'00F1'		CLG-K	X'00F9'
2PD (Add1)	CL2-C	X'0012'	2PK (Add5)	CL2-L	X'001A'	2PB (DKA Add1)	CLA-C	X'0092'	2PH (DKA Add3)	CLA-L	X'009A'
	CL4-C	X'0032'		CL4-L	X'003A'		CLC-C	X'00B2'		CLC-L	X'00BA'
	CL6-C	X'0052'		CL6-L	X'005A'		CLE-C	X'00D2'		CLE-L	X'00DA'
	CL8-C	X'0072'		CL8-L	X'007A'		CLG-C	X'00F2'		CLG-L	X'00FA'
	CL2-D	X'0013'		CL2-M	X'001B'		CLA-D	X'0093'		CLA-M	X'009B'
	CL4-D	X'0033'		CL4-M	X'003B'		CLC-D	X'00B3'		CLC-M	X'00BB'
	CL6-D	X'0053'		CL6-M	X'005B'		CLE-D	X'00D3'		CLE-M	X'00DB'
	CL8-D	X'0073'		CL8-M	X'007B'		CLG-D	X'00F3'		CLG-M	X'00FB'
2PE (Add2)	CL2-E	X'0014'	2PL (Add6)	CL2-N	X'001C'	-	-	-	-	-	-
	CL4-E	X'0034'		CL4-N	X'003C'		-	-		-	-
	CL6-E	X'0054'		CL6-N	X'005C'		-	-		-	-
	CL8-E	X'0074'		CL8-N	X'007C'		-	-		-	-
	CL2-F	X'0015'		CL2-P	X'001D'		-	-		-	-
	CL4-F	X'0035'		CL4-P	X'003D'		-	-		-	-
	CL6-F	X'0055'		CL6-P	X'005D'		-	-		-	-
	CL8-F	X'0075'		CL8-P	X'007D'		-	-		-	-
2PF (Add3)	CL2-G	X'0016'	2PM (Add7)	CL2-Q	X'001E'	-	-	-	-	-	-
	CL4-G	X'0036'		CL4-Q	X'003E'		-	-		-	-
	CL6-G	X'0056'		CL6-Q	X'005E'		-	-		-	-
	CL8-G	X'0076'		CL8-Q	X'007E'		-	-		-	-
	CL2-H	X'0017'		CL2-R	X'001F'		-	-		-	-
	CL4-H	X'0037'		CL4-R	X'003F'		-	-		-	-
	CL6-H	X'0057'		CL6-R	X'005F'		-	-		-	-
	CL8-H	X'0077'		CL8-R	X'007F'		-	-		-	-

Acronyms and Abbreviations

APAR	Authorized Problem Analysis Report
CCW	channel command word
CU	control unit
DASD	direct-access storage device
DBAREArc	database area configuration definition record
DBREC	database area index control record
DEV	device
DR	disaster recovery
ECB	entry control block
GMT	Greenwich mean time
HDS	Hitachi Data Systems
HMC	Hardware Management Console
HUR	Hitachi Universal Replicator for IBM® z/OS
LCU	logical control unit
LDEV	logical device
LVI	logical volume image
LPAR	logical partition
MCU	main control unit (for TrueCopy for IBM® z/OS®)
M-VOL	main volume (for TrueCopy for IBM® z/OS®)
MVS™	Multiple Virtual Storage
NSC	Hitachi TagmaStore Network Storage Controller
OCO	object code only
ONLINEDB	online database area
OFFREC	offline volume control device configuration definition record
PAIRREC	copy pair configuration definition record
P-VOL	primary volume (for Universal Replicator for IBM® z/OS®)
RCU	remote control unit (for TrueCopy for IBM® z/OS®)
RCUREC	RCU command device configuration definition record

R-VOL	remote volume (for TrueCopy for IBM® z/OS®)
SDA	symbolic device address
SETREC	set index control record
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 IBM® z/OS®) secondary volume (for Universal Replicator for IBM® z/OS®)
SVP	service processor
TAR	target
TCz	Hitachi TrueCopy for IBM® z/OS
TOD	time of day
TOV	timeout value
TPF	Transaction Processing Facility
T-VOL	target volume (for ShadowImage for IBM® z/OS®)
URz	Hitachi Universal Replicator for IBM® z/OS®
USP V	Hitachi Universal Storage Platform V
USP VM	Hitachi Universal Storage Platform VM
UT	universal time
VFA	virtual file access
VM	Virtual Machine
VSN	Volume Serial Number
VSP	Hitachi Virtual Storage Platform
VTOC	volume table of contents
XRC	Extended Remote Copy
YHDF, YHDZ	"E-type" programs that are used for user exits

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