IBM IMS Recovery Solution Pack for z/OS
Version 1  Release 1

IMS High Performance Change
Accumulation Utility User's Guide
Note:
Before using this information and the product it supports, read the information in “Notices” on page 181.

This edition applies to Version 1 Release 1 of IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility (product number 5655-V86) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this information

IBM® IMS™ High Performance Change Accumulation Utility for z/OS® (also referred to as IMS HP Change Accumulation Utility and IMS HPCA) is an IMS tool that improves the performance of change accumulation merge operations by running multiple change accumulation groups in parallel and streaming the output across all addresses simultaneously.

This information provides instructions for using IMS High Performance Change Accumulation Utility.

To use the procedures in this information, you must first install the IMS High Performance Change Accumulation Utility as detailed in the Program Directory for IMS Recovery Solution Pack for z/OS, GI10-8824-00 and then perform the post-installation steps as detailed in the IMS Recovery Solution Pack: Overview and Customization.

This information is designed to help database administrators, system programmers, application programmers, and system operators perform the following tasks:

- Plan for the installation of IMS HPCA
- Configure your IMS HPCA environment
- Operate IMS HPCA
- Diagnose and recover from IMS HPCA problems
- Design and write applications for IMS HPCA

Always check the IMS Tools Product page for the most current version of this publication:

http://www.ibm.com/software/data/db2imstools/imstools-library.html

Service updates and support information

To find service updates and support information, including software fix packs, PTFs, Frequently Asked Question (FAQs), technical notes, troubleshooting information, and downloads, refer to the following Web page:

www.ibm.com/software/data/db2imstools/support.html

Highlighting conventions

This information uses the following highlighting conventions:

- **Boldface** type indicates commands or user interface controls such as names of fields, folders, icons, or menu choices.
- *Monospace* type indicates examples of text that you enter exactly as shown.
- *Italic* type indicates variables that you should replace with a value, to indicate the titles of other publication, and to emphasize significant terms.

How to look up message explanations

You can use any of the following methods to search for messages and codes:
Searching an information center

In the search box that is located in the top left toolbar of any Eclipse help system, such as the IBM Information Management Software for z/OS Solutions Information Center, enter the number of the message that you want to locate. For example, you can enter DFS1065A in the search field.

Use the following tips to help you improve your message searches:

- You can search for information on codes by entering the code; for example, enter -327.
- Enter the complete or partial message number. You can use wild cards (*) or (?) in the message number to broaden your search; for example, DFS20??I.

The information center contains the latest message information for all of the information management products that are included in the information center.

Using a Web search

You can use any of the popular search engines that are available on the Web to search for message explanations. When you type the specific message number or code into the search engine, you will be presented with links to the message information in IBM information centers.

Using LookAt

LookAt is an online facility that you can use to look up explanations for most of the IBM messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can use LookAt from the following locations to find IBM message explanations for z/OS elements and features, z/VM®, VSE/ESA, and Clusters for AIX® and Linux®:

- The Internet. You can access IBM message explanations directly from the LookAt Web site at http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/.
- Your z/OS TSO/E host system. You can install code on your z/OS or z/OSe systems to access IBM message explanations, using LookAt from a TSO/E command line (for example, TSO/E prompt, ISPF, or z/OS UNIX® System Services running OMVS).
- Your Microsoft® Windows® workstation. You can install code to access IBM message explanations on the z/OS Collection (SK3T-4269) using LookAt from a Microsoft Windows command prompt (also known as the DOS command line).
- Your wireless handheld device. You can use the LookAt Mobile Edition with a handheld device that has wireless access and an Internet browser (for example, Internet Explorer for Pocket PCs, Blazer, or Eudora for Palm OS, or Opera for Linux handheld devices). Link to the LookAt Mobile Edition from the LookAt Web site.

You can obtain code to install LookAt on your host system or Microsoft Windows workstation from a disk on your z/OS Collection (SK3T-4269) or from the LookAt Web site (click Download, and select the platform, release, collection, and location that suit your needs). More information is available in the LOOKAT.ME files available during the download process.
How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this information, any other IMS High Performance Change Accumulation Utility for z/OS documentation, or the IMS Recovery Solution Pack use either of the following options:

- Use the online reader comment form, which is located at: www.ibm.com/software/data/rcf/
- Send your comments by e-mail to comments@us.ibm.com. Be sure to include the name, part number and version of the book and, if applicable, the specific location of the text you are commenting on (for example, a page number or table number).
IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility (also referred to as IMS HP Change Accumulation Utility) is an IMS tool that improves the performance of change accumulation merge operations by running multiple change accumulation groups in parallel and streaming the output to each group simultaneously.

Topics:
- IMS HPCA overview
Chapter 1. IMS HP Change Accumulation Utility overview

IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility is one of several IBM tools that can help you manage backup and recovery operations for your databases in the event of a system outage or application failure.

Topics:
- “What does IMS HP Change Accumulation Utility do?”
- “Backup and recovery solutions” on page 4
- “Database recovery and change accumulation overview” on page 5
- “Change accumulation using IMS HP Change Accumulation Utility” on page 7
- “IMS HP Change Accumulation Utility architecture and process flow” on page 8
- “IMS HP Change Accumulation Utility information” on page 11
- “Accessibility features” on page 12

What does IMS HP Change Accumulation Utility do?

IMS High Performance Change Accumulation Utility for z/OS is an IMS tool that improves the performance of IMS change accumulation merge operations by running multiple change accumulation groups in parallel rather than in sequence and streaming the output to each group simultaneously.

IMS HP Change Accumulation Utility is a high performance tool that can merge the most recent database changes quickly, safely, and accurately while reducing the I/O, CPU time, and elapsed time that is required to build change accumulation data sets.

Jobs that might normally take hours are easier to perform and are processed in a fraction of the time. IMS HP Change Accumulation Utility protects your data, saves database administrator resources, and reduces supplementary software costs. By conducting change accumulation procedures regularly between image copies, you can ensure your ability to restore business-critical data in the event of a disaster.

IMS HP Change Accumulation Utility enables you to extract database updates with one pass of the data, which minimizes the need for manual intervention. By using your existing DBRC GENJCL statements, IMS HP Change Accumulation Utility can automatically generate the required JCL.

Product features

IMS HP Change Accumulation Utility provides the following features:
- A new scheduling method that allows all processing to be completed within a single address space
- Simplified setup and configuration using a single address space
- In-memory spill files that use 64-bit addressing
- Point-in-time change accumulation
- Priority scheduling

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• Cache storage management
• Improved performance
• Reduction or elimination of cross-memory data transfers
• Additional options that extend IMS/CA functionality

Product benefits

IMS HP Change Accumulation Utility provides the following benefits:

• Provides an easy-to-use interactive system productivity facility interface (ISPF) for setup and operation
  Alternative batch and extended batch interfaces are also provided.
• Can use custom or standard JCL procedures for processing job tasks
  Manual modification of JCL is not required.
  Multiple methods are available for scheduling JCL to be run.
• Provides a single point of control and reporting
• Enables you to quickly perform change accumulation for multiple change accumulation groups
• Reduces the need for manual intervention during the change accumulation process
• Allows you to reuse your existing IMS Database Recovery Control (DBRC) input stream processes to minimize additional setup
• Allows reuse of most DBRC skeletons without modification
• Leverages the latest technology to maximize the number of processes that can run concurrently
• Helps you efficiently manage resource consumption by limiting the number of parallel processes
  Performance controls allow some change accumulation groups to be processed serially when you need to allot CPU resources to other projects.
• Using IMS DBRC to determine which log files need to be read, which ensures that no data is omitted from the recovery process

Backup and recovery solutions

IBM solutions help IT organizations maximize their investment in DB2® and IMS databases while staying on top of some of today’s toughest IT challenges. Backup and recovery solutions can protect your data and lessen the negative impact that data loss can have on your business.

Backup and recovery is one of the most complicated areas of database management. Having the right resources to do a recovery is critical, and unfortunately in many cases, not addressed until after data is already lost.

Database backup and recovery solutions include recovering from a dropped object to bouncing back from a major disaster, and everything in between. Recoveries done manually can be error prone, time consuming, and resource intensive.

Some of the challenges you might face as a Database Administrator responsible for backup and recovery tasks include:

• Can a transaction be reversed or does the entire database have to be recovered?
• How can you determine which objects have been impacted?
• Do you have the necessary resources to recover to a point in time?
Are you prepared for a disaster? Can you recover your subsystem? How much data are you willing to lose?

Many IMS Tools products provide database management features not available in IMS itself or provide enhancements to capabilities built into IMS.

IMS HP Change Accumulation Utility, as a part of the IMS Recovery Solution Pack for z/OS, is one of several IMS Tools products that provide enhancements to the process of managing backup and recovery operations for your databases in the event of a system outage or application failure.

The following tools are included in the combined IMS Recovery Solution Pack for z/OS:
- IMS Database Recovery Facility
- IMS Database Recovery Facility: Extended Functions
- IMS HP Change Accumulation Utility
- IMS High Performance Image Copy
- IMS Index Builder

For more information, see the IMS Recovery Solution Pack: Overview and Customization.

**Database recovery and change accumulation overview**

Change accumulation is one of several IMS processes that can help you manage the successful backup and recovery of databases in the event of a system outage or application failure.

**IMS log information and DBRC**

While IMS is running, it records the event information that is necessary to restart the system if a hardware or software failure occurs. IMS activities are recorded in the following IMS logs:
- Write-ahead data set (WADS)
  A data set containing log records that reflect completed operations and are not yet written to an online log data set.
- Online log data set (OLDS)
  A data set that contains all the log records for IMS restart and recovery. There are many different types of records recorded in the logs so they eventually get archived to a system log data set (SLDS).
- System log data set (SLDS)
  This data set can be very large because it holds data from one or more OLDS. The SLDS can be used as input to a number of IMS utilities (for example, change accumulation) and for an emergency restart of IMS.
- Recovery log data set (RLDS)
  RLDS is like the SLDS except that it contains only the log records that are needed for a database recovery. The RLDS is mostly used as input to IMS database utilities (for example, change accumulation).

The IMS logs contain information about:
- IMS startups and shutdowns
- Changes made to databases
• Transaction requests received and responses sent
• Application program initializations and terminations
• Application program checkpoints
• IMS system checkpoints

IMS Database Recovery Control (DBRC) is the integral component of IMS that helps ensure IMS system and database integrity by recording and managing information that is associated with the logging process.

Additionally, DBRC facilitates database and log recovery by recording and maintaining information about the database and logs in the Recovery Control (RECON) data set.

As IMS runs, IMS logging records all events into the OLDS. As the OLDS fills, the records are archived to the SLDS and RLDS. These two data sets can be used as input for restart and recovery of a failed IMS or database.

The database recovery process

Recovering a database includes the following basic steps:
1. Restore the database to the most recent image copy
2. Use log data sets or change accumulation data sets to restore changes since the last image copy
   An image copy generally refers to an as-is image copy of a database (a backup copy) that is often used as input to a database recovery utility.
3. Back out any incomplete changes

Information for a database recovery can come from any or all of the following sources:
• Image copies of the database
• Database reorganization data sets
• Log data sets (SLDS and RLDS)
• Change accumulation data sets

The need for change accumulation

One problem with using SLDS and RLDS to recover a database is the large number of records that must be processed. Many system event type records that are contained in SLDS and RLDS are not required for database recovery.

The following characteristics of SLDS and RLDS highlight the difficulties for database recovery:
• Each SLDS or RLDS contains a record of activities of the entire system and all of the data sets within all the databases.

   Recovering a database requires only a single data set.
• SLDS and RLDS chronologically notes each change to any single record.

   Database recovery requires only the value of the data at the moment the data set was lost.

Change accumulation is the process of creating a compacted version of one or more IMS log data sets by eliminating records that are not related to recovery, and by merging multiple changes to a single segment into a single change.
Change accumulation can be viewed as a condensed version of the SLDS and RLDS. OLDS can also be directly used as input to change accumulation. With change accumulation, only the most recent database change records are collected, merged, and sorted by data set for a given database.

Change accumulation performs the following functions:
- Merges updates from different subsystems
- Selects only those log records that relate to the recovery of database
- Sorts these records by data set within a database
- Saves only the most recent state of each changed part of each data set

IMS provides a change accumulation utility called DFSUCUM0 to perform the change accumulation function.

IMS change accumulation (also known as IMS/CA) uses the concept of change accumulation groups (CAGRP). A CAGRP can be created to represent application specific databases, physically clustered databases, logically clustered databases, or even a single critical data database. The utility ultimately produces a change accumulation data set for each CAGRP.

An excellent source of information for the topic of database recovery can be found in *IMS Database Recovery Control (DBRC) Guide and Reference* (SC18-7818).

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**Change accumulation using IMS HP Change Accumulation Utility**

In the IMS world, change accumulation is the process of creating a compacted version of one or more IMS log data sets by eliminating records that are not related to recovery, and by merging multiple changes to a single segment into a single change.

IMS change accumulation (IMS/CA) has the following limitations:
- IMS/CA is sequential and can process only one CAGRP.
- The input logs (SLDS, RLDS, and OLDS) must be read for each change accumulation operation (repeated I/O).

When you use DFSUCUM0 to build multiple change accumulation data sets from the same IMS logs, you must process in sequence as many jobs or job steps as there are change accumulation data sets.

IMS HP Change Accumulation Utility augments the existing IMS/CA process by providing an environment in which DFSUCUM0 processes run in parallel. IMS HP Change Accumulation Utility creates multiple tasks in a single address space for reading the input log data sets and multiple z/OS address spaces for creating the new change accumulation data sets.

In an IMS environment with multiple systems, you can run IMS HP Change Accumulation Utility simultaneously for all systems.

IMS HP Change Accumulation Utility allows multiple CAGRPs to be processed while reading the input logs in one pass. This capability saves I/O and CPU resources and time.
Additionally, IMS HP Change Accumulation Utility enables multiple CAGRP's to be processed in parallel by submitting subordinate address spaces with each running change accumulation for a single CAGRP.

Optionally, IMS HP Change Accumulation Utility enables multiple CAGRP's to be processed as separate sub-tasks in a single address space.

In summary, IMS HP Change Accumulation Utility provides the following benefits:
- Schedules log and sort tasks
- Reads log files
- Routes log and control information to the started processes
- Reports activity for all tasks in a single consolidated report file

**IMS HP Change Accumulation Utility architecture and process flow**

IMS HP Change Accumulation Utility can operate in multiple address space mode or single address space mode.

The following diagram illustrates the change accumulation process flow for an IMS HP Change Accumulation Utility environment that includes two parallel log readers and four parallel Sort tasks.
In multiple address space mode, change accumulation data sets are built in parallel, and each Sort task resides in a separate address space.

In single address space mode (AS1), change accumulation data sets are built in parallel, and all Sort tasks reside within one control address space.

The following process steps match the numbers in the diagram:

1. The IMS HP Change Accumulation Utility driver retrieves the control and JCL information that was created during IMS HP Change Accumulation Utility setup tasks.
2. The IMS HP Change Accumulation Utility driver establishes the environment for a single copy of the IMS change accumulation utility.

Figure 1. IMS HP Change Accumulation Utility architecture and process flow
The IMS HP Change Accumulation Utility driver creates (for this example) four parallel subordinate sort processes to handle 4 CAGRP's. Each Sort process is either a separate task (TCB) when in single address space mode, or a separate address space when in multiple address space mode. Each Sort process invokes an instance of the IMS change accumulation utility.

3. The IMS HP Change Accumulation Utility driver creates (for this example) two parallel log read tasks that will read \( n \) number of logs. Each log is read just once.

4. All log records are selected according to the appropriate CAGRP and sent to the Sort task.

5. The Sort Controller invokes an instance of the IMS change accumulation utility.

6. IMS change accumulation utility invokes the Sort process.

7. The Sort process selects DB-change type records.

8. Records from the Sort process and old change accumulation data sets are merged.

9. The Merge process ultimately produces a new change accumulation data set.

10. The IMS change accumulation utility report is returned to IMS HP Change Accumulation Utility.

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**Product requirements**

IMS Recovery Solution Pack: IMS High Performance Change Accumulation Utility has the following software, hardware, operational, and storage area requirements.

**Hardware prerequisites**

IMS HP Change Accumulation Utility is designed to operate on any hardware configuration that supports the required versions of IMS.

**Software prerequisites**

IMS HP Change Accumulation Utility is designed to run with IMS V9.1 (5655-J38), IMS V10.1 (5635-A01), and IMS V11.1 (5635-A02), and runs on any IMS for S/390® software configuration that supports the required version of IMS.

**Compatibility with earlier releases**

This version of IMS Recovery Solution Pack: IMS High Performance Change Accumulation Utility is compatible with earlier releases.

**Extended batch**

Existing JCL and command files from previous IMS HP Change Accumulation Utility releases will continue to function without change.

**Two-step batch**

Existing JCL files from previous IMS HP Change Accumulation Utility releases will continue to function without change.
ISPF

You can reference existing IMS HP Change Accumulation Utility tables and IMS HP Change Accumulation Utility control file data sets with this version of the product. For each IMS ID, the conversion is performed on all field values that change from a previous version to the current version. However, when converted IMS IDs are referenced by the new version, it is not guaranteed that they will function properly if you attempt to roll them back to a prior version.

It is recommended that new IMS IDs be created for the current version and that you do not share them with a prior version.

If you roll forward an IMS ID, it is also recommended that the SETUP-A option be selected once to verify that all field values have been converted correctly.

IMS HP Change Accumulation Utility information

This topic describes the significant changes that have been made to IMS HP Change Accumulation Utility information, explains where to find DB2 and IMS Tools information on the Web, and explains how to receive information updates automatically.

Summary of changes

This topic summarizes the technical changes for this edition. Specific changes since the previous edition of this book are indicated by a vertical bar (|) to the left of a change. Editorial changes that have no technical significance are not noted.

SC27-1176-06
• Using PITCA with IMS Database Recovery Facility time stamp recovery

Information on the Web

The IMS Tools Library Web page provides current product documentation that you can view, print, and download. To locate publications with the most up-to-date information, refer to the following Web page:

http://www.ibm.com/software/data/db2imstools/imstools-library.html

IBM Redbooks® publications that cover DB2 and IMS Tools are available from the following Web page:

http://www.ibm.com/software/data/db2imstools/support.html

Receiving updates automatically

To automatically receive a weekly email that notifies you when new DCF documents are released, when existing product documentation is updated, and when new product documentation is available, you can register with the IBM My Support service. You can customize the service so that you receive information about only those IBM products that you specify.

To register with the My Support service:
1. Go to http://www.ibm.com/support/mysupport
2. Enter your IBM ID and password, or create one by clicking register now.
3. When the My Support page is displayed, click **add products** to select those products that you want to receive information updates about. The DB2 and IMS Tools category is located under **Software → Data and Information Management → Database Tools & Utilities**.

4. Click **Subscribe to email** to specify the types of updates that you would like to receive.

5. Click **Update** to save your profile.

### Accessibility features

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use a software product successfully.

The major accessibility features in IMS HP Change Accumulation Utility enable users to:

- Use assistive technologies such as screen readers and screen magnifier software. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.
- Customize display attributes such as color, contrast, and font size.
- Operate specific or equivalent features by using only the keyboard. Refer to the following publications for information about accessing ISPF interfaces:
  - z/OS ISPF User’s Guide, Volume 1
  - z/OS TSO/E Primer
  - z/OS TSO/E User’s Guide

These guides describe how to use ISPF, including the use of keyboard shortcuts or function keys (PF keys), include the default settings for the PF keys, and explain how to modify their functions.
Part 2. Configuring IMS HP Change Accumulation

IMS HPCA must be configured to meet the demands of your specific environment. Without configuration and setup, IMS HPCA will not be fully operational.

Before continuing, ensure that IMS HP Change Accumulation Utility has been installed as documented in the Program Directory for IMS Recovery Solution Pack for z/OS, GI10-8824-00. Also, ensure that the post-installation steps have been completed as documented in the IMS Recovery Solution Pack: Overview and Customization.

Topics:
• IMS HPCA setup and operation overview
Chapter 2. Completing IMS HP Change Accumulation Utility installation

IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility requires you to perform some post-installation procedures before the product is fully operational.

Topics:
- “Product requirements” on page 10
- “Post-installation procedures”
- “PROCLIB and JOBLIB requirements and usage” on page 16

Post-installation procedures

IMS HP Change Accumulation Utility requires specific customization procedures following installation.

Review the APF-authorization information in the IMS Recovery Solution Pack: Overview and Customization.

After completing the SMP/E install process, you must:

1. Modify your skeletal JCL, if this member has one or more job steps following the CA step.
2. Ensure that the userid/group that is assigned to the started tasks has ALTER authority to the IMS/CA master data.
   This requirement is necessary because the change accumulation address spaces can run as started tasks. The names of the started task procedures are determined by IMS HP Change Accumulation Utility using the HPCA-ID. You can define generic profiles hpca-id *.** for the RACF® class STARTED. Alternately, you can define a generic ** entry for the STARTED class of RACF and the generic "*" in the ICHRIN03 started procedures table.
3. Verify that IMS HP Change Accumulation Utility modules are installed in an APF-authorized library.

   Note: This step is not necessary if you are using only the single address space mode for invoking IMS HP Change Accumulation Utility.
4. Ensure that the TSO user ID that runs ISPF has CONTROL access to the RECON data sets.
   The userid on the batch JOB JCL statement (SET opt 2) also requires ALTER access to the IMS/CA master data sets and READ access to the IMS log data sets.
5. For IMS HP Change Accumulation Utility in batch mode, the user ID on the batch JOB JCL statement must have the following permissions:
   • CONTROL access to the RECON data sets
   • ALTER access to the IMS/CA master data sets
   • READ access to the IMS log data sets
6. If the IEFJOBS feature is used, ensure that the user ID that is assigned to the submitted job has the following permissions:
CONTROL access to the RECON data sets
ALTER access to the IMS/CA master data sets
READ access to the IMS log data sets

If you use the custom procedure method to store and process procedures of JOBs, the following two steps are required:

7. A PROCLIB with a record length of 80 and a fixed block attribute must be defined to either the IEFPSDI DD of the master scheduler JCL or to the PROCxx DDs of the started JES procedure.
   This PROCLIB is a partitioned data set that IMS HP Change Accumulation Utility allocates for writing members into and for starting IMS HP Change Accumulation Utility and its associated subordinate address spaces.

8. Optionally, add a JCL JOBS library, and make it accessible through the IEFJOBS DD of the master scheduler JCL.
   The record length and block size of this partitioned data set must conform to z/OS requirements.
   When the IEFJOBS library is used to start IMS HP Change Accumulation Utility address spaces, the PROCLIB data set is not required to be in the IEFPSDI or PROC00 concatenation.

If you use the standard procedure method, complete the following step:

9. The standard procedure or standard JOB JCL must be installed into a procedure library.
   For JOB JCL, the library must be in the IEFJOBS DD concatenation of the master scheduler JCL.
   PROCEDURE JCL can be in the IEFPSDI DD concatenation of the master scheduler or PROC00 DD of the started JES system.
   Users will require READ authority for the library.
   The members HPCSPROC and HPCSJOB in the IMS HP Change Accumulation Utility samples library describe the JCL and necessary modifications.

If you use the started task method, complete the following step:

10. The started task JCL must be installed into a library in the IEFPSDI DD or IEFJOBS DD concatenation of the master scheduler JCL.
    The member HPCSSTC in the IMS HP Change Accumulation Utility samples library describes the JCL and necessary modifications.

Note: Each time IMS HP Change Accumulation Utility is processed, the PROCLIB and the JCL JOBS libraries might be updated. Over time, the libraries will need to be compressed. It is recommended that you define the JCL JOBS and PROCLIB libraries as PDSE data sets. By doing so, you eliminate the need to compress the libraries. If the libraries are not defined as PDSE data sets, then you must include a periodic compress run in your job schedule.

---

**PROCLIB and JOBLIB requirements and usage**

IMS HP Change Accumulation Utility has different installation requirements based on the job processing method.

The following table describes the requirements for installing and invoking IMS HP Change Accumulation Utility using custom procedures, standard procedures, started task control (STC), and single address space (AS1).

OMIT means that the parameter must not be specified.
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Custom Procedures</th>
<th>Standard Procedures</th>
<th>Started Task Control</th>
<th>Single Address Space</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS HP Change Accumulation Utility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>member is added to PROCLIB and JOBLIB</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RACF authority required to PROCLIB/JOBLIB for all IMS HP Change Accumulation Utility users</td>
<td>UPDATE</td>
<td>READ</td>
<td>READ</td>
<td></td>
</tr>
<tr>
<td><strong>PROCLIB</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROCLIB in the master scheduler IEFPSDI</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>PROCLIB in the JES PROC00 concatenation (Optional)</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>JOBLIB</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOBLIB in the master scheduler IEFJOBS concatenation.</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td><strong>ISPF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invoke Setup Option 1</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>HPCSTASK</td>
</tr>
<tr>
<td>Member specification =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROCLIB specification =</td>
<td>YES</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOBLIB specification =</td>
<td>OPTIONAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Two-step batch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC= proiname (EXEC parameter)</td>
<td>OMIT</td>
<td>INCLUDE</td>
<td>HPCSTASK</td>
<td></td>
</tr>
<tr>
<td>STC= proiname (EXEC parameter)</td>
<td>OMIT</td>
<td>OMIT</td>
<td>INCLUDE</td>
<td></td>
</tr>
<tr>
<td>DD allocation required</td>
<td>HPCAPPROC</td>
<td>HPCAPPROC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DD allocation optional</td>
<td>HPCAJLIB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Extended batch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC= proiname (EXEC parameter)</td>
<td>OMIT</td>
<td>INCLUDE</td>
<td>HPCSTASK</td>
<td></td>
</tr>
<tr>
<td>STC= proiname (EXEC parameter)</td>
<td>OMIT</td>
<td>OMIT</td>
<td>INCLUDE</td>
<td></td>
</tr>
<tr>
<td>PROCEDURE NAME= proiname (command)</td>
<td>OMIT</td>
<td>INCLUDE</td>
<td>HPCSTASK</td>
<td></td>
</tr>
<tr>
<td>STC NAME= proiname (command)</td>
<td>OMIT</td>
<td>OMIT</td>
<td>INCLUDE</td>
<td></td>
</tr>
<tr>
<td>Procedures/JOBS written to DD</td>
<td>HPCAPPROC</td>
<td>HPCAPPROC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedures/JOBS written to DD (Optional)</td>
<td>HPCAJLIB</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3. IMS HP Change Accumulation Utility setup and operation


Topics:
- “IMS HP Change Accumulation Utility setup overview” on page 20
- “Modes for using IMS HP Change Accumulation Utility” on page 21
- “Setup phase and operation phase summary” on page 23
- “Methods for processing job tasks” on page 24
- “DBRC support” on page 25

IMS HP Change Accumulation Utility setup overview

Setup for IMS HP Change Accumulation Utility consists of creating JCL procedures and the IMS HP Change Accumulation Utility control file.

Summary of setup tasks:
- Create a control file member that contains user-provided options for IMS HP Change Accumulation Utility operation
- Create system and user-defined PROCLIB members for JCL
The following process steps match the numbers in the diagram:
1. Set options that specify the operation environment.
2. Option values are stored in the control file (HPCACTL) for reference during the IMS HP Change Accumulation Utility operation.
3. Create JCL for executing multiple parallel change accumulation processes.
4. JCL is stored as procedure library members (PROCLIB) or encoded for dynamic allocation.

**IMS HP Change Accumulation Utility operation overview**

IMS HP Change Accumulation Utility operation consists of using the JCL and control file created during the setup phase to schedule the processing of all input logs and CAGRP sorts.

IMS HP Change Accumulation Utility operation runs the JCL by using the control information to schedule job tasks in parallel:
- Parallel log readers
- Parallel sort tasks

*Figure 2. Summary of IMS HP Change Accumulation Utility Setup*
The following process steps match the numbers in the diagram:

1. IMS HP Change Accumulation Utility driver retrieves control and JCL information that was created during the setup phase.
   
   IMS HP Change Accumulation Utility driver creates subordinate processes. Each process is an address space or task.
   
2. IMS HP Change Accumulation Utility driver reads logs in parallel (multiple tasks).
   
   IMS HP Change Accumulation Utility can read up to 99 logs in parallel. Each log is read just once.
   
3. Records from the Sort process and old CA data sets are merged.
4. The merge process ultimately produces a new change accumulation data set.
   - Multiple parallel processes each running one copy of IMS/CA (sort)
   - 64-bit memory capability eliminates spill file
   - IMS HP Change Accumulation Utility manages the interface to DBRC

**Modes for using IMS HP Change Accumulation Utility**

Three modes of operation are available for using the IMS HP Change Accumulation Utility utility.

- ISPF user interface (ISPF/UI) mode
- Two-step batch mode
- Extended batch mode
**ISPF user interface (ISPF/UI) mode**

The ISPF mode is an interactive method for specifying global and runtime parameters for the IMS HP Change Accumulation Utility environment. ISPF is the easiest mode to use and is useful when processing parameters are frequently changed.

Other information about the ISPF mode includes the following items:
- Parameters are presented as options or selection lists, thereby making it unnecessary to remember parameter settings.
- Full context-sensitive help provides support.
- Settings are remembered across sessions.
- DBRC is required.

Refer to Chapter 6, “ISPF user interface mode,” on page 41.

**Two-step batch mode**

The two-step batch mode requires knowledge of DBRC utility control statements and is appropriate if your site uses an automated process to generate DBRC control statements.

Other information about the two-step batch mode includes the following items:
- Two-step batch creates JCL and the control file.
  You must then manually submit JCL to run the accumulation process defined by the control file.
- You use the two-step batch mode in combination with the ISPF or extended batch mode.
- An IMS HP Change Accumulation Utility-ID must be created in a permanent IMS HP Change Accumulation Utility control file prior to running two-step batch.
- Thereafter, you need to use ISPF or extended batch only when the setup parameters are changed for the IMS HP Change Accumulation Utility-ID or when a new IMS HP Change Accumulation Utility-ID is created.
- You can use batch JCL and DBRC GENJCL control statements to create new change accumulation JCL procedures to be submitted for processing.

Refer to Chapter 4, “Two-step batch mode,” on page 29.

**Extended batch mode**

The extended batch mode combines the setup and accumulation processes.

Other information about the extended batch mode includes the following items:
- Extended batch mode uses a single JCL stream for setup, control, and submission of the subordinate processes.
- This mode is a one-step process that uses JCL and control statements (does not require a SUBMIT).
- You can use this mode to perform most of the functions that are performed by the ISPF and two-step batch modes.
- This mode is appropriate if your site uses an automated JOB scheduling system.
- DDs provide some of the same values that can be set by using ISPF.
Many DDs are optional - IMS HP Change Accumulation Utility dynamically allocates those that are required.

The HPCSYSIN DD * provides free form commands to enter most of the values found in ISPF dialogs.

DBRC is optional.

Extended batch commands

- Batch mode uses keyword commands to set control file values
- Commands are not case-sensitive
- Free form, not column-restricted
- Order independent (with some exceptions)
- Defaults apply; most commands are never required

Refer to Chapter 5, “Extended batch mode,” on page 35.

Setup phase and operation phase summary

IMS HP Change Accumulation Utility operates in two phases to create the parallel environment.

- Phase 1 involves the setup and conversion of JCL to prepare the necessary procedures and control blocks.
- Phase 2 uses the output of phase 1 to schedule log files and subtasks or subordinate address spaces for the change accumulation process.

In phase 2, the IMS/CA utility (PGM=DFSUCUM0) is invoked in each subordinate address space to perform the change accumulation process.

The following table summarizes how and when each phase is used:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>ISPF</th>
<th>Two-step Batch</th>
<th>Extended Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1 setup</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel input fields describe external files, functions to perform, and the target CA groups.</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JCL DD statements describe external files.</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Phase 1 output from ISPF or Extended Batch describes functions to perform.</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS HP Change Accumulation Utility commands describe the functions to perform and the target CA groups.</td>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>User input defines the target CA groups.</td>
<td>YES</td>
<td>OPTIONAL</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 1 conversion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEN primary command produces and then converts JCL to procedures and control blocks.</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conversion is automatic.</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 2 scheduling</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. IMS HP Change Accumulation Utility setup and operation summary (continued)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>ISPF</th>
<th>Two-step Batch</th>
<th>Extended Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUN primary command submits JCL for scheduling of converted procedures.</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Independent processing of the IMS HP Change Accumulation Utility driver program, HPCADRIV, is required.</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>PGM=</td>
<td>HPCA0E00</td>
<td>HPCABAT0</td>
<td>HPCAMAIN</td>
</tr>
<tr>
<td>DBRC interface.</td>
<td>REQUIRED</td>
<td>OPTIONAL</td>
<td>OPTIONAL</td>
</tr>
<tr>
<td>Scheduling is automatic.</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

Methods for processing job tasks

IMS HP Change Accumulation Utility processes the JCL that is produced by the DBRC GENJCL.CA or an equivalent process.

The GENJCL.CA output is a multi-job or multi-step single JOB stream. IMS HP Change Accumulation Utility uses the JCL to create multiple procedures or JOBs, each representing one step of the original JCL.

The following sections describe the four job processing methods and considerations for selecting an appropriate method for your environment:

- **Custom job processing**
- **Standard job processing**
- “Started task control job processing” on page 25
- “Single address space job processing” on page 25
- “Selecting an appropriate job processing method” on page 25

Custom job processing

The custom job processing method writes each PROC or JOB to a PROCLIB or JOBLIB library.

These libraries must be available to the z/OS master scheduler or to the Job Entry Subsystem (JES). Custom procedures provide the greatest degree of flexibility and security control, but have resource and authority requirements.

Update authority is required for access to the PROCLIB and JOBLIB library.

Standard job processing

For the standard job processing method, an IMS HP Change Accumulation Utility defined member is added to the PROCLIB and JOBLIB libraries during installation.

IMS HP Change Accumulation Utility does not write the procedures into a library. Instead, the definition of each step is recorded in the IMS HP Change Accumulation Utility control file. The control file is merged with the standard JCL using dynamic allocation when each CA sort is initiated.
Standard procedures require fewer resources and less authority for access but are more restricted than custom procedures in accommodating special situations.

UPDATE authority to the procedure library is required only for installation.

**Started task control job processing**

The started task control (STC) job processing method provides features of both the custom and standard procedure methods.

For STC job processing, procedures are written to a user’s PROCLIB, but no special authorization is required for the library.

Like the standard procedure method, a single member must be inserted into a system procedure library during installation. This single member is then used to start all subordinate address spaces by using the JCL that is stored in the user’s procedure library.

As a result, this method provides the JCL flexibility that is associated with custom procedures, but has the lesser authority requirements that are associated with standard procedures.

**Single address space job processing**

The single address space (AS1) job processing method runs each CA group as a subtask within the control address space.

The advantages include a simplified setup, and fewer resource and security considerations. Access to a system PROCLIB is not required.

Some restrictions apply for single address space job processing, and not all environments can be supported.

**Selecting an appropriate job processing method**

All IMS HP Change Accumulation Utility operation modes (ISPF, two-step, and extended batch) can use any of the four job processing methods.

The mode determines the default job processing method.

- In ISPF mode, the single address space procedure is the default method if no other method is selected.
- For extended batch mode, the single address space procedure is the default method.
- No default is available for two-step batch mode. One of the four procedure methods must be selected.

Guidelines for selecting the appropriate procedure method are given in the following topics:

- Chapter 6, “ISPF user interface mode,” on page 41
- Chapter 4, “Two-step batch mode,” on page 29
- Chapter 5, “Extended batch mode,” on page 35

**DBRC support**

IMS HP Change Accumulation Utility can use DBRC services to generate JCL for each change accumulation group (CAGROUP).
Secondary logs

The DBRC GENJCL.CA command normally selects secondary logs (SECLOG) only if the paired primary logs (PRILOG) are marked in error.

IMS HP Change Accumulation Utility extends the capabilities of DBRC and IMS/CA to allow processing of either the set of primary logs or the set of secondary logs. DBRC is required and dual logging must be active.

When selected, the secondary log feature substitutes each secondary log for its corresponding primary log. Each primary log that is selected must be paired with a unique secondary log identified by SSID and Start time.

Two temporary files that are used in the process are dynamically allocated as shown in the following example:

HPCLOGIN DD UNIT=SYSDA,SPACE=(TRK,1),RECFM=FB,LRECL=80
HPCLOGOU DD UNIT=SYSDA,SPACE=(CYL,(50,50)),RECFM=FBA,LRECL=133

If the dynamic defaults are not sufficient, then you might want to preallocate these data sets. For example, you might want to use a unit name other than SYSDA, or you might have excessively large RECON data sets that require larger space allocations.
Part 3. Using IMS HP Change Accumulation modes

IMS HPCA provides three modes of operation.

Topics:
- Two-step batch mode
- Extended batch mode
- ISPF user interface mode
- Controlling IMS HPCA through ISPF
Chapter 4. Two-step batch mode

You can use IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility as a two-step batch operation to run multiple change accumulation groups in parallel.

Topics:
- “Creating the control member”
- “Generating JCLPROC”
- “Manually submitting JCL for change accumulation” on page 32

Creating the control member

When using IMS HP Change Accumulation Utility in two-step batch mode, you must first create the control member for the HPCA-ID that was selected when you started the ISPF dialog.

The control member implements the parameters that were specified for that ID.

Complete the following steps to create the control information required for the two-step batch mode:
1. Use the ISPF user interface to specify the control information.
2. Run the BAT command to create the control member.
3. Exit the ISPF user interface.

Setting the control information for two-step batch mode is a one-time operation unless you must change any control parameters in the future.

Generating JCLPROC

If you plan to run IMS HP Change Accumulation Utility as a two-step batch job, you must generate the JCLPROC.

Sample JCL for is shown in the following example:
JCL statement definitions for the first step are provided below.

**JOB statement**
This is the statement you entered in the Current® Environment Data panel.

**EXEC statement**
HPCABAT0 is the main entry program for this step. *hpca-id* is a parameter that identifies the IMS HP Change Accumulation Utility ID associated with the IMS system for which the CA is to run.

LIST=n (0,4,8) requests that the DBRC output be included in the IMS HP Change Accumulation Utility report file *(HPCPRINT)* for DBRC RC>n.

MAXLOGS=nnn specifies the upper limit on the number of log files that will be processed. Because a log file on tape can span multiple volumes, the actual number of mount requests might exceed MAXLOGS.

PROC=procname selects standard procedure or AS1 mode. The reserved name HPCSTASK identifies AS1 mode. For any other name, a corresponding member of a system library (IEFPDS,IEFJOBS,PROC00) will be used by the master scheduler to initiate IMS HP Change Accumulation Utility started tasks. HPCAPROC and HPCAJLIB DD's are optional.

SCAN analyzes setup parameters and JCL. Analysis is presented in the IMS HP Change Accumulation Utility Report file *(HPCPRINT)* DD. The SCAN reported information is described in **“SCAN” on page 156.**

STC=procname selects the STC method for JCL processing. The procname names a member of IEFPSI or IEFJOBS that will be used by the master scheduler to initiate IMS HP Change Accumulation Utility started tasks. The value STC=procname overrides the STC Name= command. STC overrides the standard procedure mode, as well.

**STEPLIB DD statement**
This DD statement is always included. It defines the IMS HP Change Accumulation Utility program load library. smphlq is the high-level qualifier for all IMS HP Change Accumulation Utility product libraries and is determined at installation time.

The data set concatenated to the IMS HP Change Accumulation Utility product library is the DBRC utility program load library. If the data set is not provided,
IMS HP Change Accumulation Utility expects the module DSPURX00 (DBRC utility program) to be available through the LINKLST data sets or in the LPALIB.

For DBRC API sequencing, the IMS RESLIB must be included in the IMS HP Change Accumulation Utility JCL.

**RECON DD statements**
RECON DD statements are present if they are not to be dynamically allocated. If the RECON data sets are to be dynamically allocated, then members for the RECON data sets that were built using the IMS DFSMDA macro must be present in the STEPLIB or in a library in LINKLST or in the LPALIB.

**HPCACTL DD statement**
This DD statement defines the IMS HP Change Accumulation Utility control data set. *hpchlq* is the IMS HP Change Accumulation Utility high level qualifier for data sets you provide when invoking ISPF.

**HPCPRINT DD statement**
This DD statement defines the IMS HP Change Accumulation Utility report data set. This can be SYSOUT or a user-allocated data set. Minimum DCB information is LRECL=133.

**HPCDBPRT DD statement**
This DD statement defines the IMS HP Change Accumulation Utility data set that will be a copy of the DBRC generated output (SYSPRINT). This can be SYSOUT or a user-allocated data set.

**SYSOUT DD statement**
This DD statement defines a sequential data set to contain error messages from the HPCABAT0 program. The dsname can be assigned to the JES SPOOL data set and is defined with LRECL=133, blocked or unblocked. You can use any dsname that is approved by your site.

**SYSPRINT DD statement**
This DD statement defines a sequential data set to contain output listings from the GENJCL procedure. It is defined with LRECL=133, blocked or unblocked. You can use any dsname that is approved by your site.

**JCLOUT DD statement**
This DD statement defines a sequential data set to contain the generated JCL of the GENJCL procedure. It is defined with LRECL=80, blocked or unblocked. You can use any dsname that is approved by your site.

**JCLPDS DD statement**
This DD statement defines the skeletal JCL library used by the GENJCL procedure to build the change accumulation JCL. The data set is created when IMS is installed. You should use the data set name that was defined at that time.

(JCLPDS is owned by DBRC and is an integral component of IMS, not IMS HP Change Accumulation Utility.)

**GENJCLIN DD statement**
This DD statement defines a sequential data set that contains input statements for the GENJCL procedure. This input can contain one or more GENJCL commands. Each command creates the JCL for the change accumulation. IMS HP Change Accumulation Utility processes change accumulation for each CAGROUP in parallel up to the threshold value specified as MAXOUT limit. The remaining are processed after the change accumulation SORT task becomes available.
The order of these commands in the GENJCL in/out stream determines the order in which the CAGROUPS are processed. If you want to process a CAGROUP with the highest priority, then place the GENJCL command for that CAGROUP as the first GENJCL command. It is recommended that CAGROUPS that have a higher number of log records to accumulate be given a higher priority.

**HPCAPROC DD statement**
This DD statement defines a procedure library that can be used by IMS HP Change Accumulation Utility. If a JOBLIB is not defined through the presence of the HPCAJLIB DD statement, this library must be accessible through the JES startup procedure for starting IMS HP Change Accumulation Utility subordinate address spaces. You can use any dsname that is approved by your site.

**HPCAJLIB DD statement**
This DD statement defines the JOBLIB into which IMS HP Change Accumulation Utility places the JCL of jobs to start the SORT address spaces.

**HPCSYSIN DD statement**
This DD statement defines IMS HP Change Accumulation Utility command statements.

**DBRC processing for generating JCLPROC**

DBRC is optional.

If the DD GENJCLIN is allocated, it must contain the GENJCL.CA command statements which DBRC will use. IMS HP Change Accumulation Utility connects directly to DBRC to process these commands.

If DD GENJCLIN is not allocated, then the DD JCLOUT must contain the JCL stream to be converted. JCLOUT might have been created by DBRC or by some other manual or automated process.

If DBRC is used, the command LISTC.CAGRP ALL should be appended to the GENJCL.CA commands and to the DBRC output file that SYSPRINT made available to IMS HP Change Accumulation Utility. The member HPCSPASS in the IMS HP Change Accumulation Utility samples library demonstrates a method of independently running DBRC. You can bypass DBRC by replacing the first step with a user-defined process.

**Manually submitting JCL for change accumulation**

You must manually submit the JCL that you create for change accumulation.

Sample JCL is shown in the following example:
JCL statement definitions for the second step are provided below.

**JCLLIB**
Specifies the procedure library used by IMS HP Change Accumulation Utility.

**JOBLIB**
JOBLIB is a concatenation of the IMS HP Change Accumulation Utility product library and the DBRC library that contains the DBRC utility program. This is usually the IMS RESLIB.

**EXEC statement**
Specifies that the HPCADRIV procedure should be processed. The HPCADRIV procedure is created by the BAT command and placed in the IMS HP Change Accumulation Utility procedure library.

### Sample HPCADRIV procedure
The JCL in the procedure shown in the following example is essentially the same JCL as that created by the GEN command.

The difference is that the GEN command creates an IMS HP Change Accumulation Utility job that is submitted by the RUN command, and the BAT command creates an IMS HP Change Accumulation Utility job that is submitted as part of your job stream.

The job that is created by the BAT command invokes IMS HP Change Accumulation Utility as a procedure. Using this indirect method enables you to maintain your batch job stream without making daily changes.

However, input to the DBRC utility program for GENJCL does require change. Each time the GENJCL input changes, a new batch procedure is created by Step 1.
Two-step batch mode restrictions

IMS HP Change Accumulation Utility is designed to run in multiple address spaces.

Specifying a VOLNUM parameter in the GENJCL input control statement causes a serialization of the change accumulation process when running the standard IMS change accumulation utility. This serialization is necessary if there is a large number of data sets and the number of device units is limited.

IMS HP Change Accumulation Utility resolves this issue by providing the INLIM parameter which restricts the number of log data sets being read in parallel to the number. The higher this number, the more you can achieve parallel processing.

```
//IEFPROC EXEC PGM=HPCADRIV,REGION=&RGN,
// PARM='&PARM1'
//*
//STEPLIB DD DISP=SHR,
// DSN=IMSYS.IB1ST527.CRESLIB
//RECON1 DD DISP=SHR,
// DSN=HPCA.IMS.RECON1
//RECON2 DD DISP=SHR,
// DSN=HPCA.IMS.RECON2
//HPCACTL DD DISP=SHR,
// DSN=VNDR400.CONTROL(HPCA#CTL)
//HPDMSG00 DD SYSDUT=ASOUT
//SYSIN DD SYSDUT=ASOUT
//SYSPRINT DD SYSDUT=ASOUT
//SYSDUMP DD SYSDUT=ASOUT
```

Figure 6. Sample HPCADRIV procedure
Chapter 5. Extended batch mode

You can use IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility as an extended batch operation to run multiple change accumulation groups in parallel.

Topics:
- "Extended batch modes of operation"
- “Sample extended batch JCL” on page 36
- “Extended batch control statements” on page 39

Extended batch modes of operation

The extended batch mode combines the setup and accumulation processes. Extended batch mode uses a single JCL stream for setup, control, and submission of the subordinate processes.

By performing only one job-step, the extended batch mode can interface with DBRC, create IMS HP Change Accumulation Utility procedures, and process multiple address space SORTS. The one-step process does not require ISPF or DBRC.

The extended batch mode does not support the specification of spill file and sort parameters by individual CA group.

The extended batch mode offers three modes of operation:

Mode 1
This mode is similar to the IMS HP Change Accumulation Utility ISPF user interface. You enter the parameters for DBRC GENJCL as control statements, and IMS HP Change Accumulation Utility interfaces with DBRC to generate the GENJCL input to create and process IMS HP Change Accumulation Utility procedures.

This mode requires DBRC and is selected when one or more GEN.GRPNAME statements are present in the HPCSYSIN control file. Each group is processed using the same DBRC GENJCL.CA parameters.

Mode 2
This mode is similar to the two-step batch process and is used when no GEN.GRPNAME statements are provided, and the GENJCLIN DD name is pre-allocated.

This mode requires DBRC. The GENJCLIN input file must contain DBRC GENJCL.CA input statements that you have either created manually or through a non-IMS automated procedure. GENJCL.CA parameters can vary by group. For example, they can use different skeletal JCL members.

Mode 3
This is the only mode that does not require DBRC to invoke IMS HP Change Accumulation Utility. If no GEN.GRPNAME statements are provided, and the GENJCLIN DD name is omitted, then DBRC is not used to generate IMS HP Change Accumulation Utility JCL.
In this mode, you must preallocate the JCLOUT DD name and create a JCL stream of the form that might be created by DBRC (for example, JCL created by a non-IMS automated procedure). The member HPCSPASS in the IMS HP Change Accumulation Utility samples library demonstrates of method of independently running DBRC. DBRC can be bypassed entirely by replacing the first step with a user defined process.

### Sample extended batch JCL

Sample JCL for running the extended batch mode is shown in the following example.

```plaintext
//JOBNAME job JOB INFORMATION
//*
//*
//*
//S1 EXEC PGM=HPCAMAIN,PARM='hpca-id,LIST'
//STELIB DD DISP=SHR,DSN=smphlq.SHPLMD0
// DD DISP=SHR,DSN=imsvs.17ists27.creslib
//RECON1 DD DISP=SHR,DSN=hpca.ims.recon1
//RECON2 DD DISP=SHR,DSN=hpca.ims.recon2
//*
//HPCACTL DD DISP=SHR,DSN=hpchlq.CONTROL
//HPCPRINT DD SYSOUT=* 
//HPCDBPRT DD SYSOUT=* 
//HPMSG000 DD SYSOUT=* 
//SYSPRINT DD DSNAME=dsname,DISP=SHR 
//JCLOUT DD DSNAME=dsname,DISP=SHR 
//JCLPOS DD DSNAME=dsname,DISP=SHR 
//GENJCLIN DD DSNAME=dsname,DISP=SHR 
//SYSOUT DD DUMMY,LRECL=133 
//HPCAJLIB DD DSNAME=dsname,DISP=SHR 
//HPCSYSIN DD *
//HPCSYSIN DD *

Parallel Logs = 4
Parallel Sorts = 6
Sort.FIlsz = 1000000
CA.Space = CYLS
CA.Primary = 100
CA.Secondary = 100
CA.Unit Count = 2

GEN.GENJCL = MEMBER(CAJCLTST)
GEN.GENJCL = DEFAULT(KEYR819C)
GEN.GRPNAME = CAGRPI
GEN.GRPNAME = CAGRP42
GEN.GRPNAME = CAGRP50
GEN.GRPNAME = CAGRP51
GEN.GRPNAME = CAGRP52
GEN.GRPNAME = CAGRP53

/*

Figure 7. Sample JCL for running the extended batch mode

where:

**JOB statement**

Specifies a valid JOB statement

**EXEC statement**

- **HPCAMAIN** is the extended batch program name.
hpca-id is the optional 1-to-4 character identifier that IMS HP Change Accumulation Utility uses as the prefix for members of the IMS HP Change Accumulation Utility control file and PROCLIB. This parameter value overrides the id= command value from HPCSYSIN. The default is IMS HP Change Accumulation Utility.

LIST/NOLIST are optional keywords to include or exclude the command lines listing in the IMS HP Change Accumulation Utility report. This parameter value overrides the LIST/NOLIST commands from HPCSYSIN. If both are provided, NOLIST overrides LIST. The default is NOLIST.

WARN=action is described under the GEN.WARN command later in this topic. The WARN= parameter overrides the value specified in GEN.WARN.

SCAN analyzes setup parameters and JCL. Analysis is presented in the IMS HP Change Accumulation Utility Report file HPCPRINT DD.

The optional PROC= parameter selects the standard procedure or AS1 method for JCL processing. The reserved name HPCSTASK indicates AS1 mode. For any other name, the name must be a member of the concatenation DD IEFPDSI of the master scheduler, DD IEFJOBS of the master scheduler, or DD PROC00 of the active JES.

The optional STC= parameter selects the STC method for JCL processing. The STC parameter overrides the STC NAME= command and also the standard procedure method.

STEPLIB DD statement
This DD statement is always included. It defines the IMS HP Change Accumulation Utility program load library. smphql is the high-level qualifier for all IMS HP Change Accumulation Utility product libraries and is determined at installation time.

The data set concatenated to the IMS HP Change Accumulation Utility product library is the DBRC utility program load library. If the data set is not provided, IMS HP Change Accumulation Utility expects the module DSPURX00 (DBRC utility program) to be available through the LINKLST data sets or in the LPALIB.

For DBRC API sequencing, the IMS RESLIB must be included in the IMS HP Change Accumulation Utility JCL.

RECON DD statements
RECON DD statements are present if they are not to be dynamically allocated. If the RECON data sets are to be dynamically allocated, then members for the RECON data sets that were built using the IMS DFSMDA macro must be present in the STEPLIB or in a library in either the LINKLST or in the LPALIB.

HPCACTL DD statement (optional)
This DD statement defines the IMS HP Change Accumulation Utility control data set that is used for communicating between the IMS HP Change Accumulation Utility main task and the IMS HP Change Accumulation Utility SORT address spaces.

Write access is required.

The IMS HP Change Accumulation Utility control data set can be the same data set that is used in the ISPF user interface and two-step processes, in which case the hpca-id members of the control file are overwritten. If you omit the HPCACTL DD statement, IMS HP Change Accumulation Utility allocates a temporary file.

HPCPRINT DD statement
This DD statement defines the IMS HP Change Accumulation Utility report
file. Write access is required. The report file can be spooled SYSOUT or a user-defined data set. The minimum required DCB is LRECL=133.

**HPCDBPRT DD statement**
This DD statement defines the IMS HP Change Accumulation Utility data set that is a copy of the DBRC generated output (SYSPRINT). This value can be SYSOUT or a user-allocated data set.

**HPCMSG00 DD statement**
This DD statement defines a file for selected error messages from the HCADRIV program. Write access is required. The file can be spooled SYSOUT, a user-defined data set, or DUMMY. The minimum required DCB is LRECL=121.

**SYSPRINT DD statement (optional)**
This DD statement defines a sequential data set to contain output listings from the GENJCL command. It is defined with LRECL=133, blocked or unblocked. You can use any dsname that is approved by your site. Write access is required. If you omit the SYSPRINT DD statement, IMS HP Change Accumulation Utility allocates a temporary data set, when necessary.

**JCLOUT DD statement (optional)**
This DD statement defines a sequential data set to contain the generated JCL of the GENJCL command. It is defined with LRECL=80, blocked or unblocked. You can use any dsname that is approved by your site. Write access is required for modes 1 and 2. If you omit the JCLOUT DD statement, IMS HP Change Accumulation Utility allocates a temporary data set, when necessary.

**JCLPDS DD statement**
This DD statement defines the skeletal JCL library that is used by the GENJCL procedure to build the change accumulation JCL. The data set is created when IMS is installed. You can use the data set name that was defined at that time.

(JCLPDS is owned by DBRC and is an integral component of IMS, not IMS HP Change Accumulation Utility.)

**GENJCLIN DD statement**
This DD statement defines a sequential data set that contains input statements for the GENJCL procedure. Write access is required. This input can contain one or more GENJCL commands. Each command creates the JCL for the change accumulation. IMS HP Change Accumulation Utility processes change accumulation for each CAGROUP in parallel up to the threshold value specified as MAXOUT limit. The remaining CAGROUPS are processed after the change accumulation SORT task becomes available.

The order of these commands in the GENJCL in/out stream determines the order in which the CAGROUPS are processed. If you want to process a CAGROUP with the highest priority, then place the GENJCL command for that CAGROUP as the first GENJCL command. It is recommended that CAGROUPS that have a higher number of log records to accumulate, be given a higher priority.

If you omit the GENJCLIN DD statement, IMS HP Change Accumulation Utility allocates a temporary data set, when necessary.

**SYSOUT DD statement**
This DD statement defines a sequential data set to contain error messages from the HPCAMAIN program. Write access is required. The dsname can be assigned to the JES SPOOL data set and is defined with LRECL=133, blocked or unblocked. You can use any dsname that is approved by your site. The file can be spooled SYSOUT, a user-defined data set, or DUMMY.
**HPCAPROC DD statement**
This DD statement defines a procedure library that can be used by IMS HP Change Accumulation Utility. Write access is required. If a JOBLIB is not defined through the presence of the HPCAJLIB DD statement, this library must be accessible through the JES startup procedure for starting IMS HP Change Accumulation Utility subordinate address spaces. You can use any dsname that is approved by your site.

HPCAPROC DD is optional for the standard procedure mode and for the single address space mode (AS1).

**HPCAJLIB DD statement (optional)**
This DD statement defines the JOBLIB into which IMS HP Change Accumulation Utility places the JCL of jobs to start the SORT address spaces. Write access is required.

**HPCSYSIN DD statement**
This DD statement defines the control statements that are submitted to HPCAMAIN. The file can be fixed or variable, maximum record length is 254. The file can be spooled SYSIN or a user-defined data set. Concatenation can be used to provide standard parameters that are seldom changed and local one-time overrides. You generally use the HPCSYSIN DD statement if the HPCAMAIN JCL was stored as a PROCLIB member for multiple reuse.

For example, you can use the following setup file to define typical default values and then require for processing only the names of the CA groups:

```
//HPCSYSIN DD DSN=some.set.of.defaults,DISP=SHR
//   DD DDNAME=LCLSYSIN
...  ...  ...
//LCLSYSIN DD *
   GEN.GRPNAME = CAGRP01
   GEN.GRPNAME = CAGRP02
   GEN.GRPNAME = CAGRP06
/*
```

**HPCACOLP, HPCACOLS, HPCACSV, HPCAHTML, HPCXML DD statements (optional)**
Use these DD statements to select optional report outputs.

---

**Extended batch control statements**
Control statements used in extended batch are commands that are equivalent to most of the parameters that are entered for ISPF user interface processing.

The HPCSYSIN DD is required and, together with the DD allocations, provides the control functions of IMS HP Change Accumulation Utility.

Commands relevant to extended batch are described in Chapter 9, “IMS HP Change Accumulation Utility JCL parameters,” on page 91.
Chapter 6. ISPF user interface mode

You can use the ISPF user interface mode to specify global and runtime parameters for your IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility environment and run multiple change accumulation groups in parallel.

Topics:
- “Starting the ISPF user interface”
- “Creating the HPCA-ID and profile” on page 45
- “Defining DBRC utility data sets” on page 46
- “Displaying CAGROUPs” on page 48
- “Setting CAGROUP-dependent control parameters” on page 50
- “Using IMS HP Change Accumulation Utility ISPF line commands” on page 52
- “Assigning skeletal JCL member names” on page 52
- “Using IMS HP Change Accumulation Utility ISPF primary commands” on page 54
- “Displaying current environment data (ENV command)” on page 56
- “Displaying job status (STAT command)” on page 57
- “Submitting JCL for processing (RUN command)” on page 58

Starting the ISPF user interface

You use the ISPF user interface to specify control information for the IMS HP Change Accumulation Utility environment.

If you encounter problems, enter HELP on any panel for an explanation of what can be entered on the panel.

Required libraries

Before you run the ISPF user interface, ensure that the following libraries exist:
1. smphlq.SHPCCEXE (CLISTs)
2. smphlq.SHPCPLIB (Panels)
3. smphlq.SHPCMLIB (ISPF messages)
4. smphlq.SHPCMD0 (Programs)

You do not need to change your TSO logon procedure to include any of the previous libraries.

ISPF data sets

The ISPF user interface uses the following data sets when ISPF is running.

hpchlq.CONTROL

This is a partitioned data set that is created by ISPF to contain control information for the ISPF user interface. If the data set exists, it is reused. This data set is defined with variable length unblocked records. The ISPF user interface generates the following members:
**hpca-id#BAT**
This member contains global control information records and run-time parameter values for each CAGROUP that is selected for processing. If you plan to run IMS HP Change Accumulation Utility as a batch job using a two-step procedure, this member must contain the CAGROUP-dependent control information for all CAGROUFS that are registered in the RECON data set.

**hpca-id#CTL**
This member contains records from the HPCA#BAT member and records built from the output of the GENJCL procedure. The information in this member is run dependent. For each selected CAGROUP for which change accumulation occurs, relevant records for that CAGROUP are selected from HPCA#BAT and merged with the records from the output of the GENJCL procedure.

**hpca-id#GIN**
This member contains input statements to the GENJCL procedure. These statements are built using information you provide through the ISPF user interface. When running IMS HP Change Accumulation Utility as a batch job using a two-step procedure, you provide the input to the GENJCL procedure through the GENJCLIN data set.

**hpca-id#DRIV**
This member contains the JCL to run IMS HP Change Accumulation Utility for the IMS system that is associated with the IMS HP Change Accumulation Utility ID.

**hpchlq.SYSIN**
This is a temporary sequential data set that is used by the ISPF user interface to hold the input to the DBRC utility program.

**hpchlq.JCLOUT**
This is a temporary sequential data set that is used by DBRC to output the JCL it creates.

**hpchlq.SYSPRINT**
This is a temporary sequential data set that is used by the ISPF user interface to hold the output from the DBRC utility program.

**hpchlq.HPCTABLE**
This is a partitioned data set created by the ISPF user interface to hold control information. If the data set does not exist, it is created and maintained across ISPF sessions. This data set contains the following ISPF tables:
- HPCTIMS
- HPCTCA
- HPCTENV
- HPCTSRM
- HPCTLOG

This data set is allocated to ISPTLIB and ISPTABL using the LIBDEF facility of ISPF. You do not need to allocate the data set in your LOGON procedure.

**hpchlq.SAMPLIB**
This library is provided with the product and contains sample JCL.

You do not need to allocate work data sets or an ISPF tables data set because they are allocated by the ISPF user interface.
Information about the ISPF screen display

- If your screen size is 24 X 80 and your screen shows the PFK settings, you might not see all the data IMS HP Change Accumulation Utility displays.
- Use the ISPF command FKA OFF to remove the display of the PFK settings.

Activating the ISPF interface

Perform the following steps to activate the ISPF interface for IMS HP Change Accumulation Utility:

1. From ISPF main menu, select Option 6: Command.

   The ISPF Command Shell is displayed.

2. From the ISPF Command Shell, enter a command string using the following syntax:

   EX 'smphlq.SHPCCXE(HPCC000)' 'SMTPHLQ(smphlq) HPCHLQ(hpchlq) <VOL(volser)> <PDSE>''

   The following list defines the keywords that are used to run the ISPF user interface:

   **SMTPHLQ**
   - Specify the high-level qualifier of your installation data set.

   **HPCHLQ**
   - Specify the high-level qualifier for work data sets required by the ISPF user interface.

   **VOLSER**
   - Specify the volume serial number of the DASD device on which the work data sets are allocated. This parameter is optional.

   **PDSE**
   - Specify that PDSE data sets are to be used for the IMS HP Change Accumulation Utility work files. The default is to define the data sets as PDS. PDS data sets require periodic compression.

   For example:
3. The IBM copyright screen appears.

4. Press Enter to continue.

The HPCA-ID/IMS Profile panel displays:

```
Command ===> _____________________________________ Scroll ===> Page

Enter END (PF3) to exit.

To create a new HPCA-ID/IMS profile, enter an HPCA-ID and its description

HPCA-ID: ____ Profile Description: ______________________________

Enter line command S to select an IMS System for this run
T to setup DBRC product datasets
D to delete an HPCA-ID profile

Cmd HPCA-ID HPCA-ID/IMS Profile Description
--- ------- -------------------------------
_ IMST IMS Version n.n Test
```

Figure 9. ISPF Command String

Figure 10. ISPF IBM Copyright Screen

Figure 11. HPCA-ID/IMS Profile - part 1
Creating the HPCA-ID and profile

Use the HPCA-ID/IMS Profile panel to specify an HPCA-ID that uniquely identifies an IMS system on which the IMS HP Change Accumulation Utility program runs.

The HPCA-ID/IMS Profile panel in represents the main ISPF panel for IMS HP Change Accumulation Utility.

For example:

<table>
<thead>
<tr>
<th>HPCA-ID</th>
<th>HPCA-ID/IMS Profile Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMST</td>
<td>IMS Version n.n Test</td>
</tr>
<tr>
<td>IMSP</td>
<td>IMS Version n.n Production</td>
</tr>
</tbody>
</table>

Figure 12. HPCA-ID/IMS Profile - part 2

Specifying the HPCA-ID name and profile

An HPCA-ID profile is an entry in a table that associates an HPCA-ID with its related DBRC utility program data sets.
Each HPCA-ID is associated with data sets that are required by the DBRC utility program.

To create an HPCA-ID profile, enter any 1-4 character string to represent the HPCA-ID name. You can use the IMS System ID for this name.

Enter a 1-30 character string as a short descriptor of the IMS system identified by the HPCA-ID. It is recommended that you include the IMS release level in the descriptor. The HPCA-ID/IMS Profile panel shows a sample list of existing HPCA-ID profiles.

To delete an entry from the table, enter the D line command.

**Associating DBRC utility data sets**

An HPCA-ID profile is not complete until the DBRC utility program data sets have been associated with the HPCA-ID.

To create the association, enter the line command T, or wait until prompted by the system. You can also use the T line command when you want to change the data sets associated with an HPCA-ID.

To use the ISPF user interface for a specific IMS system, select the HPCA-ID by entering the S line command in the table row for that HPCA-ID. If the DBRC data sets for the selected HPCA-ID have not been defined, you are prompted to define them using the DBRC Utility Data Sets panel.

You can also enter line commands on multiple lines. The commands are processed in the sequence of displayed rows.

---

**Defining DBRC utility data sets**

Use the DBRC Utility Data Sets panel to define, for an HPCA-ID, the data set names that are required by the DBRC utility program.

If the DBRC data sets for the selected HPCA-ID have not been defined in the HPCA-ID/IMS Profile panel, you are prompted to define them.

You can also display the DBRC Utility Data Sets panel by entering the line command T on the HPCA-ID/IMS Profile panel.

For example:
To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous ISPF panel is displayed.

To continue processing with the selected HPCA ID enter the END command (typically, PF3).

The CA Group Selection panel displays with a table of CAGROUPs that have been defined in the RECON data sets.

**Field descriptions for DBRC Utility Data Sets panel**

**HPCA-ID**
Shows the current IMS HP Change Accumulation Utility ID selected.

**DBRC Utility RESLIB dsname**
Specify the dsname of the library that contains the DBRC utility program DSPURX00. This library is normally the same as the IMS RESLIB. This field can be left blank to indicate that the dsname is in the LINKLST. If the dsname is fully qualified, it must be entered in single quotes. If the name is not enclosed in single quotes, the TSO user ID is prefixed to the entered dsname. One additional load library is optionally provided for concatenation to the IMS RESLIB. This second library can be used for locating IMS local exit modules that are not in the same library as the DBRC utility (DSURX00).

**DBRC Skeletal Library dsname**
Specify the dsname of the library that contains the skeletal JCL members for the DBRC utility program. If the dsname is fully qualified, it must be entered in single quotes. If the name is not enclosed in single quotes, the TSO user ID is prefixed to the entered dsname. This entry is required.

**Dynamic allocation option of RECON data sets**
Specify whether (Y) or not (N) the RECON data sets are dynamically allocated. If the RECON data sets are to be dynamically allocated, the DFSMDA members for RECON1 and RECON2, must have been created and placed in a data set. Typically, this data set is the same data set that contains the DSPURX00 program. If not, then you must specify the name of the data set that contains the DFSMDA modules.
**DFSMDA Library dsname**
Specify the dsname of the library that contains the dynamic allocation modules for the RECON data sets defined through the IMS macro DFSMDA. This name is required only if the Dynamic Allocation option is Y and the dynamic allocation modules are not in the DBRC utility program load library.

If the dsname is fully qualified, it must be entered in single quotes. If the name is not enclosed in single quotes, the TSO user ID is prefixed to the entered dsname.

**RECON1 Data Set dsname**
Specify the dsname of the RECON1 data set. If the Dynamic Allocation option is N, enter the dsname of the RECON1 data set. If the dsname is fully qualified, it must be entered in single quotes. If the name is not enclosed in single quotes, the TSO user ID is prefixed to the entered dsname.

**RECON2 Data Set dsname**
Specify the dsname of the RECON2 data set. If the Dynamic Allocation option is N, enter the dsname of the RECON2 data set. If the dsname is fully qualified, it must be entered in single quotes. If the name is not enclosed in single quotes, the TSO user ID is prefixed to the entered dsname.

If the Dynamic Allocation option is N, both RECON1 and RECON2 dsnames are required.

**RECON3 Data Set dsname**
Specify the dsname of the RECON3 data set. This entry is optional. If the Dynamic Allocation option is N, enter the dsname of the RECON3 data set. If the dsname is fully qualified, it must be entered in single quotes. If the name is not enclosed in single quotes, the TSO user ID is prefixed to the entered dsname.

**Displaying CAGROUPs**
The CA Group Selection panel displays all the CAGROUPS that are registered in the RECON data set.

For example:
After group selection example:

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous ISPF user interface panel is displayed.

The CA Group Selection panel includes all CAGROUPS in the RECON data set. Select those CAGROUPS that IMS HP Change Accumulation Utility is to include in its processing. Use the line command S to select a CAGROUP and U to deselect a CAGROUP.

If you plan to run IMS HP Change Accumulation Utility in batch mode and you are using the ISPF user interface in a one-time effort to build control information, then select all CAGROUPS displayed.

The following items explain panel functions:

- The primary command S* or S All selects all CAGROUPS.
- Multiple S and U line commands can be entered.
- Selected CAGROUPS appear with SELECTED in the ACTION column.
- Deselected CAGROUPS appear with a blank in the ACTION column.
You can scroll up and down the table.

After the selection is complete, enter the END command (usually, PF3) to continue processing. The Selected CA Groups panel displays.

**Setting CAGROUP-dependent control parameters**

You use the Selected CA Groups panel to set CAGROUP-dependent control parameters for each CAGROUP.

The Selected CA Groups panel displays after you select the CAGROUPS to be processed. Each row of the table represents a CAGROUP and its values as recorded in the RECON data set.

Initially, all CAGROUPS have these parameters set to the same default values.

For example:

![Figure 17. Selected CA Groups panel](image)

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous ISPF user interface panel is displayed.

Use the line commands **L** and **S** to change the CAGROUP-dependent parameter values.

From this panel, you can perform many actions that affect processing of selected CAGROUPS.

- For more information about **line commands** that are available on this panel, see "Using IMS HP Change Accumulation Utility ISPF line commands" on page 52.
- For more information about **primary commands** that are available on this panel, see "Using IMS HP Change Accumulation Utility ISPF primary commands" on page 54.

**Field descriptions for Selected CA Groups panel**

**HPCA-ID**

Shows the current HPCA-ID selected.
DEFAULT VOLNUM
Provides a default value to be used for the VOLNUM parameter of each CA group when generating the DBRC GENJCL inputs. This default is applied to each selected group unless a group has been assigned an individual VOLNUM value. Providing a default is a convenient way of setting the VOLNUM for all selected groups.

CAGROUP
Displays the name of a selected CAGROUP. You cannot change this value.

PRTY
Displays the priority of performing the change accumulation. 01 is the highest priority; 99 is the lowest. You can set the priority for each CAGROUP and then sort the table by priority (see SORT command below). The output from GENJCL and the processing of the CAGROUP will be in the sorted order.

REUSE
Contains information obtained from the RECON data set. It is the REUSE/NOREUSE option for the CAGROUP when the CAGROUP was registered in the RECON. N indicates that a data set will be allocated to create a new CA data set. Y indicates that the system will use the oldest of the data sets defined for the CAGROUP to create a new CA data set. The line command C is not permitted if REUSE is Y. In this case, data set allocation parameters for a new CA data set are not relevant. This field cannot be changed.

SKEL.MBR
Specify the name of the skeletal JCL execution member that is to be used by the GENJCL command. You can enter a different member name in this field; however, the member must exist in the skeletal JCL library.

VOLNUM
Specify the VOLNUM value to be used for this selected CA group. The value of VOLNUM overrides any setting for DEFAULT VOLNUM. VOLNUM 999 cancels the effect of the DEFAULT VOLNUM.

CATIME
Specify the time after which no log volumes for the selected CAGROUP are to be included. The time stamp need not be the stop time of any log volume. All log volumes that have start times less than or equal to the specified time stamp are included in the CA processing. The time stamp must be in the standard format:

```
yydddhhmmssst
```

or

```
[yy]yy|dd|hh|mm|ss|t
```

where:

- **yy (yyyy)** is the year 00-99 (0000-9999)
- **ddd** is the day (0000-365)
- **hh** is the hour (00-23)
- **mm** is the minute (00-59)
- **ss** is the second (00-59)
- **t** is the tenth of a second (0-9)
- **|** is any non-numeric character delimiter including blank but excluding the single quote;
- if delimiter is a blank, comma or parentheses, the time stamp must be enclosed in single quotes
Using IMS HP Change Accumulation Utility ISPF line commands

Use the line commands from the Selected CA Groups panel to specify additional information to tailor GENJCL command processing or IMS HP Change Accumulation Utility processing.

Additional tailoring of GENJCL command processing can be specified for user key resolution and volume specification to hold the new CA data set.

IMS HP Change Accumulation Utility uses a set of default parameter values when processing the IMS Change Accumulation utility program. You can override these values, such as space allocation parameters for SORT work data sets, to accommodate specifics of the CAGROUP. The values you choose for the selected CAGROUP override default settings for that CAGROUP, only.

To override the default settings for a specific CAGROUP, use the following line commands:

- To set space allocation parameters for all SORT work data sets used for the selected CAGROUP during change accumulation, use the S line command.
  
  This command is equivalent to using Option 3 from the SET primary command.
- To set space allocation parameters for the log spill data sets, use the L line command.
  
  This command is equivalent to using Option 5 from the SET primary command.

If user keys are present in the skeletal JCL for a CAGROUP, the values for these user keys are set through the M and K line commands.

Using the END command (usually, PF3) causes the CA Spill Parameters panel to display.

Assigning skeletal JCL member names

If user keys are present in the skeletal JCL member, you must assign values for them prior to processing the GEN command.

You can use either of the following two methods to assign values:

- “Entering user key values from the skeletal JCL library”
- “Entering user key values directly” on page 53

Entering user key values from the skeletal JCL library

You can use the Key Defaults Member List pane to enter the user keys and their values as records of a member in the skeletal JCL library.

When you enter user keys and their values as records of a member in the skeletal JCL library, you should format the records prior to running the ISPF user interface.

Select the line command M from the Selected CA Groups panel. The Key Defaults Member List panel displays. Use this panel to enter member names to resolve user keys.
You can enter up to ten skeletal JCL defaults member names. User keys are searched for in the order in which the members are specified.

For example:

![Figure 18. Key Defaults Member List panel](image)

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

**Entering user key values directly**

You can use the User Keys panel to enter the values of the user keys directly.

Select the line command K from the Selected CA Groups panel to display the User Keys panel. Use this panel to specify user key values.

User keys in the skeletal JCL member display as rows of a table.

For example:

![Figure 19. User Keys panel](image)
To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

**Field descriptions for User Keys panel**

**Userkey**
Displays the user key (non-IBM key) found in the skeletal JCL. This field cannot be changed.

**Key value**
Specify the value to be assigned to the associated user key. The value can be any character string enclosed in single quotes. The maximum length of the value is 132 characters (excluding the quotes). If the value contains a quote, use two single quotes to represent the quote in the key value. Value can be a null string (" ").

If a keyword is assigned a value here (as well as through a defaults member name), IMS HP Change Accumulation Utility uses the value you specify here.

If a keyword is assigned a value using both the defaults member name and the USER KEY parameters, the value specified in USER KEY is used.

Members that are specified using the defaults member name must exist in the skeletal JCL library.

---

**Using IMS HP Change Accumulation Utility ISPF primary commands**

This topic summarizes the primary commands available from the Selected CA Groups panel.

The following primary commands are used to set default control information values and to build the control parameters that are required by IMS HP Change Accumulation Utility.

**SET** Sets the default IMS HP Change Accumulation Utility control parameter values, as well as the space allocation parameters for all log spill data sets. You can override space allocation parameters for any CAGROUP by using the line commands at the CAGROUP level.

The SET command and the L line commands have similar menus. The SET menu is at the global level, and the L line command menu is at the CAGROUP level.

For a description of menu items, see Chapter 7, “Controlling IMS HP Change Accumulation Utility through ISPF,” on page 61.

**GEN** Creates the control information records that are required to run IMS HP Change Accumulation Utility. These records are created from the setup values entered using the SET command and the output of the GENJCL procedure for the CGROUPS selected for the IMS HP Change Accumulation Utility run. In addition, the GEN command creates the JCL to run IMS HP Change Accumulation Utility.

**ENV** Displays the current settings of the runtime parameters. An example of the panel resulting from the ENV command is displayed in “Displaying current environment data (ENV command)” on page 56.

**FAST (Create Control and Processing Information)** Combines the processing values of the GEN and RUN commands.
RUN  Submits the JCL created by the GEN command to the z/OS internal reader for processing.

STAT (Display Job Status)
Displays the status of the submitted IMS HP Change Accumulation Utility job. If no IMS HP Change Accumulation Utility job has been submitted, STAT displays the status of all jobs for the TSO user ID. An example of the panel that results from the STAT command is displayed in "Displaying job status (STAT command)" on page 57.

BAT (Create Control Information for Batch Mode)
Creates control parameters for running batch jobs.

SORT  Sorts the displayed table by PRTY or by CAGROUP. To sort the table by PRTY, enter the SORT command without parameters. To sort it by CAGROUP, enter the command SORT CAG.

SCAN  Analyzes setup parameters and JCL. Analysis is displayed in Browse format for review. The information reported by SCAN is described in Chapter 14, “Using diagnostic resources,” on page 155.

JCL  The JCL command converts the current environment settings to JCL that will process the extended batch function. The JCL is displayed and can be viewed, modified, submitted, or saved.

You can change one or more fields in multiple rows before pressing the Enter key, and you can enter multiple line commands. Processing is performed in the sequence of the CAGROUP name.

Changes are applied in two phases:
- In the first phase, fields in selected rows are changed when there is no plausibility check failure.
- In the second phase, rows with plausibility errors are processed again, and an error message is displayed for the field in error.

The row that contains the error displays at the top, and line commands are ignored for rows with errors.

Generally, all row modifications should precede any primary command. However, if a primary command is also entered with line commands and field modifications, then processing depends on the type of primary command that was entered.

The SET, ENV, SORT, RUN and STAT primary commands are processed immediately and cause line commands and field modifications to be ignored. The GEN, BAT and FAST commands are ignored if any row has a line command or a field modification.

If DBRC returns with a highest return code of 4 during the processing of the GEN command, the output in SYSPRINT is displayed, as shown in Figure 20 on page 56. The description explains the cause of the error.

You can either cancel the GEN command (by issuing the CAN command), or continue by entering the END command (usually, PF3).
For example:

```plaintext
GENJCL Messages - 'VNDR400.SYSPRINT'   GENJCL returned with err

Enter END (PF3) to exit. Enter CAN to exit without processing.

*******************************************Top of data*******************************************
1   IMS VERSION 11 RELEASE 1 DATABASE RECOVERY CONTROL PAGE 000
   GENJCL.CA GRPNAME(CAGRP1)-
   NOJLIST NOJOB
DSP0326I UNDEFINED SIMPLE KEYWORD %USERNAME IN SKELETAL JCL
DSP0326I MEMBER CAJCL DD NAME JCLPDS RECORD NUMBER 00001
DSP0326I UNDEFINED SIMPLE KEYWORD %USERID IN SKELETAL JCL
DSP0326I MEMBER CAJCL DD NAME JCLPDS RECORD NUMBER 00002
DSP0326I UNDEFINED SIMPLE KEYWORD %PRINT IN SKELETAL JCL
DSP0326I MEMBER CAJCL DD NAME JCLPDS RECORD NUMBER 00004
DSP0203I COMMAND COMPLETED WITH CONDITION CODE 04
DSP0220I COMMAND COMPLETION TIME 01.230 15:09:06.6
1   IMS Version 11 RELEASE 1 DATABASE RECOVERY CONTROL PAGE 000
   GENJCL.CA GRPNAME(CAGRP2)-
   NO DEFAULTS(MBR1)-
DSP0203I COMMAND COMPLETED WITH CONDITION CODE 00
DSP0220I COMMAND COMPLETION TIME 01.230 15:09:06.7
1   IMS Version 11 RELEASE 1 DATABASE RECOVERY CONTROL PAGE 000
DSP0211I COMMAND PROCESSING COMPLETE
DSP0211I HIGHEST CONDITION CODE=04

*******************************************Bottom of data*******************************************
```

Figure 20. Sample SYSPRINT output

Displaying current environment data (ENV command)

The Current Environment Data panel displays current runtime parameter settings.

Use the ENV command to display the current settings of runtime parameters.

For example:
Field descriptions for Current Environment Data panel

Environment Parameter

Specify global parameters for all CAGROUPS. These parameters apply to the current IMS ID. To view values for a specific CAGROUP, see the setup parameters for the CAGROUP.

Current Allocation

Specify the value assigned to the related parameter.

Displaying job status (STAT command)

The Job Status Display panel displays the status of a submitted IMS HP Change Accumulation Utility job.
Use the STAT command to display the status of the job submitted through the RUN or FAST command.

For example:

```
HPCA Job Status Display
Command ===> ________________________ SCROLL ===> ___
Press END to exit.

JOB Status
----------------------------------------
IKJ562021 JOB HPCA(JOB26691) NOT FOUND
The above status row indicates that IMS HPCA was submitted and is no longer in the output queue.
The job IMS HPCA must be identifiable by its Job name (in this case HPCA).

JOB Status
----------------------------------------
IKJ561971 JOB HPCA(JOB28381) WAITING FOR EXECUTION
The above status row indicates that IMS HPCA was submitted and is waiting for execution.

JOB Status
----------------------------------------
IKJ561921 JOB HPCA(JOB28381) ON OUTPUT QUEUE
The above status row indicates that IMS HPCA has completed and is on the output queue.
```

*Figure 22. Job Status Display panel*

## Submitting JCL for processing (RUN command)

IMS HP Change Accumulation Utility runs as a batch job submitted through the RUN or FAST command.

The JCL for the batch job is created with the GEN command and placed in member `hpcar-id#DRIV JCL of the control data set.`

You can also tailor the sample HPCABAT0 job that is provided in the `hpchlg.SAMPLIB` library to the requirements of your site.

The following example shows sample generated JCL:
**Field descriptions for sample generated JCL**

**JOB statement**
Specify the statement that you entered in the Current Environment Data panel.

**EXEC statement**
Specify the main entry program for IMS HP Change Accumulation Utility (HPCADRIV).

**STEPLIB DD statement**
This DD statement is always included. It defines the IMS HP Change Accumulation Utility program load library. smphql is the high-level qualifier for all IMS HP Change Accumulation Utility product libraries and is determined at installation time.

The data set concatenated to the IMS HP Change Accumulation Utility product library is the DBRC utility program load library. If the data set is not provided, IMS HP Change Accumulation Utility expects the module DS PURX00 (DBRC utility program) to be available through the LINKLST data sets or in the LPALIB.

For DBRC API sequencing, the IMS RESLIB must be included in the IMS HP Change Accumulation Utility JCL.

**RECON DD statements**
RECON DD statements are present if they are not to be dynamically allocated. The dsnames are provided on the DBRC Utility Data Sets panel.

**HPCACTL DD statement**
Specify the IMS HP Change Accumulation Utility control data set. hpchql is the IMS HP Change Accumulation Utility high-level qualifier for data sets you provide when invoking the ISPF user interface.

**HPCPRINT DD statement**
Defines the IMS HP Change Accumulation Utility report data set. This can be SYSOUT or a user-allocated data set. Minimum DCB information is LRECL=133.

**SYSUDUMP, HPCAXML, etc.**
Specify IMS HP Change Accumulation Utility spool data sets which are used.

---

**Figure 23. Sample generated JCL**

```
VIEW USRT004.CONTROL(R81DRIV) - 01.00  Columns 00001 00072
Command ===> 000001 //HPCA JOB (IMSUTIL-HPCA),CLASS=A,MSGCLASS=H,
000002 //  REGION=0M,TIME=NOLIMIT,
000003 //  NOTIFY=&SYSUID
000004 //*
000005 //*
000006 //*
000007 //*
000008 /*MESSAGE *** START OF HPCA UTILITY ***
000009 //STEP01 EXEC PGM=HPCADRIV
000010 //STEPLIB pd DISP=SHR,
000011 //  DSN=VND0459.HPC140.SHPCLMD0
000012 //  pd DISP=SHR,
000013 //  DSN=IMSBLD.I81RTS2A.CRESLIB
000014 //HPCACTL pd DISP=SHR,
000015 //  DSN=USRT004.CONTROL.(R81#CTL)
000016 //HPCPRINT pd SYSOUT=
000017 //SYSUDUMP pd SYSOUT=
000018 //HPCAXML pd SYSOUT=X
****** ***************************************** Bottom of Data **************
```
for *messages and system dumps. You can choose these data sets from the Execution JCL pd Control panel, setup option 9.
Chapter 7. Controlling IMS HP Change Accumulation Utility through ISPF

The ISPF Setup Selection Menu provides options to control the operation of IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility.

Topics:
- "Setup Selection Menu"
- "Option 1: JCL Job Statements panel" on page 62
- "Option 2: Control Parameters panel" on page 65
- "Option 3: SORT Parameters panel" on page 66
- "Option 4: (Reserved)" on page 67
- "Option 5: CA Spill Parameters panel" on page 67
- "Option 6: CA Spill Data Set Allocation Parameters panel" on page 68
- "Option 7: (Reserved)" on page 69
- "Option 8: Fast Path Spill Allocation Parameters panel" on page 69
- "Option 9: Execution JCL DD Control panel" on page 71

Setup Selection Menu

Setup parameters are those parameters which are the same for all CAGROUPS. All parameters are initially set to their defaults.

Use the SET command from the Selected CA Groups panel to display the Setup Selection Menu.

Use the Setup Selection Menu to proceed directly to a specific set of parameters by entering the number associated with the desired set of parameters. To display all parameters in succession, select option A.

For example:

```
SETUP HPCA Setup Selection Menu
COMMAND===>______________________________________________________
Enter a selection option. Enter END (PF3) to exit.
HPCA-ID: IMS1
Option. . . . . 1. - JCL Job Statements
               2. - Control Parameters
               3. - SORT Parameters
               4. - Reserved
               5. - CA Spill Parameters
               6. - CA Spill Data Set Allocation Parameters
               7. - Reserved
               8. - Fast Path Spill Parameters
               9 - Execution JCL DD Control
               A. - ALL of the above in succession
```

Figure 24. Setup Selection Menu
To cancel the process and the data entries that you made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

**Option 1: JCL Job Statements panel**

You use the JCL Job Statements panel to build the JCL JOB statement for the IMS HP Change Accumulation Utility program.

For example (after selection A from the Setup selection menu):

<table>
<thead>
<tr>
<th>SETUP</th>
<th>HPCA JCL Job Statements</th>
<th>SETUP required</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ====&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enter END (PF3) to exit. Enter CAN to exit without processing.
Enter RESET to restore JOBCARD defaults.

**JES:** JES2 (JES2 or JES3)

Use JOBCARD from member JOBJCLR_ in JCLPDS dataset

Key values from member ________ in JCLPDS dataset

**JOBCARD Information:**

---

//HPCA JOB (IMSUTIL-HPCA),CLASS=A,MSGCLASS=A,
// REGION=0M,TIME=NOLIMIT,
// NOTIFY=&SYSUID
//*
//*
//*
//*
//*
//*

Member HPCSTASK (TASK=HPCSTASK)

**PROCLIB** to contain PROCS for HPCA subordinate CA address spaces:

DSname..: ______________________________________________

**JOBLIB** to contain JOBS for HPCA subordinate CA address spaces:

DSname..: ______________________________________________

---

Figure 25. JCL Job Statements panel

To cancel the process and the data entries that you made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

Issue the RESET command from this panel to reset all seven JOB JCL statements to the values defined in the JOBCARD member. If this member name is blank, the JOB JCL statements will be reset to the default JOBCARD statements.

**Field descriptions for JCL Job Statements panel**

**JES**

Specify JES2 or JES3 depending on the type of job entry subsystem. The eighth JOB statement is inserted based on this selection.

**Use JOBCARD from member**

Specify the member name from the skeletal JCL library. All eight job statements can be taken from records of a member of the skeletal JCL library. Enter the name of the member in this field.

Enter up to eight statements that will build the JCL JOB statement for the IMS HP Change Accumulation Utility program. All statements must conform to JCL requirements.

**Key values from member**

Specify the name of a member of the skeletal JCL library that is to be used to resolve user keys present in the JOB statements. The format of the records in this member is the same as the format required to resolve user keys by DBRC.
Resolving user keys can result in job card data being displaced to the left or to the right. Ensure that enough free space is present on the job cards so that after key value substitution, the job card data does not extend beyond column 71.

**JOBCARD Information**

Information displayed in this panel is the default IMS HP Change Accumulation Utility provides if you do not enter information in the **Use JOBCARD from member** field. You can modify the default information for your own requirements.

**Member**

Specify the started task, or procedure name to be used. This name might refer to a member created during IMS HP Change Accumulation Utility installation. The default for a new IMS HP Change Accumulation Utility ID will be HPCSTASK (AS1 mode). The default applies if both member name and PROCLIB are omitted.

If member name is blank and PROCLIB is non-blank, the custom procedure method is selected. If both member name and PROCLIB are non-blank, STC mode is selected.

**PROCLIB dsname..:**

The name of a library used to store the IMS HP Change Accumulation Utility JCL procedures. This library can be a system library or a user library depending on the values for Member and for JOBLIB. System libraries must be defined in the IEFPDSI concatenation of the master scheduler or PROC00 concatenation of the started JES.

**JOBLIB dsname..:**

Specify the dsname of a jobs library into which IMS HP Change Accumulation Utility places the JCL for jobs to start the SORT subordinate address spaces. This entry is optional.

If JOBLIB is specified, then the PROCLIB defined above is not required to be in the IEFPDSI or PROC00 concatenation. The JOBLIB dsname must be included in the IEFJOBS data set in the z/OS startup member MSTJCLxx in SYS1.PARMLIB.

**Sample JCL job statements**

Because IMS HP Change Accumulation Utility runs in a multiple address space environment, it generates additional z/OS address spaces called SORT address spaces. Each SORT address space represents a CAGROUP.

The JCL to start each SORT address space is placed in the PROCLIB. The names of these procedures in the PROCLIB are generated internally by IMS HP Change Accumulation Utility using the IMS HP Change Accumulation Utility ID as a prefix and appending to it a number starting from 0000.

If the JOBLIB dsname is not present, the SORT procedures will be accessed from the PROCLIB, which is accessible through the JES procedure.

If the JOBLIB dsname is included, then IMS HP Change Accumulation Utility creates additional jobs for each CAGROUP and place them in the JOBLIB data set. These jobs are stored as members that have the same member names as the procedure member names in the PROCLIB.
Each job processes its corresponding procedure. A //JCLLIB statement in the job references the PROCLIB and, therefore, you do not need to have the PROCLIB in the JES concatenation. Each time the GEN (or FAST) command runs, it creates a new set of PROCLIBs and, optionally, a set of JOBLIB members for each of the CAGROUPS selected for CA processing.

In batch mode, the first step of the two-step batch procedure does the same.

A sample of the procedure for a CAGROUP is shown in the following example:

```jcl
//hpcaid0001 PROC RGN=3000K,SOUT=*,
//PARM1=*
//IEFPROC EXEC PGM=hpcaдрi1,REGION=RGN,
//PARM=’&PARM1’
//*
//THIS JCL ORIGINATES FROM THE USER’S ‘JCLPDS’ LIBRARY.
//*KEYWORDS ARE REPLACED BY THE GENJCL FUNCTION OF
//*THE IMS DATABASE RECOVERY CONTROL FEATURE.
//*JCL FOR CHANGE ACCUMULATION
//*
//STELIB DD DISP=SHR,DSN=IMSSP.IMSB.RESLIB
//SYSPRINT DD SYSOUT=* 
//SYSUDUMP DD SYSOUT=*
//RECON1 DD DSN=HPAC, IMS.RECON1,DISP=SHR
//RECON2 DD DSN=HPAC, IMS.RECON2,DISP=SHR
//IMS DD DISP=SHR, DSN=IMSSP.IMSB.DECLIB
//SYSOUT DD SYSOUT=*
//SORTLIB DD DSN=SYS1.SORTLIB,DISP=SHR
//SORTWK01 DD UNIT=3380,SPACE=(CYL,(5),,CONTIG)
//SORTWK02 DD UNIT=3380,SPACE=(CYL,(5),,CONTIG)
//SORTWK03 DD UNIT=3380,SPACE=(CYL,(5),,CONTIG)
//SORTWK04 DD UNIT=3380,SPACE=(CYL,(5),,CONTIG)
//SORTWK05 DD UNIT=3380,SPACE=(CYL,(5),,CONTIG)
//SORTWK06 DD UNIT=3380,SPACE=(CYL,(5),,CONTIG)
//DFSUCSUMO DD DUMMY,DCB=BLKSIZE=100
//DFSUCSUMN DD DSN=imssp.ca.cagrp1.ca134939,
//   DISP=(NEW,CATLG),UNIT=3380,VOL=SER=(*=*),
//   SPACE=(CYL,(1,1)),LABEL=(1,SL)
//DFSUCUMN DD DSN=IMSSP.IMSB.DECLIB,DISP=SHR
//DFSULOG DD DISP=SHR,
//DD DSN=HPAC,IMS.RECON2,DISP=SHR
//DD DSN=HPAC, IMS.DECLIB,DISP=SHR

Figure 26. Sample CAGROUP JCL procedure

To create a second copy of the new change accumulation data set, define the new data set in your skeletal JCL member for the CAGROUP in the skeletal JCL library.

The following example shows JCL that defines a duplicate new CA data set:

```jcl
//ICBUCUMN DD DSN=HPAC, SECONDOCA.%CANDSN,
//UNIT=SYSDA,VOL=SER=(ICE000),
//* SPACE=(TRK,(1,1)),
//*
NOTE! The DD name of the data definition statement must be ICBUCUMN

Figure 27. Defining a duplicate CA data set
Option 2: Control Parameters panel

You use the Control Parameters panel to specify parameter values that affect all CAGroups.

Select option 2 to display the Control Parameters panel.

For example:

```
$SETUP

COMMAND ===> HPCA Control Parameters

Enter END (PF3) to exit. Enter CAN to exit without processing.

Control Parameters for CA-GROUP: ALL

Max. number of input tasks: 9 (1-99. Default 9)
Max. number of output tasks: 9 (1-19. Default 9)
I/O buffers for input datasets: 5 (1-255. Default 5)
I/O buffers for output datasets: 5 (1-255. Default 5)
Log and FP spill file blksize: 32760 (6K-32K Default 32760)

Write SMF records: N (F=FULL, N=NO, S=SHORT, Default N)
Select Logs: PRILOG (PRILOG, SECLOG Default PRILOG)
```

Figure 28. Control Parameters panel

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

The parameter values for this panel are valid for all CAGROUPS. They cannot be overridden for a specific CAGROUP.

Field descriptions for Control Parameters panel

Max. number of input tasks
Enter the maximum number of input tasks (log read subtasks) to read log files in parallel. The number must be between 1 and 99. The default is 9.

Max. number of output tasks
Enter the maximum number of output tasks (SORT subtasks) to write CA output files in parallel. The number must be between 1 and 19. The default is 9.

I/O buffers for input datasets
IMS logs and IMS HP Change Accumulation Utility spill files are input data sets. Specify the number of I/O buffers to be used for input data sets. Minimum value is 1; maximum value is 255. The default is 5.

I/O buffers for output datasets
IMS HP Change Accumulation Utility spill files are output data sets. Specify the number of I/O buffers to be used for output data sets. Minimum value is 1; maximum value is 255. The default is 5.

Log and FP Spill Blksize
Specify the block size value for CA and spill file data sets. Minimum value is 6144, maximum value is 32760. The default is 32760.
Write SMF records
Specify whether each SORT instance must write SMF records.

Select logs
Specify primary or secondary log processing. The default value is PRILOG (primary logs).

Option 3: SORT Parameters panel
You use the SORT Parameters panel to specify the parameters for the SORT subtask process.

Select option 3 to display the SORT Parameters panel.

For example:

<table>
<thead>
<tr>
<th>SETUP</th>
<th>HPCA SORT Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ===&gt; _________________________________________________________________</td>
<td></td>
</tr>
</tbody>
</table>

Enter END (PF3) to exit. Enter CAN to exit without processing.

SORT Parameters for CA-GROUP: ALL

<table>
<thead>
<tr>
<th>SORT filesize: 100000</th>
<th>(5000 thru 10**13-1. Def. 100000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Storage for SORT: 4</td>
<td>(1-2000. Default 4)</td>
</tr>
<tr>
<td>Number of SORT work data sets: 4</td>
<td>(2-255. Default 4)</td>
</tr>
<tr>
<td>SORT Hiperspace usage size: 0</td>
<td>(0,0-9999,0%-100%. Default 0)</td>
</tr>
</tbody>
</table>

Parameters to create DBRC Utility Control ID Statement:

Max. root sequence field len: ___ | (1-256. Default blank) |
Maximum lrecl: _____ | (1-99999. Default blank) |

Figure 29. SORT Parameters panel

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

Field descriptions for SORT Parameters panel

SORT Filesize
Specify the estimated number of records to be sorted for the identified CAGROUP. The file size can be specified by a number ranging from 5000 through (10**13)-1. The default is 100000.

Main storage for SORT
Specify the amount of main storage, in megabytes, to be used by SORT. The range is 1-2000. The default is 4 megabytes.

Number of SORT work data sets
Specify the number of SORT work data sets for each CAGROUP. The number can be between 2 and 255. The default is 4.

SORT hiperspace usage size
Specify the size of the hiperspace used by each SORT instance, in megabytes, of configured expanded storage. Optimal (O) lets SORT calculate the maximum size dynamically. 0 prohibits hiperspace usage.
The hiperspace size can be specified as a number from 0 through 9999 or as a percentage from 0% through 100%. The default is Optimal (O).

When Optimal is specified, the following DFSORT performance features can be enabled:

- **MOSIZE**
  Can be specified to improve elapsed time and EXCP performance

- **DSPSIZE**
  Can be set to limited, versus the installation default of max, to allow DFSORT to optimally determine the best SORT method

- **DSA**
  Can be specified to allow DFSORT to tune the right amount of storage for improving performance

- **MAINSIZE**
  Can be specified to support dynamic storage adjustments

- **SDB**
  Can be specified to allow DFSORT to select optimal block sizes for output data sets

**Maximum root sequence field length**
Specify the maximum root sequence field length. The default is 10.

**Maximum logical record length**
Specify the maximum database change log records. The default is 4531. If an ID does not exist in your skeletal JCL member, IMS HP Change Accumulation Utility creates an ID statement as input to the change accumulation process. You can set these values as global parameters or by CAGROUP. If an ID statement already exists in your skeletal JCL member, then these parameters are ignored.

**Option 4: (Reserved)**
Option 4 is reserved for future use.

**Option 5: CA Spill Parameters panel**
You use the CA Spill Parameters panel to provide spill file characteristics.

Select option 5 to display the CA Spill Parameters panel.

For example:

```plaintext
SETUP HPCA CA Spill Parameters
COMMAND ===>______________________________ SCROLL ===>PAGE
```

Enter END (PF3) to exit. Enter CAN to exit without processing.

CA Spill data set allocation parameters for CA-GROUP: ALL
CA Spill DSN prefix: USRT004

*Figure 30. CA Spill parameters panel*

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.
Field descriptions for CA Spill Parameters panel

CA Spill DSN Prefix

Specify the prefix of a constructed dsname for the CA spill data set. In the case of normal flat files, IMS HP Change Accumulation Utility appends a generated ddname to create the dsname. The CA spill data set is allocated dynamically.

The user ID of the address spaces running IMS HP Change Accumulation Utility must be authorized to allocate data sets that have the prefix as the high-level qualifier of the data set name of the CA spill data set.

Option 6: CA Spill Data Set Allocation Parameters panel

You use the CA Spill Data Set Allocation Parameters panel to specify the external device characteristics for spill files.

Select option 6 to display the CA Spill Data Set Allocation Parameters panel.

For example:

<table>
<thead>
<tr>
<th>SETUP</th>
<th>HPCA CA Spill Data Set Allocation Parameters</th>
<th>Row 1 of 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>===&gt;__________________________________________</td>
<td>SCROLL ===&gt;PAGE</td>
</tr>
</tbody>
</table>

Enter END (PF3) to exit. Enter CAN to exit without processing.

CA Spill data set allocation parameters for CA-GROUP: ALL
Max number of Spill volumes: 4 (1-9, Default 4)
Management class .......: ______ (Blank for default management class)
Storage class ...........: ______ (Blank for default storage class)
Device type ............: ______ (Generic unit or device address)
Data class .............: ______ (Blank for default data class)
Space units ............: CYLS (TRKS, CYLS)
Primary quantity ......:25 (In above units)
Secondary quantity ....:25 (In above units)
Volumes:
  ==>VOL1 ===> ----===> ====> ===> ====>
  ===> ====> ==<> ====> ====>

************************************************ Bottom of data ************************************************

Figure 31. CA Spill Data Set Allocation Parameters panel

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

Field descriptions for CA Spill Data Set Allocation Parameters panel

Max Number of Spill Units

Specify the maximum number of device units (1-9) for the Spill data sets.
The default is 4.

Management class

Specify the management class that should be used to obtain information that is related to data management (migration, backup and retention criteria) for allocation of the data set.

Storage class

Specify the storage class that should be used to obtain information related to storage for allocation of the data set.
Device type
Specify the generic unit address for the direct access volumes that you want to contain the data set.

Data class
Specify the data class that should be used to obtain the information related to data (for example, space and LRECL) for allocation of the data set.

Space units
Specify either of the following values:

TRKS
If the data set size is expressed in tracks

CYLS
If the data set size is expressed in cylinders

Primary quantity
Specify the primary allocation quantity in tracks or cylinders as indicated in the Space units field.

Secondary quantity
Specify the secondary allocation quantity in tracks or cylinders as indicated in the Space units field.

Note: The maximum value that you can specify in the primary or secondary space field is 16777215. To specify more space, convert to a different space unit. For example, convert TRKS to CYLS.

Volumes
Specify the volume serial numbers of the direct access volumes that are to contain the data set. Specify the numbers in one or more rows of the table at the bottom of the panel. You can specify up to six numbers in each row. Additional rows appear as needed. Leave these fields blank to allow the system to select an eligible volume.

Eligibility is determined from Device type or Space units.

Option 7: (Reserved)
Option 7 is reserved for future use.

Option 8: Fast Path Spill Allocation Parameters panel
You use the Fast Path Spill Allocation Parameters panel to specify the file characteristics and external device characteristics for Fast Path spill files.

Select option 8 to display the Fast Path Spill Allocation Parameters panel.

For example:
To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

**Field descriptions for Fast Path Spill Allocation Parameters panel**

**Spill data set name prefix**
Specify a prefix that will be used to create a data set name for allocating the Fast Path Spill data set using the prefix as a high level qualifier. IMS HP Change Accumulation Utility appends an internal CAGROUP name to create a data set name. The length of the prefix cannot be more than 17 characters.

The Fast Path Spill data set is allocated dynamically. The user ID of the address spaces running IMS HP Change Accumulation Utility must be authorized to allocate data sets that have the prefix as the high-level qualifier of the data set name of the work data set.

**Number of CA Output units**
Specify the number of device units available for the Fast Path Spill data set.

**Management class**
Specify the management class that should be used to obtain information that is related to data management (migration, backup and retention criteria) for allocation of the data set.

**Storage class**
Specify the storage class that should be used to obtain information related to storage for allocation of the data set.

**Device type**
Specify the generic unit address for the direct access volumes that you want to contain the data set.

**Data class**
Specify the data class that should be used to obtain the information related to data (for example, space and LRECL) for allocation of the data set.

**Space units**
Specify either of the following values:

- **TRKS**
  If the data set size is expressed in tracks
CYLS
If the data set size is expressed in cylinders

Primary quantity
Specify the primary allocation quantity in tracks or cylinders as indicated in the Space units field.

Secondary quantity
Specify the secondary allocation quantity in tracks or cylinders as indicated in the Space units field.

Note: The maximum value that you can specify in the primary or secondary space field is 16777215. To specify more space, convert to a different space unit. For example, convert TRKS to CYLS.

Volumes
Specify the volume serial numbers of the direct access volumes that are to contain the data set. Specify the numbers in one or more rows of the table at the bottom of the panel. You can specify up to six numbers in each row. Additional rows appear as needed. Leave these fields blank to allow the system to select an eligible volume.

Eligibility is determined from Device type or Space units.

Option 9: Execution JCL DD Control panel

You use the definitions on this panel to create DD statements to be included in the IMS HP Change Accumulation Utility driver JCL that is submitted by the RUN or FAST command.

Each DD row consists of a ddname and optional SYSOUT class and dsname. To include a DD statement, either or both the SYSOUT class and DSNAME field must be non-blank.

Select option 9 to display the Execution JCL DD Control panel.

For example:
To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.

### Field descriptions for Execution JCL DD Control panel

**STEPLIB**

Two STEPLIB entries are provided for system or product libraries in addition to the IMS HP Change Accumulation Utility product library which is automatically included.

**HPCSYSIN**

IMS HP Change Accumulation Utility command statement input to the driver (PGM=HPCADRIV). Enter a cataloged dsname or dsname(member).

**HPCPRINT**

Generates the IMS HP Change Accumulation Utility Report file. This is a required DD statement. It cannot be deselected. The default SYSOUT class is *.

**SYSUDUMP**

The abend/dump file. This is a required DD statement. It cannot be deselected. The default SYSOUT class is *.

**HPCTRACE**

The trace file used for performing diagnostics on the product.

**HPCADIAG**

The diagnostics file used for performing diagnostics on the product.

### Columns Report, CVS, HTML, and XML reports

The following report types are available:

- Columns Report
- Column Report with Page Headings
- CVS
- HTML
- XML

---

Figure 33. Execution JCL DD Control panel

To cancel the process and the data entries made on this panel, enter the CAN/CANCEL command. The previous panel is displayed.
Each report type is individually selectable to SYSOUT, or to a cataloged data set. If both SYSOUT and DSN are entered, SYSOUT is used. Reference to existing data sets must be compatible with RECFM=VB,LRECL=137.

**HPCCACHE**

IMS HP Change Accumulation Utility input entry for specifying definitions for using an above-the-bar cache in single address space mode. Enter a cataloged dsname or dsname(member).
Part 4. Administering IMS HP Change Accumulation

IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility administration tasks include creating JCL, using JCL parameters in the HPCSYSIN DD statement to control the operation of IMS HPCA, and customizing report output.

Topics:
• Creating and converting JCL
• Controlling IMS HPCA through JCL
• Selecting and customizing reports
Chapter 8. Creating and converting JCL

You must create and convert JCL to process your IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility tasks.

Topics:
- "Processing tasks using JCL"
- "Modifying skeletal JCL members"
- "JCL conversion" on page 80
- "JCL conversion for custom job processing" on page 82
- "JCL conversion for standard job processing" on page 82
- "JCL conversion for started task control job processing" on page 87
- "JCL conversion for single address space job processing" on page 88

Processing tasks using JCL

IMS HP Change Accumulation Utility achieves higher performance through the scheduling of multiple parallel address spaces.

Z/OS requires a JCL procedure in order for the master scheduler to start these address spaces. IMS HP Change Accumulation Utility produces the JCL automatically from a JOB stream in the form of output of the DBRC GENJCL.CA command. You can use a JOB stream that has been created manually or by a process other than DBRC if it is structurally equivalent to JCL generated by DBRC.

Generating JCL through DBRC requires a template called the skeletal JCL. Some skeletal JCL work with CA and with IMS HP Change Accumulation Utility without changes. Others might need modifications for use with IMS HP Change Accumulation Utility.

IMS HP Change Accumulation Utility converts the DBRC JCL to the form necessary to initiate multiple address spaces. At a minimum, this requires a JCL procedure member in a system PROCLIB or IEFJOBS data set.

Optionally, write access to a PROCLIB or IEFJOBS is required to use custom procedures.

Modifying skeletal JCL members

IMS HP Change Accumulation Utility analyzes the output from GENJCL and creates multiple job procedures to run in parallel, one for each selected CA group.

Because multiple tasks are created to read the log data sets, the demand on the number of tape device units can exceed the number of available devices. Unnecessary waits would result until a tape device does become available.

The global parameter INLIM allows you to limit the number of log reader tasks that read log data sets in parallel. This parameter also limits the number of tape devices IMS HP Change Accumulation Utility uses.
However, before starting the change accumulation process, DBRC checks the availability of all log data sets and requires that the data sets and their devices be available even though the log read is done in a different address space.

IMS HP Change Accumulation Utility processing modifies the JCL to defer the mounting of tapes while DBRC is performing its checks. Also, to reduce the requirement for devices, you will need to modify your skeletal JCL member as follows:

- If the log data sets are on permanently mounted devices, no change is required.
- If all log data sets are on tape devices, then change the UNIT parameter of the DFSULOG DD statement to:
  \[
  \text{UNIT=AFF=HPCADUMY}
  \]
  and add:
  \[
  \text{//HPCADUMY DD UNIT=(xxxx,,DEFER)}
  \]
  or for SMS managed tape libraries:
  \[
  \text{//HPCADUMY DD DISP=SHR,}
  \text{DSN=%LOGDSN,}
  \text{UNIT=(%LOGUNIT,,DEFER),}
  \text{VOL=SER=(%LOGVOLS)}
  \]
  where: \(xxxx\) is the generic unit name for the tape device.
- If some log data sets are on tape and some on DASD, modify the skeletal JCL using the following example. This will leave all DASD log data set UNIT parameter definitions unchanged and force all TAPE log data set UNIT parameter definitions to reference the //HPCADUMY DD statement described above.

```
%DELETE (%LOGUNIT EQ '3400')
//DFSULOG DD DSN=%LOGDSN,
//    UNIT=%LOGUNIT,
//    VOL=SER=(%LOGVOLS),
//    DCB=RECFM=VB,
//    DISP=OLD
%DELETE
/*
%DELETE (%LOGUNIT NE '3400')
//DFSULOG DD DSN=%LOGDSN,
//    UNIT=AFF=HPCADUMY,
//    VOL=SER=(%LOGVOLS),
//    DCB=RECFM=VB,
//    DISP=OLD
%ENDDEL
```

Figure 34. Modifying skeletal JCL for tape and DASD

In this example, if the log unit is 3400, the first DFSULOG DD statement is deleted, and the second one is kept.

If the unit is not 3400, the first DFSULOG DD statement is kept and the second is deleted. The value in the delete expression (3400, in the example) is where you expect the log data set to reside. This is either the generic device name as registered with DBRC, or it is a name known to you when the log data set was created.

When the standard procedure method is used for JCL processing, additional skeletal JCL changes must be considered.

1. JES symbols (&name) are not processed.
The JCL is processed to dynamic allocation format which does not accept & symbols. DBRC symbols (%name) are accepted.

2. Only the EXEC PGM=DFSUCUM0 step is merged into the standard procedure. Other steps from the skeletal JCL are ignored.

3. UNIT=AFF= is processed only for the DFSULOG DD.

**Preventing duplicate log DSN error**

When OLDS, RLDS, SLDS, or image copy data sets are managed by the Data Facility Storage Management Subsystem (DFSMS), the CATDS parameter must be set for the RECON data set.

In general, the CATDS parameter can be set even when data sets are not managed by DFSMS. DBRC uses the system catalog to find data sets when the CATDS parameter is active.

When submitting HP change accumulation under DFSMS managed systems, there are two methods that can be used to avoid the HPC1103W message (Duplicate log DSN):

- Set CATDS and modify the skeleton JCL
- Set CATDS and add IMS HP Change Accumulation Utility parameter USE CATALOG=YES

**Set CATDS and modify the skeleton JCL**

The following information explains how to set CATDS and modify the skeleton JCL

1. Change RECON to CATDS=YES
   
   When in a Storage Management Subsystem (SMS) managed environment, you can change RECON to CATDS=YES to specify that the data sets are cataloged and to generate the JCL using the catalog information.
   
   This action ensures that DBRC will not split the multi-volume log data set in the JCL and treat it as one log.

2. Remove VOL=SER=%LOGVOLS parameter in the skeletal JCL
   
   In order for the CATDS option to be effective, the data set must be cataloged and the volume serial information for the data set must be omitted from the JCL.
   
   If the data set is cataloged, CATDS is specified, and volume serial information is included in the JCL, DBRC ignores CATDS and allocates the data set using the JCL. Normal volume serial and file sequence checking occurs.

**Set CATDS and add IMS HP Change Accumulation Utility parameter USE CATALOG=YES**

The following information explains how to set CATDS and modify the skeleton JCL

1. Change RECON to CATDS=YES
2. Specify USE CATALOG=YES for the HPCSYSIN DD
   
   When specifying USE CATALOG=YES for execution, IMS HP Change Accumulation Utility uses only catalog and SMS information to allocate the logs, so that multi-volume log data sets can be allocated successfully.
Even if you remove the VOL=SER= parameter in the skeletal JCL, IMS HP Change Accumulation Utility forces the catalog and SMS information to be used for log data sets allocation with the same effect as removing the VOL=SER= parameter.

**About the Data Facility Storage Management Subsystem (DFSMS)**

The Data Facility Storage Management Subsystem (DFSMS) is an operating environment that comprises a suite of related data and storage management products for the z/OS system. DFSMS helps automate and centralize the management of storage based on the policies that your installation defines for availability, performance, space, and security.

The heart of DFSMS is the Storage Management Subsystem (SMS). Using SMS, the storage administrator defines policies that automate the management of storage and hardware devices. These policies describe data allocation characteristics, performance and availability goals, backup and retention requirements, and storage requirements for the system.

**JCL conversion**

IMS HP Change Accumulation Utility processes an input JCL file to create JCL procedures and IMS HP Change Accumulation Utility control file members.

The source input to this conversion is created by IMS HP Change Accumulation Utility GENJCL.CA commands or by other processes that produce similar JCL structures.

The acceptable form of JCL is a single data set containing one or more JOBS or a single JOB with multiple steps such as that created by the DBRC GENJCL.CA function. At least one step of each JOB must run the IMS/CA utility, PGM=DFSUCUM0.

This section includes the following topics:

- **“Creating the JCLOUT data set”**
- **“Creating IMS HP Change Accumulation Utility procedures” on page 81**

**Creating the JCLOUT data set**

The input JCL is read from the file allocated to JCLOUT.

As indicated in the following table, there are several methods possible for creating the JCLOUT data stream.

<table>
<thead>
<tr>
<th>JCLOUT produced by:</th>
<th>ISPF</th>
<th>Two-step Batch</th>
<th>Extended Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS HP Change Accumulation Utility performs the entire process; user describes only the GENJCL.CA formats and the CA groups to process. IMS HP Change Accumulation Utility interfaces directly to DBRC to create and process the JCLOUT.</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Methods for creating JCLOUT data stream (continued)

<table>
<thead>
<tr>
<th>JCLOUT produced by:</th>
<th>ISPF</th>
<th>Two-step Batch</th>
<th>Extended Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>User provides the complete GENJCL.CA input stream which IMS HP Change Accumulation Utility uses to create and process the JCLOUT. (DD GENJCLIN)</td>
<td></td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>User runs DBRC independently from IMS HP Change Accumulation Utility and provides the JCLOUT file to be processed. (DD JCLOUT, SYSPRINT)</td>
<td></td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>User creates JCLOUT from a manual or automated procedure in a format that is compatible with IMS HP Change Accumulation Utility. (DD JCLOUT, SYSPRINT)</td>
<td></td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Creating IMS HP Change Accumulation Utility procedures

When the JCL is converted, each IMS/CA step (PGM=DFSUCUM0) becomes a separate procedure for use by IMS HP Change Accumulation Utility.

Procedures are limited to a single process of DFSUCUM0, but any number of other steps created by the DBRC skeletal JCL can be included. Depending on the processing method selected, the procedural JCL is written to one of several destinations, as indicated in the following table.

Table 4. Destinations for procedural JCL

<table>
<thead>
<tr>
<th>JCLOUT description:</th>
<th>Custom Procedures (Note 1)</th>
<th>Standard Procedures (Note 2,3)</th>
<th>Started Task Control (Note 4)</th>
<th>Single Address Space (Note 2, 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPCAPROC DD</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>A member of a system library in the IEFPDSI concatenation.</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A member of a system library in the PROC00 concatenation.</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A user-defined library requiring no special authority.</td>
<td></td>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>In extended batch mode, HPCAPROC can be a temporary data set.</td>
<td></td>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>HPCAJLIB DD</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A member of a system library in the IEFPDSI concatenation.</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A member of the system library in the IEFJOBS concatenation.</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPCACTL DD</td>
<td>YES</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Encoded for use in dynamic allocation.</td>
<td>YES</td>
<td></td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

Chapter 8. Creating and converting JCL
UPDATE authority is required to access these system procedure libraries.

Dynamic allocation does not support all possible DD parameters that can be used in JCL. When present, these parameters are ignored.

The only step converted is IMS/CA, PGM=DFSUCUM0. Other steps in the JCLOUT file are ignored. To include other steps before or after IMS/CA, the additional steps must be defined in the standard procedure JCL member.

Update authority is required for the library name in the HPCAPROC DD.

The only step allowed is IMS/CA, PGM=DFSUCUM0. Other steps in the JCLOUT file are ignored.

### JCL conversion for custom job processing

Custom procedures provide flexibility when creating JCL that can be accepted by IMS HP Change Accumulation Utility.

However, additional authority is required because the converted JCL procedures must be written to a system library used by the master scheduler or JES.

The following summary outlines the steps for using custom procedures.

**ISPF (Setup option 1, JCL job statements)**
1. Remove or leave blank the Member field
2. Enter the name of a system proclib into the PROCLIB field
3. Optionally, enter the name of a system joblib in the JOBLIB field

**Two-step batch**
1. Omit both PROC= and STC= from the EXEC PARM value.
2. Allocate HPCAPROC DD to a system PROCLIB.
3. Optionally, allocate HPCAJLIB to a system JOBLIB.

**Extended batch**
1. Omit both PROC= and STC= from the EXEC PARM value.
2. Omit both PROCEDURE=name and STC=name commands.
3. Allocate HPCAPROC DD to a system PROCLIB.
4. Optionally, allocate HPCAJLIB to a system JOBLIB.

### JCL conversion for standard job processing

Standard job processing procedures remove the requirement for write access to a system PROCLIB or IEFJOBS library.

You can place one or more simple, read-only procedure members into a PROCLIB or JOBLIB during installation to be used by IMS HP Change Accumulation Utility. Special situations might still require the custom procedure method. Limitations of the standard procedure method are explained in the following topics.

The standard procedure method has two components:
- The IMS HP Change Accumulation Utility procedure to be placed into a PROCLIB or the IMS HP Change Accumulation Utility job to be placed into a JOBLIB.
Whichever is chosen, the library must be accessible to JES or MSTRJCL according to the rules for z/OS started tasks. At least one procedure or JOB is required.

You can use more than one standard procedure or JOB to support multiple versions of IMS or IMS HP Change Accumulation Utility.

Write access to the library or libraries is required only when entering or changing the standard procedures as part of the install process.

- The JCL created from the DBRC GENJCL.CA or equivalent process.

Existing skeletal JCL probably requires no changes, but certain information from the generated JCL is processed differently in the standard procedure mode. Parameter values and DD statements from the skeletal JCL are merged into the IMS HP Change Accumulation Utility standard procedure to complete the definition of the processing environment.

Subtopics:

- “Using the standard procedure JCL”
- “Merging skeletal JCL into standard job processing” on page 85
- “Standard job processing JCL restrictions” on page 86
- “Standard job processing JCL tips” on page 86

**Using the standard procedure JCL**

IMS HP Change Accumulation Utility sample library members (HPCSPROC and HPCSJOB) are provided as the starting point for installation of standard procedures.

These library members are documented to describe the necessary changes for use.

When the sample JCL has been modified to meet your site standards, it can be added to a system PROCLIB or IEFJOBS data set for testing and use.
One or more standard procedure or job members must be placed in a PROCLIB or JOBLIB. The rules for z/OS started tasks apply to each member.

The procedure or job has a minimum of three JCL statements (two without STEPLIB).

Figure 35. Sample JCL procedure
1. The PROC header or JOB statement
2. EXEC PGM=HPCADRI1 is required. The PARM= parameter is optional and generally can be omitted.
3. STEPLIB DD to HPCA. Optional only if all required modules are located through LINKLIST/LPALIB

Optional DD statements for HPCPRINT, HPCTRACE, and HPCSYSIN must be in the standard procedure JCL to be processed. These statements are not merged from the skeletal JCL.

There are generally no other DDs in the procedure. However, because of restrictions on the processing of the skeletal JCL, it might be necessary to include additional DDs in the procedure.

The procedure might include other steps before and after the HPCADRI1 step. If these other steps are present, no information from the skeletal JCL is merged into them.

If your skeletal JCL member has one or more job steps following the CA step, include the HPCADLIM DD statement at the end of the skeleton JCL member, as shown in the following figure:

```
//COPY3 EXEC PGM=IEBGENER,COND=(0,LT,CA%STPNO)
//SYSPRINT DD SYSOUT=*  
/*/ 
//SYSUT1 DD DISP=OLD,DSN=&hilev.%CAGRP.GDGOUTD1
//SYSUT2 DD DSN=&hilev.%CAGRP.GDGOUTD2(+1),
    DISP=(NEW,CATLG),
    UNIT=(*,DEFER),
    VOL=(*,99),
    LABEL=EXPDT=99000,
    DCB=(BUFNO=16),
    SPACE=(CYL,(40,0)),
    STORCLAS=GSYES2
//SYSIN DD DUMMY
//HPCADLIM DD DUMMY
```

Figure 36. Skeletal JCL member with one or more job steps

In this example, IEBGENER is used to create a copy the CA output.

Attention: To prevent skeleton JCL parser errors, //HPCADLIM DD DUMMY cannot be followed by a slash-asterisk (/*).

**Merging skeletal JCL into standard job processing**

HPCADRI1 performs initiation of the subordinate CA SORT address spaces.

The program name and optional STEPLIB must be in the standard job processing JCL to locate the first module. HPCAPRINT must be allocated in the procedure because the report file is opened prior to dynamic allocation of other files. For the same reason, if HPCTRACE and HPCSYSIN are used, they must be in the procedure.

The CA execution parameter string is merged. If PARM= of the standard procedure is omitted, or if PARM=", then the string is taken instead from the PARM= value of the DFSUCUM0 step of the skeletal JCL.
DD statements are merged. For any DD in the standard procedure, a DD of the same name in the skeletal JCL is ignored.

The following exceptions apply:
1. STEPLIB is renamed and allocated as HPCALIB.
2. HPCPRINT, HPCTRACE, and HPCSYSIN are ignored.
3. SYSIN is freed, if necessary, and reallocated.

**Standard job processing JCL restrictions**

The standard job processing method has certain restrictions.

The following JCL restrictions apply for the standard job processing method.
- STEPLIB, HPCPRINT, HPCTRACE, and HPCSYSIN are processed only from the standard procedure JCL.
- JES & symbols can be used only for JCL that appears in the standard procedure.
- DBRC % symbols can be used in the skeletal JCL.
- Steps before and after EXEC DFSUCUM0 in the skeletal JCL are ignored.
- UNIT=AFF= is allowed only for DD DFSULOG/HPCADUMY.
- SYSIN defined in the standard procedure are freed and reallocated.
- DD * is allowed only for SYSIN DD and only in the EXEC DFSUCUM0 step of the skeletal JCL.
- The list of processed DD parameters for merged DDs is limited to the following parameters:

  DUMMY
  DSN=dataset and DSN=dataset(member)
  FREE=CLOSE
  DISP=(stat,norm,cond)
  UNIT=(dev,count,DEFER)
  UNIT=(AFF=) DFSULOG only
  VOL=SER=
  SPACE=(type,(prim,sec,dir))
  DCB=(DSORG=,RECFM=,LRECL=,BLKSIZE=)
  SYSOUT=
  DATACLAS=
  MGMTCLAS=
  STORCLAS=
  EXPDT=
  RETPD=
  LIKE=
  RECFM=
  LRECL=
  BLKSIZE=
  LABEL=
  EXPDT=

**Related concepts**

For the standard job processing method, an IMS HP Change Accumulation Utility defined member is added to the PROCLIB and JOBLIB libraries during installation.

**Standard job processing JCL tips**

Because certain DD statements are processed only from the standard job processing JCL, you might want to define more than one member.
For example, you might want members to support multiple versions of IMS HP Change Accumulation Utility, or you might want to have a procedure with predefined parameter values for testing.

If you use the JOBLIB feature, the standard JOB JCL can be a complete JOB, or it can be only a reference to a procedure. The procedure might even be in a library that is referenced by JCLLIB so that the procedure does not need to be directly accessible to JES or to MSTRJCL.

For two-step batch and extended batch, you can choose custom or standard mode by including the PROC= parameter.

If the JCL that you are using has defined HPCAJLIB, HPCAPROC, or both, you can switch modes by changing the parameter value. If you do not have write access to a procedure library and always use the standard procedure mode, you can omit both HPCAJLIB and HPCAPROC.

The following information summarizes the steps for standard procedures:

**ISPF (Setup option 1, JCL job statements)**
1. Enter the procedure name into the **Member** field.
2. Leave the **PROCLIB** field blank.

**Two-step batch**
Include the **PROC=** parameter in the EXEC PARM value.

**Extended batch**
Use either of the following methods:
* Include the **PROC=** parameter in the EXEC PARM value.
  * or
* Include the command **PROCEDURE NAME=**.

---

**JCL conversion for started task control job processing**

The started task control (STC) job processing method combines the flexibility of custom procedures without the requirement to update a system PROCLIB or JOBLIB.

JCL procedure statements are written to a library, but no special authority is required for the library. In extended batch mode, the HPCAPROC DD is allocated to a temporary library if it is omitted from the JCL.

The IMS HP Change Accumulation Utility sample library member HPCSSTC is provided as the starting point for installing the started task procedure. The changes that you must make to HPCSSTC are documented in the member.

After you modify the sample JCL to meet your site standards, you can add it to the IEFPDS or IEFJOBS data set for testing and use.

The following information summarizes the steps for STC:

**ISPF (Setup option 1, JCL job statements)**
1. Enter the procedure name in the **Member** field.
2. Enter the procedure library name in the **PROCLIB** field.

**Two-step batch**
1. Include the STC=name parameter in the EXEC PARM value.
2. Allocate HPCAPROC DD to a procedure library data set.

Extended batch
1. Either include the STC=name parameter in the EXEC PARM value, or include the command STC NAME=name.
2. Optionally, allocate HPCAPROC DD to a procedure library data set.

### JCL conversion for single address space job processing

The single address space job processing method (AS1) is similar to the standard procedure method because no JCL procedure member is written to a PROCLIB.

Instead, the information to run each CA group is stored as a member of HPCACTL in a format to be used for dynamic allocation.

Because each CA group is run as a subtask within the IMS HP Change Accumulation Utility control address space, restrictions apply to the format of the JCLOUT, and therefore to the underlying DBRC skeleton JCL.

One-step execution of PGM=DFSUCUM0 is allowed only for any one CA group. Therefore, the GENJCL VOLNUM() cannot be used. All steps other than PGM=DFSUCUM0 are ignored.

All selected CA groups must have the same EXEC PARM= value and the same allocations for the following DD names:
- STEPLIB
- DFSRESLB
- IMSDALIB
- RECON1
- RECON2
- RECON3
- IMS

These conditions are required because the parameter and DD allocations are performed once for the IMS HP Change Accumulation Utility control address space and reused by each CA subtask.

The DD names SYSIN, SYSPRINT, SORTWKnn, HPCADUMY, HPCMSGDD, ICBUCUMN, DFSUCUMN, DFSUCUMO, and DFSULOG are renamed, and separate copies are allocated for each subtask. All other DD names are ignored. All other JCL restrictions of the standard procedure method apply equally to JCL for AS1 mode.

The number of parallel subtasks is set by using the parallel sort count. Because a single address space is used, contention exists for the limited resources, particularly 24-bit memory. IMS HP Change Accumulation Utility in AS1 mode computes and reports a default value for the number of parallel subtasks that can be supported for a typical environment. When the parallel sorts count is omitted or set to a value that is greater than the calculated default, the default value is used.
The true maximum number of subtasks might be less than the default if, for example, your setup includes a large number of logs, CA groups, and DBDs. Other factors, such as DFSORT replacements, system exits routines, or user exit routines, can also affect how memory is allocated.

Another consideration is the number of DD allocations that can be supported in a single address space. The limiting value depends on the number of DDs and the unit count for each DD. The task input output table (TIOT) size and number of DDs is described in the ALLOCxx section in the *MVS Initialization and Tuning Reference*.

The most critical factor for this condition is the SORTWKnn statements, either coded in the JCL or assumed by dynamic allocation. When work files (limit is 256 per sort) are large, the TIOT can be exceeded in as few as three concurrent sort steps.

The following information summarizes the steps for ASI:

**ISPF (Setup option 1, JCL job statements)**

Either enter HPCSTASK in the Member field, or clear both the Member and PROCLIB. Clearing both of these fields results in HPCTASK being used.

**Two-step batch**

Include the PROC=HPCSTASK parameter in the EXEC PARM value.

**Extended batch**

1. Omit the STC= parameter and command.
2. Do one of the following:
   - Include the PROC=HPCSTASK parameter or the Procedure Name = HPCSTASK command.
   - Omit the STC=, PROC=, and DD HPCAPROC (this will default to PROC=HPCSTASK).

**Restriction:** When you use single address space job processing, HPCSTASK is a reserved keyword.
Chapter 9. IMS HP Change Accumulation Utility JCL parameters

You can use JCL parameters to control the operation of IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility.

Topics:
- “HPCSYSIN DD parameters”
- “General syntax for HPCSYSIN DD” on page 93
- “Operation statements” on page 94

HPCSYSIN DD parameters

JCL parameters that control the operation of IMS HP Change Accumulation Utility are read from the HPCSYSIN DD statement in all modes.

However, many parameters are processed in specific environments. In addition, command syntax is validated only for the extended batch environment.

The following table lists the parameters that can be used in the HPCSYSIN DD statement to control the operation of IMS HP Change Accumulation Utility.

Table 5. HPCSYSIN DD statement parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Extended batch</th>
<th>Two-step batch step 1</th>
<th>Two-step batch step 2</th>
<th>ISPF/UI (Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA.ALLSPILL</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CA.DATACLAS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.MGMTCLAS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.PREFIX</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.PRIMARY</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.SECONDARY</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.SPACES</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.START</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CA.STORCLAS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.UNIT</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>CA.UNIT COUNT</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>DYNMSG</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FP.DATACLAS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.MGMTCLAS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.NOEEQES</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FP.NOSPIILL</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>FP.PREFIX</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
</tbody>
</table>
Table 5. HPCSYSIN DD statement parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Extended batch</th>
<th>Two-step batch step 1</th>
<th>Two-step batch step 2</th>
<th>ISPF/UI (Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP.PRIMARY</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.SECONDARY</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.SPACE</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.STORCLAS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.UNIT</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>FP.UNIT COUNT</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>GEN.GENJCL</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>GEN.GRPNAME</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>GEN.LIST</td>
<td>Yes</td>
<td>Note 4</td>
<td>N/A</td>
<td>Note 3</td>
</tr>
<tr>
<td>GEN.RETRY</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>GEN.STOP</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>GEN.WARN</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>HALDB</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ID</td>
<td>Yes</td>
<td>Note 4</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>INPUT BUFFERS</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>JOB</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>LIST/NOLIST</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>LOG TIME</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MAXIMUM LOGS</td>
<td>Yes</td>
<td>Note 4</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MEMLIMIT</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>OUTPUT BUFFERS</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PARALLEL LOGS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>PDS</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PROCEDURE NAME</td>
<td>Yes</td>
<td>Note 4</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>QUEUE BUFFERS</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>RPT.COLUMNS</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>RPT.DATE</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>RPT.ORDER</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>RPT.SUMMARY</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>SECLOG.UNIT</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>SECLOG.VOLSER</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>SELECT LOGS</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Note 2</td>
</tr>
<tr>
<td>SORT.DYNALLOC COUNT</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>SORT.FILSZ</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>SORT.HIPRMAX</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>SORT.MAINSIZE</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>SORT.MSGDDN</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
</tbody>
</table>
Table 5. **HPCSYSIN DD statement parameters (continued)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Extended batch</th>
<th>Two-step batch step 1</th>
<th>Two-step batch step 2</th>
<th>ISPF/UI (Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOR.TSMF</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>SPILL BLKSIZE</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>SUM.FILES</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>SUM.REPORT CLASS</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>SUM.SORT</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>STC NAME</td>
<td>Yes</td>
<td>Note 4</td>
<td>N/A</td>
<td>Note 2</td>
</tr>
<tr>
<td>UNIT</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>USE CATALOG</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>WAIT FOR UNIT</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>&lt;&lt;TRACE&gt;&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>&lt;&lt;DEBUG&gt;&gt;</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Notes:**

1. HPCSYSIN DD is allocated when the IMS HP Change Accumulation Utility ISPF user interface starts.
   The data set is allocated to HPCSYSIN at setup option 9; JCL DD control is used in the IMS HP Change Accumulation Utility driver step that is submitted by the RUN command.
2. These values are entered as ISPF values on setup panels.
3. The DBRC list is displayed if RC>0 is returned.
4. This value is entered in the EXEC PARM, not as a command.

**General syntax for HPCSYSIN DD**

Extended batch control statements are read from the HPCSYSIN DD file.

The record type can be fixed or variable. The maximum record length is 254. For record type=F and LRECL=80, when columns 73 through 80 are numeric, data is processed from columns 1 through 72.

For all other cases, all columns are processed as data.

The following additional rules apply:

- A statement is contained within the data portion of one record.
- Continuation is not allowed.
- Statements are not case sensitive.
- A space is a statement consisting entirely of blanks.
- A comment is a statement in which the first non-blank column is an character asterisk (*).
- Spaces and comments have no processing significance. You can use them without restriction to enhance the readability of the control statements file.
- An operation statement is a statement that is not a space or a comment.
- Operation statements have the following form: type or type=value
- Leading and trailing blanks are ignored for both the type and value operands.
• Unless explicitly stated, the ordering of control statements is not significant.

Operation statements

The operation statements that are used by IMS HP Change Accumulation Utility are described here.

• “Global parameters”
• “JOB statement for JCL data sets” on page 98
• “SORT parameters passed to DFSORT” on page 98
• “Parameters for CA SORT spill files” on page 99
• “Parameters for Fast Path spill files” on page 100
• “Parameters for generating reports” on page 101
• “Parameters for generating summary reports” on page 102
• “GENJCL definitions” on page 102

Global parameters

The global parameters that are used by IMS HP Change Accumulation Utility are described here.

DYNMSG=value

Dynamic allocation produces many messages to describe the processing that is performed for each allocation. Dynamic allocation error messages are routed to the system log (WTO) and to the IMS HP Change Accumulation Utility report file (HPCPRINT DD). The DYNMSG setting controls the disposition of all information messages.

Valid values are:

ERRORS
Discard information messages
INFO
Display at system log (WTO).
ALL
Display (WTO) and report (HPCPRINT DD)

Default: ERRORS

HALDB=YES/NO

Specifies whether a database is a HALDB. This parameter is ignored when DBRC information is available to identify database types. If DBRC is not available (message HPC0011W), you must set HALDB=YES for HALDB databases to be processed.

Default: NO

ID=hpca-id

Defines the 1- to 4-character prefix that IMS HP Change Accumulation Utility uses for the members of IMS HP Change Accumulation Utility control file and PROCLIB data sets. This command is secondary to the hpca-id that is optionally provided in the EXEC parameters.

Default: HPCA

INPUT BUFFERS=number

Specifies the number of I/O buffers to be used for input data sets. IMS logs and IMS HP Change Accumulation Utility spill files are input data sets.

Default: 5
LIST/NOLIST
Requests that all command input records from HPCSYSIN are included (LIST) or not included (NOLIST) in the IMS HP Change Accumulation Utility report file HPCPRINT. This command is secondary to the LIST and NOLIST parameters that are optionally provided in the EXEC parameters. If both are provided, NOLIST overrides LIST.

Default: NOLIST

LOG TIME=YES/time stamp
Requests point-in-time accumulation processing and optionally defines the log-ending time stamp. If a time stamp value is used, it identifies a stopping position within the time period that represents the set of input logs.

To run point-in-time to the last input log, set LOG TIME=YES.

To run point-in-time to a specified time, set LOG TIME=time stamp. The time stamp value is entered in the standard IMS external time stamp format. Offset labels are not acceptable (for example, PST).

MAXIMUM LOGS=number
Specifies the upper limit of logs to be included for processing change accumulation (like CATIME and VOLNUM). For details, see "Limiting input logs" on page 149.

Range: 1-999

MEMLIMIT=number
The maximum amount of 64-bit storage (in megabytes) that are allocated for IMS HP Change Accumulation Utility buffers. MEMLIMIT is expressed in megabytes, and each 64-bit buffer is 1 MB so the value is both the memory limit and the buffers count limit.

Note: Use of 64-bit memory by IMS HP Change Accumulation Utility requires z/OS V1.6, or later.

z/OS provides three separate means for limiting the amount of 64-bit storage that an address space is allowed to obtain. The system exit routine IEFUSI can be modified and activated to set a system wide upper limit that individual MEMLIMIT parameters cannot exceed. For values less than the IEFUSI limit, the JCL JOB and JCL EXEC statement parameter MEMLIMIT functions like the REGION parameter, except that the parameter value refers to storage above the bar (64-bit).

When any or all possible limits are specified, the amount of storage used by IMS HP Change Accumulation Utility is limited to the least value given. To reserve some portion of the 64-bit storage for use by other tasks, set the IMS HP Change Accumulation Utility MEMLIMIT command to a value that is less than the system limit (IEFUSI or JCL MEMLIMIT parameter).

Range: 0 - 2147483647 (M)

Default: 0

OUTPUT BUFFERS=number
Specifies the number of I/O buffers to be used for output data sets. IMS HP Change Accumulation Utility spill files are output data sets.

Default: 5
PARALLEL LOGS=number
Limits the number of log reader tasks that can be scheduled in parallel. For tape LOGs, this limit affects the number of units required to satisfy simultaneous MOUNT requests.
Default: 9
Range: 1-99

PARALLEL SORTS=number
Limits the number of SORT address spaces that can be scheduled in parallel. This number affects the allocation of spill files when the number of total SORTs exceeds the parallel limit.
For AS1 mode, limits the number of subtasks to be created in the IMS HP Change Accumulation Utility control address space. All CA groups are processed in spill file mode.
Default: 9
Range: 1-19

PDS=name
Defines a device name to be used for dynamic allocation of IMS HP Change Accumulation Utility temporary libraries. The PDS= device name defaults to the value specified for the UNIT= global parameter.
Default: global UNIT
Range: any 1 - 8 character device name; excluding VIO

Note: If the value of the global parameter UNIT= is set to VIO (for example, UNIT=VIO), then PDS= must be specified.

PROCEDURE NAME=name
Selects the standard procedure method for JCL processing. This keyword is the name of the IMS HP Change Accumulation Utility procedure to be used in PROCLIB or IEFJOBS. You can override Procedure name=name by using the HPCAPROC DD and PROC=value parameter.

QUEUE BUFFERS=number
The specified number is the upper limit in megabytes that are used for buffering SORT input and spill files data. IMS HP Change Accumulation Utility computes a default buffers limit from the number combination of CA groups, sort steps, and logs. The default size is reduced if necessary to the QUEUE BUFFERS value. Each buffer is 32 K bytes irrespective of any spill file or sort file blksize.
Default: n/a
Range: 99 - 16384

SECLOG.UNIT=name
Overides the UNIT value for secondary logs as recorded in the RECON. This action might be necessary when the registered value is not a valid unit name, for example, UNIT=3400. To allocate without a specified unit, omit the name value as in SECLOG.UNIT=.

JCL created by the GENJCL.CA command can include the UNIT= parameter, but the UNIT value applies only to the primary log files.
name is one of the following values:
• RECON - Use the unit name as recorded in the RECON
• unitname - A valid device identifier is specified; for example, 3490
• omitted - The unit type is unspecified.

Default: RECON

SECLOG.VOLSER=volser
Overrides the volume list for secondary logs as recorded in the RECON. To allocate without a volume specification, omit the volser value as in SECLOG.VOLSER=.

JCL created by the GENJCL.CA command can include the SECLOG.VOLSER parameter, but this value applies only to the primary log files.

volser is one of the following values:
• RECON - Use the volumes list as recorded in the RECON.
• omitted - The volumes list is unspecified.

Default: RECON

SELECT LOGS=prilog|seclog
Specifies that the secondary log feature is used only when the SECLOG value is provided.

Default: PRILOG

List: PRILOG/SECLOG

SPILL BLKSIZE=number
Defines the block size value used to allocate CA and FP spill files.

Default: 32760

Range: 6144-32760

STC NAME=name
Selects the started task control (STC) method for JCL processing. This value is the name of the IMS HP Change Accumulation Utility procedure to be used in IEFPSDI or IEFJOBS. STC overrides the standard procedure mode if both are selected in the same run.

UNIT=name
Defines a device name to be used for dynamic allocation of data sets when no specific unit type is otherwise available.

Default: SYSDA

The default, SYSDA, applies to both SAS and MAS.

z/OS provides a standard feature known as virtual input/output (VIO). VIO can improve system performance by eliminating much of the processor usage and time required to allocate a device and move data physically between main storage and an I/O device. The main difference is that paging is used instead of explicit I/O to transfer data (EXCPs).

USE CATALOG=YES/NO
Uses only catalog and SMS information to allocate the LOGS. If set to NO, include UNIT and VOLSER, LOGs might be uncataloged data sets.

Default: NO
**Wait for UNIT=YES|NO**

Determines whether the S99WTUNT flag is to be set for dynamic allocation, when authorized.

YES causes the flag to be set.

Default: NO

**JOB statement for JCL data sets**

Reference for IMS HP Change Accumulation Utility JOB statement for JCL data sets.

**JOB= . . .**

Provides the JOB JCL statement to be used when creating the members of the JOBS JCL data set. JOB= is not required if the DD HPCAJLIB is omitted.

You can include a maximum of 7 JOB= statements; each statement is concatenated to create a JCL JOB statement.

The order of the JOB= statements determines the order of the continuation lines of the JOB JCL statement.

The JOB name on the first line is replaced to form the IMS HP Change Accumulation Utility assigned member names.

JOB name should be 8 characters.

**SORT parameters passed to DFSORT**

Reference for IMS HP Change Accumulation Utility SORT parameters.

SORT parameters are passed to DFSORT (5740-SMI) for processing. The specific format of each parameter setting is defined by DFSORT in the DFSORT Application Programming Guide, SC33-4035.

Specifying the DFSPARM DD statement allows you to override DFSORT control statements.

In multi-address space mode, the specification of DFSPARM parameters in a pre-allocated DFSPARM DD DSN=&dsn(DFSPARM) must be within skeleton JCL.

In single address space mode, the DFSPARM parameters can also be specified directly in the JCL instream via SYSIN (for example, DFSPARM DD *).

**SORT.DYNALLOC COUNT=**number

Maximum number of requested work data sets

Default: 4

Range: 2-255

**SORT.FILSZ=**number

Estimate of the number of records to be sorted

Default: 100000

Range: 5000-999999999

**SORT.HIPRMAX=**value

Maximum amount of hiperspace to be used for hipersorting
When IMS HP Change Accumulation Utility command SORT.HIPRMAX=0 is received, IMS HP Change Accumulation Utility will pass DFSORT parameters to take advantage of optimized sort processing. These options allow DFSORT to take advantage of memory object sorting and internally calculating optimal storage requirements.

The following DFSORT parameters are added:

- **DSPSIZE=256**
- **MOSIZE=MAX**
- **DSA=64**
- **SDB=LARGE**

Default: 0 (Optimal)

**SORT.MAINSIZE=number**
DFSORT determines how much storage to allocate above and below 16MB virtual; however, the total amount of storage cannot exceed MAINSIZE.

Default: 4
Range: 1-2000 (M)

**SORT.SMF=name**
Specify whether the sort step should record SMF type-16 records, and which data to include

Default: No
List: FULL/SHORT/NO

### Parameters for CA SORT spill files

Reference for IMS HP Change Accumulation Utility CA SORT spill file parameters.

**CA.ALLSPILL**
This command directs IMS HP Change Accumulation Utility to process all sort address spaces using spill files in place of cross-memory data transfer. This action can be helpful in heavily loaded systems when cross-memory transfers compete for resources.

**CA.PREFIX=dsname**
The prefix used to create unique data set names for SORT spill files. The prefix value is 1-17 characters and can be multiple nodes.

Default: User ID, 1-17 characters

**CA.SPACE=CYLS/TRKS**
The unit of allocation for dynamic allocation of SORT spill files

Default: CYLS

**CA.START=sequence**
IMS HP Change Accumulation Utility constructs a network from the required DBDs, LOGs, and CAGRP's and uses the network to schedule the start and stop of each LOG and CAGRP. The CA.START command allows the user to override the IMS HP Change Accumulation Utility-selected order in which the CAGRP's are started.

The start sequence is as follows:
- **ORDERDED** - start the CAGRP's in the sequence given for the GENJCL.CA commands
- **AUTO** - start the CAGRP's in the order selected by IMS HP Change Accumulation Utility
CA.PRIMARY=\textit{number}
\text{The primary allocation count in the units (CA.SPACE) for dynamic allocation of SORT spill files}
Default: 0

CA.SECONDARY=\textit{number}
\text{The secondary allocation count in the units (CA.SPACE) for dynamic allocation of SORT spill files}

CA.UNIT=\textit{name}
\text{The device name for dynamic allocation of a SORT spill file. If CA.UNIT is not provided, the default value is used.}
Default: global UNIT

CA.UNIT\ COUNT=\textit{number}
\text{Maximum number of devices that are used to satisfy the allocation of a SORT spill file}
Default: 4
Range: 1-9

CA.DATACLAS=\textit{name}
\text{The DATACLAS parameter for dynamic allocation of a SORT spill file}

CA.MGMTCLAS=\textit{name}
\text{The MGMTCLAS parameter for dynamic allocation of a SORT spill file}

CA.STORCLAS=\textit{name}
\text{The STORCLAS parameter for dynamic allocation of a SORT spill file}

**Parameters for Fast Path spill files**
Reference for IMS HP Change Accumulation Utility Fast Path spill file parameters.

FP.DATACLAS=\textit{name}
\text{The DATACLAS parameter for dynamic allocation of a Fast Path spill file}

FP.MGMTCLAS=\textit{name}
\text{The MGMTCLAS parameter for dynamic allocation of a Fast Path spill file}

FP.NOEEQES
\text{The FP.NOEEQES parameter directs IMS HP Change Accumulation Utility to process Fast Path transactions without regard to recovery of indoubt transactions. (Incomplete transactions for non-Fast Path are referred to as \textit{inflight}. Incomplete transactions for Fast Path are called \textit{indoubt}.) IMS HP Change Accumulation Utility cannot resolve indoubt Fast Path transactions if DBRC is not used, or if the input CA files are not registered to DBRC. This option should not be used when DBRC controls the recovery environment. FP.NOEEQES can safely be used only when the input CA files do not have indoubt transactions. For example, NOEEQES can be used when DBRC processing is not possible and there are no DEDBs, or all DEBDs are known to be without indoubt transactions.}

FP.NOSPILL
\text{This processing option forces the serialization of all log data sets for Fast Path data bases. The number of parallel logs is reduced to 1 as applied to}
all input logs associated with Fast Path databases. The effect is that DASD storage for spill files might be reduced at the cost of increased processing time.

**FP.PREFIX=dsname**
The prefix used to create unique data set names for Fast Path spill files.
The prefix value is 1-17 characters and can be multiple nodes.
Default: User ID, 1-17 characters

**FP.PRIMARY=number**
The primary allocation count in the FP.SPACE units for dynamic allocation of Fast Path spill files

**FP.SECONDARY=number**
The secondary allocation count in the FP.SPACE units for dynamic allocation of Fast Path spill files

**FP.SPACE=CYLS|TRKS**
The unit of allocation used for dynamic allocation of Fast Path spill files
Default: CYLS

**FP.UNIT=name**
The device name for dynamic allocation of a Fast Path spill file.
If FP.UNIT is not provided, then the default GLOBAL.UNIT value is used.

**FP.UNIT COUNT=number**
Maximum number of devices that are used to satisfy the allocation of a Fast Path spill file
Default: 4
Range: 1-9

**FP.STORCLAS=name**
The STORCLAS parameter for dynamic allocation of a Fast Path spill file

### Parameters for generating reports
Reference for IMS HP Change Accumulation Utility report parameters.

**RPT.SUMMARY=select**
Generates the summary report files.
Default: YES
List: YES/NO

**RPT.DATE=format**
Formats date values in reports.
Default: MDY
List: MDY, MM/DD/YYYY
• DMY, DD-MM-YYYY
• YMD, YYYY/MM/DD
• YDM, YYYY.DD.MM

**RPT.COLUMNS=select**
Writes the columnar report to HPCPRINT. You can also direct the columnar report to HPCACOLS.
Default: NO
List: NO/YES

**RPT.ORDER=select**
Generates columnar, CSV, HTML, and XML report displays and sorts to the named order.
Default: DBD
List:
- DBD, sort by DBD,DDNAME.NUMBER,GROUP,DATE,TIME
- GROUP, sort by GROUP,DATE,TIME, DBD, DDNAME, NUMBER
- CC, sort by CC, GROUP, DATE, TIME, DBD, DDNAME, NUMBER

### Parameters for generating summary reports
Reference for IMS HP Change Accumulation Utility parameters for generating reports.

**SUM.FILES=select**
Includes the list of allocated files in each summary report. Message HPC4040I is generated to precede the list of DD entries.
Default: NO
List: NO/YES

**SUM.REPORT CLASS=char**
Requests separate SYSOUT data sets for each subordinate address space summary report. The default is to merge all summary reports into the IMS HP Change Accumulation Utility report file (HPCPRINT). The class value, \( x \), is a single character value that is the class to be assigned, or to use the JOB default class, select \( * \). Each SYSOUT DD name is the JOB name of the subordinate space.
Default: none
Value: a single character JES SYSOUT class

**SUM.SORT=select**
Includes the sort step output in each summary report.
Default: YES
List: YES/NO

### GENJCL definitions
Reference for IMS HP Change Accumulation Utility GENJCL definitions.

**GEN.GRPNAME=name**
Names a change accumulation group for which a DBRC GENJCL.CA command is created. If you provide a GEN.GRPNAME statement, then you must provide at least one GEN.GENJCL statement. You can create as many GEN.GRPNAME statements as necessary to define all groups for processing. GENJCL.CA commands are created in the order in which GEN.GRPNAME statements are processed.

**GEN.GENJCL=string**
Represents a continued line of a DBRC GENJCL.CA command. The command must not contain the GRPNAME( ) parameter. If you provide a GEN.GENJCL statement, then you must provide at least one GEN.GRPNAME statement. You can create as many GEN.GENJCL
statements as necessary to define all continuation lines for the GENJCL.CA command. The GENJCL.CA command is created in the order in which GEN.GENJCL statements are processed. The continuation indicator for each line is optional.

**GEN.LIST=number range=0-8**

If the DBRC completion code (CC) > number, then the SYSPRINT DD output of the GENJCL.CA commands is listed in the HPCDBPRT data set, if allocated. IMS HP Change Accumulation Utility tests for this condition prior to GEN.WARN. The completion codes are:

- 0 = list for all conditions
- 4 = list for warnings or errors
- 8 = list only when errors

**GEN.RETRY=number**

Specifies the number of times IMS HP Change Accumulation Utility will reprocess GENJCL for CAGRI's that cannot be accumulated because of the purge time validation error.

Range: 0-3

Default: 0

Valid only for the extended batch environment.

The following restrictions apply:

- Only accept simple form of GENJCL definitions in HPCSYSIN
- VOLNUM is not supported
- Single Address Space (SAS) is not supported
- Point-in-time (PIT) is not supported
- New delete data set step if HPCADRI1 RC=4
- No standard procedures (STDPROC) mode

**GEN.STOP**

Directs IMS HP Change Accumulation Utility to bypass processing of the converted CAJCL procedures. This is similar to running PGM=HPCABAT0 (the first step in the 2-step batch process).

**GEN.WARN=action**

Directs IMS HP Change Accumulation Utility to take action if the DBRC GENJCL.CA process completes without error, but with warnings.

Actions are the following:

- STOP - End processing after messages are displayed.
- IGNORE - Attempt to process the JCL that was returned. The warning condition might result in additional errors or abends depending on the conditions of the resulting JCL.
- DEFER - Continue processing the JCL that was returned. Final return code will be RC=0 unless other errors are detected.

Default: STOP

**Note:** If no CA groups were returned by DBRC, or if error conditions have caused all groups to be bypassed, processing always ends with RC=4. GEN.WARN=IGNORE or DEFER has no effect when there are no CA groups to be processed. This command is secondary to the WARN=parm optionally provided in the EXEC parameters.
## Condition codes

Termination condition codes for HPCADRIV and HPCAMAIN reflect the combined termination status of the main address space and all subordinate address spaces. The completion codes are:

- **CC=00** All selected groups scheduled and completed successfully.
- **CC=04** No requested groups have input logs for processing.
- **CC=04** At least one scheduled group completed with a warning.
- **CC=08** At least one scheduled group completed with an error.
- **CC=20** At least one selected group was not scheduled.
- **CC=20** At least one scheduled group ended abnormally (abended).
- **CC=20** At least one scheduled group ended in an unknown condition.

CC=20 can result from an abend or from a condition that is not identifiable to the IMS HP Change Accumulation Utility main task. For example, a JCL error in the subordinate address space prevents any cross-memory communication and the condition is, therefore, unknown to the main address space.
Chapter 10. Selecting and customizing reports

You can select and customize reports produced by IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility.

Topics:

- “IMS HP Change Accumulation Utility report reference”
- “IMS HP Change Accumulation Utility report file (HPCPRINT)” on page 106
- “Summary reports” on page 108
- “Summary reports (HPCACOLP and HPCACOLS)” on page 112
- “Comma-separated reports (HPCACSV)” on page 112
- “HTML report (HPCAHTML)” on page 113
- “XML report (HPCAXML)” on page 114
- “DBRC output (HPCDBPRT)” on page 116
- “TRACE report (HPCATRACE)” on page 117
- “Diagnostics report (HPCADIAG)” on page 117

IMS HP Change Accumulation Utility report reference

IMS HP Change Accumulation Utility produces many reports to display information from multiple sources.

Table 6. IMS HP Change Accumulation Utility reports

<table>
<thead>
<tr>
<th>Report</th>
<th>Report function and content</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPCPRINT</td>
<td>Primary IMS HP Change Accumulation Utility report. HPCPRINT is a required DD for all batch processing but optional for ISPF. HPCPRINT includes normal and error processing information, status. Optional summary reports and Columnar report for each sort procedure can be included. RECFM=VBA LRECL=137</td>
</tr>
<tr>
<td>hpca-id mmm</td>
<td>Summary report by sort procedure. This is a SYSOUT file directed to the class specified in SUM.REPORT=class. A summary report can be directed to either the main HPCPRINT file or to an individual SYSOUT file. RECFM=VBA LRECL=137</td>
</tr>
<tr>
<td>HPCACOLP</td>
<td>Columnar report with page headings.</td>
</tr>
<tr>
<td>HPCACOLS</td>
<td>Columnar report. This report presents a single line for each database and DDN combination from the summary reports of all sort procedures. The information fields are aligned in columns according to a user defined sequence. RECFM=VB LRECL=137</td>
</tr>
<tr>
<td>HPCACSV</td>
<td>Comma-separated values. This report is similar to the columnar report, but each line is a set of comma-separated values. The resulting file can be loaded into a spreadsheet application that accepts input in the CSV format. RECFM=VB LRECL=137</td>
</tr>
<tr>
<td>HPCAHTML</td>
<td>HTML. The output file generated for this report is defined as an HTML table for display in a web browser. RECFM=VB LRECL=137</td>
</tr>
<tr>
<td>HPCAXML</td>
<td>XML. The XML report includes DTD and XML suitable for transfer to another application. RECFM=VB LRECL=137</td>
</tr>
</tbody>
</table>
 IMS HP Change Accumulation Utility report file (HPCPRINT)

The IMS HP Change Accumulation Utility report file is defined by HPCPRINT DD.

The format is RECFM=VBA, LRECL=137. This DD is required for all batch environments but is optional for ISPF. During ISPF processing, status and messages are presented in interactive panels.

Sections of the report vary by function.

The following sample report explains how the IMS HP Change Accumulation Utility report file is structured when not in scan mode. The numbers in parentheses do not appear in the actual report. These numbers refer to explanatory notes following the sample report.
Figure 37. Sample IMS HP Change Accumulation Utility report listing
Notes:

1. The standard IMS HP Change Accumulation Utility report header identifies the IMS HP Change Accumulation Utility version, date, time, and JOB identification.
2. Batch parameters from EXEC PGM=HPCAMAIN
3. Start of JCL processing. This section includes errors and warnings during JCL conversion.
4. Start of procedure execution. The procedures created in the previous step are scheduled to run.
5. IMS HP Change Accumulation Utility setup parameters and calculated values. These parameters are the settings from ISPF setup panels, or from IMS HP Change Accumulation Utility commands from the HPCSYSIN DD file. Limits and sizes are calculated from the setup and from the processed JCL.
6. Status and error messages. The status of each procedure as it starts and stops is recorded as it happens. Errors are reported as they occur. The sequencing of this section is chronological.
7. Procedure recap. Each procedure is listed with its completion status. Procedures in this section are sequenced according to the GENJCL.CA commands used to generate the JCL. If DBRC was not used, then the sequence is defined by the order in which the CA steps are defined in the JCL.
8. Start of a summary report. Each procedure that is successfully started produces a summary report. The reports are included here unless suppressed by RPT.SUMMARY=NO, or selected to alternate SYSOUT locations by SUM.REPORT CLASS=.
9. The columnar report is included here if RPT.COLUMNS=YES was selected.
10. Lines of informational messages describe the highwater use and limit values for 24-bit, 31-bit, and 64-bit memory allocations.
11. End of processing condition code, and end of IMS HP Change Accumulation Utility report.

Summary reports

Summary reports are produced for each successfully initiated CA address space.

You can direct the report to HPCPRINT, to a SYSOUT, or to neither. The default is to include basic summary report sections in HPCPRINT.

The following table shows the available commands for generating Summary reports.

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPT.SUMMARY=YES</td>
<td>NO</td>
</tr>
<tr>
<td>SUM.REPORT CLASS=x</td>
<td>CLASS designates a SYSOUT instead of HPCPRINT</td>
</tr>
<tr>
<td>SUM.FILES=YES</td>
<td>NO</td>
</tr>
<tr>
<td>SUM.SORT=YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Summary reports
For SUM.REPORT CLASS=x, each summary file is written to a separate output of the specified SYSOUT class. The name used for starting the address space is assigned to the DD name of the SYSOUT file.

In the following sample summary report, the numbers in parentheses do not appear in the actual report. These numbers refer to explanatory notes following the sample report.
Figure 38. Sample summary report - part 1
Note:

1. Start of summary. Each report is identified by the procedure name, CA group name, date, and time.

2. File allocations. This section appears only when SUM.FILES=YES is specified. Each allocation includes DDname and DSname or SYSOUT. Three types of allocation are described:
   - // - file is allocated from JCL in the executed procedure
   - ++ - HPCA dynamically allocated file
   - >> - log data set, allocated in the IMS HP Change Accumulation Utility main address space, data transferred X-memory

3. File allocations. The CA master input and master output files are always included.

4. CA report. The contents of the CA report SYSPRINT DD are reproduced here.

5. Sort messages. The content of the DFSORT message file SYSOUT DD is reproduced here. Sort messages appear only when SUM.SORT=YES is specified.
Columnar reports (HPCACOLP and HPCACOLS)

You can direct the Columnar report with page headings to HPCPRINT DD or HPCACOLP DD, or both.

The Columnar report (no page headings) is selected by the HPCACOLS DD.

The following table shows the commands available for generating columnar reports:

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPT.COLUMNS=YES/NO</td>
<td>Direct the report output to HPCPRINT</td>
</tr>
<tr>
<td>RPT.ORDER=DBD/GROUP/CC</td>
<td>Specifies the sort sequence</td>
</tr>
<tr>
<td>RPT.DATE=MDY/DMY/YMD/YDM</td>
<td>Specifies the date format for report headers</td>
</tr>
<tr>
<td>HPCACOLP DD</td>
<td>Directs output to HPCACOLP</td>
</tr>
<tr>
<td>HPCACOLS DD</td>
<td>Directs output to HPCACOLS</td>
</tr>
</tbody>
</table>

Report order determines both the sequence of lines within the report and the sequence of fields within the line. Report order options include the following:

- DBD = DBD,DDN,NUM,GROUP,DATE,TIME ...
- GROUP = GROUP, DATE, TIME,DBD,DDN,NUM ...
- CC = CC,GROUP,DATE,TIME,DBD,DDN,NUM ...

The default order is DBD.

The following example shows a Columnar report with page headings:

```
DBDNAME DDNAME NUM CA GROUP DATE TIME DFSULOG DFSUCUMO DFSUCUMN PURGE CC DBRC
-------- -------- --- -------- ------ ---------- -------- -------- -------- ------------ ---- ----
PRSB02Z PRSB02VA 47 PRSB02Z 09.288 12:23:58.7 0000230 0000000 0000021 092011305501 0000 N
PRSB02Z PRSB02VB 48 PRSB02Z 09.288 12:23:58.7 0000237 0000000 0000027 092011305501 0000 N
PRSB02Z PRSB02V0 37 PRSB02Z 09.288 12:23:58.7 0000254 0000000 0000029 092011305501 0000 N
```

Figure 40. Sample Columnar report with page headings (HPCACOLP)

The following example shows a Columnar report with no page headings:

```
DBDNAME DDNAME NUM CA GROUP DATE TIME DFSULOG DFSUCUMO DFSUCUMN PURGE CC DBRC
-------- -------- --- -------- ------ ---------- -------- -------- -------- ------------ ---- ----
PRSB02Z PRSB02VA 47 PRSB02Z 09.288 12:23:58.7 0000230 0000000 0000021 092011305501 0000 N
PRSB02Z PRSB02VB 48 PRSB02Z 09.288 12:23:58.7 0000237 0000000 0000027 092011305501 0000 N
PRSB02Z PRSB02V0 37 PRSB02Z 09.288 12:23:58.7 0000254 0000000 0000029 092011305501 0000 N
```

Figure 41. Sample Columnar report with no page headings (HPCACOLS)

Comma-separated reports (HPCACSV)

The comma-separated report, which is in CSV format, is similar to the columnar report in content and in sequence.
However, the fields in this report are stripped of trailing blanks and separated by commas. The CSV format can be loaded directly by most commercially available spreadsheet programs and is appropriate for performing additional sorting, totaling, or search analysis.

The following table shows the commands available for generating comma-separated reports:

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPT.ORDER=DBD/GROUP/CC</td>
<td>Specifies the sort sequence</td>
</tr>
<tr>
<td>HPCACSV DD</td>
<td>Specifies that the report output should be directed to HPCACSV</td>
</tr>
</tbody>
</table>

Report order determines both the sequence of lines within the report and the sequence of fields within the line. Report order includes the following options:

- **DBD** = DBD,DDN,NUM,GROUP,DATE,TIME ...
- **GROUP** = GROUP,DATE,TIME,DBD,DDN,NUM ...
- **CC** = CC,GROUP,DATE,TIME,DBD,DDN,NUM ...

The default order is DBD.

The following example shows a comma-separated report:

```
DBDNAME,DDNAME,NUM,CA,GROUP,DATE,TIME,DFSULOG,DFSUCUMO,DFSUCUMN,PURGE,CC,DBRC
DBVHDJ05,CJVHG1E,1,CAGRP1,07.269,06:01:47.6,0000817,0000000,0000010,051111848270,0000,N
```

**Figure 42. Sample comma-separated report (HPCACSV)**

**HTML report (HPCAHTML)**

The HTML report is a table format defined in HTML. It is suitable for display in a Web browser.

The following table shows the commands available for generating HTML reports:

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPT.ORDER=DBD/GROUP/CC</td>
<td>Specifies the sort sequence</td>
</tr>
<tr>
<td>RPT.DATE=MDY/DMY/YMD/YDM</td>
<td>Specifies the date format for report headers</td>
</tr>
<tr>
<td>HPCAHTML DD</td>
<td>Specifies that the report output be directed to HPCAHTML</td>
</tr>
</tbody>
</table>

Report order determines both the sequence of lines within the report and the sequence of fields within the line. Report order options include the following:

- **DBD** = DBD,DDN,NUM,GROUP,DATE,TIME ...
- **GROUP** = GROUP,DATE,TIME,DBD,DDN,NUM ...
- **CC** = CC,GROUP,DATE,TIME,DBD,DDN,NUM ...

The default order is DBD.
The following example shows an HTML report using DBD report order:

```html
<html>
  <head>
  </head>
  <body>
    <table border=2>
      <caption>HPCA Process Report 10/16/2009 06:56:12</caption>
      <th>DBDNAME</th>
      <th>DDNAME</th>
      <th>NUM</th>
      <th>CA GROUP</th>
      <th>DATE</th>
      <th>TIME</th>
      <th>DFSULOG</th>
      <th>DFSUCUMO</th>
      <th>DFSUCUMN</th>
      <th>PURGE</th>
      <th>CC</th>
      <th>DBRC</th>
      <tr>
        <td>PRSB02Z</td>
        <td>PRSB02VA</td>
        <td>47</td>
        <td>PRSB02Z</td>
        <td>09.289</td>
        <td>06:56:17.3</td>
        <td>0000230</td>
        <td>0000000</td>
        <td>0000021</td>
        <td>092011305501</td>
        <td>0000</td>
        <td>N</td>
      </tr>
      <tr>
        <td>PRSB02Z</td>
        <td>PRSB02Z9</td>
        <td>10</td>
        <td>PRSB02Z</td>
        <td>09.289</td>
        <td>06:56:17.3</td>
        <td>0000189</td>
        <td>0000000</td>
        <td>0000017</td>
        <td>0920111305501</td>
        <td>0000</td>
        <td>N</td>
      </tr>
    </table>
  </body>
</html>
```

Figure 43. Sample HTML report (HPCAHTML)

**XML report (HPCAXML)**

The XML report is formatted in XML. It is suitable for transfer to other XML enabled applications.

The report includes the complete DTD necessary for parsing the XML element contents of the report.

The following table shows the commands available for generating XML reports:
### Table 11. Commands for XML reports

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPT.ORDER=DBD/GROUP/CC</td>
<td>Specifies the sort sequence</td>
</tr>
<tr>
<td>RPT.DATE=MDY/DMY/YMD/YDM</td>
<td>Specifies the date format for report headers</td>
</tr>
<tr>
<td>HPCAXML DD</td>
<td>Specifies that the report output be directed to HPCAXML</td>
</tr>
</tbody>
</table>

Report order determines the sequence of CA report content used in creating the XML report. The sequence of the DBD composite elements changes, but the order of elements in the DTD remain constant.

Report order options include the following:
- `DBD = DBD,DDN,NUM,GROUP,DATE,TIME ...`
- `GROUP = GROUP,DATE,TIME,DBD,DDN,NUM ...`
- `CC = CC,GROUP,DATE,TIME,DBD,DDN,NUM ...`

The default order is `DBD`.

The following example shows an XML report using `DBD` report order:
The DBRC report is a reproduction of the SYSPRINT DD produced by IMS HP Change Accumulation Utility.

For descriptions of report features, refer to the DBRC product documentation.
TRACE report (HPCATRACE)

The TRACE report is described in “Trace” on page 160.

Diagnostics report (HPCADIAG)

The Diagnostics report is described in “HPCADIAG” on page 159.
Part 5. Performance and usage

You can apply additional performance and usage information to help improve the operation and performance of IMS HPCA.

Topics:
- Managing spill files with 64-bit addressing
- Performance and resource utilization
- IMS HPCA special features and functions
Chapter 11. Managing spill files with 64-bit addressing

You can improve IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility performance by taking advantage of 64-bit addressing to handle spill files used during the change accumulation process.

Topics:
- “Storage use above the bar in z/Architecture”
- “Using 64-bit memory to handle IMS HP Change Accumulation Utility spill files” on page 122
- “Managing 64-bit addressing with MEMLIMIT” on page 123
- “Managing 64-bit addressing with cache manager” on page 123
- “Precedence rules for 64-bit memory allocation” on page 125
- “64-bit addressing examples” on page 125

Storage use above the bar in z/Architecture

As of z/OS Release 1.2, an address space begins at address 0 and ends at 16 exabytes. The z/Architecture® that creates this address space provides 64-bit addresses.

The 64-bit address space includes a virtual line at the 16-megabyte address. Additionally, it includes a second virtual line called the bar that marks the 2-gigabyte address. The bar separates storage below the 2-gigabyte address, called **below the bar**, from storage above the 2-gigabyte address, called **above the bar**.

The area above the bar is intended for data; no programs run in the area above the bar. There is no area above the bar that is common to all address spaces, and no system control blocks exist above the bar.

You can set a limit on how much virtual storage above the bar each address space can use. This limit is called the MEMLIMIT.

If you want to use virtual storage above the bar, you need to set the MEMLIMIT explicitly in one of three ways:
- You can set an installation default MEMLIMIT through System Management Facility (SMF).
- You can set a MEMLIMIT for a specific address space in the job control language (JCL) that creates the address space.
  For example, the following jobcard will limit above the bar memory usage to 32GB:
  ```pl
  //HPCACCUM JOB 'SYSUID',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A,
  // TIME=1440,NOTIFY=SYSUID,MEMLIMIT=32G
  ```
  The MEMLIMIT value specified in SMFPRMxx will be used for jobs not establishing a MEMLIMIT in their JCL.
- You can set a MEMLIMIT by using SMF exit IEFUSI.
  When the IEFUSI exit receives control, it can change the MEMLIMIT value set by SMF or JCL.
For good background information on 64-bit addressability, refer to the z/OS concepts section of the z/OS basic skills information center:


---

**Using 64-bit memory to handle IMS HP Change Accumulation Utility spill files**

The purpose of spill files is to buffer log records when there is a requirement to maintain the serialization of log records and when those records cannot be immediately processed.

Fast Path spill files buffer the log input records when parallel log readers are assigned.

Spill files can also be created for CAGRP sort tasks. In single address space mode, each sort task creates a unique spill file. For multiple address space mode, spill files will be used when the number of CAGRP sorts to be processed exceeds the parallel sort count.

Prior to this release of IMS HP Change Accumulation Utility, spill files were always written to DASD or tape. In this release, IMS HP Change Accumulation Utility can take advantage of 64-bit addressing to store and retrieve spill file data in memory, thereby reducing the I/O activity to external storage devices.

Using 64-bit memory can reduce execute channel program (EXCP) count to improve performance. If the 64-bit memory is set large enough, all the spill records will go to 64-bit memory. If the 64-bit memory for the address space becomes full, the remaining spill records will be written to spill files on DASD or tape. As spill records are retrieved and processed, storage will be released to be reused for subsequent spill files.

Two mutually exclusive application methods are available for accessing spill records in 64-bit memory above the bar:

- The IMS HP Change Accumulation Utility MEMLIMIT command specifies the amount of storage above the bar that IMS HP Change Accumulation Utility is allowed to access. The IMS HP Change Accumulation Utility MEMLIMIT command is an option when IMS HP Change Accumulation Utility runs in either multiple address space mode or single address space mode.
- The IMS HP Change Accumulation Utility cache manager utilizes an external file (HPCCACHE DD) and control statements to define the 64-bit limits. The cache manager is the preferred method only when IMS HP Change Accumulation Utility runs in single address space mode.

Each method defines an application limit to the amount of storage that can be used above the bar. Both methods are equally restricted such that the application-defined limit is always subject to the system-applied limits.

In addition to IMS HP Change Accumulation Utility, the DFSORT task(s) can also specify the use of storage above the bar for sort work space. The 64-bit storage defined by IMS HP Change Accumulation Utility does not have to encompass all of the available storage. For example, the JOB statement parameter MEMLIMIT=10G
will make 10 gigabytes above the bar available to the address space. If the cache manager specifies SPACE=2G, then 8 GB of storage above the bar will be available to DFSORT.

IMS HP Change Accumulation Utility requires z/OS V1.6, or later to use 64-bit addressing.

### Managing 64-bit addressing with MEMLIMIT

The IMS HP Change Accumulation Utility MEMLIMIT command specifies the upper limit of storage above the bar that will be used by IMS HP Change Accumulation Utility for spill file data in memory. IMS HP Change Accumulation Utility commands are read from the HPCSYSIN DD.

The IMS HP Change Accumulation Utility MEMLIMIT command is described in the *Using IMS HP Change Accumulation Utility commands* topic of this user’s guide.

The following conditions apply when using the IMS HP Change Accumulation Utility MEMLIMIT command:

- The limit value is always given in units of 1 megabyte (1024MB = 1GB).
- The limit can be less than the system MEMLIMIT value to reserve memory above the bar.
- The IMS HP Change Accumulation Utility MEMLIMIT command is supported in both multiple address space mode and single address space mode.
- In single address space mode, the IMS HP Change Accumulation Utility cache manager overrides the IMS HP Change Accumulation Utility MEMLIMIT command.

For example, the MEMLIMIT value set in the following HPCSYSIN DD limits IMS HP Change Accumulation Utility use of above the bar memory to 4GB:

```
//HPCSYSIN DD  *  00470013
   ID   = CA14  00480013
   List = 3390  00490013
   Unit = 118   00500013
   MAXIMUMLOGS = 5  00510013
   PARALLELLOGS = 5  00520013
   PARALLELSORTS = 7  00530013
   ProcedureName = HPCSTASK  00540013
   Spill BLKSIZE = 26624  00550013
   SelectLogs = PRILOG  00560013
   MEMLIMIT = 4096  00570013
```

### Managing 64-bit addressing with cache manager

The IMS HP Change Accumulation Utility cache manager specifies the upper limit of storage above the bar that will be used by IMS HP Change Accumulation Utility for spill file data in memory.

IMS HP Change Accumulation Utility obtains cache manager control statements from the HPCCACHE DD statement. This optional cache is created by the IMS HP Change Accumulation Utility job during initialization and is dedicated to this job while IMS HP Change Accumulation Utility is running. The HPCCACHE DD statement must be provided in the JCL and the associated cache manager control statements must be correct. The cache is freed when the job terminates.
The following conditions govern the use of the IMS HP Change Accumulation Utility cache manager:

- The cache manager is only available when the HPCCACHE DD is present in single address space mode.
- IMS HP Change Accumulation Utility initialization checks for the HPCCACHE DD statement and will attempt to initialize the cache manager if the statement is present.
  If successful, the IMS HP Change Accumulation Utility cache manager is in use and is dedicated to IMS HP Change Accumulation Utility.
  If the HPCCACHE DD statement is not present, no cache will be used.
- The cache manager uses 64-bit addressing.
- The maximum size of the 64-bit above the bar memory that the cache is allowed to use is defined by the SPACE control in the HPCCACHE DD statement.
  IMS HP Change Accumulation Utility cache manager will not go beyond the limit set for above the bar memory allocations.
- If the IMS HP Change Accumulation Utility cache manager is not initialized, then the IMS HP Change Accumulation Utility MEMLIMIT command will control the memory above the bar.

Space above the bar is allocated by the IMS HP Change Accumulation Utility cache manager in 64MB increments as needed for the run. For example, when cache is used with a maximum setting of SPACE=2GB, and spill record processing needs only 1GB during this run, the total cache memory use above the bar will be 1GB for the run.

For example, the value set in the following HPCCACHE DD limits IMS HP Change Accumulation Utility use of above the bar memory to 4GB:

```
HPCCACHE DD *
CACHE LEVEL=1,TYPE=64BIT,SPACE=4GB
```

**HPCCACHE DD control statements**

The IMS HP Change Accumulation Utility cache manager control statements are read from HPCCACHE DD, which must be a sequential data set or PDS member with DCB options RECFM FB or VB and LRECL <=255.

HPCCACHE DD control statements must adhere to the following conditions:

- All keywords are required.
- A "*" in first column makes the statement a comment.
- CACHE LEVEL=level
  level is a numeric value (1-9).
  For this release of IMS HP Change Accumulation Utility, level is restricted to 1.
  For example:
  ```
  LEVEL=1
  ```
- CACHE TYPE=type
  type is the name of a storage class.
  For this release of IMS HP Change Accumulation Utility, type is restricted to 64BIT.
  For example:
  ```
  TYPE=64BIT
  ```
- CACHE SPACE=nMB|GB
The SPACE $n$ is the maximum above the bar memory allocated for use by IMS HP Change Accumulation Utility.

For this release of IMS HP Change Accumulation Utility, $n$ is restricted to $n$MB (megabytes) or $n$GB (gigabytes).

The cache manager cannot go beyond that limit in above the bar allocations.

For example, the following setting limits the cache manager to use up to 512MB of above the bar memory.

SPACE=512MB

The cache manager only uses memory when it needs it. IMS HP Change Accumulation Utility can use less memory than specified, but not more.

The memory size is rounded up to the 64MB boundary (the unit of allocation for the IMS HP Change Accumulation Utility cache manager).

- Control statements must not be sequenced numbered.

For example, a control statement specified as:

HPCCACHE DD *
CACHE LEVEL=1,TYPE=64BIT,SPACE=2GB 00412020

receives the following error message:

BPE0003E AN ERROR OCCURRED PARSING CACHE CONTROL STATEMENT
BPE0003E AT CHARACTER 73
BPE0003E FAILING TEXT: "00412020"
BPE0003E UNKNOWN POSITIONAL PARAMETER

Precedence rules for 64-bit memory allocation

Precedence rules govern the two IMS HP Change Accumulation Utility methods for using 64-bit memory.

- In single address space mode, the presence of HPCCACHE DD will take priority and 64-bit memory will be managed by the cache manager.

- IMS HP Change Accumulation Utility cache manager will indicate an out-of-memory condition to IMS HP Change Accumulation Utility when the lower of the two limits (HPCCACHE DD or MEMLIMIT in JCL) is reached.

- The MEMLIMIT control in the z/OS JCL jobcard statement always takes precedence over any above the bar address space limit defined for IMS HP Change Accumulation Utility.

- If no MEMLIMIT is set at the system level (by whatever means), the system default is 0, meaning that this address space cannot use virtual storage above the bar.

64-bit addressing examples

This topic contains examples that illustrate the different methods for allocating 64-bit memory in the IMS HP Change Accumulation Utility environment. Comment lines in each example explain the details of the methods.

Example 1: Using IMS HP Change Accumulation Utility MEMLIMIT in multiple address space mode

In this example, SMF MEMLIMIT=2G (specified in JCL) and HPCSYSIN MEMLIMIT = 2048 is specified for multiple address space.

//HPCACCUM JOB '&SYSUID',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A, // TIME=1440,NOTIFY=&SYSUID,MEMLIMIT=2G ... //HPCSYSIN DD *
In the HPC9997I informational message (HPCPRINT), the 64-bit value reveals a high-water mark of 2048MB for the address space. Because HPCSYSIN MEMLIMIT is specified, the 64-IMS HP Change Accumulation Utility value is output to represent the memory allocation internally managed by IMS HP Change Accumulation Utility.

<table>
<thead>
<tr>
<th>Storage:</th>
<th>Used</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPC9997I 24_bit:</td>
<td>176K</td>
<td>8168K</td>
</tr>
<tr>
<td>HPC9997I 31_bit:</td>
<td>67576K</td>
<td>1004544K</td>
</tr>
<tr>
<td>HPC9997I 64-bit:</td>
<td>2048M</td>
<td>0M</td>
</tr>
</tbody>
</table>

**Example 2: Using IMS HP Change Accumulation Utility cache manager in single address space mode**

In this example, SMF MEMLIMIT=1G (specified in JCL), the IMS HP Change Accumulation Utility cache manager (HPCCACHE) is configured for 8GB, and single address space mode (HPCSTASK) is specified.

//HPCACCUM JOB '&SYSUID',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A,  
// TIME=1440,NOTIFY=&SYSUID,MEMLIMIT=1G  
  
//HPCCACHE DD *  
//CACHE LEVEL=1,TYPE=64BIT,SPACE=8GB  
//HPCSYSIN DD *  

In the HPC9997I informational message (HPCPRINT), the 64-bit value reveals a high-water mark of 1024MB for the address space. The 64-IMS HP Change Accumulation Utility value is not output when the IMS HP Change Accumulation Utility cache manager is used for managing 64-bit memory.
Example 3: Using IMS HP Change Accumulation Utility cache manager or IMS HP Change Accumulation Utility MEMLIMIT command

In this example, SMF MEMLIMIT=6G (specified in JCL), the IMS HP Change Accumulation Utility cache manager (HPCCACHE) is configured for 4GB, and single address space mode (HPCSTASK) is specified.

```
//HPCACCUM JOB '&SYSUID',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A,
// TIME=1440,NOTIFY=&SYSUID,MEMLIMIT=6G
...
//HPCCACHE DD *
   CACHE LEVEL=1,TYPE=64BIT,SPACE=4GB
//HPCSYSIN DD *
   ID = CA14
   List
   Unit = 3390
   PARALLEL LOGS = 5
   PARALLEL SORTS = 7
   MEMLIMIT=4096
   PROCEDURE NAME = HPCSTASK
...
```

* SMF MEMLIMIT makes a maximum of 6GB available to this address space.
* SPACE=4GB sets the cache manager to 4GB.
* HPCA MEMLIMIT=4096 limits IMS HPCA use above the bar to 4GB (but this method will not be used because HPCCACHE is specified and therefore takes precedence).
* 2GB is reserved for other tasks in this address space. SMF MEMLIMIT =6G and IMS HPCA MEMLIMIT =4G, so a minimum of 2GB is reserved for other tasks in this address space. If IMS HPCA used only 1GB, then other tasks in the address space can use up to 5GB.
* HPCSTASK is single address space (SAS); cache manager is the only IMS HPCA method for managing 64-bit memory allocations in single address space.
* If the procedure name is not HPCSTASK, then cache manager is bypassed.

```
/*
In the HPC9997I informational message (HPCPRINT), the 64-bit value reveals a high-water mark of 4096MB for the address space. This example is trying to show that although the SMF MEMLIMIT is 6G (6144MB), the HPCCACHE limit restricts the usage to 4GB (4096MB).
```

```
HPC9997I Storage: Used Limit
HPC9997I 24_bit: 4748K 8168K
HPC9997I 31_bit: 71844K 1004544K
HPC9997I 64-bit: 4096M 0M
```

Example 4: Using IMS HP Change Accumulation Utility MEMLIMIT in single address space mode

In this example, SMF MEMLIMIT=3G (specified in JCL) and HPCSYSIN MEMLIMIT = 2048 is specified for single address space.

```
//HPCACCUM JOB '&SYSUID',MSGCLASS=H,MSGLEVEL=(1,1),CLASS=A,
// TIME=1440,NOTIFY=&SYSUID,MEMLIMIT=3G
...
//HPCSYSIN DD *
   ID = CA14
   List
   Unit = 3390
   PARALLEL LOGS = 5
   PARALLEL SORTS = 7
   Select Logs = PRILOG
   MEMLIMIT = 2048
   PROCEDURE NAME = HPCSTASK
...
```
* SMF MEMLIMIT makes a maximum of 3GB available to this address space
* IMS HPCA MEMLIMIT=2048 limits IMS HPCA use above the bar to 2GB
* 1GB is reserved for use by other tasks. If IMS HPCA used only 1GB, then
  other tasks in the address space would be allowed up to 2GB (for a
total of SMF MEMLIMIT=3G).
/*
In the HPC9997I informational message (HPCPRINT), the 64-bit value reveals a
high-water mark of 2349MB for the address space. This example shows that
although there are differences in high-water marks for 64-bit and 64-HPCA, the
values indicated are accurate.

<table>
<thead>
<tr>
<th>Storage Type</th>
<th>Used</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPC9997I 24_bit:</td>
<td>4716K</td>
<td>8168K</td>
</tr>
<tr>
<td>HPC9997I 31_bit:</td>
<td>71868K</td>
<td>1004544K</td>
</tr>
<tr>
<td>HPC9997I 64-bit:</td>
<td>2349M</td>
<td>0M</td>
</tr>
<tr>
<td>HPC9997I 64-HPCA</td>
<td>2048M</td>
<td>2048M</td>
</tr>
</tbody>
</table>

In this scenario, 64-bit differs from 64-HPCA because IMS HP Change
Accumulation Utility used 2048MB but other tasks in the address space used
301MB for a total of 2349MB. IMS HP Change Accumulation Utility MEMLIMIT
will track 64-IMS HP Change Accumulation Utility usage and will limit allocations
accordingly.

In this example, IMS HP Change Accumulation Utility is allowed 2048MB and the
address space is entitled up to 3072MB (for example, 3GB). The additional 301MB
can be attributed to other tasks in the address space.

In single address space, all tasks that use 64-bit memory allocations will be
reflected in the 64-bit output line.
Chapter 12. Performance and resource utilization

The way you use system and product resources has an impact on the speed and efficiency of various IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility processes.

Topics:
- “Diagnostic facilities”
- “Tape files”
- “Spill files” on page 130
- “Temporary files” on page 134

Diagnostic facilities

Unrestricted use of the diagnostic facilities (HPCADIAG and HPCTRACE) can significantly increase resource use and degrade performance.

These functions require additional memory and external storage, such as DASD JES queue.

Diagnostic tools are designed to gather information for problem resolution.

Normal production runs achieve better performance if diagnostics are off.

Tape files

Restrictions might be necessary when input log files and IMS/CA master files are recorded to tape files.

The number of physical drives might not be enough to support the multiple instances of IMS/CA processing in multiple address spaces. Even if there are sufficient physical drives, site limitations might restrict the number of drives that can be assigned to IMS HP Change Accumulation Utility JOBs.

The total number of required drives includes logs and CA master files allocated to each active dependent address space and the number of logs allocated to log readers in the IMS HP Change Accumulation Utility control address space.

IMS HP Change Accumulation Utility implements the PARALLEL LOGS command and PARALLEL SORTS command to control the required number of drives.

This section contains the following additional topics:
- “Tape log files”
- “Tape IMS/CA master files” on page 130

Tape log files

You can allocate log files to multiple address spaces, but you cannot allocate them simultaneously.

For dependent SORT address spaces, you should modify the DBRC skeletal JCL to use the DEFER parameter.
Using the DEFER parameter limits the number of drives required for starting each dependent address space. Because only one address space at a time obtains a tape volume, a single drive satisfies all dependent address spaces.

The PARALLEL LOGS command limits the number of reader tasks to be started in the IMS HP Change Accumulation Utility control address space.

For each parallel reader, there must be a physical drive available to mount each log.

**Tape IMS/CA master files**

Each dependent SORT address space requires an output master and optional input master.

The total number of drives required is 1 (or 2) times the number of parallel sorts requested.

This number of drives is in addition to the log readers processed by the IMS HP Change Accumulation Utility control address space.

---

**Spill files**

Spill files buffer log records when there is a requirement to maintain the serialization of log records and records cannot be immediately processed.

Input logs contain many record types that are not relevant to change accumulation, such as checkpoint records and DB status records. Because these record types are not carried on the spill files, the definition for "log unit of measure" does not include them.

A log data set, particularly tape logs, can reside on multiple volumes. Estimating the percentage of update records for the logs requires site specific knowledge of the database and transaction types that are typically being processed.

When converting estimates of spill file size to actual space values, the spill file BLKSIZEmust also be considered. The default block size of 32760 might not be optimal for some DASD devices. Using a smaller but more track efficient size can affect the number of tracks required for spill files.

Examples in the following topics illustrate required work file sizes using input log data sets as the unit of measure:

- "CA spill files"
- "Fast Path spill files" on page 132

**CA spill files**

CA spill files buffer the log input records when there are more CA groups to process than there are parallel address spaces that can be started.

The number of spill files generally is the total number of CA groups to be processed minus the number of parallel sorts assigned. Sort address spaces start when the first processed log is opened and end with the closing of the final input log.
If the distribution of log input data sets is not common to all the groups being processed, the number of spill files might be reduced. This happens when two or more groups process disconnected sets of logs. Because these groups do not share log inputs, they are not scheduled for processing in parallel, thus making the spill files unnecessary.

Examples:
- **Example 1: 4 CA groups**
- **Example 2: 2 CA groups**
- **Example 3: 5 total CA groups, 4 selected for processing** on page 132
- **Example 4: 5 total CA groups, 4 selected for processing** on page 132

**Example 1: 4 CA groups**
CA spill file example 1.
10 input logs
4 CA groups
3 parallel sort address spaces

Assume the log distribution is common to all groups. Each group processes logs 1 through 10. When log 1 is opened, all 4 CA groups must be started. Groups 1, 2, and 3 are started as address spaces and receive the log input directly using cross-memory data transfer. Because group 4 cannot use cross-memory, it will be directed to a spill file.

The DBRC VOLNUM parameter also affects the scheduling of address spaces and use of spill files. When a CA group requires more log files than the VOLNUM limit, DBRC creates multiple CA utility processing steps. These steps cannot be run in parallel because, after the first step, the input to each step is the output of the preceding step.

**Example 2: 2 CA groups**
CA spill file example 2.
10 input logs
2 CA groups
3 parallel sort address spaces
VOLNUM=5

Assume the log distribution is common to all groups. Each group processes logs 1 through 10. The VOLNUM parameter causes four processing steps to be created and, therefore, four address spaces to be started. However, steps 1 and 2 cannot be run in parallel, nor can steps 3 and 4. When log 1 is opened, only step 1 (group 1) and step 3 (group 2) are started. The third possible address is not used.

The next step depends on the size of the CA groups and processing speed of the processors. When log 5 is closed, the 2 active steps (1 and 3) enter the sort completion and ending phase of processing.

This is overlapped with the opening of log 6. Log 6 schedules the start of the remaining steps (2 and 4). If step 1 ends before the opening of log 6 completes, then step 3 (group 1) is eligible for scheduling directly and uses cross-memory transfer. The same rule applies to steps 2 and 4 (group 2). However, the volume of data for either step 1 or step 2 might cause the sort completion and ending to take
longer than the time required to complete the opening of log 6. The input log reader is not delayed by waiting for completion, therefore spill files are assigned.

The size of a spill file depends on the number of logs, databases, and distribution of log records. As in estimating sort work space, the ultimate factor is the number and size of records to be processed. A spill file must be large enough to hold all log records for a complete CA group. Records from each log are selected to include only those records for DBs and DEDBs that are included in the CA group.

**Example 3: 5 total CA groups, 4 selected for processing**

CA spill file example 3.

- 10 input logs
- 5 total CA groups
- 4 CA groups selected for processing
- 2 parallel sort address spaces

Assuming that log records are evenly distributed across all groups, then each group represents 20% memory, and the remaining 2 groups use spill files.

Each spill file contains approximately the volume of 2 input logs (2 * 10). Therefore, the total spill file requirement would be twice that value.

**Example 4: 5 total CA groups, 4 selected for processing**

CA spill file example 4.

- 10 input logs
- 5 total CA groups
- 4 CA groups selected for processing
- 2 parallel sort address spaces

Assume that log records are not evenly distributed across all groups and that the fifth (unprocessed) group is the group with the high volume of databases that represent approximately 70% of total transactions.

Therefore, the 4 groups to be processed represent approximately 30% of the total. If these are evenly distributed within the 4 groups, each represents 7.5% of the total volume (.30 / 4).

Each spill file is approximately 75% of the volume of one log. Therefore, the total spill file requirement would be twice that value.

**Fast Path spill files**

Fast Path spill files buffer the log input records when parallel log readers are assigned and Fast Path input is processed.

You can avoid Fast Path spill files by setting the number of parallel log readers to 1 or by using the FP.NOSPILL command.

The maximum number of spill files is the total number of log files minus 1. Fast Path spill files are processed and released in sequence as the log files are read. Thus, the number of spill files that exist at any time is different from the total number of spill files.
Because each log starts and stops independently, you cannot be certain when each Fast Path spill file will be released. The working set of spill files can range from 0 to number of logs minus 1, but is generally the number of parallel log readers when parallel logs is greater than 1.

The size of a spill file depends on the size of the largest input log, the DEDBs to be processed, and the distribution of log records. Each spill file is created from a single input log.

The spill file must be large enough to hold all Fast Path log records for all DEDBs to be processed. A Fast Path spill file is, generally, not larger than the largest log and is frequently much smaller.

However, because IMS HP Change Accumulation Utility keeps additional information about each log record, if every record of a log file is a Fast Path record for a DEDB to be processed, then the spill file might be slightly larger than the input log file.

Examples:
- “Example 1: 20 total DEDBs, 10 selected for processing”
- “Example 2: 20 total DEDBs, 10 selected for processing”

**Example 1: 20 total DEDBs, 10 selected for processing**

Fast Path spill file example 1.
- 10 input logs
- 20 total DEDBs
- 10 DEDBs selected for processing (number of groups is not a consideration)
- 4 parallel log readers

Assume that log records are evenly distributed across all DEDBs, then 50% of each log will be processed (10 of 20 DEDBs).

Each spill file is approximately 50% of the volume of one input log.

The maximum number of spill files is 9 (10-1 logs).

Therefore, the average working set size is 4 spill files, and the working set volume is 2 times the volume of 1 log (4 x .50).

**Example 2: 20 total DEDBs, 10 selected for processing**

Fast Path spill file example 2.
- 10 input logs
- 20 total DEDBs
- 10 DEDBs selected for processing (number of groups is not a consideration)
- 4 parallel log readers

Assume that log records are not evenly distributed across all DEDBs. Let the unprocessed DEDBs be the groups with the high volume databases that represent approximately 70% of total transactions.

The 10 DEDBs to be processed are then 30% of the total.

Therefore, each spill file is approximately 30% of the volume of 1 input log.
The maximum number of spill files is 9 (10-1 logs).

The average working set size is 4 spill files.

The working set volume is 120% of the volume of 1 log (4 x .30).

**Temporary files**

IMS HP Change Accumulation Utility dynamically allocates many temporary files that are necessary for processing JCL and control information.

These files each have default values that control allocation. The defaults are appropriate for most typical environments.

Occasionally, very large files are required (for example, RECON data sets and skeletal JCL). If the space or other allocation default parameters are not adequate for processing, then each temporary file can be pre-allocated by the user.

For batch executions, DD statements can be defined in the JCL.

For ISPF, the user can preallocate files using TSO ALLOC either directly or with the command file CLIST,REXX.

**Subtopics:**

- “Temporary files used in HPCA/ISPF HPCAE000”
- “Temporary files used in HPCA/ISPF HPCAMAIN” on page 135
- “Temporary files used in batch HPCA/ISPF HPCABAT0” on page 136
- “Temporary files used in subordinate address spaces, HPCADRI1” on page 137

### Temporary files used in HPCA/ISPF HPCAE000

The table in this topic identifies the temporary files used in HPCA/ISPF HPCAE000.

**Table 12. Temporary files used in HPCA/ISPF HPCAE000**

<table>
<thead>
<tr>
<th>ddname</th>
<th>Used for</th>
<th>Defaults</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYIN</td>
<td>DBRC inputs (GENJCL, LISTDB)</td>
<td>UNIT = name&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RECFM = FB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LRECL = 80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BLKSIZE = 6160</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPACE = (TRK, (2, 2))</td>
</tr>
<tr>
<td>SYSPRINT</td>
<td>DBRC output listings</td>
<td>UNIT = name&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RECFM = FBA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LRECL = 133</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BLKSIZE = 2660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPACE = (CYL, (10, 10))</td>
</tr>
<tr>
<td>JCLOUT</td>
<td>DBRC output JCL</td>
<td>UNIT = name&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RECFM = FBA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LRECL = 133</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BLKSIZE = 2660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPACE = (CYL, (2, 2))</td>
</tr>
</tbody>
</table>
Table 12. Temporary files used in HPCA/ISPF HPCAE000 (continued)

<table>
<thead>
<tr>
<th>ddname</th>
<th>Used for</th>
<th>Defaults</th>
</tr>
</thead>
</table>
| HPCASCAN | IMS HP Change Accumulation Utility SCAN command output | UNIT=\textit{name} \footnote{1} 
RECFM=FBA 
LRECL=133 
BLKSIZE=2660 
SPACE=(CYL,(1,10)) |
| HPCATABL | ISPF table members                                   | UNIT=SYSDA 
RECFM=FBL 
RECL=80 
BLKSIZE=6160 
SPACE=(TRK,(2,2,10)) |
| HPCACTL  | IMS HP Change Accumulation Utility control file members | UNIT=SYSDA 
RECFM=V 
LRECL=1024 
BLKSIZE=1028 
SPACE=(TRK,(20,20,5)) |
| HPCALOGIN| DBRC input (LIST.LOG) for secondary logs             | UNIT=\textit{name} \footnote{1} 
RECFM=FB 
LRECL=80 
SPACE=(TRK,(1)) |
| HPCLOGOU | DBRC output listing for secondary logs              | UNIT=\textit{name} \footnote{1} 
RECFM=FBA 
LRECL=133 
SPACE=(CYL,(50,50)) |

\footnote{1}{Name is the value assigned to the IMS HP Change Accumulation Utility command UNIT=\textit{name}.}

If no value is assigned, SYSDA is used.

**Temporary files used in HPCA/ISPF HPCAMAIN**

The table in this topic identifies the temporary files used in HPCA/ISPF HPCAMAIN.

Table 13. Temporary files used in HPCA/ISPF HPCAMAIN

<table>
<thead>
<tr>
<th>ddname</th>
<th>Used for</th>
<th>Defaults</th>
</tr>
</thead>
</table>
| SYSIN  | DBRC inputs (GENJCL, LISTDB)                  | UNIT=\textit{name} \footnote{1} 
RECFM=FB 
LRECL=80 
BLKSIZE=80 
SPACE=(TRK,(2,2)) |
| SYSPRINT | DBRC output listings                          | UNIT=\textit{name} \footnote{1} 
RECFM=FBA 
LRECL=133 
BLKSIZE=133 
SPACE=(TRK,(20,20)) |
| JCLOUT | DBRC output JCL                               | UNIT=\textit{name} \footnote{1} 
RECFM=FBA 
LRECL=80 
BLKSIZE=80 
SPACE=(TRK,(2,2)) |
Table 13. Temporary files used in HPCA/ISPF HPCAMAIN (continued)

<table>
<thead>
<tr>
<th>ddname</th>
<th>Used for</th>
<th>Defaults</th>
</tr>
</thead>
</table>
| HPCACTL | IMS HP Change Accumulation Utility control file members | UNIT = *name*<sup>1</sup>  
RECFM = V  
LRECL = 1024  
BLKSIZE = 1028  
SPACE = (TRK,(10,10,5)) |
|         |                                              | **HPCAPROC** IMS HP Change Accumulation Utility procedure lib members | UNIT = *name*<sup>1</sup>  
RECFM = FB  
LRECL = 80  
SPACE = (TRK,(10,10,5)) |
| HPCLOGIN | DBRC input (LIST.LOG) for secondary logs | UNIT = *name*<sup>1</sup>  
RECFM = FB  
LRECL = 80  
SPACE = (TRK,(1)) |
| HPCLOGOU | DBRC output listing for secondary logs | UNIT = *name*<sup>1</sup>  
RECFM = FBA  
LRECL = 133  
SPACE = (CYL,(50,50)) |
| GENJCLIN | DBRC input reformatted | UNIT = *name*<sup>1</sup>  
RECFM = FB  
LRECL = 80  
SPACE = (TRKL,(10,10)) |

<sup>1</sup>Name is the value assigned to the IMS HP Change Accumulation Utility command UNIT = *name*.

If no value is assigned, SYSDA is used.

Temporary files used in batch HPCA/ISPF HPCABAT0

The table in this topic identifies the temporary files used in HPCA/ISPF HPCABAT0.

Table 14. Temporary files used in batch HPCA/ISPF HPCABAT0

<table>
<thead>
<tr>
<th>ddname</th>
<th>Used for</th>
<th>Defaults</th>
</tr>
</thead>
</table>
| SYSIN   | DBRC inputs (GENJCL, LISTDB) | UNIT = SYSDA  
RECFM = FB  
LRECL = 80  
BLKSIZE = 80  
SPACE = (TRK,(2,2)) |
| SYSPRINT | DBRC output listings | UNIT = SYSDA  
RECFM = FBA  
LRECL = 133  
BLKSIZE = 133  
SPACE = (TRK,(20,20)) |
| JCLOUT  | DBRC output JCL | UNIT = SYSDA  
RECFM = FBA  
LRECL = 80  
BLKSIZE = 80  
SPACE = (TRK,(2,2)) |
Temporary files used in subordinate address spaces, HPCADRI1

The table in this topic identifies the temporary files used in subordinate address spaces, HPCADRI1.

Table 15. Temporary files used in subordinate address spaces, HPCADRI1

<table>
<thead>
<tr>
<th>ddname</th>
<th>Used for</th>
<th>Defaults</th>
</tr>
</thead>
</table>
| DFSPARM   | SORT control statements | UNIT=name²  
|           |                     | RECFM=FB  
|           |                     | LRECL=80  
|           |                     | BLKSIZE=400  
|           |                     | SPACE=(TRK,(1,10)) |
| HPCPITIN  | DBRC inputs         | UNIT=name²  
|           |                     | LIST.CAGRP  
|           |                     | RECFM=FB  
|           |                     | LRECL=80  
|           |                     | SPACE=(TRK,(1,1)) |
| HPCPITOUP | DBRC output         | UNIT=name²  
|           |                     | RECFM=FBA  
|           |                     | LRECL=133  
|           |                     | SPACE=(CYL,(10,10)) |

¹These DD definitions can be generated from the DBRC GENJCL.CA skeleton member or defined in the standard proc or standard JOB member of proclib/joblib.

²Name is the value assigned by the IMS HP Change Accumulation Utility command UNIT= name. If no value is assigned, SYSDA is used.
Reprocessing change accumulation groups

After a validation error, the IMS HP Change Accumulation Utility process stops. You can automatically reprocess change accumulation groups after a validation error by using the GEN.RETRY extended batch control statement. This control statement also preserves the integrity of the recovery environment that is maintained by DBRC and works within the boundaries of the IMS HP Change Accumulation Utility architecture.

IMS HP Change Accumulation Utility validation error

If DBRC cannot validate the purge time or the input logs that are specified in the JCL, which is created during the IMS HP Change Accumulation Utility setup phase, an IMS error condition occurs. If an IMS error condition occurs (DSP0711I, DSP0712I, or DSP0715E), the specified change accumulation process is not performed and must be resubmitted.

During IMS HP Change Accumulation Utility setup, the GENJCL.CA command creates the correct JCL, which includes all of the unprocessed log data sets that are registered in the RECON.

More specifically, DBRC analyzes information in the RECON to determine which changes need to be accumulated and reverts back to an earlier point to determine an effective purge time. The purge time is effective after analyzing the contents of the RECON at that specific point in time. However, after you run the GENJCL command, the environment continues to be set up to support parallel processing of reading multiple input logs and scheduling multiple IMS/CA processes.

During the IMS HP Change Accumulation Utility operation phase, the JCL that is created during setup is used to schedule parallel processes that will each run a single copy of the DFSUCUM0 utility. The scheduled processes begin running when log input or spill file input is ready, and an address space or subtask is available for the scheduling of DFSUCUM0.
When DFSUCUM0 runs, it invokes DBRC to validate that the input JCL is correct according to the current information in the RECON data set. Because processing still continues after IMS HP Change Accumulation Utility setup, the JCL will not pass DBRC validation and returns an IMS DSP error message (DSP0711I, DSP0712I, or DSP0715E).

DSP0711I SPECIFIED PURGETIME IS NOT THE CURRENT IMAGE COPY TIME
DSP0712I NO INPUT TO PROCESS FOR CHANGE ACCUMULATION GROUP
DSP0715E SPECIFIED PURGETIME IS LATER THAN THE CURRENT PURGETIME
FOR DBDNAME=dbdname DDNAME=ddname
CURRENT PURGETIME = time stamp

Important: IMS HP Change Accumulation Utility normally returns the information and does not handle the error.

GEN.RETRY extended batch control statement

The IMS HP Change Accumulation Utility command GEN.RETRY is used to automatically reprocess change accumulation groups after a validation error that occurs when DBRC cannot validate the change accumulation purge time or input logs with a concurrent image copy.

The GEN.RETRY command is read from the HPCSYSIN DD and is validated only for the extended batch environment.

The GEN.RETRY command is enabled only when the GEN.GENJCL and GEN.GRPNAME commands are specified via HPCSYSIN. When the GEN.RETRY command is enabled, it allows IMS HP Change Accumulation Utility to reprocess the CAGR when the IMS change accumulation utility (IMS/CA) returns the purge time validation error.

The following sections discuss other conditions that affect the use of the GEN.RETRY command:

VOLNUM parameter support

The VOLNUM parameter is not supported with the GEN.RETRY command because a series of job steps is created for each CAGR.

The GEN.RETRY command requires each CAGR to get a single JCL procedure.

Point-In-Time change accumulation support

Point-in-time change accumulation is not supported with the GEN.RETRY command because of unanticipated results.

The purpose of the GEN.RETRY command is to capture a new purge time and archived logs. However, outside processes such as image copy or reorganization might result in all log records being discarded. In this case, the change accumulation will result with No input to process.

Skeletal JCL modification

If your skeletal JCL member allocates a new change accumulation master using DISP=(NEW,CATLG,DELETE), you might need to add a conditional step to the skeletal JCL to delete the data set when an error is encountered.
When the change accumulation is initially processed, the change accumulation master is created. If the purge time validation condition is experienced, the data set is never deleted. When the reprocessing of the change accumulation is performed, an error might be encountered because the change accumulation cannot be created.

For example:

//DSP07XX EXEC PGM=IEFBR14,COND=(8,LT,CA%STPN0)
//DFSUCMN DD DISP=(OLD,DELETE,DELETE),DSN=(&HILEV.....)

**IMS HP Change Accumulation Utility Reports**

The IMS HP Change Accumulation Utility reporting interface remains intact. If the first change accumulation process is successful, then reporting occurs as normal. If the first change accumulation process fails, a message is sent indicating that IMS HP Change Accumulation Utility will reprocess change accumulation. If reprocessing change accumulation is successful, the reporting will be produced as if everything was successful the first time.

**Performance considerations**

IMS HP Change Accumulation Utility might run for an extended period of time when reprocessing change accumulation for a group. IMS HP Change Accumulation Utility will reperform the GENJCL.CA, read new input logs, and schedule and run new IMS/CA tasks for each iteration of GEN.RETRY.

The recommendation is to specify GEN.RETRY=1 to enable some investigation for unsuccessful change accumulation after the first iteration of reprocessing.

**GEN.RETRY process flow**

The following process flow describes the IMS HP Change Accumulation Utility environment when using GEN.RETRY to automatically reprocess change accumulation that was stopped by the purge time or input log validation error

During IMS HP Change Accumulation Utility setup phase, the run environment is determined and JCL is created. IMS HP Change Accumulation Utility then reads all input logs in parallel. The scheduled processes normally begin running when log input or spill file input is ready and an address space or subtask is available for scheduling of DFSUCUM0.

However, the GEN.RETRY solution adds another process after IMS/CA processing. If the GEN.RETRY command is enabled in HPCSYSIN, IMS HP Change Accumulation Utility will analyze the completion of the IMS/CA task to detect the IMS DSP message (DSP0711I, DSP0712I, or DSP0715E) and reprocess the CAGRP.

For the following process flow description, IMS HP Change Accumulation Utility is started for 10 CA groups with 5 parallel sorts:

1. JCL is created and stored as result of IMS HP Change Accumulation Utility setup processing.
2. IMS HP Change Accumulation Utility generates a network of CAGRPs and required input logs, and begins reading input logs.
3. A subordinate address space is created (IMS/CA).
4. DBRC is invoked to validate the input. Processing continues or fails with a non-zero return code and a corresponding message.
5. After IMS/CA processing, subsequent processing continues based on the following circumstances:
   • If GEN.RETRY is not specified, processing continues normally.
   • If GEN.RETRY is specified and no purge time or input log validation error condition occurs, processing continues normally.
   • If GEN.RETRY is specified and there is a purge time or input log validation error condition, the CAGRPs are added to a list for reprocessing.
6. If a GEN.RETRY list is returned, IMS HP Change Accumulation Utility outputs a message that indicates that the CAGRPs are being reprocessed.
7. IMS HP Change Accumulation Utility reprocesses the GENJCL.CA command, rereads the input logs, and reschedules the IMS/CA task (essentially returning to step 1 of this process flow).
8. IMS HP Change Accumulation Utility repeats the process up to a possible three iterations (GEN.RETRY = 3).
9. IMS HP Change Accumulation Utility ends successfully with either a change accumulation recorded in the RECON, or ends unsuccessfully with errors returned during processing.

Point-in-time change accumulation and database recovery

Point-in-time change accumulation (PITCA) and database recovery restores a database to a specific date and time. A point-in-time change accumulation is useful for contingency planning and for disaster recovery planning.

When you use IMS Database Recovery Facility to restore a database to a point in time, only committed updates up to and including the point in time are selected from the change accumulation input. A point-in-time recovery is useful when a database is corrupted.

- “Point-in-time change accumulation overview”
- “Database transactions” on page 143
- “Enabling point-in-time change accumulation” on page 143
- “IMS HP Change Accumulation Utility PITCA set up” on page 144
- “IMS HP Change Accumulation Utility PITCA time stamps” on page 145
- “IMS HP Change Accumulation Utility PITCA UTC time stamps” on page 145
- “IMS HP Change Accumulation Utility PITCA time stamp adjustments for leap seconds” on page 145
- “IMS HP Change Accumulation Utility PITCA file processing” on page 146
- “IMS HP Change Accumulation Utility PITCA spill file allocation” on page 146
- “Change accumulation data sets for future use” on page 147
- “PITCA and IMS Recovery Solution Pack time stamp recovery” on page 147

Point-in-time change accumulation overview

Point-in-time change accumulation (PITCA) merges all available updates from different systems into a single file.

The PITCA file contains all completed transactions up to the specified point in time. For example, if two systems are sharing a database, logs for both systems must be archived for the specified point in time. The PITCA file will be within the time stamp range of the input logs.
Because PITCA files contain only complete transactions, the accumulation process cannot continue beyond the PITCA end time. When you use PITCA for recovery purposes, you must perform and record an image copy in the RECON to create a valid starting point for subsequent change accumulation processing.

Important: PITCA does additional checking to track the inflight and indoubt status of every input log record. This checking can cause a negative influence on performance.

Differences with standard change accumulation

The standard change accumulation process maintains a transitional view of a database that is represented in the IMS log data. The accumulation file that is generated by standard change accumulation processing includes records of completed transactions. The accumulation file also includes partially completed transactions and a subset of records of the complete update. These partially completed transactions and subsets of records are recorded in the change accumulation file as spill records.

Database transactions

A transaction for a database is a group of log records that share a common recovery token. Recovery tokens are tracked only for input logs.

A transaction group can have many update records and one or more commit records. If one or more records from the transaction group are not available, then the transaction is considered incomplete. For example, an incomplete transaction either does not include a commit record or is missing a log record from the transaction group.

Incomplete non-Fast Path transactions are referred to as inflight. Incomplete Fast Path transactions are referred to as indoubt. Such transactions are fully resolved by the application of additional log files in subsequent change accumulation processing.

Enabling point-in-time change accumulation

You enable point-in-time change accumulation (PITCA) by using the LOG TIME command.

To enable PITCA, set the LOG TIME command and specify the appropriate parameter.

- Set LOG TIME=YES to use the final time stamp of the final input log for the point in time.
- Set LOG TIME=time stamp to use the time stamp that you specify. The time stamp value must be a time value later than the first archived input log and not later than the STOP time of the last input log. All sharing IMS systems must have at least one archived log.

Requirement: For a point-in-time change accumulation time stamp, you must select a time stamp that is within the range of the input logs. A time stamp that is earlier than the first input log causes all input records to be truncated. A time stamp that is later than the STOP time of the final log is the same as LOG TIME=YES.
**Using the LOG TIME command in ISPF**

The LOG TIME command does not have a panel entry field in ISPF. Therefore, before using the LOG TIME command, you need to create a HPCSYSIN file to include the LOG TIME parameter.

1. Edit a sequential or PDS member file with the file type F(80).
2. Include the LOG TIME command in the file with the file type F(80).

**Tip:** You can also place other IMS HP Change Accumulation Utility commands into the same file or member and use the file or member for other IMS HP Change Accumulation Utility sessions. Enter the data set name for the HPCSYSIN file on the IMS HP Change Accumulation Utility Execution JCL DD control panel (Setup option 9).

**IMS HP Change Accumulation Utility PITCA set up**

After enabling point-in-time change accumulation (PITCA), IMS HP Change Accumulation Utility PITCA might require additional set up to run properly in your environment.

**IMS RESLIB requirement**

The LOG TIME command requires IMS RESLIB. If you specify LOG TIME=time stamp, an IMS time management function is loaded. Therefore, the IMS RESLIB data set must be available in LINKLIST or in STEPLIB.

If you specify LOG TIME=time stamp and if the IMS RESLIB data set is not available, IMS HP Change Accumulation Utility processing will not process PITCA.

If IMS RESLIB is unavailable, use STEPLIB DD to make it available.

To make IMS RESLIB available, enter the data set name for the IMS HP Change Accumulation Utility Execution JCL DD control panel (Setup option 9) on one of the two lines in ISPF STEPLIB.

**Remember:** Configuring STEPLIB DD is not required for LOG TIME=YES.

**HPCPITIN DD and HPCPITOU DD allocation**

The system automatically sets the default allocations for HPCPITIN DD and HPCPITOU DD. These temporary DDs are allocated for each subordinate address space. If you receive an error message against the data set for HPCPITIN or HPCPITOU, the default allocations are insufficient and must be reallocated.

HPCPITIN DD and HPCPITOU DD allocation is done in the skeleton JCL member. This JCL member must be referenced in the GENJCL.CA command if you have performed the GENJCL.CA command independently. If you want IMS HP Change Accumulation Utility to run the GENJCL.CA command, you must specify GEN.GENJCL=MEMBER(skeletonjcl).

**File naming convention with DFSUCUMN DD**

DFSUCUMN DD controls the naming of PITCA output master files. The output files need to be created with the suffix of HPCAP for IMS Database Recovery Facility to recognize those files.

The naming convention for the PITCA file is controlled in the skeleton JCL. In the following example, the DFSUCUMN DD of the skeleton JCL that is used for PITCA has been modified to include a suffix of HPCAP for the new output data set.
IMS HP Change Accumulation Utility PITCA time stamps

All events are recorded in the RECON with a time stamp. The time stamp is used for command processing, database utility processing, and recovery processing that references the RECON.

The standard punctuated time stamp format is described in detail in the *IMS DBRC Guide and Reference*. The punctuated forms are supported but exclude labeled offset values.

The following examples show the formats that you can use.

- **YYYY.DDD HH:MM:SS.T**
  
  2008.260 08:24:45.7
- **YY.DDD HH:MM:SS.T**
  
  08.260 08:24:45.7

You can identify the log record time stamp to the microsecond for the IMS Record Format and Print Module (DFSERA30) or for any utility that enables log record analysis.

**Important:** PITCA filtering is based on the converted UTC time stamp and not the local time stamp.

IMS HP Change Accumulation Utility PITCA UTC time stamps

Coordinate universal time (UTC) time stamps are used to synchronize time stamps for logs that come from multiple systems. IMS time stamps are converted to UTC time stamps that are used for filtering.

UTC time stamps are not the same as local time stamps. UTC time stamps are converted for both the LOG TIME= *input value* and for time stamps that are stored in log records. PITCA processing converts a time stamp that is specified as LOG TIME= into a UTC time stamp and compares that UTC time stamp to the STCK time stamp in the log record suffix. If the STCK time is less than or equal to the LOG TIME, the log record is included.

**Time zone considerations**

You must understand time zone differences when you create a change accumulation to a specified point in time because UTC time stamps might differ from your local timezone.

In the following example, the UTC time stamp for PST has an offset of 8 hours, and the time stamp is saved to the HPCPRINT report file for reference. The time stamps are precise to the microsecond.

- **HPCSYSIN:** Log Time = 2008.260 17:47:50.8
- **HPCPRINT:** Log Time 08.260 17:47:50.8
  
  UTC Log Time 08.261/00:47:50.800000

**IMS HP Change Accumulation Utility PITCA time stamp adjustments for leap seconds**

On some systems, the time stamp for which a log record is created might be different from the time stamp that is reported by the operating system. This
difference occurs because the IMS and RECON time stamps are adjusted for leap
seconds, but the STCK time stamp in the log records are not.

The IMS subsystem tracks events by writing a log record. When a log record is
created, a time stamp from the system's hardware clock is stored in the log record.
However, the hardware clock does not include any leap second adjustments that
might be present on the system.

If you set the SYSPLEX timer with leap seconds, the time stamps for any event
that is recorded in the RECON data sets will be adjusted to include leap seconds.
As a result, if a listing from RECON data sets is used to derive the LOG TIME
time stamp, the LOG TIME time stamp might have a time difference that is equal
to the leap second value.

For example, if leap seconds are implemented, a DBRC listing will show a time
stamp of 12:00:25. However, the LOG record time stamp will reflect a STCK time
stamp of 12:00:00.

**IMS HP Change Accumulation Utility PITCA file processing**

When the IMS/CA process initially creates the PITCA file, the file is recorded in
the RECON as a standard CA file and is immediately marked invalid by HPCA.
IMS HP Change Accumulation Utility uses DBRC function commands to mark the
PITCA file invalid.

When the PITCA entry is marked invalid, the entry is ignored in subsequent
recovery processes by DBRC. The PITCA entry is listed in the RECON with an
ERR indicator and will not be included in any database utility or recovery
processing.

If DBRC is not used to register the PITCA or if you manually register the PITCA,
you are responsible for ensuring that the PITCA is not used as input to subsequent
processes. You can use the DBRC CHANGE.CA command to mark the PITCA
valid and remove the ERR indicator, however, do so with caution and only when
you understand the consequences.

**Restrictions:**

- PITCA file processing is not compatible with the DBRC GENJCL
  VOLNUM() parameter. If multiple JCL steps for a CA group are
  found, IMS HP Change Accumulation Utility cancels each step
  after the first step.
- You cannot keep a registered PITCA file if a subsequent
  non-PITCA file is registered for the same set of input logs. In the
  same manner, if a PITCA file is registered after a normal CA with
  the same log inputs, only the final CA is retained.

**IMS HP Change Accumulation Utility PITCA spill file allocation**

IMS HP Change Accumulation Utility will allocate a temporary spill file to serve as
a holding place for log records to facilitate PITCA processing. As input files are
read, the log records are written to the temporary spill file.

In PITCA mode, IMS HP Change Accumulation Utility uses spill processing for
each CA group. The standard spill formats are 64-bit, Cache Manager, tape, and
DASD files, which are the same formats that are used in non-PITCA processing.
The allocation values for the SORT spill values and Fast Path spill files must be
sufficient. Insufficient allocation values will prevent change accumulation processing from completing (ending with allocation errors), and the IMS HP Change Accumulation Utility job will need to be resubmitted. If the allocation values are insufficient, set the allocation values to contain all of the log records that are used for change accumulation. Additionally, make the allocations available for processing.

In the following example, every spill file that is allocated has a primary allocation count of 400 cylinders and a secondary allocation count of 100 cylinders, for a maximum of 9 devices.

CA.SPACE = CYLS unit allocations  
CA.PRIMARY = 400 Allocation units  
CA.SECONDARY = 100 Allocation units  
CA.UNIT COUNT = 9 max devices to satisfy the spill file allocation

FP.SPACE = CYLS unit allocation  
FP.PRIMARY = 400 allocation units  
FP.SECONDARY = 100 allocation units  
FP.UNIT COUNT = 9 max devices to satisfy the spill file allocation

**Change accumulation data sets for future use**

You must review and set the parameters for managing the change accumulation output data sets.

DBRC records the standard change accumulation in the RECON based on values of the INIT.CAGRP command. The rules for CA and PITCA also apply to REUSE and GRPMAX definitions. Review the definition for using the CA data sets for future use so that stability is maintained in the recovery environment.

When you specify the REUSE parameter and the maximum number of change accumulation data sets has been reached, the PITCA will replace the change accumulation data set with the oldest change records.

When you specify the NOREUSE parameter, the record of the change accumulation event with the oldest change records will be deleted from the RECON. The physical data set will remain intact, but DBRC will not consider the data set for future recovery processing.

**PITCA and IMS Recovery Solution Pack time stamp recovery**

Time stamp recovery is the recovery of full-function databases, HALDB partitions, and DEDB areas to a specified time stamp or recovery time. The IMS Recovery Solution Pack supports time stamp recovery to database allocation boundaries or to any prior point-in-time recovery.

In the point-in-time recovery process, only committed updates up to and including the specified recovery time are applied to a change accumulation data set. This process ensures that a change accumulation data set that contains uncommitted data is not used.

IMS Recovery Solution Pack recognizes only a change accumulation data set that contains a suffix of HPCAP for use in time stamp recovery with point-in-time recovery.

The change accumulation output that is created by IMS HP Change Accumulation Utility point-in-time change accumulation is recorded in the RECON with status INVALID (*ERR), which makes it unavailable to normal utility processes.
You request a PITCA recovery by specifying the PITCA parameter on the RCVTIME keyword.

For example:

```
RCVTIME('2008.105 10:57:21.8 -07:00', PITCA)
```

When you specify the PITCA parameter, the time stamp must be the run time of the PITCA that was created by the IMS HP Change Accumulation Utility utility. The time stamp is recorded in the RECON. The CA must be marked in ERR status. The CA can either be complete or incomplete (the RECON listing shows COMPLETE CA= YES|NO). The CA data set name must have a suffix of HPCAP. Only an image copy and the CA are used for the recovery, and no logs are used.

The recovery is recorded in the RECON by DBRC as a POINT-IN-TIME (PITR). The recover to time, which is the run time of the CA, is the time stamp in RCVTIME. Because the recovery is a point-in-time recovery, the Image Copy Needed flag is set to ON in the RECON after recovery. Therefore, an image copy is required.


### Using secondary logs

The IMS dual logging feature records logs in duplicate. The copy of each primary log is called the secondary log.

This redundancy is important if a primary log becomes damaged or lost. Secondary logs are also useful for offsite backup and recovery.

DBRC maintains the register of primary and secondary logs, but does not normally generate secondary logs (GENJCL.CA) unless the primary logs are marked invalid. However, IMS HP Change Accumulation Utility can make adjustments to the JCL procedures to facilitate the use of secondary logs.

DBRC is required when the SELECT LOGS=seclog command is used. IMS HP Change Accumulation Utility performs the following steps:

1. Requests primary and secondary log definitions from DBRC.
2. Computes the set of primary-secondary log combinations.
   - Each is registered in the RECON with an IMS ID and a start time. Each primary log must be paired with its corresponding secondary log which has the same IMS ID and start time.
   - If any primary log selected by GENJCL.CA is found to not have a secondary log, IMS HP Change Accumulation Utility identifies the log data set name and then aborts processing.
3. Dynamically allocates the secondary logs to the log readers in the IMS HP Change Accumulation Utility control address space.
4. Dynamically allocates the primary logs in the sort address spaces.
   - This allocation is necessary because DBRC validates the DD DFSULOG allocation using the primary log data sets named in the RECONs. When allocated and validated by DBRC, the DFSULOG DD is released.
The secondary logs read by IMS HP Change Accumulation Utility control address space are sent by cross-memory or through spill files to be accumulated in each sort address space.

**Limiting input logs**

It is sometimes necessary to limit the number of log data sets that are processed.

For example, if there is an exceptionally large number of logs, it might be helpful to run IMS HP Change Accumulation Utility with several smaller sets of logs rather than one huge process.

The smaller IMS HP Change Accumulation Utility runs can then be checkpoints if any unusual conditions occur. IMS HP Change Accumulation Utility provides options for controlling the GENJCL.CA selection of log data sets.

**Using the CATIME parameter**

The DBRC parameter CATIME selects the input logs limited by the specified time.

The time value represents a point within the start/stop times of a log file. The identified log file and all logs that chronologically precede it are included in DFSULOG. Logs that follow the selected log in chronological order are excluded.

The disadvantages of using CATIME are that selection is only at a log boundary and the CATIME value must be calculated on the log times each time it is used.

**Using the VOLNUM parameter**

The DBRC parameter VOLNUM restricts the number of log data sets that are generated for a single DFSULOG.

This parameter does not affect the total number of or last log to be processed. Instead, if more than the VOLNUM number of logs exists to be processed.

Multiple IMS CA steps are created. Each step has no more than the VOLNUM number of logs to be processed. The CA output master of step $n$ is the CA input master for step $n+1$.

**Using the MAXLOGS parameter**

The IMS HP Change Accumulation Utility parameter MAXLOGS operates in a way similar to both CATIME and VOLNUM.

MAXLOGS should not be used with either CATIME or VOLNUM.

The list of logs for processing is generated according to DBRC rules. IMS HP Change Accumulation Utility determines the complete set of logs defined for processing across all selected CA groups. This single list is then truncated, if necessary, to the number specified and the JCL is regenerated using only the logs that remain after truncation.

MAXLOGS operates in a way similar to CATIME because it truncates the list of logs to be processed.
MAXLOGS functions in a way similar to VOLNUM because the logs to be processed are identified by count rather than a time stamp that must be recalculated each time it is used.

For two-step batch processing, the MAXLOGS parameter is specified in the HPCABAT0 EXEC statement.

For extended batch processing, the MAXIMUM LOGS parameter is specified in the HPCSYSIN DD statement.

For the ISPF user interface, the MAXLOGS parameter must be entered into a sequential data set or a partitioned data set member that is named in the HPCSYSIN field of the setup panel, HPCPS09.

**Failure to start SORT subordinate address spaces**

It is possible to receive an error message indicating a failure in starting the SORT subordinate address spaces.

The following error message text is followed by RC=20:

```
HPC991E Procedure failed

Usually, this happens during initial testing following installation of IMS HP Change Accumulation Utility.
```

The most common causes of this failure are:

- The procedure library referenced by HPCAPROC is not a library in the concatenation of IEFPS01 (MSTRJCL) or PROC00 (JES).
- The JCL generated by DBRC or modified by IMS HP Change Accumulation Utility has a JCL error that prevents processing.

The difficulty in diagnosing this failure is often compounded by the fact that the JES output of started tasks is not immediately available for analyzing the failure. You can perform the following steps (listed in order of increasing difficulty) to obtain the necessary additional information:

1. **Use SDSF to find available JES output.**
   - Ensure that you set the OWNER() and PREFIX() filters to include the subordinate address space JOB names.
   - The owner is assigned by your ICHRIN03 started procedures table or by the STARTED class of RACF. JOB names are prefixed with the IMS HP Change Accumulation Utility ID assigned during JCL generation. The suffixes will be 0001, 0002, and so forth.

2. **If JOB outputs are not found and you have proper authority, consider changing your JES defaults to allow viewing, and then rerun the test.**
   - For example, to set the output class to H and retain for viewing, specify these parameters:
     - `$t jobclass(stc),msgclass=h`
     - `$t stcclass,outdisp=(keep,leave)`

3. **Review the system log for evident errors, such as:**
   - `IEFC452I xxxxxxx - JOB NOT RUN - JCL ERROR Procedure might not have been found because the user PROCLIB is not in MSTRJCL or JES concatenations`
IEE132I START COMMAND ALLOCATION ERROR JOB step could not start because a data set is not available, possibly misspelled DSN or RACF restricted.

IEF450I xxxxxxx - ABEND=S806 U0000 REASON=0000004HPCA module not found, possibly because STEPLIB is wrong.

4. If the error is still not evident, then ensure that you are using the custom procedure method of IMS HP Change Accumulation Utility. This method places the JCL procedures into the library named by DD HPCAPROC, or the ISPF setup panel HPCPS03, "JCL JOB statements". The members created will be HPCA-<id>0001-nnnn. Edit any of the failing members (0001 is easiest), and add or edit the JOB statement for the member. The JOB should choose a MSGCLASS that will be HELD or kept and MSGLEVEL (1,1). SUBMIT the JCL for processing and examine the result which should now be available in SDSF under the assigned JOB name and owner.

**Diagnosing ISPF errors**

You can make use of the JOBLOG and DBRC information to diagnose errors that might occur while using various ISPF applications.

- "Accessing the JOBLOG for system abend information"
- "Viewing DBRC input and output information"

**Accessing the JOBLOG for system abend information**

For ISPF applications, such as HPCA (HPCAE000), abends are trapped and reported by ISPF.

System abends such as SE37, SD37, and S213 usually require a DD or DSN for problem resolution.

The required DD/DSN information can be located in the JES JOBLOG of the current TSO session in which the abend was found. The Spool Display and Search Facility (SDSF), can provide access to the JOBLOG.

To start SDSF, you must know your local site procedure. Generally, a menu option is used; however, your location might use an ISPF or TSO command.

To access the JOBLOG, perform the following steps:

1. Start the SDSF session.
2. Select the active (DA) or status (ST) panel display.
3. If necessary, set the PREFIX and OWNER filters to allow inclusion of your active TSO session.
4. Note that the session name is the userid that you used for TSO signon.
5. Browse (S) the entry of your session to find relevant error entries, usually messages ICEnnnn.

**Viewing DBRC input and output information**

IMS HP Change Accumulation Utility runs DBRC multiple times to obtain information about change accumulation (CA) groups, log data sets, and CA master
data sets. The DBRC result is generally displayed for any RC>0. However, even when RC=0, processing results might not be what you expect.

You can view input and output information for the last DBRC request by browsing the SYSIN or SYSOUT data sets allocated to your session. These ddnames are established when the IMS HP Change Accumulation Utility ISPF session starts (PGM=HPCAE000).

To view the DBRC commands and results that were last used, use the HPCC command. The HPCC command can browse any sequential file that is currently allocated and available as input.

For example: enter any of the following HPCC command statements into the command field of any IMS HP Change Accumulation Utility panel:

```
TSO HPCC VIEW SYSIN
TSO HPCC VIEW SYSPRINT
TSO HPCC VIEW JCLOUT
```
Part 6. Troubleshooting

IMS HPCA provides resources that can be used to help you troubleshoot and diagnose IMS HPCA problems.

Topics:
• Using diagnostic resources
• Error messages
• Abend codes
Chapter 14. Using diagnostic resources

There are several resources available to help you diagnose and troubleshoot IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility problems.

Some resources, such as messages and SCAN, are always available to assist with interpreting processing results. Other resources focus on debugging and are normally used by or with direction from IMS HP Change Accumulation Utility support personnel.

Topics:
- “IMS HP Change Accumulation Utility messages”
- “Other messages”
- “SCAN” on page 156
- “HPCADIAG” on page 159
- “Trace” on page 160
- “DEBUG” on page 160

IMS HP Change Accumulation Utility messages

Messages are the first source for diagnostic information. Refer to the Abend Codes and Error Messages reference sections of this user’s guide for detailed IMS HP Change Accumulation Utility abend code and error message information.

Abend 3400 is the only abend code controlled by IMS HP Change Accumulation Utility. Other abend codes indicate a failure of setup, environment, or system.

Abend 3400 always includes the reason code to indicate cause of failure. IMS HP Change Accumulation Utility uses this abend when processing cannot continue because of the conditions indicated in the reason code.

All messages generated by IMS HP Change Accumulation Utility have the prefix HPC and trailing character I, W, or E.

- Informational (I) messages indicate specific information conveying status or the possibility of an unusual situation. (I) messages do not affect processing.
- Warning (W) messages identify unusual situations which might create invalid results if processing continues.
- Error (E) messages cause termination.

Other messages

Messages from other applications might be included in IMS HP Change Accumulation Utility reports and displays.

These messages are captured during the IMS HP Change Accumulation Utility process and merged with IMS HP Change Accumulation Utility for reporting.
For descriptions and interpretations for these messages, see the appropriate documentation for the application which produces the message, as indicated below:

- Messages prefixed with DFS are produced by IMS Change Accumulation Utility.
- Messages prefixed with DSP are produced by IMS Data Base Recovery Control.
- Messages prefixed with ICE are produced by IBM DFSORT.

**SCAN**

Messages might not always explain an error sufficiently or, in the absence of an error, the results of a certain process might not be as expected. The SCAN function provides additional diagnostic information and is useful for validating setup and resource requirements.

In scan mode, JCL processing is performed according to the setup parameters. However, no PROCLIB members or IMS HP Change Accumulation Utility control file members are produced as output.

Instead, the setup parameters and JCL are analyzed to produce a SCAN report. In ISPF, the report is displayed in a browse window. For batch processing, the report is directed to the IMS HP Change Accumulation Utility Report defined by HPCPRINT DD.

The scan report consists of several sections starting with DBRC messages and status and ending with extracted JCL parameters. The following example shows a sample report structure with descriptions for each section. The numbers in parentheses do not appear in the report. The numbers refer to notes which are explained after the report.
JOB=HPCA91D
Parms=CA14,SCAN
  1 ID = CA14
  2 List
  3 PROCEDURE NAME = HPCSPROC
4
5 * Gen.Warn = (Stop/Ignore/Defer)
6  GEN.LIST = 4
7  GEN.Warn = Stop
8 * ******************************************
9 * *** Gen Groups go here ***
10 * ******************************************
11 *

...Preparing PROCLIB members

   DSP0211I COMMAND PROCESSING COMPLETE
   DSP0211I HIGHEST CONDITION CODE = 00

Control statement processing information
  CA groups 1
  CA sorts 1
  LOG datasets 54
  Scheduled LOGs 54
  Data Bases 100
  FastPath Yes
  Full Function No
  HALDB No
  DBRC Loadlib IMSBLD.I91RTS14.COMRESL3
  RECON1 IMTOOL1.HPCA300.RCNGDG91
  RECON2 IMTOOL1.HPCA300.RCNGDG92
  RECON3
  HPCA Loadlib IMSTOOL.HPCA14.HPC.SHPCLMD0
  HPCACTL dsname IMTOOL1.HPCA300.CONTROL
  Procedure name PROC=HPCSPROC
  PROC library
  JOB library
  SMF No
  Concurrent LOGs 9
  Parallel SORTs 9
  Input buffers 5
  Output buffers 5
  Spill LRECL 4351
  Spill BLKSIZE 32760
  (max) Spill count 0
  (max) FP spill count 104

Figure 45. Sample SCAN report - part 1
<table>
<thead>
<tr>
<th>DSN</th>
<th>VOLSERs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NODLET1.RLDPHPCA.IMXA.D09216.T2225226.V01</td>
<td>[IMT212]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMXB.D09216.T2225317.V01</td>
<td>[IMT043]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.T2234247.V01</td>
<td>[IMT020]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.T2234506.V01</td>
<td>[IMT187]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2236390.V00</td>
<td>[IMT041]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2236549.V00</td>
<td>[IMT172]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2239183.V00</td>
<td>[IMT050]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2239185.V00</td>
<td>[IMT172]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2241250.V00</td>
<td>[IMT198]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2241370.V00</td>
<td>[IMT065]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2248060.V02</td>
<td>[IMT006]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2248106.V02</td>
<td>[IMT037]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2250110.V01</td>
<td>[IMT188]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2250111.V01</td>
<td>[IMT119]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2252164.V01</td>
<td>[IMT075]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2252165.V01</td>
<td>[IMT053]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2254199.V01</td>
<td>[IMT005]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2256224.V01</td>
<td>[IMT173]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2256225.V01</td>
<td>[IMT123]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2258251.V03</td>
<td>[IMT007]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2258253.V03</td>
<td>[IMT100]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2300282.V03</td>
<td>[IMT011]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2300285.V03</td>
<td>[IMT182]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2302296.V02</td>
<td>[IMT072]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2302301.V02</td>
<td>[IMT032]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2304305.V02</td>
<td>[IMT154]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2304307.V02</td>
<td>[IMT089]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2306314.V02</td>
<td>[IMT015]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2306315.V02</td>
<td>[IMT301]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2308314.V02</td>
<td>[IMT011]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2308316.V02</td>
<td>[IMT008]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2310309.V04</td>
<td>[IMT008]</td>
</tr>
<tr>
<td>NODLET1.RLDPHPCA.IMX.B09216.T2310310.V04</td>
<td>[IMT108]</td>
</tr>
</tbody>
</table>

Figure 46. Sample SCAN report - part 2
Note:

1. The standard IMS HP Change Accumulation Utility report header identifies the IMS HP Change Accumulation Utility version, date, time, and JOB identification.

2. Batch parameters showing the SCAN options.

3. DBRC section. This section includes specific DBRC messages, IMS HP Change Accumulation Utility messages, and condition code for the JCL preparation.

4. IMS HP Change Accumulation Utility setup parameters and calculated values. These parameters are the settings from ISPF setup panels, or from IMS HP Change Accumulation Utility commands from the HPCSYSIN DD file. Limits and sizes are calculated from the setup and from the processed JCL.

5. Each sort procedure is shown with its associated CA group name and the input and output CA master files. Master files display DSN and VOLSER information.

6. The set of logs to be processed in the order shown. Log files display DSN and VOLSER information.

7. Volume serial number list. Each unique VOLSER collected from items 5 and 6 is listed. Each VOLSER is described as L=log, N=new master, or O=old master.

**Figure 47. Sample SCAN report - part 3**

**Note:**

1. The standard IMS HP Change Accumulation Utility report header identifies the IMS HP Change Accumulation Utility version, date, time, and JOB identification.

2. Batch parameters showing the SCAN options.

3. DBRC section. This section includes specific DBRC messages, IMS HP Change Accumulation Utility messages, and condition code for the JCL preparation.

4. IMS HP Change Accumulation Utility setup parameters and calculated values. These parameters are the settings from ISPF setup panels, or from IMS HP Change Accumulation Utility commands from the HPCSYSIN DD file. Limits and sizes are calculated from the setup and from the processed JCL.

5. Each sort procedure is shown with its associated CA group name and the input and output CA master files. Master files display DSN and VOLSER information.

6. The set of logs to be processed in the order shown. Log files display DSN and VOLSER information.

7. Volume serial number list. Each unique VOLSER collected from items 5 and 6 is listed. Each VOLSER is described as L=log, N=new master, or O=old master.

**HPCADIAG**

The diagnostic file is created when the HPCADIAG DD is allocated. This file is defined with RECFM=VB and LRECL=1024.

The diagnostic file captures a snapshot of IMS HP Change Accumulation Utility processing that includes significant inputs, outputs, intermediate tables, and status. Diagnostics are available in all environments:

- HPCAMAIN
- HPCABAT0
- HPCAE000
The diagnostic file can always be produced. However, this file is intended for use by support personnel in troubleshooting IMS HP Change Accumulation Utility failures.

The file can be very large and the processing necessary to capture the information can have a negative affect on performance. Normally, it is not expected that diagnostics will be captured from production runs of IMS HP Change Accumulation Utility.

Trace

The trace file is created when HPCTRACE DD is allocated. This file is defined with RECFM=VBA and LRECL=137.

Trace commands are used to limit what is included in the trace file. In the absence of trace commands, minimal informational messages and all error messages are traced.

The amount of trace output can be very large. You should not use the ALL command unless the session to be traced is relatively small. When used for troubleshooting, trace commands are selectively applied to isolate specific points within an IMS HP Change Accumulation Utility session, thereby limiting the amount of output to be analyzed.

Trace commands are defined in the TRACE section of the command file HPCSYSIN DD. The TRACE section must be located following all IMS HP Change Accumulation Utility commands in the file.

The sample library member HPCADIAG describes several trace commands as an aid to understanding the syntax.

DEBUG

Many debug commands are available to assist IBM support personnel in diagnosing or reproducing IMS HP Change Accumulation Utility failures caused by environmental conditions.

Normally, you would use these commands only when instructed to do so by IBM support personnel.

Debug commands are defined in the DEBUG section of the command file HPCSYSIN DD. The DEBUG section must be located following all IMS HP Change Accumulation Utility commands in the file.

The sample library member HPCADIAG describes several debug commands as an aid to understanding the syntax in case you are instructed by IBM support personnel to use debug commands.
Chapter 15. IMS HP Change Accumulation Utility messages

This reference section provides detailed information about IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility messages.

IMS HP Change Accumulation Utility messages have the following format:

```
HPCnnnnx text
```

Where:

- **HPC** indicates that the message was issued by IMS HP Change Accumulation Utility.
- **nnnn** is the message identification number.
- **x** indicates the severity of the message as follows:
  - **A** indicates that operator intervention is required before processing can continue.
  - **E** indicates that the job step is about to terminate abnormally.
  - **I** indicates that the message is for information only.
  - **W** indicates that the message is a warning to alert you to a possible error condition.

**Message Variables**

In the message text, there can be lowercase variables (for example, `xxx...`). The variables represent values when the message appears such as:

- Data in a data set
- A return code
- An error code

**Message Documentation**

In addition to message number and message text, information for each message includes the following:

- **Explanation:**
  The Explanation section explains what the message text means, why it occurred, and what its variable entry fields are (if any).

- **System Action:**
  The System Action section explains what the system will do next.

- **User Response:**
  The User Response section describes whether a response is necessary, what the appropriate response is, and how the response will effect the system or program.

---

**HPC0001E** Open failed for SYSIN data set.

**Explanation:** A SYSIN DD statement might have been omitted from the HPCABAT0 job stream, or the data set might have been created with a logical record length other than 80 bytes.

**User response:** If a SYSIN DD statement is included in the HPCABAT0 job stream, ensure that the data set exists and has a logical record length of 80 bytes. Resubmit the job.

---

**HPC0002E** Open failed for the GENJCLIN data set.
HPC0003E  Open failed for member HPCA-ID/#BAT in the CONTROL data set.
Explanation: The program failed while opening the member named HPCA-ID/#BAT.
User response: Check the HPCACTL data set. Ensure that the member name created by appending the HPCA-ID in the parm field of the EXEC statement to #BAT exists in the CONTROL data set identified by the HPCACTL DD statement. If the member does not exist, run the ISPF/UI and process the BAT command to create the member.

HPC0004E  Build of control records from GENJCL failed.
Explanation: The GENJCL for the SYSPRINT and JCLOUT data sets might not have completed.
User response: Check the SYSPRINT and JCLOUT data sets to ensure that the GENJCL completed successfully. Correct the problem, and resubmit the job.

HPC0005E  Open failed for CONTROL data set.
Explanation: The CONTROL data set defined by the HPCACTL DD statement could not be opened.
User response: Ensure that the data set exists.

HPC0006E  Merge of HPCA-ID/#BAT and GENJCL failed.
Explanation: The records in the member named HPCA-ID/#BAT and the output of the GENJCL process could not be merged.
User response: Ensure that the HPCA-ID specified in the EXEC statement is correct.

HPC0007E  GENJCL failed. DBRC returned with a return code of 8 or higher.
Explanation: The GENJCL input stream contains errors.
User response: Check the SYSPRINT data set for the reason for the failure. Correct the GENJCL input stream, and resubmit the job.

HPC0008E  DSPURX00 not found.
Explanation: The DBRC Utility program could not be found.
User response: Ensure that the data set pointed to by the STEPLIB DD statement is correct or, if no STEPLIB DD is included in the JCL, that the program DSPURX00 is in the LINKLIB.

HPC0009E  ATTACH failed for DSPURX00.
Explanation: The DBRC Utility program could not be attached.
User response: Report the problem to your system programmer.

HPC0011W  Set DSIDs in DB0 records failed. reason
Explanation:
Reason: DBRC is bypassed.
IMs HP Change Accumulation Utility could not identify all databases named in DB0 records. Processing continues without the missing DBRC information. IMS HP Change Accumulation Utility might select log records with redundancy to allow for unidentifiable destination address spaces. Performance might be adversely affected by increased spill file use and data replication.

Reason: SYSIN open error.
The data set containing DBRC LIST commands could not be opened.
User response:
Reason: DBRC is bypassed.
The DBRC output listing, if available, might further describe the cause of this error. DBRC output is directed to HPCPRINT by the GEN.LIST command, or to the HPCDBPRT file, if allocated.

Reason: SYSIN open error.
IMS HP Change Accumulation Utility could not determine the proper association of CA groups and databases. The GEN.WARN command allows IMS HP Change Accumulation Utility to continue with additional resource requirements and degraded performance. The cause of the failure can be found in the DBRC listing file available from the HPCDBPRT DD and/or the GEN.LIST command.

HPC0013E  WRITE/STOW error.
Explanation: The IMS HP Change Accumulation Utility PROCLIB data set is incorrectly allocated.
User response: Reallocate the IMS HP Change Accumulation Utility PROCLIB data set and resubmit the job.
HPC014E  Out of space D37.
Explanation: The size of the IMS HP Change Accumulation Utility PROCLIB has caused an out of space condition.
User response: Compress the IMS HP Change Accumulation Utility PROCLIB, and resubmit the job.

HPC015E  Out of space E37.
Explanation: The size of the IMS HP Change Accumulation Utility PROCLIB has caused an out of space condition.
User response: Compress the IMS HP Change Accumulation Utility PROCLIB, and resubmit the job.

HPC016E  Directory full.
Explanation: The size of the IMS HP Change Accumulation Utility PROCLIB has caused a directory full condition.
User response: Compress the IMS HP Change Accumulation Utility PROCLIB and resubmit the job.

HPC017E  Creation of HPCADRV procedure failed.
Explanation: The JCL for the HPCADRV procedure could not be written because the library identified by the HPCAPROC DD statement could not be opened or the member could not be stowed.
User response: Ensure that the HPCAPROC data set exists and is a PDS or PDSE. Also, make sure that there is enough space to contain the newly created member. A compress of the data set might be necessary. After correcting the error, retry the job.

HPC018W  Nothing to accumulate in this run.
Explanation: DBRC returned with a Return Code of 04 with the indication that there was nothing to accumulate.
User response: Skip the HPCA run of your job scheduling procedure.

HPC019E  Control records could not be built from JCLOUT.
Explanation: The member HPCA-ID#CTL in the control data set could not be created because one of the following conditions has occurred:
• The JCLOUT data set could not be opened.
• The HPCAPROC data set could not be opened.
• The HPCAJLIB data set could not be opened.
• An error occurred while attempting to stow a procedure in the HPCAPROC or HPCAJLIB data set.

User response: Ensure that the data sets JCLOUT, HPCAPROC, and HPCAJLIB exist. The JCLOUT data set must be a sequential data set, and the HPCAPROC and HPCAJLIB data sets are PDS or PDSE. Also, make sure that HPCAPROC and HPCAJLIB have enough space for stowing the newly created members. A compress of these data sets might be necessary. After correcting the error, retry the job.

HPC024I  Log or DB conflict has cancelled SORT steps.
Explanation: The SORT JCL has failed one or more validation steps, and one or more SORT procedures has been marked as not executable.
User response: The cause of the conflict is identified by the previous informational messages. Correct the error and rerun HPCA. If the generated procedures are processed without rerunning, some steps will be omitted.

HPC025W/E DBRC GENJCL.CA RC=nn.
Explanation: DBRC was invoked for GENJCL.CA to create JCL for IMS HP Change Accumulation Utility processing. The DBRC return code was non-zero.
User response: For RC=4, the warning may be bypassed using the GEN.WARN command or EXEC parameter. For RC=4 and no valid logs exist for any selected CA group, GEN.WARN has no effect. For RC other than 4, processing terminates and the error must be corrected before rerunning HPCA. The error can be found in the DBRC output available in DD HPCDBPRT and/or in the HPCA report file if GEN.LIST is set to at least 4.

HPC040E  No SECLOG for PRILOG(dsn).
Explanation: A valid secondary log could not be found for the named primary log. Primary and secondary log pairs are determined by matching SSID and start time of each log. Processing is prevented until all secondary logs are available.
User response: The DBRC LIST.LOG command can be used to display the current primary and secondary logs of the RECON. The secondary log(s) may not have been registered in DBRC, or they may have been registered but marked with error status.

HPC100E  Invalid control card sequence.
Explanation: The IMS HP Change Accumulation Utility control file member (HPCACTL DD) is constructed with an invalid sequence of control statements.
User response: The control file may have become corrupted by editing or incorrect use by processes other than HPCA. Rerun the steps to create the IMS HP Change Accumulation Utility control member being...
referenced. Control file members are generated by the IMS HP Change Accumulation Utility ISPF UI, two-step batch and extended batch procedures. If the problem persists, collect all IMS HP Change Accumulation Utility output, the IMS HP Change Accumulation Utility control file, and the JCLOUT from DBRC, if applicable.

**HPC101E**  Unsupported use of JESIN DD *.

**Explanation:** The use of DD *, or of DD DATA is supported only for the SYSIN DD statement of the CA step, DFSUCUM0/HPCADRI1. The location of the incorrect JCL is defined by the following // EXEC and // DD statements.

**User response:** The JCL must be changed to remove the use of JESIN for the IMS HP Change Accumulation Utility procedures. Alternative uses may include referencing the input data as pre-allocated sequential or PDS files.

**HPC102E**  SYSIN DD * is required.

**Explanation:** The CA step, DFSUCUM0/HPCADRI1, must include the SYSIN DD in the JESIN format: DD * or DD DATA. The location of the incorrect JCL is defined by the following // EXEC and // DD statements.

**User response:** The JCL must be changed to include the CA input data through the JESIN statement format //SYSIN DD *.

**HPC999E**  Invalid message #: Not defined.

**Explanation:** An internal error has occurred.

**User response:** Report the problem to your system programmer.

**HPC1101W**  Sort step suppressed for MAXLOGS.

**Explanation:** When a scheduled change accumulation group is processed, the MAXLOGS parameter can cause it to be nullified if none of the logs assigned to the group are within the MAXLOGS limit. The group is marked as neither selected nor scheduled.

**User response:** This is an informational message and does not affect the final condition code setting of HPCADRIV or HPCAMAIN.

**HPC1105W**  No (DFSULOG) log data sets defined.

**Explanation:** The JCL presented for processing has defined a SORT step without a DFSULOG DD input file. The SORT step is marked not executable.

**User response:** If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If the JCL was produced by a non-IMS process, change the process to properly generate the DFSULOG DD statement into the JCL for each SORT step.

**HPC1102W**  No DBD selectors defined.

**Explanation:** The JCL presented for processing has defined a SORT step with no DBD selector statements in the SYSIN DD file. This error might also indicate that SYSIN DD is not in-stream (DD *). The SORT step is marked not executable.

**User response:** If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If the JCL was produced by a non-IMS process, change the process to properly generate the SYSIN DD statement and DB0 selectors into the JCL for each SORT step.

**HPC1103W**  Duplicate log DSN.

**Explanation:** The JCL presented for processing has defined a SORT step with a log data set repeated with the DD DFSULOG concatenation. The SORT step is marked not executable.

**User response:** If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If the JCL was produced by a non-IMS process, change the process to properly generate the DFSULOG DD concatenation into the JCL for each SORT step.

If the IMS data sets are managed by DFSMS, refer to “Preventing duplicate log DSN error” on page 79.

**HPC1104W**  DB0 * ALL database selectors are not supported.

**Explanation:** IMS HP Change Accumulation Utility does not allow the use of the * ALL option to select databases. The SORT step is marked not executable.

**User response:** If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If the JCL was produced by a non-IMS process, change the process to properly generate the DB0 selectors into the JCL for each SORT step.

**HPC1105W**  DB1 database selectors are not supported.

**Explanation:** IMS HP Change Accumulation Utility does not allow the use of the * ALL option to select databases. The SORT step is marked not executable.

**User response:** If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If the JCL was produced by a non-IMS process, change the process to properly generate the database selectors into the JCL for each SORT step.
HPC1106W  DB0 name selected in more than one CA group.

Explanation:  Two SORT steps for different CA groups have named the same database in the DB0 selectors. The SORT step is marked not executable.

User response:  If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If JCL was produced by a non-IMS process, change the process to properly generate the database selectors into the JCL for each SORT step.

HPC1107W  LOG descriptions differ.

Explanation:  Two SORT steps have defined the same input log DSNNAME but with different UNIT or VOLSER designations. The second SORT step is marked not executable.

User response:  If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If JCL was produced by a non-IMS process, change the process to properly generate the correct DFSULOG DD statements into the JCL for each SORT step.

HPC1108E  Log sequence validation failed

Explanation:  The DFSULOG DD input statements for all CAGRP are merged to a common input stream for the log read function. DBRC API services were unavailable for sorting the input statements. The validation for a common chronological sequence of DFSULOG DD input statements failed for the SORT step. The SORT step is marked not executable.

User response:  To use DBRC API sequencing, include the IMS RESLIB in the IMS HP Change Accumulation Utility JCL. DBRC API sorts the input statements in chronological order. If the input was created manually, verify that the DFSULOG DD statements in the JCL for the SORT step are in accordance with the DBRC GENJCL.CA output. The job may be resubmitted for the CAGRP in error.

HPC1109W  Propagated step cancellation.

Explanation:  The VOLNUM option has produced multiple SORT steps for a CA group. The previous step for this same CA group was marked not executable. The SORT step is marked not executable.

User response:  If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If JCL was produced by a non-IMS process, change the process to properly generate the correct JCL into the JCL for each SORT step.

HPC1109E  All SORT steps have been eliminated.

Explanation:  The JCL for all SORT steps has been marked not executable.

User response:  If the JCL was created by the DBRC GENJCL.CA process, check the skeletal JCL member and variable settings that were used. If JCL was produced by a non-IMS process, change the process to properly generate the correct JCL into the JCL for each SORT step.

HPC1110W  typ txt nnn jcl

Explanation:  A suspicious condition was found during conversion of JCL to IMS HP Change Accumulation Utility procedures. In standard procedure mode, only a single step (PGM=DFSUCUM0) will be converted for IMS HP Change Accumulation Utility use.

**typ**
- JCL, an unsupported statement type is found
- EXE, the EXEC statement names a PROC or PGM that is not DFSUCUM0
- DD, unsupported DD option is found
- SYM, a JCL symbolic parameter is found
- LOG, unsupported DD option is found for DFSULOG

**txt** The beginning text at the exception location. This text may have been found on a continuation line of the statement.

**nnnn** The relative record number of the statement within the JCLOUT file.

**jcl** The first line of the statement. Continuation lines are not displayed.

User response:  All exceptions should be resolved through modification of the DBRC skeletal JCL or other process by which JCL is produced. If the exceptions are minor, you can attempt to process by using the GEN.WARN command.

HPC1111E  SORT() PROC0 CAGRP0 point-in-time sequence truncated.

Explanation:  There is more than one sort step defined for the named CA group and point-in-time processing. This may be the result of the GENJCL VOLNUM parameter, duplication of the GENJCL input records, or from other manual editing of the GENJCL output stream. Only the first sort step of each CA group is allowed for PITCA. The identified sort step is bypassed with RC=20.

User response:  Verify that the first sort step for the named CA group successfully completed. If the JCL is to be reprocessed, correct any GENJCL inputs to
remove the VOLNUM() parameter or duplicated CA group requests before submitting.

**HPC1112E**  \( \text{UNIT}=\text{VIO} \) is not valid except in AS1 mode.

**Explanation:** The unit designation of the CA spill file has been set to or defaulted to VIO when the IMS HP Change Accumulation Utility processing mode is multiple address space.

**User response:** Change to use AS1 (PROC=HPCSTASK), or change the designated CA,UNIT to be not VIO. Resubmit the JCL.

**HPC1113E** DBRC API sequence error encountered

**Explanation:** The DFSULOG DD input statements for all CAGRPs are merged into a common chronological input stream for the log read function. The merge function invoked the DBRC services to collect log data set statistics for sort processing. However, an error was encountered during processing which prevented successful completion. The SORT step is marked not executable.

**User response:** Capture the problem documentation at the time of the original error and provide to IMS HP Change Accumulation Utility support. The IMS HP Change Accumulation Utility job may be resubmitted for the CAGRPs receiving the error.

**HPC1114E** DBRC API log sequence validation failed

**Explanation:** The DFSULOG DD input statements for all CAGRPs are merged into a common input stream for the log read function. A DBRC API service was invoked to sequence the logs but the validation for a common chronological sequence of DFSULOG DD input statements failed for the SORT step.

**User response:** Capture the problem documentation at the time of the original error and provide to IMS HP Change Accumulation Utility support. The IMS HP Change Accumulation Utility job log and LIST.RECON output should be provided for troubleshooting. Add the HPCTRACE and HPCADIAG DD statements and resubmit the job and save the output. For more information, see "Option 9: Execution JCL DD Control panel" on page 71.

**HPC1140W** Multiple JCL steps skipped for Standard Procedure Mode

**Explanation:** In AS1 mode, not more than one step will be executed for each CA group. This message can result from using the GENJCL VOLNUM() parameter. RC=4 is set to indicate the condition.

**User response:** Verify that the expected CA groups were processed. Steps after the first for each CA group have been cancelled.

**HPC1142W** CAGRP() PROC() PARM= values differ

**Explanation:** In AS1 mode, all CA groups must use the same EXEC PARM= value. This is normally ensured by using the same DBRC GENJCL skeleton member for all CA groups. A mismatch has been found between the 1st CA group and the named CA group. The named group has been cancelled.

**User response:** If the named CA group must be processed, regenerate the JCLOUT using a correct DBRC GENJCL skeleton, run in non-AS1 mode, or run the cancelled group by itself without other groups.

**HPC1143W** CAGRP() PROC() DD() allocations differ

**Explanation:** In AS1 mode, all CA groups must use the same DD definitions for the following ddnames: STEPLIB, DFSRESLB, IMSDALIB, RECON1, RECON2, RECON3, and IMS. This condition is normally ensured by using the same DBRC GENJCL skeleton member for all CA groups. A mismatch has been found between the 1st CA group and the named CA group. The named group has been cancelled.

**User response:** If the named CA group must be processed, regenerate the JCLOUT using a correct DBRC GENJCL skeleton, run in non-AS1 mode, or run the cancelled group by itself without other groups.

**HPC1149I** Default number of parallel sort steps \( (n) \)

**Explanation:** The expected number of parallel sort subtasks that can be supported has been computed to be "n" given the current memory allocation and IMS HP Change Accumulation Utility setup. The value \( n \) can be assigned to override the user specification of PARALLEL SORTS.

**User response:** None required. If the parallel sort count was given and does not agree with the computed value, it might be necessary to decrease the number if the IMS HP Change Accumulation Utility address space subsequently runs out of memory (ABEND 80A).

**HPC1150W** RECON not allocated. Parallel sorts (1) assigned.

**Explanation:** Parallel processing and dynamic allocation of the RECON in single address space is technically restricted. Sort processing is serialized to prevent abnormal conflicts. The change accumulation output is correct; however, large mass change accumulation processing might experience a performance degradation.

**User response:** If dynamic allocation must be used in single address space mode, then change Parallel
Sorts = 1 to prevent this message. If performance degradation is a concern, then either remove dynamic allocation of the RECON in single address space mode, or run the process in multiple address space mode.

**HPC1201E**  Value must be omitted.
**Explanation:** The previous control statement does not accept a value clause (=).
**User response:** Correct the statement format and rerun HPCA.

**HPC1202E**  Required value cannot be blank.
**Explanation:** The previous control statement requires a non-null value clause (=).
**User response:** Correct the statement format and rerun HPCA.

**HPC1203E**  Value is not a valid name format.
**Explanation:** The previous control statement requires a NAME format value.
**User response:** Correct the statement format and rerun HPCA.

**HPC1204E**  Value is not a valid dataset name format.
**Explanation:** The previous control statement requires a DATASET format value.
**User response:** Correct the statement format and rerun HPCA.

**HPC1205E**  Value is not alphabetic.
**Explanation:** The previous control statement requires an ALPHA format value.
**User response:** Correct the statement format and rerun HPCA.

**HPC1206E**  Value is not numeric.
**Explanation:** The previous control statement requires a NUMBER format value.
**User response:** Correct the statement format and rerun HPCA.

**HPC1207E**  Value is not within range.
**Explanation:** The previous control statement requires a NUMBER format value that falls within the designated lower and upper limits.
**User response:** Correct the statement format and rerun HPCA.

**HPC1208E**  Value is not a valid selection list choice.
**Explanation:** The previous control statement requires a specific value selected from a list of valid choices.
**User response:** Correct the statement format and rerun HPCA.

**HPC1209E**  Timestamp invalid. Reason code **diagcd**.
**Explanation:** The format of the point-in-time timestamp is not a valid IMS external timestamp. Timestamp formats are described in the **IMS DBRC Guide and Reference**. Message DSP0304I in the **IMS Messages and Codes** manual describes the values for **diagcd**.
**User response:** Correct the timestamp value and rerun the job.

**HPC1219E**  Parameter value **HPCAID** is required.
**Explanation:** The EXEC JCL that initiated this process did not define the PARM value to include a 1-to-4-character IMS HP Change Accumulation Utility id.
**User response:** Correct the JCL EXEC statement PARM parameter and rerun HPCA.

**HPC1220E**  Undefined keyword.
**Explanation:** The previous control statement was not recognized.
**User response:** Correct the statement format and rerun HPCA.

**HPC1221E**  Operand value not accepted.
**Explanation:** The user-entered value is not valid for this command.
**User response:** Refer to the command description in the section **Using IMS HP Change Accumulation Utility commands**. Correct the parameter value and resubmit the JCL.

**HPC1230E**  Cannot allocate **ddname** temporary file.
**Explanation:** Dynamic allocation has failed for the named file.
**User response:** Previous informational messages in the JOB log or IMS HP Change Accumulation Utility report file identify the cause of the failure. Correct the parameters for allocation and rerun HPCA.

**HPC1231E**  **HPCSYSIN** LRECL exceeds 254.
**Explanation:** The **HPCSYSIN** DD references a file with LRECL greater than 254.
**User response:** **HPCSYSIN** must be allocated with RECFM F or V and LRECL less than or equal to 254.
**HPC1232E • HPC1301E**

Correct the HPCSYSIN DD, and rerun HPCA.

**HPC1232E** Size of the operand value is invalid.

**Explanation:** The previous control statement defines a value clause that exceeds the length of the intended target for the statement.

**User response:** Correct the statement format and rerun HPCA.

**HPC1233E** JOB statement exceeds 7 continuation lines.

**Explanation:** More than 7 JOB= control statements have been defined.

**User response:** Remove lines 8 and above for the JOB= control statements and rerun HPCA.

**HPC1240E** DD HPCAJLIB requires JOB statement definition.

**Explanation:** The HPCAJLIB DD is allocated in the current JOB indicating started task JOB support, but no JOB= control statements were found to provide the JOB JCL.

**User response:** Remove the HPCAJLIB DD to use only the procedure support for started tasks, or include one or more lines of JOB= definition.

**HPC1241E** At least one GRPNAME and one GENJCL is required.

**Explanation:** Either one or more GEN.GENJCL commands were entered, but no GEN.GRPNAME commands were found, or one or more GEN.GRPNAME commands were entered, but no GEN.GENJCL commands were found.

**User response:** Use of either GEN.GENJCL or GEN.GRPNAME requires use of both. Correct the commands and rerun HPCA.

**HPC1242E** HPCAPROC DD or standard PROC name is required.

**Explanation:** Neither the custom procedure method nor a standard procedure method is indicated. The DD HPCAPROC, commands PROCEDURE NAME=, STC NAME=, and parameters PROC= and STC=, are all omitted or invalid.

**User response:** If you are using the custom procedure method, then the HPCAPROC DD and optional HPCAJLIB DD must reference a library with WRITE authority to be used for the HPCA procedures. For standard procedure modes, the procedure name must be entered with one of the following:

- PROC=procname (EXEC parameter)
- STC=procname (EXEC parameter)

**HPC1243E** ddname DD DUMMY detected.

**Explanation:** The named file is defined DD DUMMY or DSN=NULLFILE.

**User response:** Change the definition to reference a real data set of the correct type. Alternatively, remove the DD in error if it is for a file that can be dynamically allocated by HPCA.

**HPC1280I** Obsolete command.

**Explanation:** The HPCA command used has become obsolete.

**User response:** Replace with the new command, or commands. The obsolete command form will be withdrawn in a future release.

**HPC1281I** Command Authorization is required.

**Explanation:** The requested function is restricted. The correct authorization code is required in order to use this command.

**User response:** Contact IMS HP Change Accumulation Utility support to request authorization.

**HPC1290I** Process Debug.Stop.On...

**Explanation:** The DEBUG.STOP.ON command has been reached. Processing ends.

**User response:** None required.

**HPC1300E** HPCAID=name, lock was not obtained.

**Explanation:** The HPCAID that was entered for this process in currently being used by another process or another user.

**User response:** Select a different ID, or wait until the ID is released when the other process completes.

**HPC1301E** All sort steps have completed, unprocessed logs remain.

**Explanation:** Input log files remain to be processed, but all sort steps have ended. HPCADRIV RC=20 indicates that one or more sort steps did not reach successful conclusion.

**User response:** Correct the causes for failures in the CA groups identified in the IMS HP Change Accumulation Utility report file (HPCPRINT) before rerunning HPCA.
HPC1350I  GEN.RETRY Status: Enabled | Disabled
Explanation:  IMS HP Change Accumulation Utility has detected the GEN.RETRY command and the current status is returned.
User response:  For disabled status, ensure the GEN.GRPNAME and GEN.GENJCL statements have been provided in HPCSYSIN.

HPC1351I  Reprocessing failed groups
Explanation:  IMS HP Change Accumulation Utility has detected the DSP0711I, DSP0712I, or DSP0715E message for one or more change accumulation groups. The failed groups will be reprocessed based on the status of GEN.RETRY command processing.
User response:  None.

HPC1352E  GEN.RETRY Status: Reset – VOLNUM | SAS | STDPROC | PIT
Explanation:  IMS HP Change Accumulation Utility has detected a restriction for the GEN.RETRY command and the current status has been reset to disabled. Refer to the IMS High Performance Change Accumulation Utility for z/OS User’s Guide for more details on the restrictions for GEN.RETRY: VOLNUM | SAS (single address space) | STDPROC (standard procedures) | PIT (point-in-time)
User response:  Remove the restriction and resubmit IMS HP Change Accumulation Utility.

HPC1501E  HPCA product LOADLIB must be APF authorized
Explanation:  APF authorization is required for execution. Abend 3400-011 will follow.
User response:  Add the IMS HP Change Accumulation Utility load library to the APF authorized library list.

HPC3400E  jobname abending, PROC(...) CAGRP(...) jobname abending, PROC(...) CAGRP(...)
Explanation:  The named JOB or started task is being abnormally ended by the IMS HP Change Accumulation Utility main task. The CA sort address space is scheduled to abend U3400-E0A.
User response:  This message should always be produced after a detailed description of the cause for abending the named JOB or started task. Correct the identified problem and rerun HPCA.

HPC3401E  FP log sequence internal error.
Explanation:  IMS HP Change Accumulation Utility has determined that the sequence of Fast Path Log records cannot properly be processed with current ordering of the DFSULOG data set concatenation list.
User response:  This message should always be produced after a detailed description of the cause for abending the named JOB or started task. Correct the identified problem and rerun HPCA.

HPC3417E  Spill record LRECL nnnnn exceeds maximum allowed of nnnnn
Explanation:  A log record was read that exceeds the maximum record length defined for any CA group. Correct the DBRC GENJCL skeletal JCL to identify the correct record size.
User response:  Correct the DBRC GENJCL skeletal JCL to identify the correct record size.

HPC3418E  The buffer LRECL size exceeds the ID card LRECL size
Explanation:  A log record was read that exceeds the maximum record length that is defined in the ID card control statement. Abend 3400-1A follows.
User response:  Correct the DBRC GENJCL skeletal JCL to identify a LRECL that is greater than the size of the log record.

HPC3419E  The spill work file LRECL of nnnnn is too large to fit in the BLKSIZE of nnnnn
Explanation:  The ID card maximum LRECL exceeds the BLKSIZE length minus 4 bytes that are specified for IMS High Performance Change Accumulation Utility.
User response:  Correct the DBRC GENJCL skeletal JCL to identify a maximum LRECL that is less than the BLKSIZE value minus 4 bytes that is specified in the IMS High Performance Change Accumulation Utility SPILL BLKSIZE = parameter.

HPC4000E  Identification failed for Change Accum module DFSUCUM0.
Explanation:  The IMS Change Accumulation Utility module (DFSCUCM0) was not recognized by HPCA.
User response:  If the module is loaded from JOBLIB/STEPLIB, verify that the IMS library is supported by HPCA.

HPC4001E  DFSULOG allocation validation failed.
Explanation:  Dynamic allocation of DFSULOG DD has failed.
User response:  Previous informational messages in the JOB log or IMS HP Change Accumulation Utility report file identify the cause of the failure. Correct the parameters for allocation and rerun HPCA.
HPC4002E  DynAlloc failed DD(...) DSN(...).

Explanation: Dynamic allocation failed for the file with the DDN/DSN combination. This message precedes ABEND U3400-5DD.

User response: Correct the cause of the allocation failure. Additional information describing the error is generally found in the JESYSMSG data set or JOB log.

HPC4040I  Sum.Files allocation report.

Explanation: The SUM.FILES command has requested the list of files allocated in the subordinate CA address space. This message precedes the pseudo JCL list of allocations.

User response: None required.

HPC4041I  global allocation report

Explanation: This message precedes any dynamic allocations for the IMS HP Change Accumulation Utility control address space when running in AS1 mode.

User response: None required.

HPC4050I  New (PIT) CA master was not invalidated.

Explanation: The output of the point-in-time accumulation was not registered to DBRC and was subsequently not invalidated.

User response: The PITCA file cannot be used as input to subsequent IMS HP Change Accumulation Utility or IMS/CA processing.

HPC4051E  New (PIT) CA master was not invalidated.

Explanation: The output of the point-in-time accumulation could not be invalidated to DBRC. The PITCA is registered and should be marked invalid, but is not. RC=20 is set to emphasize the error.

User response: Examine the RECON contents for the affected CAGRP for possible causes of this failure. The PITCA file cannot be used as input to subsequent IMS HP Change Accumulation Utility or IMS/CA processing. DBRC CHANGE.CA commands should be used to invalidate or remove the affected CA files from selection by GENJCL.

HPC4052I  New (PIT) CA master was invalidated.

Explanation: The output of the point-in-time accumulation was invalidated by HPCA. The PITCA is registered to DBRC but marked in ERR and INCOMPLETE to prevent it from being selected for input to subsequent GENJCL processing.

User response: None required.

HPC4099I  DBRC RC=value.

Explanation: DBRC has returned a non-zero return code. This message is informational and provides the RC value for analysis. If the non-zero return code is critical to the function that requested DBRC, then additional detailed error messages will follow.

User response: If user action is required, subsequent error messages are issued. Refer to those messages for instructions.

HPC9900I  CC=4 is reset by WARN=0.

Explanation: Warnings have been issued from the DBRC task or the HPCA JCL procedure process. The GEN.WARN=0 option has changed the completion code from 4 (warnings) to 0 (no error).

User response: None required.

HPC9990I  PROC(...) CAGRP(...), completed COND:

Explanation: The named SORT step has completed with the indicated condition.

User response: None required.

HPC9991E  PROC(...) CAGRP(...), not started.

Explanation: The named SORT step was not started because it was previously marked not executable.

User response: Correct the cause of the error and rerun HPCA.

HPC9992E  PROC(...) CAGRP(...), failed COND:

Explanation: The named SORT step has ended unsuccessfully with the indicated condition.

User response: Correct the cause of the error and rerun HPCA.

HPC9997I  Storage: Used Limit

Explanation: Lines of informational messages describe the high-water use and limit values for 24-bit, 31-bit, and 64-bit memory allocations. The values for 24-bit and 31-bit will always be output.

If z/OS 1.6 or later is detected, then output values obtained from the RSM Address Space Block Extension will be displayed with the line heading "64-bit".

If the IMS HP Change Accumulation Utility MEMLIMIT parameter is in effect, then output values for IMS HP Change Accumulation Utility managed storage will be displayed with the line heading "64-HPCA".

User response: None required.
**HPC9999I**

**HPC9999I**  HPCA processing complete, CC=

**Explanation:**  HPCA processing has ended. The condition code is set at the highest return value of any subordinate process.

**User response:**  None required.
Chapter 16. IMS HP Change Accumulation Utility abend codes

This reference section provides detailed information about IBM IMS Recovery Solution Pack for z/OS: IMS High Performance Change Accumulation Utility abend codes.

IMS HP Change Accumulation Utility uses only one abend code: 3400.

For each abend code, the following information is provided where applicable:

**Explanation:**
The Explanation section explains what the abend code means, why it occurred, and what its variable entry fields are (if any)

**System Action:**
The System Action section explains what the system will do next

**User Response:**
The User Response section describes whether a response is necessary, what the appropriate response is, and how the response will effect the system or program

During IMS HP Change Accumulation Utility processing, you might encounter abend codes that are issued by IMS or DFS.

---

x'02'

**Explanation:** *Reason 002:* Load module attribute extraction failed or invalid load option.

**User response:** IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOAD

---

x'03'

**Explanation:** *Reason 003:* OPEN for control card failed.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCACARD

---

x'04'

**Explanation:** *Reason 004:* GET for next sequential control card failed.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCACARD

---

x'05'

**Explanation:** *Reason 005:* Empty control card file.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV

---

x'06'

**Explanation:** *Reason 006:*
One of the following conditions has occurred:
- Invalid first control card(s)
- Number of logs exceeds maximum
- CAGROUPs exceed maximum

Load module attribute extraction failed or invalid load option.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV

---

x'07'

**Explanation:** *Reason 007:* Requested 31-bit storage could not be obtained.

**User response:** IMS HP Change Accumulation Utility
encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCABUFF

### x'08'

**Explanation:**  
*Reason 008:* Requested 24-bit storage could not be obtained.

**User response:** IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCABUFF

### x'09'

**Explanation:**  
*Reason 009:* Internal authorization failed.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCABUFF

### x'0A'

**Explanation:**  
*Reason 010:* Requested 31-bit ECSA storage could not be obtained.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCABUFF

### x'0B'

**Explanation:**  
*Reason 011:* Product library not APF authorized

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOAD

### x'0C'

**Explanation:**  
*Reason 012:* Home address space information extraction failed.

**User response:** IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV

### x'0D'

**Explanation:**  
*Reason 013:* 
One of the following conditions has occurred:
- Data space creation failed
- Invalid processing option

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV

### x'0E'

**Explanation:**  
*Reason 014:* SORT TBLK no longer exists.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOGR

### x'0F'

**Explanation:**  
*Reason 015:* Not enough storage for buffer addresses.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOGR

### x'10'

**Explanation:**  
*Reason 016:* No SORT TBLK found for CAGROUP.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOGR

### x'11'

**Explanation:**  
*Reason 017:* 
One of the following has occurred:
- OPEN/CLOSE for data set failed.
- Invalid file management processing option.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV
**x'12'**

**Explanation:** Reason 018: Spawning and initialization of all SORT address spaces failed.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCASTA0

---

**x'13'**

**Explanation:** Reason 019: Spawning of subtask failed.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV

---

**x'14'**

**Explanation:** Reason 020: SORT address space cross memory.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIVI

---

**x'15'**

**Explanation:** Reason 021: SORT address space CA application initialization failed.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIVI

---

**x'16'**

**Explanation:** Reason 022: SORT task status not known.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOGR

---

**x'17'**

**Explanation:** Reason 023: BAT command not done. Record 01 in HPCA#BAT missing.

**User response:** IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCABAT0

---

**x'18'**

**Explanation:** Reason 024: BAT command not done. Record 02 in HPCA#BAT missing.

**User response:** IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOGR

---

**x'19'**

**Explanation:** Reason 025: SORT task for FP not initialized.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCALOGR

---

**x'1A'**

**Explanation:** Reason 026: LOG task record handling error.

**User response:** IMS High Performance Change Accumulation Utility encountered a condition that prevented further processing. Refer to HPC3418E for corrective action.

**Module:** HPCALOGR

---

**x'1B'**

**Explanation:** Reason 027: No sort tasks remain to be processed, but there remain unprocessed input logs. This condition is raised when the last (or only) sort to be processed ends abnormally before EOF of the final input log.

**User response:** Correct the condition that caused the termination of the sort (or sorts) and rerun HPCA.

**Module:** HPCASTA2

---

**x'1F'**

**Explanation:** Reason 031: Cross-memory linkage has broken.

**User response:** Examine results from all associated address spaces for additional information that might explain the reason for the failure. Consult your system programmer for a possible cause for the error.

**Module:** HPCAMEM, HPCATEST, HPCAVS
Explanation: Reason 032: Request to HPCUCMN0 is not I, R or T.
User response: HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.
Module: HPCUCMN0

Explanation: Reason 033: Request to HPCUCRD0 is not 0 or 4 (EOF).
User response: HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.
Module: HPCUCCT0

Explanation: Reason 034: Return code from HPCAE150 is not 0 or 4 (EOD).
User response: HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.
Module: HPCUC150

Explanation: Reason 035: Unable to get dynamic storage in LOGR ETXR. R2 is return code from STORAGE OBTAIN.
User response: IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.
Module: HPCASPIL

Explanation: Reason 036: CSVQUERY failed for HPCAMBLK in LOGR ETXR. R2 is return code from CSVQUERY.
User response: IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.
Module: HPCAE15F
Chapter 16. IMS HP Change Accumulation Utility abend codes

**x'2B'**

**Explanation:**  *Reason 043:* Dynamic allocation unsuccessful.

**User response:** IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV, HPCADRI1, HPCADRI2

**x'2C'**

**Explanation:**  *Reason 044:* Unable to start Fast Path sort task.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCASTA0

**x'2D'**

**Explanation:**  *Reason 045:* Fast Path sort task failure.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCAPRO3

**x'2E'**

**Explanation:**  *Reason 046:* Fast Path log reader failure.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCAPRO4

**x'2F'**

**Explanation:**  *Reason 047:* SORT subtask in Fast Path sort space returned non-zero return code.

**User response:** HPCA encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:** HPCADRIV

**X'70'**

**Explanation:**  *Reason 112:* The REGISTER call to the Cache Manager for reading from or writing to a Spill File has failed.

**User response:** This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer. IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:** HPCACMGR, HPCACMIL, HPCACM15

**X'71'**

**Explanation:**  *Reason 113:* The CREATE call to the Cache Manager for writing to a Spill File failed.

**User response:** This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer. IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:** HPCACMGR, HPCACMIL

**X'72'**

**Explanation:**  *Reason 114:* The ACCESS call to the Cache Manager for writing to a Spill File failed.

**User response:** This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer. IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:** HPCACMGR, HPCACM15

**X'73'**

**Explanation:**  *Reason 115:* The ACCESS call to the Cache Manager for reading a Spill File failed.

**User response:** This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer. IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:** HPCACMGR, HPCACM15
X'74'  •  X'4DD'

X'74'

**Explanation:**  *Reason 116:* The WRITE call to the Cache Manager for writing to a Spill File failed.

**User response:**  This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer. IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:**  HPCACMGR, HPCACMIL

X'75'

**Explanation:**  *Reason 117:* The READ call to the Cache Manager for reading a Spill File failed.

**User response:**  This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer.IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:**  HPCACMGR, HPCACM15

X'77'

**Explanation:**  *Reason 116:* The WRITE call to the Cache Manager for writing to a Spill File failed during CLOSE processing.

**User response:**  This is an internal error. The CM Manager has failed after successfully being initialized. Please report this problem to your System Programmer. IMS HP Change Accumulation Utility cannot proceed with using the Cache Manager. IMS HP Change Accumulation Utility can be started without the Cache Manager by removing the HPCCACHE DD statement.

**Module:**  HPCACMGR

X'DD'

**Explanation:**  *Reason 477:* Spill file allocation failed.

**User response:**  Dynamic allocation of a Sort spill file has failed. Specifics of the failure were previously written to the JOB log or the IMS HP Change Accumulation Utility report file. Correct the indicated cause of failure and rerun HPCA.

**Module:**  HPCAALL0

X'EE'

**Explanation:**  *Reason 238:* Internal table error.

**User response:**  IMS HP Change Accumulation Utility encountered a condition that prevented further processing. Consult your system programmer for a possible cause of the error.

**Module:**  N/A

X'2DD'

**Explanation:**  *Reason 733:* Fast Path spill file allocation failed.

**User response:**  Dynamic allocation of a Fast Path spill file has failed. Specifics of the failure were previously written to the JOB log or the IMS HP Change Accumulation Utility report file. Correct the indicated cause of failure and rerun HPCA.

**Module:**  HPCALOGR

X'3DD'

**Explanation:**  *Reason 989:* DFSULOG file allocation failed.

**User response:**  Dynamic allocation of the DD DFSULOG has failed. Specifics of the failure were previously written to the JOB log or the IMS HP Change Accumulation Utility report file. Correct the indicated cause of failure and rerun HPCA.

**Module:**  HPCAULOG

X'4DD'

**Explanation:**  *Reason 1245:* DD name DFSULOG does not match control.

**User response:**  The DFSULOG DD name in the Sort JCL step specifies a sequence of log files that is different from that found in the IMS HP Change Accumulation Utility control table. The JCL procedure or the IMS HP Change Accumulation Utility control
table has been modified subsequent to initialization by HPCA.

Recreate the JCL and the control table by rerunning the appropriate preparation step: IMS HP Change Accumulation Utility, two-step batch or extended batch.

Module: HPCAULOG

X'5DD'

Explanation: Reason 1501: Dynamic allocation failed for a file in the CA SORT address space. This abend is preceded by the message HPC4002E in the IMS HP Change Accumulation Utility report file.

User response: Correct the cause of the allocation failure. Additional information describing the error is generally found in the JESYMSG data set or JOB log.

Module: HPCAULOG

X'E0A'

Explanation: Reason 3594: CA SORT abended. The IMS HP Change Accumulation Utility main task scheduled this CA SORT address for abend. The cause of the abend will be reported in the HPCA report file of the main task.

User response: None required

Module: N/A
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